App ID #: 1942

Mentor: Potochnick, Stephanie Email: spotochn@charlotte.edu

Title: Associate Professor

Department: Sociology

Co-mentor:No

Community engaged research: Yes

Title: Advancing the Labor Force Participation of Charlotte's Latino Mothers and Fathers: Examining Intersecting Employment & Child Care Sector Opportunities and Barriers

Description: Project Importance. Charlotte's economic mobility depends on its fast-growing Latino immigrant population, which represents 14% of Mecklenburg's total population and 21% of its young (age 0-8) children. The labor force participation of Latina mothers (62.8%) lags behind that of other mothers (71.2%). Addressing Latina mothers' low labor force participation is important because it can lead to upward mobility and better health for Latina mothers,' their families and communities.Additionally, despite Latino father's high employment rates, many Latino fathers, particularly immigrant fathers, work long hours in low-wage jobs, leading to financial instability, limited investment in child development, and mental health stress. Accessing early care and education (ECE) services is also complicated by low wages and non-standard work hours, further hindering upward mobility prospects for Latino immigrant families. Our overall goal is to enhance the economic well-being of Latino immigrant families by examining the intersecting challenges in the employment and ECE sectors, with a focus on Latino immigrant mothers and fathers—an under-researched group. Building on a prior Gambrell project and collaboration with Camino Research Institute (CRI), we seek to (1) identify and (2) understand how employment and ECE sector barriers and opportunities influence Latino fathers' family relationships and mental health Project Team. This is an interdisciplinary, community-engaged research project in collaboration with Camino Health Center, which provides health, employment, and education services to Latino immigrant families in the Charlotte Region. The OUR researcher will be joining the UNCC Child & Family Development Lab, which is an interdisciplinary research lab with graduate, post-graduate, and undergraduate research assistants. Project Objectives and & Methodology. Using a mixed-methods, community-driven research approach, this project will: (1) Identify Charlotte Latina mothers' and Latino fathers' overall employment experiences, opportunities, and barriers, and (2) Examine how childcare services shape Latina mothers' and Latino fathers' employment and identify their suggestions for improvement. To address these objectives, we will use secondary survey data and focus group and interviews with Latina mothers and fathers.To provide a broad picture of Charlotte's Latina mothers' and Latino fathers' employment, we will use multiple Camino data sources and different statistical techniques and software (Excel, STATA) to examine their employment experiences. To provide a more in-depth assessment of Latina mothers' and Latino fathers' employment experiences and how childcare services shape their employment prospects, we will conduct 4 focus groups (6-8 participants each) with Latina mothers with different employment backgrounds. For fathers we will conduct one-on-one interviews with ~20 fathers. We will record, transcribe, and translate these focus groups and interviews and use qualitative

software (NVIVO) to analyze common trends and patterns.Based on these data, we will create informative fact sheets with dynamic graphics to disseminate to Camino and key employment and childcare stakeholders to improve services and programs for Latina mothers and families. OUR Intern Contributions & Duties. The OUR researcher will become a part of the research lab team and attend regular (weekly or bi-weekly) meetings. In the meetings they will receive the necessary training (e.g., how to use the statistical software, code qualitative data, etc) and will work on an assigned task through the week. The Lab provides extensive mentoring and growth opportunities and flexibility (when possible) for students to work on aspects of the project of most interest to them. We will likely be working on transcribing and coding the qualitative focus groups of Latina mothers and interviews with Latino fathers. Potential Duties: Transcribe interviews, code interviews using qualitative software, help co-create fact-sheets, attend lab meetings.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: -Learn about research ethics-Learn to work as part of a larger, collaborative research team-Cultural competency and how to work in a diverse, bilingual environment-Learn how to collaborate with community partners-Learn how to transcribe and code qualitative data; how to conduct focus groups-Learn how disseminate research findings in a dynamic, informative way-Learn how to create databases (from administrative data and surveys) in Excel and clean and analyze data with STATA

Required training of 6 hours with Description: -All students complete research ethics training (CITI) before on-boarding

-Attend weekly lab meetings where training and mentorship are provided for the different research tasks students will be assigned.

-Meet with mentor to ensure project aligns with student preferences/skills and broader OUR program goals/requirements

Mentoring plan: The UNCC Child & Family Development Lab is an interdisciplinary research lab with graduate, post-graduate, and undergraduate research assistants. There are approximately 5-8 student participants and 2-3 faculty any given semester.The main goal of the lab is to foster student growth and development. We do that by having collaborative meetings that connect faculty and students from different backgrounds and stages of career development. The meetings are a collaborative environment where in addition to discussing the specific research project we also discuss different topics of interest to the students (e.g., how to apply to grad school, etc.), and each person on the lab contributes their unique knowledge, skills and viewpoints.

Applicant Requirements: Required: A strong work-ethic, desire to learn new research skills, and the ability to collaborate with a larger research team. Strongly preferred but not required: Spanish-English bilingual

Applicant Preferences: Strongly preferred but not required: Spanish-English bilingual

Specific Time considerations/conflicts: No. We set-up a When2Meet to find a time that fits best for all lab members since everyone's schedule changes each semester.

App ID #: 1943

Mentor: Zhang, Ran Email: rzhang8@charlotte.edu

Title: Assistant Professor

Department: Electrical and Computer Engineering

Co-mentor:No

Community engaged research: No

Title: Artificial Intelligence Powered Autonomous and Distributed Multi-Drone Platform

Description: Most existing drone swarm management platforms feature either centralized control by a ground station or predefined synchronized action plans, e.g., the drone light show. A fully distributed yet coordinated multi-drone platform is still missing for realistic applications. Such applications need drones' own intelligence to make coordinated decisions in a real-time manner without centralized or remote control. This project is the continuation of a 3-year project to build an autonomous, distributed and coordinated multi-drone network. Students will learn and be devoted to building customized drones from scratch, programming drones both virtually in realistic simulations and practically in real drones with on-board intelligence and advanced sensors, design machine learning and reinforcement learning algorithms for distributed multi-drone management in concrete task scenarios, and document the achievements for possible research publications.

Accepting applications for: Only 160 hours over an academic semester (~10h/wk)

2 positions available

Anticipated Student Learning Outcomes: Grasp the skills of building drones from scratchLearn how to program in a realistic drone simulator integrating Gazebo, lower-level drone flight controller and RViz.Learn to design machine learning and reinforcement learning algorithms for concrete practical tasksLearn how to program the drones in ROS and Python and upload onto the real drones for reallife testing.

Required training of 20 hours with Description: 1. Tutorials on how to build drones from scratch

2. Training on how to operate the realistic drone simulator

Mentoring plan: The mentor will hold weekly meetings with the mentees to discuss the accomplishments and tasks to be done.The mentee will get trained on the project via working with existing undergraduate research assistants. The training includes how to build a drone from scratch, how to program Intel NUC to interact with different sensors and control the drone flights, and how to use realistic drone simulator - Gazebo to simulate before actually flying.The mentees will design distributed algorithms under the guidance of the mentor.The students may present to the lab visitors to introduce the ongoing projects. They may also get involved in writing academic papers by providing simulation results from Gazebo.

Applicant Requirements: Required: Having Python programming experiences

Applicant Preferences: Preferred: have considerable amount of microcontroller (Arduino UNO, raspberry Pi, Intel NUC, or Nvidia Jetson) programming experiences

Specific Time considerations/conflicts: N/A

App ID #: 1944

Mentor: Bossu, Sebastien Email: sbossu@uncc.edu

Title: Assistant Professor

Department: Mathematics and Statistics

Co-mentor:No

Community engaged research: No

Title: New mathematical and numerical optimization methods for a class of inverse problems with applications to machine learning, financial mathematics, and engineering

Description: An important problem in mathematics is about approximating a potentially complicated function into a sum of simpler functions. For example, could be a complicated insurance contract payment formula that covers, say, 10 times the highest individual damage in a multi-car accident beyond a $5,000 deductible. If 3 cars were damaged for x_1 = $3,000, x_2 = $8,000, x_3 = $6,500, then the policy pays ; but if the car damages are x_1 = $1,000, x_2 = $3,000, x_3 = $2,000$, then the policy pays nothing. Calculating is easy, but figuring out the corresponding insurance premium is potentially difficult. Instead, we wish to approximate f as a weighted sum of single-damage contracts whose premiums are easier to calculate. Assuming at most 50 cars would be damaged, we may want to find the 50 optimal quantities of single-damage contracts that best approximate f. In this project, we will consider the function approximation problem in the simplest input dimension d=1, i.e. we wish to approximate a given target function f(x) of a single numeric variable x using a weighted sum of n basis functions , such as polynomials, Fourier cosines, Haar wavelets, step functions, or ReLU functions. The optimal quantities of basis functions are determined to minimize approximation errors according to some metric such as MSE (mean squared error) over a relevant range of x-values. The corresponding error-minimizing problem is known in mathematics as a least-squares problem. This project will use the linear algebra foundations of least-squares function approximation and how Gram matrices (similar to covariance matrices in statistics) play an important role in obtaining the solution. It turns out that the Gram matrix for step functions is a single-pair matrix whose inverse is tridiagonal in closed form. For ReLU basis functions, it is the sum of two single-pair matrices whose inverse can be calculated in semi-closed form.

Accepting applications for: Only 160 hours over an academic semester (~10h/wk)

2 positions available

Anticipated Student Learning Outcomes: Develop coding and mathematical skills, including critical thinking. Learn to work professionally under supervision. Learn to communicate results in writing and possibly verbally at a presentation.

Required training of 2 hours with Description: Standard training process

Mentoring plan: The student(s) will work directly under my supervision with weekly meetings.

Applicant Requirements: This project would typically be suitable for math majors and could also earn credit as senior project or honors project. Exceptionally qualified candidates from other disciplines will be considered. In addition to excellent coding and mathematical skills, candidates must be diligent, disciplined, motivated, and available.

Applicant Preferences: Calculus II, Matrices & linear algebra, Coding in C++/Python. Knowledge of optimization algorithms is a plus.NB: This is a multi-semester effort project. Students who previously worked on this project will be given priority consideration.

Specific Time considerations/conflicts: Weekly meeting, typically Wednesday afternoon. Some meetings may take place over Zoom.

App ID #: 1947

Mentor: Berez, Jaime Email: jberez@charlotte.edu

Title: Asst. Professor

Department: Mechanical Engineering and Engineering Science

Co-mentor:No

Community engaged research: No

Title: Novel 3D printed instructional tools for geometric dimensioning and tolerancing

Description: Geometric dimensioning and tolerancing (GD&T) is a system of syntax (symbols, terminology) and semantics (rules, guidance, conditions) that is used to create rigorous engineering drawings that fully define the geometrical specifications for a component. GD&T requires strong spatial reasoning skills to comprehend the three-dimensional shapes, tolerance zones, and geometrical errors that make up the fundamentals of this complex topic. Typically, these skills are difficult to teach and learn. The objective of this research project is to develop physical demonstration tools that embody GD&T concepts and assist instructors in explaining those concepts to students. Rapid prototyping tools, such as 3D printing, will be utilized to make these demonstrators. Other objectives include the documentation of all teaching tools (CAD files, 3D printing files, accompanying explanations, etc.) in a manner that can support open-source deployment of them. Methods for assessing the effectiveness of teaching tools will also be designed. The student researcher will assist in developing these demonstrators using a variety of rapid prototyping tools in the lab. They will also be expected to help generate new ideas for related tools.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

1 positions available

Anticipated Student Learning Outcomes: Students will gain experience working in a research lab setting. They will learn good project management and communication skills through weekly progress reports. They will gain experience working a variety of cutting-edge technologies including manufacturing systems, characterization instruments, and metrology equipment. They will develop skills in computer aided design, parametric modeling, mechanical design, and rapid prototyping.

Required training of 2 hours with Description: Students will receive training on an as-needed basis depending on the parameters of the project that they develop during the first stage of on-boarding. Training will include hands-on training for use of specialized equipment by the faculty member or another expert user as well as targeted instruction on the use of relevant software packages.

Mentoring plan: Students will have weekly in-person meetings with the faculty member. Further ad-hoc meetings to conduct training, assist in research tasks, etc. will also be conducted. Students will work with the faculty member to develop a "Research Expectations" plan at the beginning of the work period where milestones, deliverables, and a timeline are collaboratively developed and required assistance from the faculty member is identified. The student will also be introduced to other students in the lab in order to facilitate a collaborative work environment.

Applicant Requirements: General availability for in-person work during standard weekday working hours, e.g., 9-5 M-F (not including class) is required so that the student may have a weekly meeting with the adviser, attend weekly lab meetings, and schedule independent research.

Applicant Preferences: The ideal candidate would possess several of the following qualifications. Candidates who do not have all of the following qualifications are still encouraged to apply.Interest in research-based inquiry into manufacturing and metrologyProfessional work ethic and good organizational/communication skillsSecond year status or higher standing (as of Fall 2025) at UNC Charlotte with a major in mechanical engineering, mechanical engineering technology, or a related areaExperience with CAD, 3D printing, rapid prototyping, machining, and similar practicesExperience using GD&T in industrial settings

Specific Time considerations/conflicts: None.

App ID #: 1948

Mentor: Quinlan, Margaret Email: mquinla1@uncc.edu

Title: Professor, Communication Studies

Department: COMM

Co-mentor:No

Community engaged research: No

Title: Communicating Women's Reproductive Health

Description: OUR research experience serves as a research practicum for interested undergraduate students. You will work on a research project and/or research projects and complete specific tasks to get “hands-on experience” through the design and conduct of actual communication studies research. Your project will be structured and include:Assisting me with my research; depending on the research project, you may be assigned to conduct/write/perform literature reviews, interviews or surveys, coding, data entry, statistical analysis, interview or focus group scheduling, focus group/interview transcription, transcribing of one-on-one interviews, sourcing articles or other related research tasks. Before you begin the semester, we will meet and agree on your tasks and expectations.Background: Women's reproductive health is an essential aspect of women's overall health and well-being. Women's reproductive health needs to be given the attention it deserves in communication studies. There is a need to explore the communication aspects of women's reproductive health to understand the challenges and opportunities faced by women in this area.Research Questions: The proposed research will address the following questions (specific health issues will be revealed when OUR student begins):RQ1: What are women's communication challenges and opportunities for their reproductive health?RQ2: How do women communicate about their reproductive health with their partners, family members, friends, and healthcare providers?RQ3: How do media and technology shape women's perceptions and attitudes towards their reproductive health?RQ4: What are the implications of communication practices for women's reproductive health outcomes?Methodology: The proposed research will employ a qualitative research design. Data will be collected through in-depth interviews or rhetorical analysis with women who have experienced reproductive health issues, healthcare providers, and women's reproductive health experts to gain their perspectives on communication and reproductive health. The data will be analyzed using qualitative thematic analysis.Significance: The proposed research will contribute to understanding women's reproductive health in communication studies. The findings will inform the development of communication strategies and interventions to improve women's access to reproductive health services and information. The research will also contribute to developing policies to improve women's reproductive health outcomes.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: OutcomesUndergraduate Research Assistant: I will work with Dr. Margaret M. Quinlan, Professor, Department of Communication Studies, Interdisciplinary

Studies, Health & Medical Humanities at UNC Charlotte. I will help the professor collate, execute and design research. It is competitive.Dr. Quinlan will guide you to: gathering information; analyzing, compiling, and interpreting data; multitasking ability;clerical work;administrative functionsCore Skills we will work on developingExcellent written and oral communicationExcellent administrationGood presentation and organizationExpert in analyzing dataExcellent technical writing

Required training of 0 hours with Description: I will train the student when the project begins.

To train my undergraduate research assistants to help with my qualitative research on women's reproductive health, I plan to conduct initial training sessions to familiarize them with the research topic, objectives, and methodology. I will explain the importance of sensitivity and empathy when dealing with such personal topics and emphasize the significance of maintaining confidentiality and ethical practices throughout the research process. Additionally, I will provide hands-on training on various data collection methods, such as interviews and focus groups, and guide them on transcribing and analyzing qualitative data effectively. Continuous feedback and constructive evaluation will ensure their understanding and skill development.

Mentoring plan: The mentoring plan for the OUR Research Scholar Program involves Dr. Quinlan, who will work closely with students during the internship period. Dr. Quinlan is expected to be committed to the program, provide guidance and direction on the research project, and ensure that the scholar completes all required deliverables promptly. Regular contact with the student is necessary, and daily contact is encouraged. The mentor will also assist the scholar in writing an abstract, research report, and poster based on their summer research project and provide constructive criticism. Finally, Dr. Quinlan will inform the OUR Research Scholar Program Director of the scholar's progress and complete the program evaluation at the program's conclusion.

Applicant Requirements: Interest in gaining:1. Experience working with a senior researcher.2. Excellent knowledge of gathering information.3. Expertise in various fields like correcting, analyzing, compiling, and interpreting data.4. Multitasking ability and knowledge of clerical work.5. Expertise in administrative functions.6. Excellent written and oral communication skills.7. Excellent administration and organization skills.8. Good presentation skills.9. Interest in gaining expertise in analyzing data.10. Excellent technical writing skills.Regarding courses or experiences, preference will be given to Communication Studies and Interdisciplinary Studies students with a concentration in Health & Medical Humanities and a background in Research Methods. Additionally, an interest in qualitative methods, feminist methods, and rhetorical analysis is desirable

Applicant Preferences: Preference to Communication Studies students and Interdisciplinary Studies with a concentration in Health & Medical Humanities or other health-related fieldBackground in Research MethodsInterest in qualitative methods, feminist methods, rhetorical analysisSome recommended or preferred characteristics, skills, courses, or experiences for the research assistant position include:• Strong attention to detail and accuracy, focused• Interested in graduate school• Health focus in your research interests• Ability to work independently and take initiative.• Strong critical thinking and analytical skills.• Interest in learning software and tools (e.g., Google Docs, Google Sheets).• Interest in experience with data collection and analysis.• Knowledge of research ethics and protocols.• Interest in experience with academic writing and formatting.• Interest in experience with qualitative research methods.• Familiarity with feminist

methods and rhetorical analysis.• Interest in experience with interdisciplinary research.• Strong work ethic, good time management skills, and a willingness to learn and take on new challenges.

Specific Time considerations/conflicts: We will schedule a weekly meeting around 8 or 9 AM EST via Zoom that works for both our schedules (usually on Mondays)

Sunday by 5 PM EST, students are expected to submit timesheets, updated to-do list and research journal.

App ID #: 1950

Mentor: Casto-Boggess, Laura Email: lcastobo@charlotte.edu

Title: Assistant Professor

Department: Chemistry

Co-mentor:No

Community engaged research: No

Title: Smart plasmonic nanocomposites for microfluidic sensing using surfance-enhanced Raman scattering

Description: Our lab is designing new smart material technology that incorporates a thermoresponsive nanogel with plasmonic nanoparticles for designing advanced substrates for microfluidic sensing. The plasmonic nanoparticles enable surface-enhanced Raman scattering (SERS) as an analytical sensing tool, while the nanogel acts as a stabilization matrix. The nanogel undergoes a sharp viscosity transition near room temperature, allowing for pseudo-immobilization of SERS substrates that can be rinsed out after measurements for re-use of the microfluidic measurement platform. An undergraduate researcher can contribute to this work by assisting with nanoparticle characterization using darkfield scattering microscopy and/or analytical validation using micro-Raman measurements of dye standards.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: Students participating in this project will gain both technical skills and professional competencies that will directly support future careers in research, industry, or graduate/professional school. By the end of the project, the student will have:Technical skills in nanomaterials research — including synthesis and handling of plasmonic nanoparticles, operation of a thermoresponsive nanogel system, and integration into microfluidic devices.Analytical instrumentation training — assisted use of darkfield scattering microscopy for nanoparticle visualization and micro-Raman spectroscopy for SERS measurements. Students will also learn sample preparation, alignment, and spectral interpretation using dye standards.Data analysis and scientific reasoning — experience processing microscopy images and Raman spectra, recognizing meaningful features, and interpreting results in the context of the experimental goals.Laboratory safety and best practices — including chemical handling, optical instrument safety, and maintaining cleanroom or semi-clean lab practices where needed.Scientific communication — training in preparing figures, writing short methods summaries, and presenting results in both informal (lab meetings) and formal (poster sessions, conferences) formats. Students will walk away having contributed to the development of advanced sensing materials that combine nanotechnology and microfluidics — a field at the intersection of chemistry, materials science, and bioengineering. They should be able to explain how they personally collected and analyzed microscopy and Raman data, worked in a collaborative lab environment, and learned how fundamental material properties (viscosity, optical scattering, molecular vibrations) can be engineered for analytical sensing. This experience will prepare them to confidently discuss

research methodology, instrumentation, and data-driven problem-solving in interviews or graduate school applications.

Required training of 1 hours with Description: Stage 1 - Introduction to the lab, research goals, specific aims of the nanogel-nanoparticle project, and graduate student mentor + Safety training (basic, chemical hygiene, laser safety, etc) on L&D portal

Stage 2 - Lab skill development from observation/mentor shadowing

Stage 3 - Hands-on practice under graduate student supervision (sample preparation, data analysis, instrument operation)

Stage 4 - Independent contributions with daily-to-weekly check-ins

The timeline for progression from Stage 2-4 will depend on prior lab experience and may differ for every student, especially for progression from 3-4. The level of autonomy will increase as lab skills develop.

Mentoring plan: The student will be working under Dr. Casto-Boggess and a graduate student in the lab who is actively working on this project. The student should expect regular contact with a graduate mentor (daily/near-daily) and weekly check-ins with Dr. Casto-Boggess and the graduate mentor to discuss progress, challenges, and next steps. The student should attend weekly group meetings with the whole research team and present brief updates and ask questions. Presentations at conferences are viewed positively, and the student will be encouraged to do so. Dr. Casto-Boggess will work to ensure the project scope remains achievable within the semester, with clear goals. The student can expect prompt feedback and a collaborative research environment.

Applicant Requirements: No prior research is required, but preferredStrong attention to detail and good record keepingWillingness to follow safety protocolsEnthusiasm for learnign new lab techniquesAbility to work collaboratively and independentlyGood communication skills

Applicant Preferences: Prior lab experienceInterest in continuing in the lab beyond this semester

Specific Time considerations/conflicts: Students should be available for at least two 3-4 hour blocks per week for hands-on lab work

App ID #: 1954

Mentor: Gao, Zheming Email: zgao7@charlotte.edu

Title: Assistant Professor

Department: Department of Industrial and Systems Engineering

Co-mentor:No

Community engaged research: No

Title: Prodromal Dementia Detection with Convolutional Support Vector Machine

Description: This research project seeks to develop novel machine learning models, specifically neural networks and support vector machines (SVM), for the early detection of prodromal dementia, an intermediate stage before full Alzheimer's disease (AD). The project will use data from the Alzheimer's Disease Neuroimaging Initiative (ADNI), which provides a large, curated collection of MRI brain images and related patient information for academic research.Introduction Alzheimer's disease is a progressive brain disorder that destroys memory, cognitive ability, and ultimately the capacity to perform basic daily tasks. First identified by Dr. Alois Alzheimer in 1906, the disease has become one of the most pressing public health challenges of our time. Despite decades of research, the exact causes remain unclear, and definitive diagnoses often occur late, after irreversible damage has already occurred. Since mild cognitive impairment (MCI) is widely recognized as a prodromal stage of AD, accurate prediction of MCI progression is crucial. Research shows that 10% to 15% of MCI cases progress to Alzheimer's annually, underscoring the urgent need for early detection tools that can help guide treatment, improve patient outcomes, and reduce healthcare costs. The era of artificial intelligence (AI) provides new opportunities. Machine learning models trained on medical imaging and clinical data have shown promising results in identifying subtle brain changes associated with early AD. By combining the feature-extraction strength of convolutional neural networks (CNN) with the predictive power of SVM, this project aims to design hybrid methods that are both accurate and computationally efficient. These models will be formulated mathematically as optimization problems, their theoretical properties studied, and their predictive ability validated on public benchmark datasets as well as MRI data from ADNI. Ultimately, this work could contribute to earlier interventions that preserve quality of life for patients and their families. Research Plan and Student ContributionsThe project is organized into three major phases:Data Preparation and ExplorationRetrieve MRI data and patient records from the ADNI database.Clean and preprocess the images, ensuring proper labeling with domain knowledge.Establish a suitable computing environment to manage large imaging datasets.Model DevelopmentDesign convolution and pooling strategies to reduce image complexity while retaining essential features.Construct and refine support vector machine models tailored for structured MRI data.Explore hybrid "convolutional SVM" models that combine CNN-based feature extraction with SVM classification.Empirical Evaluation and AnalysisImplement algorithms for the proposed models.Validate models using both benchmark datasets and the ADNI data.Apply statistical and computational analyses to evaluate accuracy, robustness, and efficiency.Undergraduate students will actively contribute to each of these phases. Their tasks may include writing scripts for data preprocessing, running model training and testing, analyzing results with statistical tools, and

helping to prepare visualizations and figures for research dissemination. This hands-on work will give students experience in AI programming, data science workflows, and biomedical applications of machine learning.Tentative Timeline (16 weeks)Weeks 1 - 3: Data retrieval, cleaning, and initial exploration.Weeks 4 - 10: Model construction, theoretical investigation, and initial computational experiments.Weeks 11 - 14: Comprehensive testing, validation, and statistical performance analysis.Weeks 15 - 16: Drafting research manuscripts and preparing materials for presentation. Nature of this projectThis project indeed integrates mathematics, engineering, computer science, and biomedical research. It combines methods from optimization, machine learning, and image analysis with applications in healthcare industry. Students will experience how engineering tools can be applied to solve pressing problems in healthcare. Although this project has no direct community engagement, it addresses a critical public health issue with societal impact, and results may eventually benefit patient communities and healthcare providers.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

3 positions available

Anticipated Student Learning Outcomes: Students participating in this project will gain a broad set of technical, analytical, and professional skills:Teamwork and Communication: By collaborating with graduate students and Dr. Gao, undergraduates will practice working in research teams, presenting ideas, and communicating results effectively.Mathematical and Analytical Skills: Students will engage with the theoretical foundations of machine learning and optimization, strengthening their mathematical background and problem-solving abilities for future engineering or data science challenges.Programming and Technical Competency: Through Python programming, students will implement machine learning models, handle large datasets, and gain fluency in widely used tools for AI and data science.Domain-Specific Knowledge: Students will learn to process and analyze MRI brain images, providing them with valuable experience in biomedical data science, which is a skillset increasingly sought after in healthcare, AI, and research careers.Research and Professional Development: Students will contribute to the preparation of journal and conference publications, gaining academic writing and presentation experience that will strengthen graduate school and job applications. After completing the project, students will be able to describe their experience as one where they applied AI methods to real-world health problems, developed technical and teamwork skills, and contributed to advancing dementia research. Participation of this project will enhance students' ability of critical thinking, digital technology, teamwork, and professional communication.

Required training of 8 hours with Description: Since this is a machine learning-related project, students are expected to have basic knowledge of machine learning concepts, particularly support vector machine (SVM) models and convolutional neural networks (CNNs). Participants should also be familiar with image data processing and understand how to construct a supervised learning framework for data classification.

The research data will be obtained from the Alzheimer’s Disease Neuroimaging Initiative (ADNI). Students will be given access to the ADNI database and will be responsible for collecting, cleaning, and preprocessing MRI images for use in the study. Because this involves human subjects data, students will be required to complete the university-level training modules associated with compliance and ethical handling of research data.

The training is structured in two main parts:

1) Data Preparation and Handling

i) Learn how to access, request, and download MRI imaging data from the ADNI database.

ii) Gain hands-on experience in cleaning and preprocessing image data for subsequent model training.

iii) This part of the training will be conducted under the guidance of graduate students supervised by Dr. Gao.

2) Modeling Knowledge and Applications

i) Acquire background knowledge of CNNs, SVMs, and supervised learning frameworks used for medical image classification.

ii) Engage in directed readings, including selected recently published research papers, machine learning textbooks, and tutorials.

iii) Apply this knowledge directly to the design, implementation, and evaluation of the proposed predictive models.

Through this onboarding process, students will build a strong foundation in both the technical skills (programming, data processing, algorithm implementation) and the conceptual understanding (machine learning theory, biomedical applications) needed to contribute meaningfully to the project.

Mentoring plan: This project will be supervised by Dr. Zheming Gao, faculty member in the Department of Industrial and Systems Engineering at UNC Charlotte. Dr. Gao specializes in machine learning and optimization, with ongoing research in applications in healthcare field. Undergraduate students will have the opportunity to work directly under Dr. Gao's guidance, gaining hands-on experience with machine learning methods while contributing to AI powered healthcare.Dr. Gao's research group fosters a collaborative and supportive environment where students are encouraged to take initiative while receiving consistent guidance. Research resources, including access to a high-performance computing environment, relevant literature, and dedicated workspace, will be available to all students.Supervision and SupportStudents will work directly under the supervision of Dr. Gao, with additional technical support from Ph.D. students in the lab. Graduate mentors will be available to answer technical questions related to data processing, coding, and model implementation. Students are encouraged to work in the lab during scheduled hours to promote active engagement with peers and mentors.Meetings and CommunicationStudents will attend a weekly group meeting every Friday to present updates, share challenges, and receive feedback on their progress. Regular communication will also occur via email, and students are welcome to schedule additional one-on-one meetings as needed.Professional DevelopmentAs part of their training, students will contribute to the preparation of a research manuscript and are expected to participate in at least one conference presentation, such as a poster session at the 2026 or 2027 IISE or INFORMS annual meeting. This experience will expose students to professional research communities and provide opportunities for networking and career development.Evaluation and Future OpportunitiesStudent performance

will be evaluated jointly by Dr. Gao and collaborating Ph.D. mentors, with attention to both research contributions and professional growth. Students who demonstrate strong performance will receive personalized recommendation letters to support graduate school or career applications. High-performing students will also be given priority consideration for future research opportunities within Dr. Gao's group.

Applicant Requirements: Required Skills, Courses, or ExperiencesCompletion of Calculus (engineering level).Knowledge in matrix operations and linear algebra.Knowledge in probability and statistics.Experience in Python or MATLAB programming.

Applicant Preferences: Recommended or Preferred Skills and ExperiencesPrior coursework, knowledge or project-experience in machine learning.Familiarity with mathematical programming / optimization methods.Strong ability in mathematical and statistical derivations.Ideal applicants are sophomore or junior students from the College of Engineering, College of Computing and Informatics, or the College of Science who demonstrate intellectual curiosity, reliability, and strong time management skills. Students should be eager to learn new methods and tools, willing to collaborate with graduate mentors and peers, and motivated to apply artificial intelligence techniques to meaningful real-world health challenges.

Specific Time considerations/conflicts: Students are expected to attend Dr. Gao's weekly research group meeting on Friday mornings (time to be determined).

They will also be provided with a workspace in Dr. Gao's lab to conduct independent research and collaborate with peers.

To ensure smooth progress, students are required to respond promptly to emails and maintain consistent communication with Dr. Gao and graduate mentors.

App ID #: 1955

Mentor: Scheadler, Travis Email: tscheadl@uncc.edu

Title: Assistant Professor

Department: School of Social Work

Co-mentor:No

Community engaged research: Yes

Title: LGBTQ+ Political Activism, Community Belonging, Identity, and Mental Health

Description: This project involves data collected with LGBTQ+ adults related to their activism, sense of community, identity development, and mental health. More specifically, interviews were conducted with LGBTQ+ political candidates about their experiences. Data will help us learn about how we can better support LGBTQ+ political candidates and encourage other LGBTQ+ people to run for office. Interviews also will be conducted with drag queens and drag kings to develop an understanding of their experiences with activism, community, identity, and mental health. Data will help us learn how to support drag performers and will have policy implications related to recent calls to ban public drag performances. Together, all of these data will help us learn more about how to support LGBTQ+ community members.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

3 positions available

Anticipated Student Learning Outcomes: Students will have opportunities to build skills related to critical thinking, teamwork, communication, professionalism, writing, organizing, and qualitative data analysis. I expect that students will learn that research can be fun and engaging and that we can utilize community-engaged research to advance social change. I also hope students learn more about how to appropriately engage with community partners and research participants throughout the entirety of a research study. Further, I expect students to learn more about research and practice with LGBTQ+ populations.

Required training of 5 hours with Description: Students must complete CITI training prior to engaging in this project.

Mentoring plan: Students will work directly with me and with other students on the project (if there are more than 1). I will have individual meetings with students biweekly and as needed to update each other on our progress and provide constructive feedback on their progress. I also will use this space to allow students to share feedback on my mentoring. My goal is to be a flexible mentor and adapt to the needs of the student. In addition, if applicable, I will engage in monthly group meetings with all students involved on this project. Although students will not be expected to attend conferences, I will encourage them to consider drafting and submitting abstracts for conferences. I also will provide space for students to practice presenting the research project in front of me and a small group of faculty from UNC Charlotte, who I will vet to make sure that they know to provide helpful feedback and not harsh criticism. My role as a Junior Editor in Chief of a student-focused

journal has helped me develop skills related to providing helpful and encouraging feedback, even when rejecting manuscripts. I aim to do provide similar feedback for all my students.

Applicant Requirements: Students must be either of junior or senior standing. Students also must be majoring in social work or a related field in the social sciences, humanities, or health sciences.

Applicant Preferences: Ideally, students have completed a research methods course. Also, students should be ambitious and excited to learn. They should be able to thoughtfully and respectfully communicate their needs and goals so that I can make sure that my mentoring is aiding in their career development.

Specific Time considerations/conflicts: The days/times that the student could engage in this research is flexible.

App ID #: 1956

Mentor: Scheadler, Travis Email: tscheadl@uncc.edu

Title: Assistant Professor

Department: School of Social Work

Co-mentor:No

Community engaged research: No

Title: Suicide Prevention & Intervention in Sport

Description: This project will involve conducting a systematic review of research related to suicide prevention and intervention via sport throughout the United States. Athletes and coaches are becoming more aware of the need to integrate mental health support into athletics. However, little is known about suicide in sport environments in the US. Therefore, this project will entail systematically identifying and reviewing all the empirical literature related to suicide prevention and intervention efforts in sport. This research study will be used to inform practice and policy related to suicide prevention and crisis intervention in various sport settings. Students will learn how to use Covidence and will help determine if articles should or should not be included in this review. Students also will read and review the included studies. Additionally, students will help write the final research paper to be published in an academic journal.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: Students will have opportunities to build skills related to critical thinking, teamwork, communication, professionalism, writing, and organizing. Students will learn how to conduct systematic reviews. They also will learn how to write and communicate about policy and practice implications for research. Further, I expect students to learn more about research and practice with athletes and mental health.

Required training of 5 hours with Description: Students will be provided with several video tutorials and articles to review prior to beginning. I will then personally walk them through how to use Covidence.

Mentoring plan: Students will work directly with me and with other students on the project (if there are more than 1). I will have individual meetings with students biweekly and as needed to update each other on our progress and provide constructive feedback on their progress. I also will use this space to allow students to share feedback on my mentoring. My goal is to be a flexible mentor and adapt to the needs of the student. In addition, if applicable, I will engage in monthly group meetings with all students involved on this project. Although students will not be expected to attend conferences, I will encourage them to consider drafting and submitting abstracts for conferences. I also will provide space for students to practice presenting the research project in front of me and a small group of faculty from UNC Charlotte, who I will vet to make sure that they know to provide helpful feedback and not harsh criticism. My role as a Junior Editor in Chief of a student-focused

journal has helped me develop skills related to providing helpful and encouraging feedback, even when rejecting manuscripts. I aim to do provide similar feedback for all my students.

Applicant Requirements: Students must be either of junior or senior standing. Students also must be majoring in social work, exercise science, or a related field in the social sciences, humanities, or health sciences.

Applicant Preferences: Ideally, students have completed a research methods course. Also, students should be ambitious and excited to learn. They should be able to thoughtfully and respectfully communicate their needs and goals so that I can make sure that my mentoring is aiding in their career development.

Specific Time considerations/conflicts: The days/times that the student could engage in this research is flexible.

App ID #: 1980

Mentor: Dorodchi, Mohsen Email: Mohsen.Dorodchi@charlotte.edu

Title: Teaching Professor

Department: Computer Science

Co-mentor:No

Community engaged research: No

Title: LLMs Reasoning Models in Action: How do they differ from traditional models?

Description: Large Language Models (LLM) have recently advanced by the introduction of the "reasoning models". This study would investigate the capabilities of the current language models vs the reasoning models in solving selected set of problems in computer science. Furthermore, "Agentic AI as a discussion moderator" will be investigated utilizing the LLM's and the reasoning models vs traditional LLM models. This project involves weekly readings and discussions, conducting experiments followed by creating reports and presentations with a group of undergraduate and graduate students researchers in Text Analytics Lab of CCI. The selected OUR scholar would identify a particular problem and further investigate it with proper literature review and research design followed by experiments and conclusions. It is strongly recommended that the undergraduate OUR scholar submits the work to national undergraduate competitions.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: explain the steps in conducting researchreflect on the necessity of literature reviewprepare and present the relevant literatureprepare and present the research questionsprepare and present the required experiments in verifying the research questionsdiscuss on the validity and limitations of the research and experimentsdiscuss on the results and the findings prepare and present the overall research professionally

Required training of 5 hours with Description: 1. Since we are working with real data, IRB CITI training needs to be done during the onboarding process.

Mentoring plan: The mentoring plan includes 3 different aspects: 1) Mentoring student on how to conduct foundational research; 2) Mentoring student on how to structure the research ; and 3) Mentoring student on how to present the results and reflect on the experience.This three dimensional mentoring would help student apply the gained knowledge and skills beyond academics and in solving any challenging and new problems. Expectations:weekly discussion with the group and present partial resultsbi-weekly participation in discussions of the lab meetings with the rest of the lab members and occasionally present final report be prepared to be included in a planned conference or journal paper in collaboration with other lab members

Applicant Requirements: Fluent in PythonFamiliarity with Python librariesWilling to read on weekly basis and summarize and discuss the resultsBe able to follow the weekly plans including readings,

meetings, and experiments and reflect on the plan with further necessary modificationsFinal formal presentation in the lab before the necessary poster presentation for the OUR program

Applicant Preferences: Students in AI and Data Science concentration of computer science degree or Software Engineering concentration with willingness to learn more about AI and its applications in software engineering. Have tried and applied different Python visualization and machine learning packages as well as have used OpenAI API.

Specific Time considerations/conflicts: Lab meetings have been set on Wednesdays sometime between 11 to 2 pm (for only one hour) in the past. Being open during that time would simplify the process.

App ID #: 1959

Mentor: Li, Yao Email: yli129@uncc.edu

Title: Assistant Professor

Department: Earth, Environmental and Geographical Sciences

Co-mentor:No

Community engaged research: No

Title: Developing an Integrated Geospatial Deep Learning Framework to Identify Potential Human-Vector Contact Zones for Malaria Transmission in Southern Africa

Description: Malaria remains a critical global health issue, affecting millions of people each year. Our project focuses on using remote sensing data and deep learning techniques to identify areas where humans are most likely to come into contact with malaria-carrying mosquitoes. By accurately mapping these zones, we can contribute to more effective malaria prevention and control strategies. The undergraduate research assistant's responsibilities will include: Organize and preprocess large datasets like high-resolution satellite images from sources like Sentinel-1, Sentinel-2 to prepare them for analysis. This may involve tasks like cleaning data, correcting for atmospheric interference, and merging datasets from different sources. Utilize Python scripts to process and analyze the remote sensing data. Help to build a deep learning frameworkThe student will work with libraries such as GDAL, Rasterio, and possibly machine learning frameworks like PyTorch. Work closely with graduate students, and faculty members. The student will have the opportunity to contribute ideas, ask questions, and learn from experienced researchers in the fields of public health, geospatial analysis, and artificial intelligence.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

3 positions available

Anticipated Student Learning Outcomes: Gain practical experience with Geographic Information Systems (GIS) and remote sensing technologies, learning to extract valuable insights from satellite imagery.Strengthen programming expertise—particularly in Python—and acquire techniques for managing and analyzing large datasets efficiently.Explore the intersection of technology, data science, and public health, gaining firsthand experience in how data-driven approaches can help address complex global health challenges.Build professional skills in documenting work, preparing reports, and contributing to scholarly outputs, such as co-authoring research papers or presenting findings at conferences.

Required training of 6 hours with Description: You will begin with a comprehensive introduction to the project and team, followed by customized training in Python programming, remote sensing, and GIS. You'll gain hands-on experience in downloading and managing remote sensing data, running and adapting Python scripts, and applying these skills to real-world research tasks. A dedicated mentor will provide guidance throughout the project, with regular check-ins to support your progress. You will also be integrated into the research community through team meetings and workshops, receiving ongoing feedback and career development support to ensure your success.

Mentoring plan: You will begin with a comprehensive introduction to the project and team, followed by customized training in Python programming, remote sensing, and GIS. You'll gain hands-on experience in downloading and managing remote sensing data, running and adapting Python scripts, and applying these skills to real-world research tasks. A dedicated mentor will provide guidance throughout the project, with regular check-ins to support your progress. You will also be integrated into the research community through team meetings and workshops, receiving ongoing feedback and career development support to ensure your success.

Applicant Requirements: Python programming skills and an interest in data science; eagerness to learn; no prior experience in remote sensing or GIS necessary.

Applicant Preferences: Deep learning experiences

Specific Time considerations/conflicts: No

App ID #: 1960

Mentor: Das, Srijan Email: sdas24@charlotte.edu

Title: Assistant Professor

Department: Computer Science

Co-mentor:No

Community engaged research: No

Title: Vision-Language-Action Models for Robot Learning

Description: Several investigations have been carried out to model activities of daily living (ADLs) to monitorolder adults at home. Most systems have been developed using either simple sensor data(wearable sensors, touch sensors, RFID tags) or camera information to recognize ADLs in a homeenvironment. However, existing work has either focused on simple activities in real-life scenarios,or the recognition of more complex (in terms of visual variabilities) activities in hand-clippedvideos with well-defined temporal boundaries. We still lack research on methods that canretrieve several instances of complex activity in a continuous video (multimodal) flow of data.Existing methods that perform in online scenarios that can reason about the temporal andcomposite relations that characterize complex activities generally cannot handle uncertainty andtend to underperform in real life scenarios. Moreover, they have difficulties to distinguishsimilarly looking activities.On the other hand, methods that can handle uncertainty tend to ignore the temporal andcomposite relations of activities and learn short-term activity models directly from pixel data.Hence, latter model cannot recognize tong-term or composed activities.In this project, we will explore the use of Egocentric for understanding Activities of Daily Livingand use these learned representations for robotic tasks. Video models using ego viewpoints forADL with its capability to generalize to new scenarios can be useful for several robotic tasks.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

2 positions available

Anticipated Student Learning Outcomes: Understand fundamentals about VLAsLearn how to read papers.How to conduct research in a collaborative environment.Collecting trajectories using teleoperation

Required training of 10 hours with Description: Follow the OUR guidelines.

The student is expected to meet the instructor for 60 minutes a week.

The student is expected to read the recent VLM for Robotics related articles (1 paper/week).

The student will be implementing video architectures like VIMA, LLARA, Open VLA, and validate

their performance in simulated environments.

Mentoring plan: The advisor will work with the students to develop their scientific insights. This will involve weekly meetings where students will present their progress and inform the advisor about

recent papers relevant to the project. Additionally, the advisor will collaborate with the students in writing papers, refining their research writing, and teaching them effective communication with the research community through scholarly papers. The advisor will also guide the students in best practices for conducting research, which includes open sourcing data and code, accompanied by proper documentation.

Applicant Requirements: The student should have contacted me beforehand or worked with me or have taken Intro to Machine Learning or Introduction to Computer Vision before participating in this research.

Applicant Preferences: Skills - ROS, Python, Pytorch, JAXCourses - Machine LEArning, Computer Vision, Mobile Robotics

Specific Time considerations/conflicts: NA

App ID #: 1962

Mentor: Zhu, Lei Email: lzhu14@charlotte.edu

Title: Assistant Professor

Department: Industrial and Systems Engineering

Co-mentor:No

Community engaged research: No

Title: Developing a web application for Wi-Fi log data collection, process, and analysis

Description: Public Wi-Fi networks generate massive log data. Although the primary purpose of log data is to track service status and support system maintenance, by analyzing communication events (e.g., connection and disconnection) between client devices (such as smartphones and laptops) and access points (APs) in Wi-Fi logs, we can obtain valuable insights into Wi-Fi user or human mobility patterns. However, current travel analysis methods require extensive technical expertise, limiting their use by non-professionals. Additionally, processing different log formats from various vendors presents a challenge. To address these issues, it is necessary to develop a web application that integrates large language models (LLMs) and Wi-Fi mobility analysis algorithms. It enables Wi-Fi data stakeholders to easily upload, process, and analyze Wi-Fi logs in any format, automatically visualize the results, and display various statistical charts, supporting transportation planning and urban analysis.The student researcher will work on one or more of the following parts of this project: (1) web frontend development, designing web pages with features including file upload, session state management, and interactive charts; (2) backend development, implementing high-performance parallel data processing and deploying our existing LLM-based log parsing framework (WiFiLogParser); (3) database design and optimization for handling large-scale datasets (GB-level individual files); (4) deploying our system to cloud platforms and designing system monitoring mechanism. Students will test the system using real datasets from multiple cities, including the UNC Charlotte main campus, the City of Wilson, and Holly Springs.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

2 positions available

Anticipated Student Learning Outcomes: Students will develop valuable career-ready skills, including,Technical Skills: Full-stack web development, database management, API design, working with LLM systemsProblem-Solving: Handling real-world project challenges, like processing large-scale datasets, concurrent processing, and optimizing system performance.Career Preparation: Experience that can be directly translated into technical positions in SDE, DS, or government/consulting industries.

Required training of 1 hours with Description: NA

Mentoring plan: Participate in group meetings with professors and graduate students. Hands-on experience in web app development. Have the opportunity to participate in professional conferences.

Applicant Requirements: Required Skills:Strong programming foundation in PythonBasic web development experience (HTML, CSS, JavaScript)Completed coursework in software engineering, computer science, or related fieldAbility to learn new technologies independentlyGood communication skills for teamwork

Applicant Preferences: Recommended/Preferred Skills:Experience with web frameworks (Flask, Django, React, Vue.js)Database experience (SQL, PostgreSQL, MongoDB)Version control experience (Git)Interest in data science or machine learningPrevious project or internship experienceInterest in transportation or urban planning applications

Specific Time considerations/conflicts: NA

App ID #: 1964

Mentor: Alhasan, Dana Email: dalhasan@charlotte.edu

Title: Assistant Professor

Department: Epidemiology and Community Health

Co-mentor:No

Community engaged research: No

Title: Mapping Neighborhood Environments and Dementia Risk

Description: The prevalence of dementia is growing among older adults, currently impacting an estimated 5.7 million adults in the United States. With no effective treatments available, it is critical to identify neighborhood-level factors that influence dementia in order to inform resource allocation (e.g., age-related health services and caregiver support) as well as to guide community-level interventions. The neighborhood environment may be associated with dementia through higher exposure to environmental toxicants (e.g., air pollution), fewer material resources (e.g., healthy food outlets), and lower access to quality health care. Our goal is to conduct spatial analyses to map neighborhood features in relation to dementia prevalence as well as caregiver burden. Specifically, we ask:Which features of the neighborhood environment are associated with increased risk of dementia?What is the relationship between neighborhood livability and dementia prevalence?Are there adequate resources in areas with high caregiver burden?Student researchers will support this project by conducting literature reviews, creating choropleth maps using ArcPro, and preparing datasets for analysis. The end product will be a set of maps and analyses highlighting how neighborhood environments may contribute to dementia risk and identifying potential areas for intervention.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: Through this social epidemiology project, student researchers will:Gain knowledge about the neighborhood environment and its relation to dementia, deepening their understanding of public health and epidemiology.Develop research skills such as conducting literature reviews, working with secondary data, and creating choropleth maps using ArcPro.Strengthen skills including critical thinking, data analysis, written and oral communication, and problem-solving.Build professional competencies aligned with NACE Career Readiness, such as teamwork (through collaboration with faculty and graduate students), professionalism (meeting deadlines, integrating feedback), and technology proficiency.By the end of the experience, students will be able to describe their contributions to a real-world research project, highlight their applied analytic and mapping skills, and demonstrate how these experiences prepared them for graduate studies, research positions, or careers in public health and related fields.

Required training of 10 hours with Description: CITI certification, literature review workshop with the librarian, and a short list of required readings/videos to familiarize them with social epidemiology and neighborhood environment research.

Mentoring plan: Students working on this project will meet weekly with Dr. Alhasan to set goals and expectations for the upcoming week. After each meeting, the student(s) will send a brief follow-up email summarizing their action items and confirming their understanding of assignments. In addition to these meetings, students will have opportunities for mentoring and professional development through interactions with graduate students in the lab. Students are also encouraged to submit an abstract to a university, state-level, or national conference, with guidance and support provided throughout the process.My commitment is to provide clear expectations, constructive feedback, and opportunities for growth, while fostering an environment where students feel supported in developing both their research and professional skills.

Applicant Requirements: Strong reading comprehension, writing, and communication skills.Proficiency with Microsoft Word and Excel, along with strong organizational skills.Willingness to take constructive feedback and apply it to improve work.Self-motivated, able to work independently, and eager to learn new tools (e.g., ArcPro) with minimal guidance

Applicant Preferences: Experience (or willingness to learn) searching for peer-reviewed articles using tools such as Google Scholar, the UNCC library, or similar databases. Students should be open to working with the librarian to develop search strategies, identify relevant articles, and annotate them using a provided Excel template (with guidance from the faculty).Prior experience with technical or literature review writing is preferred.Ability to work both independently and collaboratively as part of a team.Familiarity with basic statistics (e.g., descriptive statistics)

Specific Time considerations/conflicts: Students must be available to meet for a one hour 1-1 meeting weekly.

App ID #: 1968

Mentor: Buchenau, Jurgen Email: jbuchena@charlotte.edu

Title: Dowd Term Chair of Capitalism Studies

Department: History

Co-mentor:No

Community engaged research: No

Title: Fruits of Conflict: Commodities and the War on Drugs in Neoliberal Mexico, 1982-present

Description: Fruits of Conflict: Commodities and the War on Drugs in Neoliberal Mexico, 1982-presentMexico is the largest trading partner of the United States, and the two countries share the longest border between a nation of the Global North and a nation of the Global South. This close relationship has many benefits for Mexico and the United States, but it has not been without problems. Since the debt crisis of 1982 dented Mexico's experiment in state-led industrial development, Mexico has once again invested in fostering commodity exports, most notably, avocados and tomatoes. At the same time, Mexico has been a source of illicit U.S. drug imports for many decades: marijuana in the 1960s and 1970s, cocaine in the 1980s and 1990s, and fentanyl in the twenty-first century. Since 2006, the Mexican Drug War has claimed over 100,000 lives and led to the cartel takeover of entire regions of Mexico. Initially, in these areas, the drug cartels only focused on the drug trade, but they have recently taken over geographic legal commodity exports. This project seeks the assistance of undergraduate students in examining the intersection of legal and illegal commodity production and trade in Mexico. Each student will conduct research that will focus on published sources on the topic such as newspaper stories, statistics published by governments, NGOs, and international organizations, videos, and scholarly articles. Where appropriate, data analysis in unpublished sources can be conducted. The research requires access to Atkins Library but not off-campus locations. Students will learn about how formal and informal economies have shaped not only Mexico, but also its relationship with the United States, and the availability of both legal and illegal products as a result of the intertwining of legal and illegal commodities. Finally, they will understand the background of the surge in drug-related violence throughout North America in the last two decades.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

4 positions available

Anticipated Student Learning Outcomes: Students will learn how to do research and data collection as part of an effort to better understand the current state of U.S.-Mexican relations and North America generally.Students will also improve critical thinking skills, including how to organize and evaluate a large body of data, both qualitative (documents and other texts) and quantitative (statistical information)Students will learn about professionalism--the importance of staying on task and meeting deadlinesStudents will improve their ability to do team work by means of close interactions with me and (if applicable) other student team members.Finally, the project will help students develop communication (writing) and intercultural skills.

Required training of 0 hours with Description: Four to five in-person or Zoom meetings that provide a research tutorial for the student. I will conduct these. The student will also make one or two appointments with the subject librarian.

Mentoring plan: I am an involved mentor who meets with students frequently to help them learnthe skills I wish to impart to them. Students can expect someone who will alwaysbe available for help, who is a role model in research, writing, and publication, andsomeone with the flexibility to address unforeseen difficulties and complications. Ialso commit to helping students use their research experience for futureprojects, whether a publication, capstone paper, or Honors thesis. I am also available to write letters for job or graduate school applications.

Applicant Requirements: Major in CHESS or Belk College; rising junior status or higherCompletion of most general education courses.

Applicant Preferences: Experience in a related major (History, Political Science, Economics, IDST/CapitalismStudies, Anthropology, International Studies, Spanish)Some competency in Spanish

Specific Time considerations/conflicts: None, but the student must be available some hours when Atkins Library is open.

App ID #: 1975

Mentor: Da Costa Vieira, Rafael Felipe Email: rvieira@charlotte.edu

Title: Associate Professor

Department: Epidemiology and Community Health

Co-mentor:No

Community engaged research: Yes

Title: Ticks and tick-borne pathogens surveillance in Mecklenburg and Cabarrus County Parks

Description: Tickborne diseases (TBDs) have been on the rise in recent decades, threatening public health. In the Northern Hemisphere, TBDs are well-known threats and represented >75% of all vector-borne disease cases reported in the USA from 2004 to 2016, with Lyme disease representing the majority of the cases (Rosenberg et al., 2018). In North Carolina, data on TBDs have been historically limited to Lyme disease and Spotted Fever Rickettsiosis, and only recently ehrlichiosis (Iyamu et al., 2024; Mokashi et al., 2024). However, other tick-borne pathogens (TBPs) and the growing number of emerging tick-borne viruses are overall understudied and rarely considered by physicians and public health professionals in differential diagnoses when evaluating tick-related febrile illnesses in humans. Habitat degradation is a major threat to animals, promoting cascading effects on species composition and influencing vector-host-pathogen interactions (Laurance et al., 2009). On this pattern, the Charlotte metropolitan area has shown rapid urban growth and tree canopy loss, directly impacting animal and vector species composition, which may lead to an increase human exposure risk to tick bites. Our long-term goal is to determine how the tick ecology, microbiome and TBPs shift in degraded areas and how this impacts human exposure risk. Our overall objective herein is to provide fundamental knowledge on how the ecology of ticks of public health importance respond to degradation comparing temperate and tropical climates. We also aim to detect and characterize other TBPs potentially transmitted by tick species in the Charlotte metropolitan area. Our central hypothesis is that degradation affects the distribution of animals and consequently tick species that serves as a vector for various TBPs.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: Local capacity building and technical and scientific support to prepare future qualified acarologists with interdisciplinary expertise that are able to minimize tick-borne diseases (TBDs) in a sustainable manner by assisting with the prevention, diagnosis, and control TBDs and arthropod vectors is critically lacking (Vieira et al., 2024). For instance, most public health organizations have inadequate training or capacity to conduct tick surveillance and identification. The limited access of acarologists to research facilities for more effective public health surveillance of ticks and the pathogens they transmit (e.g., molecular screening of field-collected ticks for pathogens), associated with the lack of multisectoral collaboration among professionals in entomology, acarology, public health, molecular methods, veterinary medicine, ecology, and zoonotic infectious disease at regional, national, and global

scales, represents an important gap in our capacity to reduce vector-borne diseases (Vieira et al., 2024).

Required training of 10 hours with Description: Herein, students will:

- Receive training in methods for field collection and identification of ticks occurring in the Charlotte metropolitan area;
- Receive training in the identification of ticks from the Brazilian Pantanal biome;
- Receive training on how to storage and maintain ticks in the scientific collection at the Zoonotic and Vector-Borne Diseases Laboratory at the Center for Computation Intelligence to Predict Environment and Health Risks (CIPHER);
- Receive training on how to send and receive tick specimens overseas;
- Develop skills on DNA and RNA extraction of different tick stages and tissues;
- Receive training on molecular methods to characterize the microbiome of ticks;
- Receive training on molecular methods for the diagnosis and characterization of zoonotic pathogens transmitted by ticks;

Mentoring plan: I have a documented history of mentoring a very engaged and successful group of students from multiple backgrounds, ethnicities, and nationalities. I have already directly supervised two postdoctoral, seven Ph.D., 14 Masters, five Veterinary Residents, and several undergraduates. In this project, I will directly lead theoretical and practical training and expeditions to the collection of ticks in the Charlotte metropolitan area. I will also provide theoretical and practical training on the identification of tick specimens. Postdoctoral and graduate students at the Zoonotic and Vector-Borne Diseases Laboratory (ZVBD Lab) will help with theoretical and practical training on DNA/RNA extraction, PCR and real-time PCR protocols for the detection of tick-borne pathogens, as well as sampling preparation for the characterization of the tick's microbiome.Herein, students are expected to discuss and present at the ZVBD Lab weekly meetings, and at Conferences when funds are available.I am committed to supporting students in their professional development and international experience, as the ZVBD Lab team includes graduate students from Brazil and Sub-Saharan Africa conducting One Health research. At the ZVBD Lab, students receive state-of-the-art training in One Health, as well as zoonotic and vector-borne disease studies.

Applicant Requirements: We are seeking motivated students who are eager to perform field activities and learn about ticks and the diseases they transmit, with the goal of advancing public health surveillance. Students with interests aligned with Public Health, Environment and Biological Sciences, Epidemiology, and Bioinformatics are highly encouraged to apply.

Applicant Preferences: We are seeking motivated students who are eager to perform field activities and learn about ticks and the diseases they transmit, with the goal of advancing public health surveillance. Students with interests aligned with Public Health, Environment and Biological Sciences, Epidemiology and Bioinformatics are highly encouraged to apply.

Specific Time considerations/conflicts: Field collections are expected to occur on Tuesdays and Friday's morning. The Zoonotic and Vector-Borne Diseases Laboratory weekly meetings are either Monday OR Friday mornings.

App ID #: 1976

Mentor: Joyee, Erina Email: ejoyee@charlotte.edu

Title: Assistant Professor

Department: MEES

Co-mentor:No

Community engaged research: No

Title: Integration of a Coaxial Nozzle and Fiber Feeding System for Multi-Component Direct Ink Writing (DIW) Printing

Description: Traditional Direct Ink Writing (DIW) printers rely on a single-material extrusion process, which limits theirability to fabricate multi-component and fiber-reinforced structures. To overcome this limitation, this projectfocuses on modifying a DIW system by integrating a coaxial nozzle and a fiber feeding system to enable theprinting of multi-functional composite structures.A coaxial nozzle allows the simultaneous deposition of different materials in a core-shell or multi-layeredarrangement, while a fiber feeding system enables the incorporation of continuous fiber reinforcements withinthe printed structures. These advancements will enhance the mechanical, electrical, and functional propertiesof DIW-printed objects, opening new possibilities for lightweight composites, wearable electronics, biomedicalscaffolds, and energy storage applications.This research aims to design, fabricate, and integrate a coaxial nozzle and fiber feeding system into anexisting DIW 3D printer and optimize its performance for printing multi-material and fiber-reinforcedstructures.The students will:Design and fabricate a coaxial nozzle system, allowing controlled co-extrusion of core-shell or layeredmaterials.-Develop a fiber feeding mechanism, ensuring precise control over fiber placement within the printedstructures.- Integrate the coaxial nozzle and fiber feeding system into an existing DIW printer.Optimize printing parameters (flow rate, nozzle speed, fiber tension, and extrusion control) to achievehigh-quality multi-component structures.-Evaluate the printed structures, analyzing mechanical properties (tensile strength, fiber-matrixadhesion) and functional characteristics using microscopy and mechanical testing.-Demonstrate the feasibility of multi-material DIW printing by fabricating functional prototypes, suchas fiber-reinforced composites, conductive pathways, or gradient biomedical scaffolds.This project will provide hands-on experience in advanced additive manufacturing, machine design, andcomposite material fabrication, equipping students with essential skills for cutting-edge research in multimaterial3D printing and structural reinforcement technologies.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: By participating in this project, students will:Understand Additive Manufacturing Principles:Gain in-depth knowledge of Direct Ink Writing (DIW)and its applications in multi-material and fiber-reinforced 3D printing.1.Optimize Printing Parameters:Investigate key factors such as extrusion rate, nozzle diameter, andmaterial viscosity to achieve high-precision prints.Develop techniques to control fiber alignment anddistribution within printed structures.2.Hands-On Experience with 3D Printing Systems:Modify and integrate

customized hardwarecomponents (coaxial nozzles, fiber feeders) into an existing DIW printer.Troubleshoot and refinehardware-software interactions for improved process control.3.Characterize and Evaluate Printed Structures:Conduct mechanical testing (tensile, compression) toassess material strength and durability.Use microscopy and imaging techniques to analyze print quality.4.Develop Problem-Solving and Research Skills:Apply critical thinking and engineering design principlesto address challenges in DIW-based multi-material printing.Learn to analyze experimental data andoptimize design iterations based on testing results.5.Explore Real-World Applications:Understand how DIW-printed composites can be used in biomedicalscaffolds, wearable electronics, energy storage devices, and structural reinforcements.Discuss thepotential of DIW technology for future research and industrial applications.

Required training of 10 hours with Description: The student training/onboarding process includes:

1. Orientation & Safety Training – Lab safety, equipment handling, and research

protocols.

2. Introduction to Research – Overview of DIW printing.

3. Hands-on Equipment Training – Operating 3D printers, material preparation, and

software tools.

4. Supervised Experiments – Guided practice in printing, testing, and data

collection.

5. Regular Progress Meetings – Feedback sessions to track learning and

improvements.

6. Independent Research – Advanced tasks, data analysis, and potential

contributions to publications or presentations.

Mentoring plan: 1. Will meet with students twice 1:1 to mentor and talk about research progress.2. Full training will be conducted by the mentor.3. Will have regular communication personally or via online resources (email/zoom).4. Will identify project goals with the student at the start of the term and evaluate them every 2 weeks.5. Will identify specific tasks for the goals.6. Will assist students in writing reports, and abstracts, and preparing poster for the annual symposium.

Applicant Requirements: Experience with motion systems, actuators, and mechanical assembly for prototype development. Proficiencyin 3D modeling (Fusion 360, SolidWorks) for designing printer components.

Applicant Preferences: Prior experience in conducting lab experiments is preferred, particularly in handling materials, mechatronics,prototype development, and fluid dynamics. Strong communication skills are also desired.

Specific Time considerations/conflicts: None

App ID #: 1985

Mentor: Cao, Yi Email: ycao11@charlotte.edu

Title: Teaching assistant professor

Department: Office of student development and success

Co-mentor:No

Community engaged research: No

Title: Finding Your Fit in Engineering: How the Common First-Year (CFY) Course Shapes Students' Confidence in Choosing a Major and Disciplinary Belonging

Description: Have you ever asked yourself: Am I in the right major? Do I really belong in this field of study? What if another field would be a better fit for me? These questions are common for many first-year college students, no matter what discipline they're in. Choosing a major is often one of the first big academic decisions in college, and it can feel exciting but also overwhelming.To support students during this process, UNC Charlotte recently created the Common First-Year (CFY) course. This new course is designed to give students a broad introduction to engineering and its many disciplines, with necessary engineering knowledge and skills, while also building community and providing tools to make thoughtful decisions about their future. Instead of rushing into a major, the CFY course gives you the chance to explore your options, understand what engineers actually do in different fields, and reflect on what path best matches your interests and strengths.This project will evaluate how well the CFY course meets these goals. We want to know: Does the course help students feel more confident in their choice of major? More connected to the engineering profession? More secure in their identity as engineers-in-training? We are particularly interested in how students' feelings of belonging evolve throughout the course. A key part of this research is exploring how students' sense of belonging develops through the course, since belonging has been shown to play a critical role in student success in STEM.Another critical dimension of this project is understanding how stereotypes about engineers affect students' experiences. Many students come into engineering with preconceived notions that engineers must be extremely smart, mathematically gifted, introverted, or fit a certain "nerdy" image. In reality, engineering as a discipline benefit from a wide variety of skills, backgrounds, and perspectives. This project explores how CFY courses might either reinforce or challenge these stereotypes, and how they can instead encourage students to see engineering as a diverse and welcoming field. By doing so, we aim to help students understand that there is no single "type" of engineer—that each student can authentically define what it means to belong in engineering.Why this matters for youYour perspective as a student is central to this work. You have either recently navigated—or are still navigating—the process of exploring majors, making decisions, and figuring out where you fit within engineering. Your insights, therefore, are not just useful but essential. By joining this project, you will have the chance to investigate how the CFY course shapes the experiences of students like you and contributes to making it more effective for future cohorts.This work is especially meaningful at UNC Charlotte, where about two-thirds of students are the first in their families to attend college. First-generation students often face additional challenges: limited access to mentors who understand higher education, fewer support networks, and fewer opportunities for

their voices to be heard in institutional decision-making. By participating in this project, you will help ensure that the experiences and perspectives of first-generation students are represented in research and shared with instructors, advisors, and administrators. In this way, your contributions will be both academically valuable and socially impactful.What you doAs a member of the research team, you will gain hands-on experience with both quantitative research (focused on surveys and numerical data) and qualitative research (focused on stories, experiences, and themes). Depending on your interests and skills, your involvement may include:Helping design short surveys that measure students' confidence in their major choice, their sense of belonging in engineering, and their views about the profession.Administering surveys at the beginning and end of the CFY course to track changes over time.Conducting or co-facilitating interviews and small focus groups where students discuss their experiences, challenges, and insights from the CFY course.Reviewing anonymized student reflections, essays, or assignments to identify which activities were most helpful in shaping identity and belonging.Analyzing survey results using tools such as SPSS, Stata, or R and learning to interpret statistical findings.Coding interview transcripts in software such as NVivo or ATLAS.ti to identify common themes and patterns.Contributing to writing manuscripts for conference presentations or journal articles, with the opportunity to be listed as a co-author.Presenting research findings at professional conferences, which will provide valuable experience in academic communication and networking.You will receive training and mentorship throughout this process, so prior experience with research methods is welcome but not required.What you'll gainParticipation in this project will provide both academic and professional benefits. You will:Receive practical training in social science and engineering education research methods, including survey design, interviewing, coding, and statistical analysis.Gain experience in data analysis software commonly used in academic and professional settings.Work as part of a supportive research team, learning how to collaborate effectively on scholarly projects.Strengthen your skills in communication, critical thinking, and project management.Build your academic profile through co-authorship on papers and presentations at professional conferences.Develop a clearer understanding of engineering identity, belonging, and persistence—topics that are relevant not only for research but also for your own journey as a student.Contribute to meaningful change by helping improve the CFY course for future engineering students.Your contribution mattersBy the conclusion of this project, our team will generate concrete recommendations for CFY instructors and advisors on how to strengthen the course's ability to support students' decision-making, confidence, and sense of belonging. These findings will not only help refine the first-year experience at UNC Charlotte but will also contribute to broader conversations in engineering education about how to better support diverse student populations.Most importantly, your work will help challenge narrow stereotypes about who belongs in engineering. Through this project, you will help demonstrate that engineering is not defined by a single personality type, background, or skill set, but instead thrives on diversity, authenticity, and the unique contributions of individuals.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

2 positions available

Anticipated Student Learning Outcomes: This project provides students with meaningful preparation for both professional engineering practice and future research careers. Because engineering education research (EER) is a multidisciplinary field, students will gain experiences that blend technical engineering approaches with social science perspectives. This allows them to

practice collaboration, critical thinking, and communication in ways that extend beyond typical coursework. By the end of the project, students will develop outcomes in five key areas:1. Identity, Belonging, and EmpowermentStudents will reflect on their own identity as engineers, challenge stereotypes of who "belongs" in the field, and see themselves as contributors to positive change in engineering culture. This is especially impactful for first-generation students, who may have fewer opportunities to explore research or envision themselves as scholars. Participation in this project provides them with confidence, a sense of belonging, and a platform to make their voices heard.2. Critical Thinking and Expanding HorizonsStudents will practice critical thinking and active learning as they interpret complex data and connect findings to big questions in engineering education. Since few universities in the U.S. offer formal EER programs, this project introduces students to a growing discipline that many may not have encountered before. Exposure to this new field can broaden their vision, spark interest in multidisciplinary research, and even open pathways to graduate study in areas they had not previously considered.3. Multidisciplinary CollaborationBecause engineering education research combines engineering and social science methods, students will learn to work across disciplinary boundaries, integrate diverse perspectives, and create a shared vision as part of a research team. Prior studies highlight the importance of collaboration in successful innovation, and this project provides an intentional environment for students to practice those skills.4. Research and Technical CompetenceStudents will design and implement surveys, facilitate interviews or focus groups, and analyze both quantitative and qualitative data. They will also gain exposure to professional research tools such as NVivo, ATLAS.ti, SPSS, Stata, or R (with training provided). This experience equips them with research skills valued in both academic and professional contexts.5. Scholarly Communication and Professional GrowthStudents will contribute to conference papers, journal publications, and professional presentations, with opportunities for co-authorship. These experiences strengthen their scholarly writing, public speaking, and professional networking abilities—skills that enhance their resumes, graduate school applications, and career readiness.How Students Might Talk About Their Experience Afterwards"I never knew engineering education research existed, but now I've done a project in it, and it opened my eyes to new career and graduate study options.""I gained confidence using professional research tools and learned how to collaborate in a multidisciplinary team.""Being part of a publication as an undergraduate gave me a huge boost for my future plans.""As a first-generation student, this project helped me feel like my perspective matters in shaping engineering education."

Required training of 4 hours with Description: IRB CITI training

Mentoring plan: Communication and Weekly UpdatesA central part of this project is maintaining open communication through regular meetings. I expect you to provide weekly updates, not only to report progress but also to share concerns, challenges, or questions that may have arisen. Even in weeks when progress feels minimal, it is important to come prepared and be honest about where things stand. These conversations help keep the project moving forward, prevent you from working in isolation, and allow me to offer the guidance you need. Weekly updates are therefore required, both as a tool for accountability and as an opportunity to practice professional communication. I value honesty above all—if you are struggling, I want to know so that I can provide support rather than have you feel stuck on your own. It is natural for progress to vary: some weeks will involve major breakthroughs while others may feel slower. Both are valuable, as long as you remain open

about your experiences.2. Literature Review ExpectationsA strong foundation in the literature is essential for meaningful research. You will spend a consistent amount of time reading, analyzing, and reflecting on relevant scholarly work throughout the project. This is not optional—developing a habit of engaging with the literature is critical for both your success here and your growth as a researcher more broadly. I will provide guidance on how to search for sources, organize readings, and synthesize key ideas, and you will be expected to share your insights during our meetings. Over time, you will learn not only how to understand prior work but also how to situate our research questions within larger scholarly conversations.3. Training, Meetings, and FeedbackWe will meet weekly as a team, and during these meetings you will give a short update on your progress, challenges, and next steps. When needed, I may schedule additional one-on-one check-ins to provide individualized support. I am committed to giving timely and constructive feedback on your drafts and assignments, typically within a few days, so that you always have clear guidance on how to improve. These regular points of contact are designed to help you build confidence, stay on track, and continually develop your skills.4. Authorship and Professional OpportunitiesAs you contribute meaningfully to the project, I will include you as a co-author on papers and conference presentations. I will also mentor you in preparing and delivering professional presentations so that you feel confident sharing your work at academic meetings. In addition, I will help you highlight your contributions on your CV and in graduate school or job applications, ensuring that your efforts are recognized and translated into future opportunities.My Commitments to YouI am committed to consistent mentorship, which includes weekly meetings, quick responses to your questions, and constructive feedback on your work. I aim to create a supportive environment where it is safe to share challenges so that we can address them together. I will provide structured training in literature review, data collection, analysis, and the use of research software, ensuring that you gain practical, transferable skills. Most importantly, I will make sure that your contributions are acknowledged through appropriate authorship and recognition. My goal is to help you grow as a researcher and to equip you with critical thinking, communication, and analytical skills that will serve you well in your academic and professional career.What I Expect from YouIn return, I expect you to come to each weekly meeting prepared to share your progress and to communicate openly about challenges and the support you need. You should dedicate consistent time to reading and reflecting on scholarly work and bring your insights into our discussions. I ask that you stay engaged and curious, ask questions, and connect your tasks to the broader goals of the project. Finally, I expect you to take responsibility by following through on agreed-upon tasks and communicating early if adjustments are needed. By meeting these expectations, you will position yourself for both immediate success on the project and long-term growth as a researcher.

Applicant Requirements: I especially value skills or experiences related to data analysis. Familiarity with qualitative tools such as NVivo or ATLAS.ti, or quantitative platforms such as SPSS, Stata, or R, would be a strong advantage. Coursework in research methods, statistics, or education-related fields can also provide helpful preparation, but it is not necessary. I also welcome experience with literature reviews, academic writing, or the use of reference management software.Equally important are lived experiences that shape how a student approaches research. Being a first-generation college student, navigating financial or institutional barriers, transferring from community college, or engaging in mentoring, outreach, or student organizations can all bring valuable perspectives to engineering education research. Sharing these experiences is optional, but I recognize the insight they can provide in understanding the challenges and opportunities

within higher education.In this role, the student will assist with designing studies, recruiting participants, and collecting and managing data such as surveys, interviews, or classroom materials. They will also contribute to data analysis, whether through coding qualitative data or applying statistical methods, and they will participate in synthesizing literature and preparing presentations or manuscripts.My goal is to provide mentorship and opportunities for professional growth. I encourage applicants from all majors and backgrounds to apply, even if they do not match every desired qualification. Enthusiasm, commitment, and a genuine interest in the work are the most important qualities I am seeking.

Applicant Preferences: Preferably in Education, Public Administration Sociology, data science, statistics, math or related disciplines. Experience in literature analysis is essential, while knowledge of quantitative data analysis or social network analysis will be beneficial. Familiarity with data analysis software such as NViyo, ATLAS.ti, SPSS, Stata, or R will be considered a big plus, Applicants should also demonstrate excellent communication and interpersonal skills, and be capable of working both independently and collaboratively. Being consistent and flexible is preferred.

Specific Time considerations/conflicts: Students have to participant the interview or focus group to collect data. All of those data collecting dates can be negotiated, but if we settled down among research team, students should make sure their availability.

App ID #: 1977

Mentor: Feng, Hongsong Email: hfeng2@charlotte.edu

Title: Assistant Professor

Department: Mathematics and Statistics

Co-mentor:No

Community engaged research: No

Title: Mathematical machine learning of biomolecular property predictions

Description: Biomolecular property assessment is a critical task in biological research, as human life is regulated at the molecular level. Accurate assessment is particularly important in drug discovery. Although traditional laboratory experiments can provide precise measurements, they are often time-consuming, labor-intensive, and costly. With the rapid growth of biological data and advances in machine learning algorithms, machine learning has emerged as a valuable tool for drug discovery. Machine learning (ML) enables biomolecular prediction predictions on a large scale and can address many limitations of traditional laboratory approaches, eventually expediting the drug discovery process. However, significant challenges remain in achieving accurate ML predictions of biomolecular properties. According to quantitative structure–activity relationship (QSAR) principles, molecular properties are largely determined by molecular structure. Yet, the high dimensionality of 3D molecular structures makes it impractical to directly use raw structural data in machine learning. Furthermore, it is crucial to account for key physical interactions within molecular structures when building ML models. To address these challenges, the PI's group has developed advanced mathematical frameworks grounded in algebraic topology, differential geometry, and graph theory. These frameworks have proven highly effective in characterizing biomolecular structures, and the resulting machine learning models deliver highly accurate predictions of key biomolecular properties. This research has direct applications in drug design, as demonstrated by top-tier performances in the D3R Grand Challenges, a leading competition in computer-aided drug design. The impact of this work has attracted collaboration opportunities from major pharmaceutical companies, including Pfizer and Bristol Myers Squibb. The overarching goal of this project is to develop reliable ML models for biomolecular property prediction. This interdisciplinary research project draws on expertise in mathematics, machine learning, and molecular biology. Specific prediction tasks include protein–small molecule interactions, nucleic acid–small molecule interactions, or analyses of molecular toxicity and solubility, which are critical investigation topics in drug design. To this end, we will integrate our advanced mathematical frameworks with state-of-the-art machine learning algorithms—including gradient boosting decision trees, random forests, support vector machines, artificial neural networks, graph neural networks, and convolutional neural networks—to build robust and accurate predictive models. Students can contribute to the project in multiple ways, including collecting data from biomolecular databases, processing raw data, assisting with hyperparameter tuning of machine learning models, creating figures, performing data analysis, conducting literature reviews, and contributing to manuscript preparation. Depending on the progress of the research, opportunities for publication may also be available.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

1 positions available

Anticipated Student Learning Outcomes: First, students will develop research skills and gain expertise in mathematical modeling for molecular biology, Python programming, and machine learning for biomolecular data analysis. This experience will prepare them for more advanced scientific research in the future.Second, through participation in the project, students will learn how to conduct research in applied mathematics and explore how mathematics can be applied to real-world challenges.Third, students will have the opportunity to write a scientific research paper, which will strengthen their graduate school applications.

Required training of 20 hours with Description: 1. Training on mathematical modeling of molecular data using available mathematical tools developed in my research group.

2. Learning how to program in python for data processing and analysis.

3. Learning how to build machine learning models using python packages.

Mentoring plan: I expect students to engage in the training and project and work hard. I encourage open communication and value timely feedback from students, whether they are making progress or encountering difficulties. I am always glad to receive emails or Teams messages and am committed to helping students resolve problems in a timely manner. I also encourage students to develop independent thinking and problem-solving skill by learning to utilize online resources like google, Youtube, or ChatGPT. Students will learn research skill from me, such as python coding, machine learning modeling, research report writing, data analysis, figure drawing for high-quality journals. I am the one whom students will work directly with. I will meet student at least once a week and students only need to present their progress with me. I will provide students sufficient training and support to help them complete a project. A publication can be possible if students make good progresses.

Applicant Requirements: Skills: coding skills or experiences, good writing skills, good communication skills Courses: Calculus I, Calculus II.

Applicant Preferences: Preference will be given to highly motivated students and to those with prior research or coding experience.

Specific Time considerations/conflicts: Regular weekly Zoom meetings or Office meetings are expected to discuss research progress and provide feedbacks.

App ID #: 1978

Mentor: Joyee, Erina Email: ejoyee@charlotte.edu

Title: Assistant Professor

Department: MEES

Co-mentor:No

Community engaged research: No

Title: Characterization and Testing of 3D-Printed Hydrophobic Membranes for Oil/Water Separation

Description: Water contaminated with oil is a major environmental challenge in both industrial and natural settings. Traditional filtration technologies often suffer from high cost, fouling, and limited reusability. Additive manufacturing offers new opportunities to fabricate custom membranes with tailored structures. In this project, thin films have already been fabricated using digital light processing (DLP) with hydrophobic polymer composites. The student's task will be to systematically evaluate the wettability, oil absorption, separation efficiency, and reusability of these printed membranes.ObjectivesThe main goals of this project are:To characterize the surface properties of the printed films using contact angle measurements.To perform oil/water separation experiments and quantify separation efficiency and flux.To assess reusability and fouling resistance of the films through repeated testing cycles.To analyze results and correlate structural features with observed performance.Educational ValueThe project emphasizes hands-on experimental skills in fluid mechanics, materials characterization, and environmental engineering. The student will gain experience in setting up standardized testing protocols, performing quantitative data analysis, and interpreting structure–function relationships. The results will directly support ongoing research into scalable, 3D-printed membranes for environmental remediation.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

1 positions available

Anticipated Student Learning Outcomes: Quantitative data on hydrophobicity and oleophobicity from contact angle measurements.Demonstration of the film's ability to separate oil from water, with separation efficiency ≥95% targeted.Determination of oil absorption capacity across oils of different viscosities.Evaluation of film durability, flux retention, and fouling resistance across multiple use cycles.Deeper understanding of how printed material properties translate into functional separation performance.

Required training of 10 hours with Description: 1. Orientation & Safety Training – Lab safety, equipment handling, and research protocols.

2. Introduction to Research – Overview of DLP bio printing.

3. Hands-on Equipment Training – Operating 3D printers, material preparation, and software tools.

4. Supervised Experiments – Guided practice in printing, testing, and data collection.

5. Regular Progress Meetings – Feedback sessions to track learning and improvements.

6. Independent Research – Advanced tasks, data analysis, and potential contributions to publications or presentations.

Mentoring plan: 1. Will meet with students twice 1:1 to mentor and talk about research progress.2. Full training will be conducted by the mentor.3. Will have regular communication personally or via online resources (email/zoom).4. Will identify project goals with the student at the start of the term and evaluate them every 2 weeks.5. Will identify specific tasks for the goals.6. Will assist students in writing reports, and abstracts, and preparing poster for the annual symposium.

Applicant Requirements: Basic knowledge of laboratory safety and interest in experimental research.Ability to commit time regularly to lab work and project meetings.

Applicant Preferences: Prior experience in conducting lab experiments is preferred, particularly in handling materials, mechanicaltesting, and biomaterials, as well as a strong interest in polymer science and additive manufacturing. Strong communication skills, with willingness to present results in written and oral formats.

Specific Time considerations/conflicts: None

App ID #: 1979

Mentor: Tabarraei, Alireza Email: atabarra@charlotte.edu

Title: Associate professor

Department: Mechanical Engineering

Co-mentor:No

Community engaged research: No

Title: Designing Lightweight Structures with Computer Optimization

Description: In this project, you will explore how computers can be used to design lighter and stronger structures. Engineers often need to figure out the best way to place material so that a part is strong enough but doesn't waste weight or resources. This process is called topology optimization, and it is widely used in areas like aerospace, cars, and 3D printing.Over the semester, you will start by learning the basics of how engineers model structures and study how they carry loads. As a student researcher, you will help by running computer programs that perform these simulations and by preparing the data that graduate students will use to train machine learning models. You will also help create visual results (pictures of optimized structures) and assist with analyzing and organizing the results.This project connects engineering, mathematics, and computer science. You will see how these fields come together in solving real design and optimization problems.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

2 positions available

Anticipated Student Learning Outcomes: By working on this project, you will:Learn the basics of structural mechanics and optimization.Gain experience running computer simulations and working with research data.Build skills in data organization and visualization.Learn how research supports the design of real-world engineering parts.Develop stronger communication and presentation skills by writing a report and sharing your results.

Required training of 0 hours with Description: At the start, you will be introduced to the background of topology optimization and to the computer tools we will use. You will receive step-by-step guidance on how to run the codes, prepare data, and generate plots. We will meet each week to go over progress, answer questions, and set goals.

Mentoring plan: We will support the student by providing clear guidance, resources, and regular feedback. At the start of the project, I will walk the student through the background of topology optimization, the computer tools we will use, and how to run the codes and prepare data. We will meet weekly to discuss progress, set goals, and address any questions. The student will also work closely with graduate students in my group, gaining practical experience and peer support. I expect the student to share updates during group meetings and to prepare a short report and presentation at the end of the semester. My goal is to help the student build research skills, learn how to handle data and simulations, and develop confidence in communicating their work.

Applicant Requirements: This project is a good fit for students who have taken at least one mechanics-related course (such as statics or mechanics of materials). You should be comfortable using a computer and willing to learn how to run research codes and work with data. An interest in engineering design, structures, or 3D printing is a plus. Most importantly, you should be motivated, detail-oriented, and eager to learn research skills.

Applicant Preferences: I'm looking for a curious, reliable student who enjoys problem-solving and is comfortable learning new tools. You should have taken at least one mechanics-related course such as statics or mechanics of materials. You do not need to write code, but you should be comfortable using a computer to run provided programs, follow step-by-step instructions, keep careful notes, and organize files and data in a clear, consistent way. Basic skills in making simple plots or figures are helpful. Attention to detail, good communication, and steady weekly progress matter more than prior research experience. An interest in engineering design, structures, or 3D printing is a plus, and any experience working with research data or lab projects is welcome but not required.

Specific Time considerations/conflicts: NA

App ID #: 1981

Mentor: Tipton, Roger Email: rtipton2@uncc.edu

Title: Research Associate Professor

Department: Mechanical Engineering and Engineering Science

Co-mentor:No

Community engaged research: No

Title: Extracting Nanocellulose Fibers from Plant Matter and Supply Chain Development

Description: Join the cutting-edge research where you'll be part of a dynamic team developing innovative processes to extract nanocellulose fibers from plant matter. These fibers are a game-changer in the manufacturing of biocomposite materials, offering a sustainable and eco-friendly alternative to traditional composites. Additional focus on developing a local cellulose supply chain to get these materials into production.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: Educationally, students will gain a deep understanding of research methodology, including experimental design, data analysis, and comprehensive literature reviews. The interdisciplinary nature of the project will broaden their knowledge across materials science, chemistry, and environmental engineering, fostering a well-rounded understanding of these interconnected fields. This holistic approach will enhance their critical thinking and problem-solving abilities, which are highly valued in any career.From a career perspective, students will significantly enhance their professional profiles. The project offers opportunities for networking with faculty, graduate students, and industry professionals, which can open doors for future career opportunities. Additionally, the chance to co-author research papers and present findings at conferences will be a notable achievement on their resumes. The focus on sustainability and eco-friendly materials will also appeal to employers and academic programs dedicated to green technologies, positioning students as forward-thinking candidates in their future endeavors.

Required training of 2 hours with Description: Students will need to perform 2 hours of lab safety training before the student can work in the lab. All other training will be on the job training

Mentoring plan: To ensure students' success in developing a process for extracting nanocellulose fibers from plant matter for biocomposite materials, I am committed to providing comprehensive support and guidance throughout their research journey. Here's what students can expect from me during this experience:Direct Mentorship and Regular Contact: Students will work closely with me through regular one-on-one meetings where we will discuss their progress, address challenges, and set goals. These sessions will provide personalized feedback and guidance, ensuring that students feel supported and confident in their work.Collaborative Team Environment: Students will be part of a collaborative research team, working directly with faculty members, graduate students, and

industry professionals. This team-based approach will foster a supportive and dynamic learning environment, encouraging the exchange of ideas and collaborative problem-solving.Collaborative Team Environment: Students will be part of a collaborative research team, working directly with faculty members, graduate students, and industry professionals. This team-based approach will foster a supportive and dynamic learning environment, encouraging the exchange of ideas and collaborative problem-solving.Collaborative Team Environment: Students will be part of a collaborative research team, working directly with faculty members, graduate students, and industry professionals. This team-based approach will foster a supportive and dynamic learning environment, encouraging the exchange of ideas and collaborative problem-solving.Collaborative Team Environment: Students will be part of a collaborative research team, working directly with faculty members, graduate students, and industry professionals. This team-based approach will foster a supportive and dynamic learning environment, encouraging the exchange of ideas and collaborative problem-solving.

Applicant Requirements: The key qualifications and characteristics we seek in an applicant:Science or engineering background: completion of foundational courses in chemistry material science, environmental science related fields.Laboratory Experience: Prior coursework that includes lab components, providing basic lab skills and familiarity with scientific equipment.Critical thinking: strong analytical skills to interpret data, troubleshoot experiments, and draw me a conclusion.We believe that with the right attitude and foundational skills, any dedicated student can succeed and make meaningful contributions to our team.

Applicant Preferences: We are looking for enthusiastic and dedicated students who are eager to contribute to cutting-edge research in sustainable materials. Here are the key qualifications and characteristics we seek in an applicant:Genuine interest and sustainable materials and desire to make a positive environmental impactAn inquisitive mindset and ability to think creatively to solve complex problemsSelf motivated with strong work ethic and ability take initiative and driving the project forwardDetail oriented, ensuring accuracy and experiment and dataAbility work effectively in collaborative team environment, sharing insides, and supporting peersStrong, verbal and written communication skills

Specific Time considerations/conflicts: None

App ID #: 1982

Mentor: Tipton, Roger Email: rtipton2@uncc.edu

Title: Research Associate Professor

Department: Mechanical Engineering

Co-mentor:No

Community engaged research: No

Title: Using Data Science to Predict Microplastics Transport in Oceans

Description: This exciting project focuses on understanding the movement of micro plastics in freshwater systems and oceans. Micro plastics are tiny plastic particles significant environmental threats. But analyze the comprehensive data to micro plastics used analysis fundamentals to predict how these particles travel through water.Project goals:Analyze, micro plastics data: diving data containing information on micro plastics found in various freshwater and ocean locationsPredict transport patterns: use data analysis techniques to approve model and predict the transport of micro plastics in the oceans.Contribute to environmental solutions: your findings could help develop strategies to mitigate the impact of micro plastics on marine ecosystems.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: Participating in this research project offers numerous benefits for students, enhancing their education, training, and career prospects. Here are some key advantages:Students will gain a thorough understanding of microplate. Their environmental impact in the scientific methods used to study them.To hands-on experience student will learn how to clean, analyze, interpret complex data sets, critical scale, many scientific and technical fields.Project combined element of environmental science state science and computational modeling provide a well-rounded educational experience.The project was hands, the student ability to tackle complex problems, think critically, and develop innovative solutions.Participation this project will be a stand out edition to student resumes showcase in their ability to handle real world, data, and contribute to meaningful research.

Required training of 2 hours with Description: Students will need to perform 2 hours of lab safety training before the student can work in the lab. All other training will be on the job training

Mentoring plan: I am committed to providing comprehensive support and guidance throughout their research journey. Here's what students can expect from me during this experience:Direct Mentorship and Regular Contact: Students will work closely with me through regular one-on-one meetings where we will discuss their progress, address challenges, and set goals. These sessions will provide personalized feedback and guidance, ensuring that students feel supported and confident in their work.Collaborative Team Environment: Students will be part of a collaborative research team, working directly with faculty members, graduate students, and industry professionals. This team-based approach will foster a supportive and dynamic learning environment, encouraging the exchange of ideas and collaborative problem-solving.Collaborative

Team Environment: Students will be part of a collaborative research team, working directly with faculty members, graduate students, and industry professionals. This team-based approach will foster a supportive and dynamic learning environment, encouraging the exchange of ideas and collaborative problem-solving.Collaborative Team Environment: Students will be part of a collaborative research team, working directly with faculty members, graduate students, and industry professionals. This team-based approach will foster a supportive and dynamic learning environment, encouraging the exchange of ideas and collaborative problem-solving.Collaborative Team Environment: Students will be part of a collaborative research team, working directly with faculty members, graduate students, and industry professionals. This team-based approach will foster a supportive and dynamic learning environment, encouraging the exchange of ideas and collaborative problem-solving.

Applicant Requirements: The key qualifications and characteristics we seek in an applicant:Science or engineering background: completion of foundational courses in chemistry material science, environmental science related fields.Laboratory Experience: Prior coursework that includes lab components, providing basic lab skills and familiarity with scientific equipment.Critical thinking: strong analytical skills to interpret data, troubleshoot experiments, and draw me a conclusion.We believe that with the right attitude and foundational skills, any dedicated student can succeed and make meaningful contributions to our team.

Applicant Preferences: We are looking for enthusiastic and dedicated students who are eager to contribute to cutting-edge research in sustainable materials. Here are the key qualifications and characteristics we seek in an applicant:Genuine interest and sustainable materials and desire to make a positive environmental impactAn inquisitive mindset and ability to think creatively to solve complex problemsSelf motivated with strong work ethic and ability take initiative and driving the project forwardDetail oriented, ensuring accuracy and experiment and dataAbility work effectively in collaborative team environment, sharing insides, and supporting peersStrong, verbal and written communication skills

Specific Time considerations/conflicts: None

App ID #: 1983

Mentor: Tipton, Roger Email: rtipton2@uncc.edu

Title: Research Associate Professor

Department: Mechanical Engineering

Co-mentor:No

Community engaged research: No

Title: Wearable Flexible Sensors for Performance Management

Description: Be part of a groundbreaking project developing wearable flexible sensors to modern evaluate performance of workers and athletes. The sensors are designed for real-time data on physical activity helping to optimize performance prevent injuries and overall well-being.Project goals:Design and develop flexible, wearable sensors that can accurately monitor various physiological parameters.Test invalid sensor performance in real world scenarios with workers and athletes3Analyze collected data to provide actionable insight from improving performance and safety.This project is an excellent opportunity to contribute to the development of innovative, wearable technologies, and make a real impact on the field of occupational health and sports science.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: Participating in this research project offers numerous benefits for students, enhancing their education, training, and career prospects. Here are some key advantages:Students will gain a thorough understanding of microplate. Their environmental impact in the scientific methods used to study them.To hands-on experience student will learn how to clean, analyze, interpret complex data sets, critical scale, many scientific and technical fields.Project combined element of environmental science state science and computational modeling provide a well-rounded educational experience.The project was hands, the student ability to tackle complex problems, think critically, and develop innovative solutions.Participation this project will be a stand out edition to student resumes showcase in their ability to handle real world, data, and contribute to meaningful research.

Required training of 2 hours with Description: Students will need to perform 2 hours of lab safety training before the student can work in the lab. All other training will be on the job training

Mentoring plan: Participating in this research project offers numerous benefits for students, enhancing their education, training, and career prospects. Here are some key advantages:Students will gain a thorough understanding of microplate. Their environmental impact in the scientific methods used to study them.To hands-on experience student will learn how to clean, analyze, interpret complex data sets, critical scale, many scientific and technical fields.Project combined element of environmental science state science and computational modeling provide a well-

rounded educational experience.The project was hands, the student ability to tackle complex problems, think critically, and develop innovative solutions.Participation this project will be a stand out edition to student resumes showcase in their ability to handle real world, data, and contribute to meaningful research.

Applicant Requirements: To ensure students' success in developing a process for extracting nanocellulose fibers from plant matter for biocomposite materials, I am committed to providing comprehensive support and guidance throughout their research journey. Here's what students can expect from me during this experience:Direct Mentorship and Regular Contact: Students will work closely with me through regular one-on-one meetings where we will discuss their progress, address challenges, and set goals. These sessions will provide personalized feedback and guidance, ensuring that students feel supported and confident in their work.Collaborative Team Environment: Students will be part of a collaborative research team, working directly with faculty members, graduate students, and industry professionals. This team-based approach will foster a supportive and dynamic learning environment, encouraging the exchange of ideas and collaborative problem-solving.Collaborative Team Environment: Students will be part of a collaborative research team, working directly with faculty members, graduate students, and industry professionals. This team-based approach will foster a supportive and dynamic learning environment, encouraging the exchange of ideas and collaborative problem-solving.Collaborative Team Environment: Students will be part of a collaborative research team, working directly with faculty members, graduate students, and industry professionals. This team-based approach will foster a supportive and dynamic learning environment, encouraging the exchange of ideas and collaborative problem-solving.Collaborative Team Environment: Students will be part of a collaborative research team, working directly with faculty members, graduate students, and industry professionals. This team-based approach will foster a supportive and dynamic learning environment, encouraging the exchange of ideas and collaborative problem-solving.

Applicant Preferences: The key qualifications and characteristics we seek in an applicant:Science or engineering background: completion of foundational courses in chemistry material science, environmental science related fields.Laboratory Experience: Prior coursework that includes lab components, providing basic lab skills and familiarity with scientific equipment.Critical thinking: strong analytical skills to interpret data, troubleshoot experiments, and draw me a conclusion.We believe that with the right attitude and foundational skills, any dedicated student can succeed and make meaningful contributions to our team.

Specific Time considerations/conflicts: None

App ID #: 1984

Mentor: Tipton, Roger Email: rtipton2@uncc.edu

Title: Research Associate Professor

Department: Mechanical Engineering

Co-mentor:No

Community engaged research: No

Title: Materials For the Final Frontier – Then Films and Additive Manufacturing for Hypersonic and Spacecraft Applications

Description: This project offers an exciting opportunity for undergraduate engineering students to contribute to groundbreaking research in advanced materials for hypersonic and spacecraft applications. Students will gain hands-on experience in cutting-edge fabrication techniques, including thin-film deposition and additive manufacturing. The goal is to develop and test novel materials capable of withstanding the extreme temperatures and pressures of space and hypersonic travel, pushing the boundaries of what is possible in aerospace engineering. This work involves collaborative research with industry partners, providing a unique chance to apply classroom knowledge to real-world challenges.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: Learning outcomes for a research project on advanced materials for hypersonic and spacecraft applications:Hands-on experience with advanced materials synthesis: Students will learn how to design and fabricate materials that can withstand extreme environments.Proficiency in advanced manufacturing techniques: Students will gain practical skills in both thin-film deposition and additive manufacturing (3D printing).Understanding of material-structure-property relationships: Students will learn how to analyze and characterize materials to understand the relationship between their composition, structure, and performance under extreme conditions.Interdisciplinary collaboration: The project will foster skills in collaborating with engineers and scientists from various backgrounds.Critical thinking and problem-solving: Students will develop the ability to identify and solve complex challenges related to material design and application in high-stakes fields like aerospace.

Required training of 2 hours with Description: Students will need to perform 2 hours of lab safety training before the student can work in the lab. All other training will be on the job training

Mentoring plan: To ensure students' success in developing a process for extracting nanocellulose fibers from plant matter for biocomposite materials, I am committed to providing comprehensive support and guidance throughout their research journey. Here's what students can expect from me during this experience:Direct Mentorship and Regular Contact: Students will work closely with me through regular one-on-one meetings where we will discuss their progress, address challenges, and

set goals. These sessions will provide personalized feedback and guidance, ensuring that students feel supported and confident in their work.Collaborative Team Environment: Students will be part of a collaborative research team, working directly with faculty members, graduate students, and industry professionals. This team-based approach will foster a supportive and dynamic learning environment, encouraging the exchange of ideas and collaborative problem-solving.Collaborative Team Environment: Students will be part of a collaborative research team, working directly with faculty members, graduate students, and industry professionals. This team-based approach will foster a supportive and dynamic learning environment, encouraging the exchange of ideas and collaborative problem-solving.Collaborative Team Environment: Students will be part of a collaborative research team, working directly with faculty members, graduate students, and industry professionals. This team-based approach will foster a supportive and dynamic learning environment, encouraging the exchange of ideas and collaborative problem-solving.Collaborative Team Environment: Students will be part of a collaborative research team, working directly with faculty members, graduate students, and industry professionals. This team-based approach will foster a supportive and dynamic learning environment, encouraging the exchange of ideas and collaborative problem-solving.

Applicant Requirements: The key qualifications and characteristics we seek in an applicant:Science or engineering background: completion of foundational courses in chemistry material science, environmental science related fields.Laboratory Experience: Prior coursework that includes lab components, providing basic lab skills and familiarity with scientific equipment.Critical thinking: strong analytical skills to interpret data, troubleshoot experiments, and draw me a conclusion.We believe that with the right attitude and foundational skills, any dedicated student can succeed and make meaningful contributions to our team.

Applicant Preferences: We are looking for enthusiastic and dedicated students who are eager to contribute to cutting-edge research in sustainable materials. Here are the key qualifications and characteristics we seek in an applicant:Genuine interest and sustainable materials and desire to make a positive environmental impactAn inquisitive mindset and ability to think creatively to solve complex problemsSelf motivated with strong work ethic and ability take initiative and driving the project forwardDetail oriented, ensuring accuracy and experiment and dataAbility work effectively in collaborative team environment, sharing insides, and supporting peersStrong, verbal and written communication skills

Specific Time considerations/conflicts: None

App ID #: 1989

Mentor: Shue, Sam Email: slshue@charlotte.edu

Title: Teaching Assistant Professor

Department: ECE

Co-mentor:No

Community engaged research: No

Title: RANSAC Approach for Multipath Mitigation in Wireless Singal-Strength Based Trilateration Localization Applications

Description: This work will focus on improving how wireless devices can be localized when signals are distorted by reflections. Trilateration is a method for determining the position of an unknown point by measuring its distance to at least three known reference points (or "nodes"). In wireless systems, distance is often estimated indirectly from the signal strength; the weaker the received signal, the farther away the transmitter is assumed to be. Using mathematical models such as the log-distance path loss model, we can estimate distance from the measured signal strength from a transmitter to a receiver. However, in environments such as buildings or urban areas, signals can reflect off surfaces before reaching the receiver, creating "multipath interference." This causes the measured signal strength to fluctuate and can make the distance estimate inaccurate, leading to large localization errors. By incorporating RANSAC (Random Sample Consensus), the system can repeatedly test different subsets of nodes, compute possible positions, and identify which measurements are consistent with one another. Nodes whose signal data is heavily distorted by multipath effects are treated as outliers and excluded, so the final trilateration uses only the most reliable inputs. This approach enhances accuracy and robustness, especially when more than three nodes are available to provide redundancy.An undergraduate student working on this project would contribute by supporting both the software implementation and experimental validation. Their duties could include writing simulation scripts to model signal strength data with noise and multipath interference, coding the RANSAC algorithm in MATLAB or Python, and testing it against known ground-truth positions. They may also help set up and calibrate wireless sensor nodes in a laboratory or field environment, collect experimental data, and assist in analyzing results. Through this process, the student would gain hands-on experience in signal processing, wireless networking, and robust algorithm design.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

1 positions available

Anticipated Student Learning Outcomes: Students participating in this research project will gain valuable technical and professional skills that strengthen their education and career prospects. They will develop hands-on experience in wireless communication systems, localization algorithms, and robust statistical methods like RANSAC, while also learning to use tools such as MATLAB or Python for simulation and data analysis. Through experimental design, sensor node calibration, and real-world testing, they will build practical competencies that bridge theory and application. Beyond technical expertise, students will refine their abilities in problem-solving,

teamwork, and scientific documentation, preparing them for both graduate study and industry roles.

Required training of 0 hours with Description: This work should not require any training or on-boarding. This work is not tied to any external association, nor does it involve work with human or animal testing.

Mentoring plan: I will meet with the student weekly to review progress, answer questions, and set clear goals for the next steps. I will provide access to all the components and testing equipment needed for the project, and I will provide hands-on help when the student gets stuck since I have experience with the same tools and devices. I will guide them through each stage of the project with clear milestones, help troubleshoot problems, and provide templates and examples. I will expect regular feedback on their code, data, and reports, and I will target publishing results at conferences such as IEEE SoutheastCon. My commitment is to make sure the student has the resources, support, and a clear direction. I would hope that this experience will encourage the student to pursue graduate school after their BS.

Applicant Requirements: I am looking for student with some programming experience. C/C++ and MATLAB preferred, but similar languages such as Python are acceptable.

Applicant Preferences: Students with some embedded systems / microcontroller programming experience is a huge bonus. Basic circuit analysis background is helpful along with any exposure to communications / networking.

Specific Time considerations/conflicts: N/A

App ID #: 2078

Mentor: Khan, Saffeer Email: mkhan8@charlotte.edu

Title: Research Associate Professor

Department: Energy Production & Infrastructure Center

Co-mentor: Yes

Community engaged research: No

Title: Implementation of a Power-Hardware In the Loop (PHIL) Testbed for Evaluating Electric Power System Components

Description: Hardware-in-the-loop (HIL) simulation is a technique that involves connecting the real input and output (I/O) interfaces of the controller hardware to a virtual environment that simulates the physical system. HIL testing is used for validating hardware-software integration and is part of certification processes in power and energy, defense, aerospace, automotive, and other applications. Traditional testing of high-power equipment including converters, generators, and motors requires physical setups that are costly, complex, and often unsafe. Power hardware-in-the-loop (PHIL) replaces the physical power system with a high-fidelity, real-time simulation, while still interacting with actual hardware through a power interface. PHIL also enables the higher integration of Distributed Energy Resources (DER) to electricity grids. At UNC Charlotte Energy Production & Infrastructure Center (EPIC), Flexible Energy and Duke Energy Smart Grid Labs (DESGL) are part of Electric Power Transmission and Distribution (T&D) Research Group. These Labs have state of the art facilities that combine the physical hardware with real-time digital modeling, simulation, and visualization capabilities (RTDS and OPAL-RT) in a test bed to advance testing and evaluation of smart grid enabling technologies and energy systems. Several hardware components for grid level studies such as battery energy storage systems, power control units, inverters and converters, protective relays, and metering devices can be tested under real-time grid conditions for functional testing, system integration, and real-time power system analysis. The two labs are connected through a high speed fiber optic link that enables analog data transfer from the power hardware in the Flexible Energy Lab to the modeling and simulation platforms and powerful high-performance server backbone in the DESGL. This testing is pivotal to characterize the behavior of power hardware as part of the risk mitigation process. Currently, the Flex Lab has a team of full-time staff including faculty, research engineers, and graduate and undergraduate students. The team works with industrial partners to collaborate on interdisciplinary research and development projects to ensure research deliverables on an industrial client's schedule. Preparing the next generation of professionals for careers in the power and energy sector is a founding goal of EPIC as a university-industry partnership. EPIC and the William States Lee College of Engineering have paired together to create programs, courses and energy concentrations within multiple departments that surpass technical skills and engineering. While working in the Flexible Energy Lab, undergraduate research assistants go through experiential learning in project management, collaborative teamwork, risk analysis and leadership skills and are equipped to become part of the energy workforce who deliver new and creative solutions for the energy industry. The goal of this project is to characterize the behavior of power system components under controlled conditions of power quality by establishing

a real-time connectivity between the power hardware and the modeling and simulation platform for the PHIL testing. The undergraduate student will assist the project team through the following activities:Gain a fundamental understanding of a power supply's voltage and current conformity to ideal, stable waveforms including measurements of frequency, voltage magnitude, harmonics (distortions from the ideal waveform), and phase unbalance. Assist in the design of power conditioning system to improve performance through simultaneously optimizing multiple objectives such as efficiency, reliability, cost, and weight and find the best trade-offs.Participate in training to achieve hands on proficiency in the use of electrical and electronic test and measuring equipment including digital multimeters, mixed domain oscilloscopes, power analyzers, function and signal generators, and differential voltage and current probes.Develop expertise in the use of MATLAB for numerical computations and Simulink/LabVIEW graphical programming environments during model-based design, simulation, and analysis while performing multidomain dynamical systems modeling. Perform mechanical and thermal design of power electronic equipment, 3D modeling and printing, PCB design, milling, component selection, and soldering. Contribute in the dissemination of research findings through journal publications, conference proceedings, and poster presentations.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

2 positions available

Anticipated Student Learning Outcomes: The research experience at UNC Charlotte EPIC Flexible Energy Lab will provide the students a well-rounded educational experience through hands-on work on real-world multidisciplinary industry driven projects. The students will apply theoretical knowledge to real-world projects in power systems and power electronics research, design, and development. They will also gain experience in data analysis techniques to clean, analyze, and interpret complex datasets, coding, and the use of industry-standard hardware and software tools and equipment. The projects will also help them develop problem-solving, critical thinking, and teamwork skills. A key outcome for students will also be increased learning to document findings and communicate technical concepts effectively to diverse audiences. environmental impact, and the scientific methods used to study them. The students will also build their resume through participation in the industry projects, and make connections with potential hiring managers and project team at the EPIC's corporate and affiliated research partners including Siemens Energy, Duke Energy, Dominion Energy, ABB, and Honeywell.

Required training of 2 hours with Description: Students will undergo comprehensive lab safety training before they can work in the lab. This includes fire safety and prevention, building emergency and evacuation, IT security training, laboratory safety, personal protective equipment 2.0, hazardous waste management, slips, trips, and falls, and back safety and injury prevention. All other training during the project will be on the job training and undergraduate students will be paired with graduate students and/or full-time research staff to develop competency in the use of lab equipment and machinery.

Mentoring plan: To ensure students' success in the projects at Flexible Energy Lab, I am committed to establishing a strong mentor-mentee relationship with the students throughout their research journey. I will accomplish this through the following:1) I will set and communicate my expectations to the students early and clearly as they start work on the project in the lab. The students will meet

directly and regularly with me to share their progress, address challenges, and set deliverables. I will use the meetings to provide timely feedback and guidance while ensuring that they feel supported and confident in their work. As the projects follow industry driven timeline, students will have clear idea of their upcoming deliverables. As they will be working as part of larger groups including graduate students, industry representatives, and research staff, I will lay out expectations on establishing a healthy team work environment and culture. I have open door policy and students will be able to share their progress and concerns and receive timely feedback and intervention from me. 2) I will ensure that students receive thorough training in laboratory techniques and the use of specialized equipment necessary for research in power and energy systems. They will have access to laboratory equipment and resources as well as trained lab staff including me to help them with any technical challenges. 3) I will encourage the students participate in co-curricular activates including marine energy and wind collegiate competitions, IEEE Power and Energy Society student chapter, and IEEE student branch meetings. I will also make the students aware of other professional development opportunities including EPIC Scholars immersive workforce development program, Lunch and Learn Recruiting Events from EPIC affiliates (GE Vernova, Burns and McDonnel, Pike Engineering, and Framatome) and resume building workshops. 4) I will also support and encourage students to develop their oral and written presentation skills through presentation of their work at UNC Charlotte Undergraduate Research Symposium, IEEE Southeast and Green Technologies conferences and workshops, and other local and regional professional venues. 5) I will also introduce the students to EPIC's industry partners to help them build their professional network. The networking at EPIC will be very helpful in findings internships, coops, and job placements.

Applicant Requirements: The students are expected to be pursuing an undergraduate program in engineering preferably electrical, mechanical, computer, or engineering technology. Basic data analysis skills and familiarity with tools including Excel, MATLAB, and Simulink is preferred but not required. Training will be provided to students to build these skills through the course of the project.

Applicant Preferences: Students are expected to have strong written and oral communication skills with ability to document and present the research findings. They are also expected be comfortable working in hands-on lab environment and use of electronic/electrical tools and equipment. The students should also possess a strong aptitude and curiosity to learn, adherence to safety culture around high power equipment and rotating machinery in the lab, and drive to meet the project deadlines and deliverables. It will also be beneficial if students have interst in power and energy careers and pursuit of energy concentration in the Lee College of Engineering undergraduate programs.

Specific Time considerations/conflicts: None. I work with students around their academic schedules and provide ample opportunities for them to adjust their schedules in accordance with their coursework requirements.

App ID #: 1990

Mentor: Molavi-Zarandi, Marjan Email: mmolaviz@charlotte.edu

Title: Research Associate Professor

Department: Mechanical Engineering and Engineering Science

Co-mentor:Yes

Ali Bonakdar, abonakd1@charlotte.edu, Mechanical Engineering and Engineering Science

Community engaged research: No

Title: Print-to-Sense: 3D-Print a Tiny Touch Sensor

Description: Big idea: Some materials make a small electrical signal when you press them. In this project, you'll help create small 3D-printed "touch tiles" from a ceramic that can feel a tap and send a signal to light an LED or show a live graph on a laptop. No prior research experience is required. We teach every step, work side-by-side, and keep safety at the center.How you'll contribute (your duties).You will be part of a small team that designs, makes, and tests simple touch-sensor tiles. Tasks are hands-on but scoped for beginners:Make (with supervision): prepare and label small powder batches; assist with the 3D-printing workflow using checklists; keep a neat lab notebook.Process: help dry and heat-treat parts in ovens/furnace (supervised); measure size and mass; record times/temps/settings.Wire & Test: paint or stencil simple silver electrodes, attach thin wires, and read the "press-to-voltage" signal with a handheld meter or a basic data-acquisition setup.Show & Tell: make one clear plot from your data and create a one-page poster; build a tiny "tap-to-light" demo or a live signal display.Safety first :Before you handle anything, you'll receive hands-on safety training about PPE, handling, cleanup, and waste.PPE required at all times (lab coat, gloves, safety glasses; mask when handling powders).No solo work—all tasks are supervised.No food/drink in the lab; wash hands after work; follow posted SOPs.All waste goes into clearly labeled, approved containers.A typical week:15–30 min check-in: plan the week's goal (print two tiles and test one).One lab block (2–3 hrs): complete a safe, supervised task (printing, processing, or testing).15–30 min wrap-up: save data, update your notebook, and note what to try next.What you'll learn:How a touch becomes a voltage.How to run a small experiment with binder jetting additive manufacturing (3D printing): change one thing, measure carefully, make a clear plot, and draw a conclusion.Good lab habits: PPE, clean workflow, precise notes, file naming.Communication: a simple, attractive one-pager and a live demo that tells your story.Optional stretch paths (choose what fits you).Make-more path: try a lattice or thinner tile and compare sensitivity.Data/code path: stream the signal into Arduino or Python and plot taps in real time.Design path: sketch a phone-sized pad and plan how to scale from one tile to many.Why this is a great first research experience: You finish with real artifacts (a working demo + a clean plot/poster), transferable skills (safe lab work, basic measurement, simple coding/plotting), and a clear story for internships or grad applications: "I built a touch sensor from scratch and proved it works."

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

1 positions available

Anticipated Student Learning Outcomes: After this project, students will be able to:Explain piezoceramic sensing—how a press turns into a measurable voltage—in plain language.Plan and run a simple experiment: define variables, collect data, make clear plots, and support a conclusion.Practice safe lab work: correct PPE, careful handling, clean workflows, proper waste, and accurate notebooks.Use basic tools/equipment: a binder-jet 3D-printing workflow (assisted), ovens/furnace (supervised), handheld meters, and simple electrode making.Communicate results: build a one-page poster and a short demo (tap-to-light or live signal plot), and present to a general audience.Reflect and translate skills to careers: tie their experience to teamwork, problem-solving, communication, professionalism, and technology useHow students will talk about it afterwards:"I helped 3D-print and test ceramic touch sensors. I designed a small experiment, collected and cleaned data, and proved my tile worked by lighting an LED when tapped. I learned safe lab habits, plotting, and how to explain my results clearly."

Required training of 8 hours with Description: Before starting, students complete the required 3D-printing training with step-by-step guidance. Orientation covers PPE, clean lab habits, safe handling of specialty materials, supervised equipment use, basic emergency procedures, and proper waste labeling. Students then learn equipment basics through assisted introductions to the binder-jet workflow, supervised oven/furnace operation, balances, and a handheld d33/voltage meter, followed by a brief benchtop rehearsal using checklists.

Training hours: 8 (front-loaded across safety/compliance, 3D-printing fundamentals, and the practice run).

Mentoring plan: What you can expect: You'll have a supportive, safety-first experience with clear goals and quick feedback.Who you'll work with: Dr. Marjan Molavi-Zarandi (faculty mentor) + an experienced graduate student (day-to-day near-peer). Dr. Ali Bonakdar advises as needed.Contact: Weekly 15–20 min 1:1 with Dr. Molavi-Zarandi; weekly progress meetings will be planned based on Dr. Molavi-Zarandi and your availability. Brief bench stand-ups on lab days.Training. Week 1: safety, PPE, clean-lab habits, and 3D-printing basics (binder-jet workflow). Guided practice run to make your first sample.Milestones:Weeks 2–3: make two baseline tiles; pass simple quality checks.Weeks 4–6: add electrodes; get your first voltage plot.Weeks 7–10: run a mini-experiment on one variable; comparison plot + 3 takeaways.Weeks 11–12: build a reliable tap-to-light (or live-plot) demo.Weeks 13–14: finalize one-page poster + 2-min talk.Presenting. Submit to a student conference or summer symposium if time/results allow.Our commitments: No solo lab work; supervised equipment use; clear, kind feedback; scope adjusted to your pace; letters for strong contributors.Your commitments: Show up prepared, follow safety rules, keep a tidy notebook, communicate early if stuck and respect shared equipment/time.

Applicant Requirements: We are looking for students who are:Reliable and safety-first, willing to follow standard operating procedures and ask questions.Curious, comfortable learning by doing, and respectful teammates.Able to attend one weekly lab block and a short check-in.Comfortable with basic algebra/graphs and using Google Sheets/Excel for plotting.Willing to wear PPE and keep a clean, organized notebook.

Applicant Preferences: (Optional (nice-to-have), student learn these on the project.)Additive manufacturing experience Intro materials/manufacturing or circuits course; basic CAD familiarity (SolidWorks).

Specific Time considerations/conflicts: To support supervision and printer access, we aim for the following and can flex around class schedules:

Weekly progress meeting (1 hour): typically Wednesdays, 11:00 AM–12:00 PM (on campus or Zoom).

One supervised lab block (2–3 hours): commonly Tue or Thu, 1:00–4:00 PM—or another daytime window that fits your classes.

If these conflict with your courses, note your availability in the application and we'll coordinate an alternative within standard business hours.

App ID #: 1991

Mentor: Montanaro, Erika Email: emontana@charlotte.edu

Title: Associate Professor

Department: Psychological Science

Co-mentor:Yes

Annelise Mennicke, amennick@charlotte.edu, Social Work

Community engaged research: No

Title: Large-Scale Data Projects with UNC Charlotte's Violence Prevention Center

Description: The Violence Prevention Center is seeking undergraduate research assistants to work on two large-scale data projects aimed at reducing community violence. Project 1: Project BOOST is a collaboration between the Violence Prevention Center and Atrium/Advocate health to explore the relationship between Atrium Health's Project Boost hospital-based violence intervention program with data from Mecklenburg County Sheriff's office, Department of Social Services, and Charlotte-Mecklenburg Schools to track violent recidivism outcomes and social determinants of health. Project 2: Collaborating with Fraser Health based in British Columbia, Canada and the Violence Prevention Center, we will focus on assessing Project EMBRACE (forensic nurse examiner program). Specifically, we will have access to Fraser Health's deidentified program-level data to describe demographic and assault characteristics for individuals who present with dating app-facilitated sexual assault and individuals who present with non-fatal strangulation. An undergraduate student will participate in data cleaning, analysis, and report development that depicts findings. For those interested in health promotion, sexual violence prevention, gun violence prevention, and quantitative research and storytelling, and gaining a better sense of the research process, this would be a great opportunity.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

2 positions available

Anticipated Student Learning Outcomes: Students will be able to learn about how to: analyze numerical data, tell a compellingstory based on data, develop figures that convey research findings, use health promotion andprevention frameworks for research and practice, manage project timelines, and use researchto inform or recommend improvements to existing interventions and programs.

Required training of 3 hours with Description: The student will receive training at the beginning that describes the purpose and goals of the

project, the recruitment and data collection process, and the process of basic quantitative analysis. The student will be able to

work with the mentor and graduate student weekly, online synchronously. Many meeting will take place virutally, with flexibility for on campus meetings.

Mentoring plan: After understanding the student's professional development goals, they will be able to workdirectly with the mentor and graduate student on their professional development goals weekly.We will set an agenda with weekly lab topics. These can include CV/resumedevelopment, applying for graduate school, applying for jobs, choosing a graduateprogram/career, different research strategies and techniques, and even self-care in academia.The student will be able to work closely with the graduate student and learn more aboutgraduate school life.Weekly lab meetings will be structured as: 1) Check ins and updates/get to know each other,2) Descriptions of the research process and next steps, 3) Professional developmentdiscussion/workgroup, and 4) Questions and closing.Weekly meetings with the graduate student will be structured as: 1) Check ins andquestion/answer, 2) research workgroup/working time synchronously with time for the studentto ask questions, clarify confusions, or address concerns, and 3) professional developmentdiscussions from the graduate student perspective.If the student is interested in attending a conference and presenting, we can work with thegraduate student to identify a relevant conference to submit our work.

Applicant Requirements: Students must have taken a research methods course and have a basic understanding of research and the research process. (Students that have taken research methods I and II are preferred; however, if students have only taken research methods I they are still encouraged to apply.)Students do not need extensive research experience.

Applicant Preferences: Students that have taken research methods I and II are preferred; however, if students haveonly taken research methods I they are still encouraged to apply.Students who can communicate in an effective and timely manner, meet project timelines, andare interested and/or passionate about storytelling, writing, image and figure making, andmaking sense of different stories/narratives are encouraged to apply.

Specific Time considerations/conflicts: We are flexible and can determine meeting times with the student.

App ID #: 1992

Mentor: Chen, Xiang Email: xchen50@charlotte.edu

Title: Assistant Professor

Department: MEES

Co-mentor:No

Community engaged research: No

Title: Toward Stable Perovskites: Atomistic Modeling of Dislocation Physics

Description: Metal halide perovskites (MHPs) are low-cost, solution-processable semiconductors with outstanding optoelectronic properties, but their operational stability remains the key barrier to deployment. Dislocations are central to this challenge: their cores perturb local chemistry, mediate phase change, and can act as fast-ion pathways or nonradiative recombination centers. Yet quantitative data on core structure, Peierls stress, and mobility in MHPs are scarce because experiments at the relevant length and time scales are difficult. This project will deliver an atomistic study of dislocations in representative MHP compositions under controlled shear and temperature, quantifying active slip systems, core configurations, Peierls stresses, and assessing how composition and point defects modify dislocation behavior and phase stability.The participating undergraduate will be trained by the advisor and graduate mentors in high-performance computing and molecular dynamics (MD). After onboarding, the student will run MD simulations to (i) compare dislocation behavior across MHP chemistries and (ii) probe how dislocations influence phase stability pathways. Where appropriate, a reactive force field will be employed to cross-check results from classical MD. The student's simulations and post-processing (e.g., dislocation identification/analysis) are expected to contribute to a journal manuscript or conference presentation.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: Students will be able to learn the usage of high-performance computing and atomistic simulations. They will gain experience working in the cutting-edge interdisciplinary field of energy, material science, nanoscience, and mechanical engineering. They will develop skills in analyzing simulation results with tools such as MATLAB and OVITO. They will also have the chance to exercise their prior knowledge on plastic deformation of materials and gain a new understanding of that from a microscopic perspective.

Required training of 6 hours with Description: Students will receive roughly three two-hour trainings conducted by the advisor and assisted by the graduate students, with an access to the UNCC high-performance computing center. After the initial training, the students will get continuous training while working on the project through group meetings and one- on-one meetings with the advisor and the graduate student mentor.

Mentoring plan: The student will receive hands-on trainings on accessing high-performance computing and conducting atomistic simulations. After the initial training, the student will meet

with the advisor to develop weekly plan and major milestones to be accomplished, as well as the deliverables and research expectations. The student will have weekly in-person meetings with the advisor. The student will also participate in the regular lab group meeting to be exposed to a collaborative work environment and other cutting-edge research topics.

Applicant Requirements: Interest in nanoscience, physics, computer programing, and simulations. Interest in reading cutting-edge research papers.

Applicant Preferences: Proficiency in MATLAB, Python, or a similar programming language. Fundamental knowledge of material science such as crystal structures.

Specific Time considerations/conflicts: Weekly group meetings (Dates/times TBD)

App ID #: 1993

Mentor: Li, Xuyang Email: xli65@charlotte.edu

Title: Assistant Professor

Department: College of Engineering, ETCM

Co-mentor:No

Community engaged research: No

Title: Learning Dynamical Systems from Data with Scientific AI

Description: From predicting the chaotic patterns of weather, like the famous "butterfly effect", to modeling the flow of air over a wing, our world is governed by dynamics, the mathematical language of change. While scientists strive to describe these rules mathematically, a major barrier in modern science is that for many complex, real-world systems, the exact expressions are either unknown or incomplete. The project dives into the cutting-edge field of Scientific AI, where we train a series of deep neural networks to learn the dynamics of systems directly from data. This model, a Neural Ordinary Differential Equations (Neural ODEs), combines the power of deep learning with classical calculus. While the approach is powerful, it presents a grand challenge: creating models that are not only fast enough for real-world use but also precise and reliable enough to be trusted for scientific discovery. Your Role: As the undergraduate researcher on this project, you will be the lead in exploring this crucial gap. Your mission will be to design and implement advanced machine learning models and complete a machine learning workflow for scientific discovery. You will dive deep into computational experiments, implementing Neural ODEs and systematically investigating how different numerical choices have a direct and measurable impact on the AI's performance. Throughout this process, you will build practical skills in model training on modern hardware like GPUs. You will also analyze the data from your experiments, create visualizations to interpret your findings, and draw conclusions that could help scientists everywhere build faster, more trustworthy AI models. No prior research experience is necessary. We are looking for a student with a passion for scientific computation and programming, a curiosity for big scientific questions, and a desire to work at the forefront of AI.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

1 positions available

Anticipated Student Learning Outcomes: The student researcher will gain significant hands-on experience at the cutting edge of scientific machine learning and scientific data. They will learn to implement and train advanced machine learning models (i.e., Neural Ordinary Differential Equations), managing the full lifecycle of a computational experiment from design to data analysis. This project uniquely bridges abstract mathematical theory with practical application, as the student will investigate how numerical methods directly impact the performance of complex AI systems. Beyond technical skills, the student will develop critical thinking by analyzing results, forming hypotheses, learning to present scientific data professionally through clear plots and visualizations, and drawing evidence-based conclusions. They will learn to communicate complex ideas across math, science, and AI through weekly mentorship and a final presentation. Ultimately,

the student will build a professional research workflow and develop the methodical habits essential for a future career in a technical or scientific field.

Required training of 2 hours with Description: As a purely computational study with no human subjects, the project requires only the Responsible Conduct of Research (RCR) module for university training.

Mentoring plan: The mentor's philosophy is to guide the student's transition from a classroom learner to a capable researcher, equipping them with the technical, critical thinking, and professional skills essential for a career at the intersection of artificial intelligence and scientific discovery. This philosophy is put into practice through a structured and supportive mentoring plan. The student can expect a weekly meeting to set goals, review progress, and receive direct technical guidance. The mentor will guide the student in mastering a computational research workflow: running simulations, analyzing output data, and documenting the code and results. A key outcome is a successful presentation at the end-of-term symposium, and the mentor will provide dedicated guidance on preparing the abstract, poster, and presentation. Should the project yield significant results, the mentor may also fully support the student in preparing a submission for a peer-reviewed conference or journal. Throughout the experience, the mentor will remain accessible and provide all necessary resources for the student to succeed.

Applicant Requirements: 1) Strong background in mathematics, or completion of foundational courses in Calculus and Linear Algebra (e.g., MATH 2241 and MATH 2164). 2) A genuine enthusiasm for applying Artificial Intelligence to scientific questions. 3) Programming in Python. 4) Excellent communication skills and a proactive attitude toward problem-solving.

Applicant Preferences: 1) Familiarity with differential equations and numerical methods (e.g., through course MATH 2171). 2) Prior coursework or experience in Machine Learning or Artificial Intelligence. 3) Hands-on experience with deep learning frameworks.

Specific Time considerations/conflicts: The majority of the research work (e.g., coding, running experiments, analyzing results) can be completed on a flexible schedule that accommodates the student's academic coursework.

The student must be available for one weekly 1-hour meeting with the mentor. The specific day and time will be determined based on mutual availability.

App ID #: 1996

Mentor: Yang, Jing Email: jyang13@charlotte.edu

Title: Professor

Department: Dept. of Computer Science

Co-mentor:Yes

Dr. Martha Cary Eppes, meppes@charlotte.edu, Dept. of Earth, Environmental and Geographical Sciences

Community engaged research: No

Title: Become a Cyberinfrasturcture Co-Developer: Finalize a Cutting-Edge Earth Science App (EVIS)

Description: MOTIVATION: One of the most important ways scientists learn about Earth is to monitor the environment over time. Whether it's daily streamflow, recording earthquake shaking, or tracking changes in climate over thousands of years, time series data (data collected as things change over time) is one of the most powerful tools for Earth Science research and applications. The U.S. Geological Survey alone has collected more than 850,000 station-years of hourly and daily records on rivers, lakes, rainfall, and water quality—an almost mind-boggling amount of data! And with climate change impacting almost every Earth system, geoscientists rely on this type of time series data more than ever to track, understand, and predict the impacts of global change. THE CHALLENGE: Although time series data are everywhere, it's often hard – if not impossible - to explore, visualize, and analyze quickly and efficiently. The demand and knowledge around easy-to-use but powerful cyberinfrastructure (CI) tools has exploded, but, remarkably, none to date has filled the need for time-series data. What if you could build a tool that let scientists visually filter, compare, and analyze huge Earth Science datasets in just a few clicks? That's exactly the kind of work this project is about—making big, messy datasets usable, browsable and exciting! Doing so will help Earth Scientists to solve real-world problems in hazards, climate, and resource management. PRIOR WORK: The mentors of this project (Profs. Yang (Computer Scientist) and Eppes (Earth Scientist) have been working together for almost a decade to build EVIS – an app that will serve any Geoscientist (student to expert) wishing to examine and analyze numeric or categorical time series data across any timescale and with as few or many dimensions as required. The capability is already there for the science requirements of EVIS. The Earth Science experts that have reviewed what EVIS can do find it to be a 'game changer' for their work! PROBLEM THE OUR STUDENT WILL SOLVE: Currently, however, EVIS is not 'hardened'. In other words, the average Earth Scientist cannot just 'plug and play' their data into EVIS. Also, the interface is clunky and not user-friendly. Fixing these CI issues is a CRUCIAL step towards making this important software available to the Earth Scientists around the world that Dr. Eppes has already assembled and who are waiting for its release!There are several aspects of this problem that the student could work on (data management, UX/UI, API interface to large, free databases, user requirements, and more). The ultimate goal is to have a product at the end that the student's name will be attached to as a 'co-developer' and that we distribute to Earth Scientists for use!

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

4 positions available

Anticipated Student Learning Outcomes: Students will gain hands-on experience in app development, UI/UX design, and database management; collaborate with domain experts to turn user needs into solutions; and learn the workflow from data to visualization.

Required training of 4 hours with Description: We will introduce students to and train them on the current version of EVIS. They will meet with domain experts (like Dr. Eppes) to better understand user requirements before they start.

Mentoring plan: Both Dr. Yang and Dr. Eppes maintain an 'open door' policy, where we are always available to help and answer questions. In addition, students can also meet with Dr. Yang and/or Dr. Eppes as required or preferred by the student. Ex: weekly meetings, bi-monthly, etc. We want the student to feel confident to work independently, but also to know their limitations and to reach out for help when needed, rather than struggling and not making any progress.

Applicant Requirements: No prior experience in Earth Sciences is required. Strong skills in Python, JavaScript, and database management are required.

Applicant Preferences: Experience or coursework in app development, database management, UI/UX, and data visualization is preferred.

Specific Time considerations/conflicts: N/A

App ID #: 1997

Mentor: Chen, Xiang Email: xchen50@charlotte.edu

Title: Assistant Professor

Department: Mechanical Engineering and Engineering Science

Co-mentor:Yes

Soumitra Joy, s.joy@charlotte.edu, Electrical and Computer Engineering Department

Community engaged research: No

Title: Atomistic Simulations of Heat Transfer for Next-Generation Microelectronics

Description: Thermal transport across metal/oxide/semiconductor interfaces is a critical bottleneck in microelectronics, especially for exascale computing systems that power next-generation AI data centers and other high-performance platforms. Device reliability and junction temperatures are strongly influenced by electron–phonon coupling on the metal side and phonon mismatch across the oxide liner and silicon substrate, which together govern the spectral distribution of interfacial resistance. Yet, quantitative insight into these coupled processes remains limited due to the challenges of resolving spectral energy exchange at nanometer scales. This project will deliver an atomistic study of thermal conduction across representative metal interconnect/oxide liner/Si substrate stacks, using a two-temperature molecular dynamics framework that explicitly incorporates electron–phonon interactions. The work will quantify spectrally resolved interfacial resistances, explore the impact of oxide thickness and chemistry, and assess how nanoscale interface features influence overall thermal conductance.The participating undergraduate will be trained by the advisor and graduate mentors in high-performance computing and molecular dynamics. After onboarding, the student will run MD simulations to (i) evaluate heat transport across metal/oxide/Si interfaces under varying conditions, and (ii) analyze how electron–phonon coupling alters phonon transmission and thermal boundary conductance. Where appropriate, spectral decomposition methods will be employed to isolate frequency-dependent contributions. The student's simulations and post-processing (e.g., spectral analysis, thermal resistance extraction) are expected to contribute to a journal manuscript or conference presentation.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

1 positions available

Anticipated Student Learning Outcomes: Students will be able to learn the usage of high-performance computing and atomistic simulations. They will gain experience working in the cutting-edge interdisciplinary field of energy, material science, nanoscience, and mechanical engineering. They will develop skills in analyzing simulation results with tools such as MATLAB and OVITO. They will also have the chance to exercise their prior knowledge on heat transfer in materials and gain a new understanding of that from a microscopic perspective.

Required training of 6 hours with Description: Students will receive roughly three two-hour trainings conducted by the advisor and assisted by the graduate students, with an access to the UNCC high

performance computing center. After the initial training, the students will get continuous training while working on the project through group meetings and one-on-one meetings with the advisor and the graduate student mentor.

Mentoring plan: The student will receive hands-on trainings on accessing high-performance computing and conducting atomistic simulations. After the initial training, the student will meet with the advisor to develop weekly plan and major milestones to be accomplished, as well as the deliverables and research expectations. The student will have weekly in-person meetings with the advisor. The student will also participate in the regular lab group meeting to be exposed to a collaborative work environment and other cutting-edge research topics.

Applicant Requirements: Interest in nanoscience, physics, computer programing, and simulations. Interest in reading cutting-edge research papers.

Applicant Preferences: Proficiency in MATLAB, Python, or a similar programming language. Fundamental knowledge of material science such as crystal structures.

Specific Time considerations/conflicts: Weekly group meetings (Dates/times TBD)

App ID #: 1998

Mentor: Murtha, Timothy Email: tmurtha@charlotte.edu

Title: Professor

Department: Anthropology and Latin American Studies

Co-mentor:No

Community engaged research: Yes

Title: Mapping the Maya Landscape: GIS, LIDAR, and Community

Description: This project leverages large amounts of environmental big data to study the environmental and cultural history of the southern Maya lowlands from a deep time perspective. Specifically, students will process and annotate LIDAR data captured by plane and drone in southern Mexico, documenting Maya cities, households, and communities. Investigating the relationships among environmental systems and cultural systems, this work provides insight into past demographic, political, and social change along with associated urbanization and landscape transformations.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: Students will get hands on experience working with environmental big data and spatial analysis relying on remote sensing and advanced environmental modeling. Students will also learn to develop project plans, carry out specific tasks, define deadlines, and work with students from other institutions collaboratively. Specifically, this project focuses on the following student learning outcomes:Understanding the breadth of earth and environmental data available globally.Applying knowledge of geographic information systems to ongoing research.Analyzing primary data collected to better understand coupled natural and human systems.Evaluating the results of work collaboratively.

Required training of 10 hours with Description: Students will:

1. Begin the first two weeks focused on reviewing and learning about our research sites in Mexico along with an overview of the data we are using.

2. Receive orientation on data access and annotation principles.

3. Receive and review a working guide on best practices.

4. Review recent articles published by the research team to encourage curiosity for the overall research objectives.

Mentoring plan: Students will work closely with Dr. Murtha and postdoctoral fellows throughout the semester. Primarily, students will meet with a group of faculty and students over zoom weekly for one hour to review the past week's progress and the upcoming tasks and actions. We will also meet individually at least every two weeks to discuss questions, challenges, and future opportunities.

Finally, the main goal of this research is to prepare a report and publication. Students will have the opportunity to participate in both opportunities beginning mid way through the semester.

Applicant Requirements: Required Skills:GIS, CAD, RHINO, or similarly related computing experience. Evidence of this experience can be professional of the completion of GIS or related coursework. The primary activities will be conducted using ArcGIS pro. Familiarity with ArcGIS pro is preferred.Effective communication skillsCuriosity for computer analysis

Applicant Preferences: Desired Skills:Knowledge or interest in anthropology and archaeology or a related disciplineIndependently motivatedDesign, planning, or analytical skillsExperience with R or other statistical software packagesHas worked with interdisciplinary research teams

Specific Time considerations/conflicts: Students will be expected to be available for at least 2 hours each week for group and individual meetings in person or on zoom. These meetings will be conducted during the work week (M-F) 9:00 to 5:00pm, but will scheduled to fit into each student's schedule. Most work can be conducted independently or outside the normal work week.

App ID #: 1999

Mentor: Fagan, Terence Email: tjfagan@charlott.edu

Title: Director of Charlotte Super Fab Lab

Department: MEES and LCOE

Co-mentor:No

Community engaged research: Yes

Title: Redesigning a Battery-Powered Glass Chipper for Local Recycling Infrastructure

Description: As Charlotte builds momentum toward its Fab City vision, the need for distributed, battery-powered recycling solutions has become increasingly urgent. The Innovation Barn—a leader in local circular economy efforts—has expressed a clear need for a portable power system to operate a commercial glass chipper without dependence on fixed electrical infrastructure. This project addresses that challenge by designing, building, and testing a refined, battery-powered solution tailored for real-world implementation.In Spring 2026, this undergraduate research project will focus on developing a reliable, field-ready power system that integrates modern battery technologies, startup current control strategies, and energy-efficient design. The project will leverage the capabilities of the Charlotte Super Fab Lab and build upon data and design concepts explored in prior semesters. Although previous efforts identified promising approaches, they did not yield a fully deployable solution for the Innovation Barn. This new phase of research will take a more targeted, performance-driven approach—with a clear goal of moving the project from concept to application.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

3 positions available

Anticipated Student Learning Outcomes: Analyze electrical power systems for high-inrush load applications and identify causes of startup failure in motor-driven equipment.Design and prototype a battery-integrated system, selecting appropriate components for functional performance.Test and interpret system performance data, including voltage, current, thermal behavior, and mechanical output.Document designs using industry-standard tools such as KiCad and SolidWorks.Apply iterative design thinking to refine a previously developed prototype using testing feedback.Balance technical tradeoffs in energy storage, mobility, safety, and cost to meet real-world operational constraints.Communicate technical findings clearly through written documentation, engineering drawings, and oral presentations.Collaborate with community stakeholders to ensure the design meets functional and contextual needs.Evaluate the role of decentralized infrastructure in local recycling and sustainability systems.Contribute to open-source hardware ecosystems by producing replicable and shareable design documentation.

Required training of 10 hours with Description: - General lab safety, emergency procedures, and proper PPE usage

- Laser cutter operation for enclosures, mounting plates, or insulation panels

- FDM 3D printing for motor mounts, wire clips, or battery housings
- Soldering and electronics assembly (through-hole and basic SMT)
- Use of multimeters, oscilloscopes, and DC power supplies for circuit testing
- Battery safety and handling for lithium-ion or $LiFePO_4$ battery packs
- Wire gauge selection, fuse protection, and grounding for low-voltage DC systems
- Basic understanding and setup of soft starters, motor controllers, or VFDs
- Circuit design and editing using KiCad
- Basic mechanical fabrication: drilling, tapping, cutting for mounting or integration
- CAD editing using SolidWorks or Fusion 360 for housing or system layout
- GitHub version control and documentation practices for open-source contribution

Mentoring plan: I view undergraduate research as a collaborative, growth-centered experience that blends technical rigor with real-world purpose. To help the student succeed in this project, I will create an environment that is structured, supportive, and grounded in the authentic engineering design process.The student can expect to work directly with me on a weekly basis, typically through 1–2 scheduled meetings per week for project planning, technical guidance, and problem-solving. I will also be available between meetings for ad hoc check-ins as challenges arise. These meetings will help the student navigate technical hurdles, maintain momentum, and reflect on how their work contributes to broader systems-level goals.In addition to my mentorship, the student will collaborate closely with staff and Lab Assistants in the Charlotte Super Fab Lab, including the Lab Manager. This team will support the student with technical training, equipment access, and fabrication troubleshooting, especially during the build and test phases.Throughout the semester, the student will also be expected to:Present at internal Super Fab Lab review sessions, where they will share updates and receive feedback from peers and facultyDocument their work for open-source publication, using GitHub and other platformsPrepare a final presentation and poster for the UNC Charlotte OUR Spring Research SymposiumSubmit a proposal and present their work at the international Fab Lab Conference (FabXX) in summer 2026, representing UNC Charlotte and the Fab City Charlotte initiativeParticipation in the Fab Lab Conference will give the student an opportunity to engage with a global network of digital fabrication leaders, present their prototype and lessons learned, and contribute meaningfully to the open-source hardware and sustainability community.As a mentor, I commit to:Providing consistent, structured feedback throughout the projectOffering hands-on design and engineering support, especially around systems integration and performance testingSupporting the student in crafting a high-quality technical presentation for both local and international audiencesEnsuring that the student develops a well-documented, replicable body of work that is Fab Lab- and Fab City-alignedCreating a learning environment that emphasizes collaboration, resilience, and real-world relevanceThe student will finish this project not only with a deployable prototype and expanded technical skills, but also with the experience of presenting their work to both academic and global innovation audiences.

Applicant Requirements: For this project, I'm seeking a student who is curious, hands-on, and eager to work through complex technical challenges. This is a real-world problem with no guaranteed answers—which means the ideal applicant is someone who can think critically, iterate with purpose, and stay resilient through trial and error.You do not need to have mastered all of the tools or concepts at the start. What's more important is a willingness to learn, a strong work ethic, and the ability to follow through on both independent tasks and collaborative goals. If you bring energy, creativity, and a commitment to improving your skills, I'll help you gain everything else you need along the way.To be successful in this project, the student must:Be motivated to work independently and stay accountable to project goalsShow a strong interest in hands-on prototyping, energy systems, or sustainabilityBe willing to learn unfamiliar tools and technologies (both hardware and software)Demonstrate effective communication skills and openness to feedbackCommit to working approximately 20 hours per week over the course of the semesterBe comfortable working in a lab-based, project-driven environment

Applicant Preferences: Preferred Skills and ExperiencesWhile not required, the following background will make onboarding smoother:Experience with digital fabrication tools such as laser cutters, 3D printers, or soldering equipment (coursework, personal projects, or club work all count)Familiarity with basic electronics (e.g., circuits, batteries, motors, power supplies)Exposure to CAD software (e.g., SolidWorks, Fusion 360) or electrical design software (e.g., KiCad)Coursework or experience in areas like prototyping, energy systems, or design thinkingCuriosity about open-source hardware, the Fab Lab network, or the circular economy

Specific Time considerations/conflicts: There are none, the project days/times are flexible.

App ID #: 2000

Mentor: Fagan, Terence Email: tjfagan@charlotte.edu

Title: Director of Charlotte Super Fab Lab

Department: MEES and LCOE

Co-mentor:No

Community engaged research: Yes

Title: Locally Grounded: Adapting Open Footwear for Charlotte's Circular Economy

Description: Are you interested in sustainability, design, and making things with your hands? This project gives you the opportunity to work on a real-world problem: how to reimagine the shoes we wear using local materials and digital fabrication tools.Inspired by the Open Footwear initiative, this project focuses on adapting an open-source, modular running shoe design into a more versatile, all-purpose shoe that fits the needs of people living in Charlotte. You'll explore how we can shift from global mass manufacturing to locally made, locally sourced, and open-source products.As the undergraduate researcher, you'll work directly with a faculty mentor and staff in the Super Fab Lab to:Research and test local or recycled materials (like recycled rubber or textile scraps) for shoe componentsModify 3D models and fabrication files to improve the shoe's function, durability, or comfortUse tools like laser cutters, 3D printers, and CNC machines to prototype shoe partsAssemble and test a working shoe using the adapted design and materialsDocument your design and process so others can learn from and build on your workPresent your findings to the Fab City Charlotte community and possibly even at international conferencesNo prior experience in footwear is needed—just curiosity, a willingness to learn, and an interest in combining sustainability, design, and engineering.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

2 positions available

Anticipated Student Learning Outcomes: By participating in this research project, the student will gain a unique combination of technical skills, sustainable design experience, and real-world project exposure that goes far beyond what is typically covered in the classroom.This project invites the student to think deeply about how global products—like footwear—can be redesigned using local materials, digital fabrication, and open-source methods. It also encourages the student to consider how engineers and designers can contribute to solving civic and environmental challenges at the community level.Key learning outcomes include:Design and Fabrication ProficiencyThe student will learn to modify CAD models and use digital fabrication tools such as laser cutters, 3D printers, and CNC routers. They'll gain experience applying design-for-manufacture principles and working within constraints related to materials, performance, and sustainability.Material Evaluation and TestingThe student will develop an understanding of materials science in a practical context by sourcing, testing, and selecting locally available or recycled materials for different parts of the shoe (midsole, outsole, upper). They will analyze flexibility, durability, and ease of fabrication.Problem-Solving and IterationWorking with open-ended problems and incomplete solutions, the student will strengthen their ability to think

critically, test hypotheses, and respond to failure productively. Iteration will be central to their design process.Project Planning and ExecutionThe student will practice breaking down a complex design challenge into manageable phases, maintaining clear milestones, tracking progress, and adapting their plans as challenges arise.Open-Source Documentation and CommunicationThe student will learn to document their work so that it can be understood and replicated by others—creating value beyond the lab. This includes version control, writing technical documentation, and preparing materials for GitHub or similar platforms.Presentation and Public EngagementThe student will present their work to internal and external audiences, including Fab City Charlotte stakeholders, other undergraduate researchers, and possibly the international Fab Lab community. These presentations will help them develop confidence in public speaking and professional communication.Civic-Centered Engineering PerspectiveBy working on a project with real-world social and environmental relevance, the student will come to see themselves not just as a technical problem solver, but as someone who can contribute meaningfully to the wellbeing of their city and the sustainability of their planet.How Students Might Talk About This Experience Afterwards:"I helped design and prototype a sustainable shoe that could be made locally using recycled materials and open-source tools. We used CAD, laser cutters, and 3D printers to make it real.""I learned how to think like a systems designer. We weren't just making a product—we were thinking about supply chains, local economies, and environmental impact.""I worked with real community partners and presented my work to other researchers and sustainability professionals. I feel confident taking on real-world design challenges now.""I built a professional portfolio piece that shows how I applied engineering skills to sustainability and open-source design.""This was the first time I saw how engineering and design can serve my community directly. I'll be thinking about local impact in all of my future projects."

Required training of 15 hours with Description: The onboarding process will include both required university research compliance and targeted training aligned with the Super Fab Lab's equipment and safety protocols. The goal is to prepare the student to safely and confidently contribute to all phases of the project—from material testing to digital fabrication to open-source documentation.

1. Institutional Onboarding & Compliance

The student will complete all relevant training outlined by the Office of Research Protections and Integrity (ORPI), including:

Responsible Conduct of Research (RCR)

Lab Safety and Hazardous Materials (if applicable)

Human Subjects Training (if stakeholder interviews are conducted)

The student will submit required forms via the ORPI Smartsheet portal: ORPI Compliance Form

2. Super Fab Lab Orientation & Technical Training

During the first two weeks of the project, the student will receive hands-on training in the Super Fab Lab, including:

General Lab Safety and Tool Access Training

Emergency procedures, PPE, and safe use of tools

Laser Cutter and 3D Printer Operation

Cutting outsoles, fabricating molds, printing components for testing

Material Handling and Post-Processing

Working with recycled materials, adhesives, and finishing tools

Electronics Workstation (if applicable)

Soldering and power tool safety (used for certain tooling or fixtures)

3. Digital Design Tools & Documentation

The student will also be introduced to:

CAD Software (SolidWorks or Fusion 360)

Used to modify Open Footwear design files

GitHub and Open-Source Documentation Standards

Students will learn how to publish their files and contribute to the broader Open Footwear community

Digital Project Log

A shared folder or digital notebook to track progress and reflect on design choices

This layered approach ensures that the student begins the project well-equipped, both from a compliance standpoint and in terms of technical readiness, while also fostering professional habits that will serve them in future research or industry roles.

Mentoring plan: This project is designed to give students meaningful, hands-on experience in open-source design, sustainable manufacturing, and digital fabrication—all while solving a real-world challenge. As a mentor, I take seriously the responsibility of guiding students through not only the technical aspects of the project but also the process of professional and personal growth.What the Student Can Expect from MeWeekly 1-on-1 Meetings:The student and I will meet once per week in a structured session to review progress, talk through challenges, and define next steps. These meetings are designed to keep the student focused and supported, while building independence over time.Frequent Informal Check-ins:Because this is a lab-based, fabrication-heavy project, the student can expect frequent informal interactions throughout the week, either during open lab hours or via email/Slack. I will also review and provide feedback on their design files, fabrication plans, or documentation as they iterate.Co-Mentorship Support from the Super Fab Lab Team:The student will work closely with our Super Fab Lab Manager and trained Lab Assistants. These staff members will provide targeted guidance on machine usage, material selection, safety, and digital workflows. This creates a team-based learning environment where students are supported from multiple angles.Presentations & ReflectionThe student will be expected to present their work at:Weekly or biweekly internal Fab Lab update meetingsThe UNC Charlotte OUR Research

Symposium (URC) at the end of the semesterThe international Fab Lab Conference (FabXX) in Summer 2026, if selectedThese presentations offer opportunities for peer feedback, public speaking practice, and refinement of the project's narrative.Commitments I Make to My StudentsI will provide a structured onboarding and ensure they receive all necessary safety and fabrication training early in the semester.I will offer constructive and timely feedback, especially during key phases like material testing, CAD iteration, and documentation.I will help the student connect their project to broader systems and goals, including circular economy principles, Fab City Charlotte initiatives, and open-source community impact.I will assist the student in preparing for future opportunities by helping them document their work in a way that supports applications, interviews, and portfolio development.Ultimately, I aim to create an environment where the student is challenged but supported, independent but not isolated, and technically capable but also deeply reflective about their role in shaping a more sustainable and inclusive future.

Applicant Requirements: To be successful in this project, a student must:Be curious, reliable, and able to work both independently and collaborativelyBe willing to learn and operate fabrication tools (laser cutters, 3D printers, etc.) safely and responsiblyShow interest in sustainability, design, or local production systemsCommit to 10 hours per week for the full semester and stay accountable to a clear project timelineCommunicate clearly, ask questions when stuck, and be open to feedback and iterationComplete required safety and research training (ORPI, lab orientation, etc.)This is a hands-on, design-driven project, so students must be comfortable engaging with messy, open-ended problems and learning by doing.

Applicant Preferences: While not required, the following skills or experiences will make onboarding faster and allow the student to dive deeper into the project:Familiarity with digital fabrication tools (e.g., laser cutting, 3D printing, or CNC)Some exposure to CAD software (such as SolidWorks, Fusion 360, or Onshape)An interest in open-source design, circular economy principles, or community-based engineeringExperience with prototyping or product development—through coursework, clubs, or personal projectsPrior work with materials (e.g., polymers, textiles, recycled goods) or experience evaluating material performanceComfort using tools like GitHub or documenting technical workThat said, I encourage students to apply even if they don't check all these boxes. If you're motivated to learn and care about making a local impact, you're exactly who this project is for.

Specific Time considerations/conflicts: The project days and times are flexible.

App ID #: 2016

Mentor: Faklaris, Cori Email: cfaklari@charlotte.edu

Title: Assistant Professor

Department: Software and Information Systems

Co-mentor:No

Community engaged research: No

Title: Decoding Algospeak: Developing AI-Powered Tools for Safer Online Spaces

Description: Are you interested in the intersection of artificial intelligence, language, and online safety? Join our research project to tackle the growing challenge of "Algospeak" – the coded language, emojis, and creative slang used to bypass online content moderation systems. In this project, you will contribute to the development of a novel framework that combines the power of Large Language Models (LLMs) with human-in-the-loop oversight to detect and understand emerging forms of Algospeak. Students will gain hands-on experience with natural language processing, machine learning, and data analysis while helping to create a more transparent and adaptive system for identifying harmful content and protecting vulnerable online communities. This is a unique opportunity to work on a cutting-edge issue in threat intelligence and contribute to making the internet a safer place.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

2 positions available

Anticipated Student Learning Outcomes: By the end of this project, students will be able to:Develop a Statistical Model: Students will build, train, and assess a natural language processing model or other data-driven model, likely using Large Language Models (LLMs) or other established tech, to accurately classify various forms of "Algospeak."Implement a Human-in-the-Loop (HITL) Workflow: Students will design and manage a system that integrates human feedback for data annotation, which will be used to continually retrain and improve the model's detection capabilities.Analyze and Report on Linguistic Trends: Students will analyze text data to identify emerging "Algospeak" patterns and effectively communicate their findings, highlighting the implications for online safety and threat intelligence.

Required training of 20 hours with Description: We want students to complete the CITI certifications for social-behavioral research and for responsible conduct of research. This can be done in the first few weeks if not already achieved. Students will also have to come up to speed on our existing research in this domain.

Mentoring plan: We are a big research group in CCI. Our approach is centered on fostering the student's growth as a researcher by providing a structured yet flexible environment. We believe in social learning and co-located work to spark innovation. We believe in learning by doing, with guidance and support readily available. We expect both undergraduates and faculty/graduate students to maintain regular communication on progress and obstacles. Faculty may take the lead in mentorship for some weeks, with a graduate student stepping up in other weeks. Weeks 1-3 will

be dedicated to getting up to speed and organizing specific plans, including establishing 1:1 and group meeting schedules. Weeks 4-9 are the main push to make progress. Weeks 10-16 are dedicated to wrapping up specific threads, preparing presentations or publications, planning for next steps, and ensuring a smooth handoff of all files and code. Expectations for all involved are as follows: Mentor (Faculty/Graduate Student):Provide overall project direction and context.Guide student's learning of core concepts in HCI, NLP, social media, and online safety and trust.Assign tasks that are challenging but achievable.Offer regular, constructive feedback.Connect the student with relevant resources and networking opportunities.Foster a supportive and inclusive research environment.Mentee (Undergraduate Student):Actively engage in learning and ask questions.Manage time effectively to meet deadlines and contribute to meetings.Maintain and share a research log to document progress, challenges, and solutions.Be proactive in seeking help and feedback.Contribute positively to the research team.Adhere to research ethics and data privacy protocols.

Applicant Requirements: This is a project that needs “both halves" of the brain engaged. The student must be comfortable with discussing concepts in math, data, and programming, even if it is not something they personally feel expert in. The student must also have had some exposure to political and social dynamics in U.S. social media and a willingness to spend time analyzing posts that use polarized language.

Applicant Preferences: The ideal candidate(s) will have prior experience with this topic or have conducted related research or coursework in data science, machine learning, HCI, and/or the social sciences. However, we are willing to onboard a student who may lack these experiences but who is thoughtful and interested in this project's goals. We are especially interested in students who have spent a lot of time online and have some experience of how conversations are conducted in different types of social media spaces.

Specific Time considerations/conflicts: We will set a 1:1 and group meeting for the project. Our group meetings have taken place this semester in person on Wednesdays from 1p-2p in Woodward Hall. The student may also need to arrange co-working times with other students on the project, depending on whether they need help or are working together to help speed things along.

App ID #: 2007

Mentor: Hammelman, Colleen Email: chammelm@charlotte.edu

Title: Associate Professor

Department: Earth, Environmental and Geographical Sciences

Co-mentor:Yes

Ian Binns, ibinns@charlotte.edu, Reading & Elementary Education

Community engaged research: No

Title: Misinformation's Deadly Outcomes

Description: Federal food assistance programs, including the current iteration, the Supplemental Nutrition Assistance Program (SNAP), have been debated since their inception in 1939. Politicians focus on topics like fraud, program cost, and eligibility requirements, while social service providers and nutrition advocates highlight their role in preventing hunger, promoting positive health outcomes, and economic benefits to society. Misinformation harms these programs and their participants, which can lead to policy decisions that limit access to SNAP for eligible families, resulting in negative health and societal consequences. This research aims to understand the nature and impact of SNAP misinformation. The first phase of this new project entails collecting and analyzing public information from policymakers, including press releases, Congressional hearings, and social media posts, to identify what specific misinformation is being disseminated and who is spreading it.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: Student researchers will gain knowledge about food systems and access, public health, misinformation, and science education. They will also gain skills in collecting public data and, depending on progress during the semester, analyzing that textual data. These experiences can contribute to students' critical thinking, technology, and engagement across perspectives skill areas beneficial for career success.

Required training of 5 hours with Description: Students will be provided with readings and training on the project topic. The student will also be provided with training for effectively collecting data from public officials and analyzing textual data. This project does not require IRB training.

Mentoring plan: The students will meet with one of the faculty mentors at least every other week. During this time, the faculty mentors will provide training (as outlined above), discuss research tasks and progress, answer questions, and otherwise support students as they complete research and build their skills.

Applicant Requirements: Students should have an interest in food systems, misinformation, and/or science education. Students should also be prepared to learn how to collect large amounts of public data efficiently. Good communication skills and an orientation to detail are critical.

Applicant Preferences: Experience with collecting large amounts of public data and/or in the subject matter is preferred. Prior research experience is beneficial.

Specific Time considerations/conflicts: Students must be available to meet with the research team during standard working hours for at least one hour every other week. The specific day/time will be arranged at the start of the semester.

App ID #: 2008

Mentor: Perry, Heather Email: hrperry@charlotte.edu

Title: Associate Professor of History

Department: History

Co-mentor:No

Community engaged research: Yes

Title: Charlotte in the Trenches: WWI & the Re-Shaping of the Queen City

Description: This project is focused on how the First World War impacted the social, cultural, geographic, and economic life of Charlotte and the surrounding area of North Carolina. How did the First World War impact women, children, and civilians on the Charlotte homefront? How did the war impact local schools, education, and families? How did daily life change when Charlotte was chosen as the location for a new US Army training camp: Camp Greene? How did the arrival of 60,000 soldiers impact the city's economic and entertainment life? How did the city's faith communities – Catholic, Protestant, Jewish -- contribute to Charlotte's war effort? How did the war impact the city's African-American, German-American, and Irish-American communities? These are just some of the questions that I am trying to answer in my current research project: WWI and the Re-Shaping of the Queen City. I am looking for students to help me with two kinds of research: research in online databases (historical newspapers, magazines, and government documents); and in-person research in the Atkins Library Special Collections; the Charlotte Mecklenburg Public Library; and other area archives.Students will help in identifying and collecting materials on topics such as: Camp Greene; Charlotte's chapters of the Red Cross, YMCA, and YWCA; Charlotte's K-12 schools; the activities of Charlotte's Jewish and Catholic communities; and the developments in local businesses. Students will be encouraged to focus on a couple of topics so that they can dig deep into the topics.Students also have the opportunity to develop digital materials for the online Digital History website: Carolina in the Trenches (carolinainthetrenches.org).

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: Students can expect to develop and refine the following skills: identifying and evaluating suitable historical research materials (critical thinking);entering and organizing research sources into Zotero bibliographic software (technology skills; organizational skills; professional tools); communicating with a variety of on-campus and off-campus archival specialists and historical professionals (professionalism; communication; teamwork); working collaboratively with me and others to organize and analyze research data via online tools: Googledocs; Googlesheets; and Googlesites (technology; critical thinking; teamwork; leadership; professionalism); and researching and recovering the “forgotten history” everyday people who lived and worked in Charlotte, NC (engagement across perspectives).

Required training of 0 hours with Description: Students should already have some experience using library or archival databases, but they will receive more training on using them for this project. Students will also be instructed in how to use Zotero software.

Mentoring plan: Students will meet with me in person every week for 1 hour. This will enable me to help with their tech skill development. They will also likely meet with Amanda Binder, the History Librarian, as they dig deeper into the research. In addition to this in-person meeting, we will have an "email check-in" once per week to report progress or problems. Finally, over the course of the project, students are keeping an online Research Log – which I monitor and on which I provide feedback and guidance. I will encourage the student to present their work at the Undergraduate Research Conference, as well.

Applicant Requirements: Required Skills: Students should have taken at least one undergraduate research skills or methods skills course (such as HIST 3600 or similar course in another department)Students should have experience with using the Atkins Library online research tools (database, catalogue)Students should have experience using the suite of Google apps (docs, sheets, slides)Students will be required to use cameras and mics on any Zoom meetings (as well as ensure a professional background)Students should have a genuine desire to learn about the past and be willing to spend 4-5 hours each week diligently closely reading through materialsStudents should have excellent written communication skills – in particular good writing, spelling, and punctuation (database work must be error-free)

Applicant Preferences: Desired Skills (not required, but must be willing to learn): Experience using Microsoft WordExperience using Bibliographic Software (Zotero, EndNote, or similar)Desired ExperiencesExperience in collegiate-level history courses

Specific Time considerations/conflicts: Students will need to be available for weekly meetings with me.

App ID #: 2009

Mentor: Zhao, Tiefu Email: tzhao5@charlotte.edu

Title: Associate Professor

Department: Dept of Electrical and Computer Engineering

Co-mentor:Yes

Dr. Kamal Paul, kpaul9@charlotte.edu, EPIC

Community engaged research: No

Title: Lightweight AI for Safer Solar: Undergraduate Research on PV Arc Fault Detection

Description: Photovoltaic (PV) systems are increasingly important in renewable energy but face a serious safety challenge: DC arc faults, which are unintended electrical discharges that can cause fires and equipment damage. This project explores lightweight artificial intelligence (AI) techniques to detect arc-fault signals early and reliably. Undergraduate students will work on scaled and student-friendly tasks as part of an ongoing research project.What you'll do (with training and support):Assist in setting up sensors and instrumentation for a PV emulator and arc-fault testbench.Collect and label voltage and current data under normal and fault conditions.Apply basic signal processing (e.g., FFT, spectrograms) using Python or MATLAB.Test introductory ML models (e.g., logistic regression, SVM) to classify signals.Support prototype evaluation and maintain clear lab documentation.Prepare a poster and short technical brief for the OUR showcase.Your work will directly support the safety of solar-energy systems and connect to ongoing research at UNC Charlotte's Renewable Energy and Power Electronics Advanced Research Lab (RE-PEARL)

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

1 positions available

Anticipated Student Learning Outcomes: By the end of the term, you will be able to:Explain what PV arc faults are and why they are dangerous.Collect, process, and visualize time-series data from lab instrumentation.Apply Python/MATLAB for feature extraction and introductory machine learning.Follow laboratory safety practices (EHS training provided).Communicate findings through a research poster and brief report.These outcomes align with NACE Career Readiness Competencies: critical thinking, teamwork, communication, professionalism, and technology use.

Required training of 6 hours with Description: • Safety training: Lab safety and equipment orientation (EHS + project specific).

- Technical modules: Python basics for data analysis, Git/GitHub workflow, signal labeling.

Mentoring plan: Weekly 1:1 check-in (30–45 min) with Dr. Paul for planning and troubleshooting.Biweekly group meeting with Dr. Zhao's lab team for feedback and integration.Milestones: instrumentation → data collection → preprocessing → ML baseline → poster

draft → final presentation .Deliverables: private GitHub repo, lab notebook, poster, and brief.We commit to clear scope, timely feedback, and support from graduate researchers. Students will be encouraged to present at OUR events and optionally pursue conference submissions.

Applicant Requirements: Interest in renewable energy or applied machine learning.One course in circuits or signals (or equivalent background).Basic Python or MATLAB programming (arrays, plotting).

Applicant Preferences: Signals & Systems or Machine Learning coursework.Experience with oscilloscopes or sensors.Familiarity with Git, Jupyter, or PyTorch/TensorFlow.

Specific Time considerations/conflicts:

- Flexible schedule with one weekly group meeting (time TBD).
- Remaining hours can be arranged around classes.

App ID #: 2011

Mentor: Waterkotte, Erik Email: ewaterko@charlotte.edu

Title: Associate Professor

Department: Art & Art History

Co-mentor:No

Community engaged research: No

Title: Environmental Stewardship as Fine Art: Sustainable Art in Papermaking and Printmaking

Description: In a world of dwindling resources and rising costs, I am moved to examine more sustainable practices in artistic production. For the last 5 years I have pursued a practice of creating mixed-media works that are carbon-neutral. I believe it is imperative that creatives and makers take the lead in discovering sustainable and net-zero ways of producing and I believe Art is the perfect, unique production space to do that within. In my artwork, found and foraged materials intersect on layers of recycled and natural handmade paper. Environmental Stewardship as Fine Art: Sustainable Art in Papermaking & Printmaking is a continuation of this creative research focusing on increased production and documentation of such sustainable practices, to create larger scale works and facilitate classroom teaching of sustainable art practices. As part of this project students will learn what constitutes an effective natural or recycled material for art making and how to prepare it. Students will collect/forage and prepare natural and recycled materials for printed and handmade paper arts. Students will learn about collaboration and communication, researching existing techniques and documenting new methods. Students will help document effects and proper workflow for creative productions of handmade paper artworks and monoprints. Students will help expand existing methods to more effective productions Examples of such practices already practiced in my creative research include collecting, clarifying, drying, and milling local red clay to create an orange pigment and foraging, drying, stripping, and boiling milkweed for paper fiber. I am looking to work with 3-4 interested students this coming spring semester. Students will be trained in gathering and collecting natural fibers and earth for paper and pigments, as well as recycled materials like old paper and clothing. Students will learn how to prepare and/or reconstitute material for handmade paper and monoprints. As part of this process students will learn how to use a pulp beater, create handmade paper and be trained in silkscreen printmaking. Students will be collaborators in exploring and growing this practice and documenting it's methodology.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

3 positions available

Anticipated Student Learning Outcomes: This project will require students to forage and prepare natural and recycled materials for printed and handmade paper arts. Students will study and learn basic principles and materiality of earth-based pigments, botanicals, and fibers. Students will produce natural pigments and fibers and work together to explore graphic applications in print and papermaking. Students will collaborate, work in a small team, collect, document, and share data on the material qualities and applications of natural and recycled materials. This project will

facilitate students' engagement across multiple perspectives, collaboration, communication, and professionalism.

Required training of 12 hours with Description: I have recently filed an ORPI for this project in which I included specific examples of activities to make sure it is above board. I will train and supervise students on foraging, collecting, preparing, and applying materials in relief and silkscreen printmaking methods. This project will be hands-on and in the majority cases I will directly supervise the preparation and application of materials by students.

Mentoring plan: As mentioned, I will primarily be working with and supervising the students directly (that is also why I'm only requesting 2-3 students to work with). Except for the foraging and collecting part of the project, I will be working directly with students to prepare and apply the materials for the production of various artworks for exhibition. The work will at times be tedious but I plan to guide and mentor the students to pace themselves accordingly and learn how to breakdown a large project into small goals and steps. I will try to understand the students own instincts, existing skillsets, and personalities to see how they can best serve the project. For instance, one student may be a very focused on milling material down for pigment (which takes patience and a keen eye for consistency), while another student may gravitate towards writing and documentation. I would like these students to feel invested in the project.

Applicant Requirements: Ability to focus, strong work ethic, willingness to learn new things, willingness to practice and re-do work if necessary, interest in creativity and art, interest in sustainability and ecology as it pertains to everyday life

Applicant Preferences: Students must be willing to work with their hands and be okay with getting a little dirty. Students must be okay with working, collecting, and foraging outdoors in small groups and individually. Students must be okay traveling off campus to locations in and around Charlotte. Students should have their own vehicle/means of transportation. Collecting and foraging may involve hiking.Students will need a certain level of patience and thoughtfulness to participate. I imagine this would be of interest to students working in Earth Science, Geology, possibly Chemistry but it could be of interest to students as a juxtaposition to their studies in more academic and theoretical areas. This research project is based in practice and discovery. There may be text research on locating various techniques and chemistry but for the most part students should expect to work with materials directly.

Specific Time considerations/conflicts: Students and I will need to schedule time to train and work together. They will need to have Friday mornings/afternoons available and possibly have time one other morning/afternoon on Mon or Wed. Ideally, the students will forage/collect during the week on their own and then we will work together on Fridays to prepare and/or apply materials. The extra Mon or Wed shouldn't be necessary if they have Friday's available

App ID #: 2010

Mentor: Joy, Soumitra Email: sjoy1@charlotte.edu

Title: Assistant Professor

Department: Electrical and Computer Engineering

Co-mentor:No

Community engaged research: No

Title: Thermal-Aware Design of Electronic Wires

Description: Have you ever noticed your laptop getting hot after a long study session or a gaming marathon? Or maybe you've felt the heat coming from your phone when you've been scrolling for hours. That heat isn't just uncomfortable; it's a huge problem in the world of electronics. It slows down your devices, drains batteries, and can even cause permanent damage.Think about the massive data centers that power things like ChatGPT and Google's search engine. These places are filled with thousands of computers that get so hot they require thousands of gallons of water to cool them down. That's a huge waste of energy and a major challenge for the tech industry. The Heart of the Problem: Wires At the core of every electronic device are tiny wires. They might seem simple, but they're the highways that carry all the information between different electronic chips. And just like any highway, when things get too hot, traffic gets jammed. When these wires heat up, their ability to carry signals gets worse, and they age faster.In this project, we're going to simulate the fundamental physics behind these wires. We'll use special software to create a digital version of a wire and simulate its behavior. This will let us see exactly how its electromagnetic performance changes as the temperature rises. We'll watch as the wire's signal-carrying ability "declines" in real time. Your Mission: The Cool Down Challenge ❄ The ultimate goal of this project isn't just to understand the problem; it's to solve it. Once we've seen how heat impacts our digital wire, we'll become design engineers. We'll experiment with different shapes, materials, and structures to design a better, cooler wire. We'll try to find a way to make a wire that can dissipate heat more effectively, keeping our electronics running faster, longer, and more efficiently.This isn't just a theoretical exercise. The skills you'll learn in this project—from device physics to advanced simulation software—are what engineers at companies like Intel and Apple use to build the next generation of computers. You'll gain a deeper appreciation for the unseen challenges behind the technology we use every day and get to contribute to a more sustainable and efficient future. Are you ready to take on the challenge

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

1 positions available

Anticipated Student Learning Outcomes: What's In It For You? This isn't just another class project. This is a chance to build skills and experiences that will make your resume stand out and give you a huge advantage in your career.Apply Foundational Knowledge: This project is for students who want to take their theoretical understanding of device physics and electromagnetics from the classroom and apply it to a real-world engineering challenge. You'll gain a deeper appreciation for the principles you've studied by seeing how they directly impact the performance of electronic

devices.Gain Hands-On Technical Skills: You will get to use professional-grade electromagnetic simulation software—the same tools used by engineers at places like Apple and NVIDIA. You'll learn to model, analyze, and troubleshoot designs in a virtual environment, a skill that is highly sought-after in the industry.Build Your Professional Identity: Imagine walking into a job interview and being able to say you helped design a better wire. You'll have a tangible project to discuss that demonstrates your understanding of a major industry challenge and your ability to apply technical skills to solve it. This is the kind of experience that gets you noticed.

Required training of 15 hours with Description: They will be training on electromagnetic simulation software by the Professor and the PhD students.

Mentoring plan: How We Will Work Together You'll work closely with our PhD students, who will serve as your primary mentors. You can expect frequent, hands-on guidance from them as you navigate the project.We hold weekly research meetings. You are expected to join these meetings to discuss your progress and engage with the team. I am flexible and we can adjust meeting times or schedule additional Zoom calls if needed. Your Opportunities You will present your work in our weekly group meetings to build your presentation skills.If your work is impactful, we will support you in presenting at academic conferences.My commitment is to help you build the skills and experiences necessary for your future career.

Applicant Requirements: Required Qualifications To succeed in this research, a student must have completed an introductory course in Electromagnetism or Electrodynamics, such as a sophomore-level university physics or electrical engineering course. This foundational knowledge is non-negotiable, as the project directly involves electromagnetic theory. Experience with Matlab or another programming language is also required, as you'll be writing scripts and analyzing data. We need someone who is prepared to apply their academic knowledge to a practical problem.

Applicant Preferences: Desired Characteristics Beyond the required courses, we're looking for a student with the following characteristics:Motivation and Initiative: We want a student who is genuinely excited about the research and eager to take ownership of their work. A proactive attitude is crucial for success in a research environment.Problem-Solving Skills: The ability to think critically, troubleshoot issues, and propose creative solutions is essential. We don't expect you to have all the answers, but we do expect you to be resourceful and persistent in finding them.Time Management: This project requires a significant commitment. We're looking for a student who can manage their time effectively, balance academic responsibilities with research duties, and consistently meet deadlines.We are purposefully limiting the applicant pool to students with a strong theoretical background in electromagnetism to ensure they can hit the ground running and make meaningful contributions. While other skills are beneficial, a solid grasp of the core physics is the single most important prerequisite for success in this specific project.

Specific Time considerations/conflicts: You are required to provide a weekly update on your progress. Our weekly research meeting is when we typically do this. It is held on Tuesday evening. While the specific time will be set to accommodate the team, we can adjust it or arrange a Zoom meeting to offer more flexibility.

App ID #: 2012

Mentor: Brock, Amanda Email: abrock12@charlotte.edu

Title: Postdoctoral Fellow

Department: Anthropology

Co-mentor:Yes

Tim Murtha, tmurtha@charlotte.edu, Anthropology

Community engaged research: Yes

Title: Archaeology, Climate, and Community: Understanding Human Relationships with their Changing Environments

Description: How do people adapt to changing environments and preserve their heritage across generations? The Kawsay Pacha research team is exploring these big questions in the Peruvian Andes by studying ancient sites, archaeological artifacts, dynamic landscapes, and community histories. We are a community-based archaeological program that conducts research in the Huaylas River Basin, Peru in collaboration with the community of Huaylas. We combine traditional archaeological analysis with participatory research methods, oral histories, and innovative digital tools, like 3D modeling, GIS, and remote sensing, to understand how people in the past built resilient lives and how those lessons can inform today's response to climate change and associated cultural challenges. Beyond our research, we are also a project dedicated to producing tangible products that make our data both meaningful for the communities that we work with, and accessible to colleagues and student researchers for future use. As a student researcher, you will have the opportunity to work with a variety of research data collected in Peru that seek to explore this question of long-term human relationships with places in dynamic environments. Depending on your interests, strengths, and abilities, you may contribute to one or more of the following components of the project:Oral Histories & Ethnographic RecordingsHelp transcribe, organize, and analyze community oral histories recorded in Spanish. Some of these oral histories were recorded in 2023, 2024, with additional oral histories to be collected in 2026. These histories relate to community relationships with archaeological places in Huaylas, Climate change issues, and issues related to water accessibility. If you are a Spanish speaker, you may also help translate and summarize interviews for use in publications and presentations. Photo Repatriation & Archival MaterialsBetween 1960s - 1970s, Applied Anthropologist Paul Doughty conducted his dissertation fieldwork in the Huaylas River Basin as a Part of the Cornell University Vicos Project. Doughty's photographs capture a period of dramatic social, economic, and political transformation throughout the region that was catalyzed by a 7.8 earthquake in 1970 that left many communities devastated. After Doughty's recent passing, the Kawsay Pacha Project began collaborating with his son to digitize the photos for repatriation back to Huaylas. We are also developing a project that will pair the photos with community oral histories to understand how their landscapes and cultural traditions have changed prior to, and following the earthquake. To this end, students will assist in cataloging and analyzing historical and recent photographs of Huaylas, Peru. 3D Modeling of ArtifactsLearn how to create 3D digital models of ceramic vessels and other archaeological materials using photogrammetry software. These models will become part of an open-access

digital archive for students, researchers, and the Huaylas community.Remote Sensing & GIS MappingWork with satellite imagery, drone data, or GIS maps to help identify ancient canals, terraces, reservoirs, and other landscape features in the Huaylas River Basin. Students may also help clean and organize geospatial data or assist in preparing maps for public presentations based on their skill set.Database & Research SupportHelp organize and clean archaeological datasets, ensuring accuracy and accessibility for ongoing research. Students may also assist with literature reviews and background research on related topics in Andean Archaeology, Paleoclimate data, or climate change.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: Students will build critical thinking skills by learning to recognize patterns and form interpretations using different kinds of data (spatial, interview, photographic, archaeological). They will learn to work as part of the Kawsay Pacha team, communicate their progress, and achieve project milestones in a timely manner. They will also learn new digital tools (GIS, 3D modeling software, NVIVO, database management) and how to apply these tools to understand anthropological/archaeological data. Students will also build their leadership skills and confidence by taking ownership of a portion of the research project and learn to make decisions about data organization, categorization, and project interpretations, guided by their training and mentorship during team meetings. Depending on their interest, they will also have the opportunity to practice science communication skills and create informative posts for the research's project's social media outlets.

Required training of 10 hours with Description: Before beginning work on the project, students will complete CITI training for human subjects research, learn the project's data organization and management process. Depending on student interests, they will also need to be trained in 3D modeling, ceramic analysis software, QGIS, and/or NVIVO. Regardless, student researchers will be provided a project Manual that they can refer to that will detail important information related to the use of project software. Students will also be asked to review bibliography relevant to the project so that they have context for the data that they are researching.

Mentoring plan: As a mentor, my goal is to create a supportive and structured environment where students not only contribute to the research project but also develop skills and confidence that will serve them in their academic and professional journeys. Students can expect regular contact with me through weekly team meetings where we will discuss progress on research tasks, troubleshoot challenges, and reflect on how their contributions fit into the broader project goals. These meetings will also serve as opportunities to explore professional development, including scholarships, grants, and other career-building opportunities. In addition, students will be able to reach me by email and during office hours for one-on-one guidance, ensuring that support is available when needed.To set students up for success, I will provide a project manual with step-by-step guides to the software and research methods they will use, as well as access to a shared Google folder containing background readings, data, and contextual materials. During their scheduled research hours, I will be available in person to provide hands-on mentorship and ensure that students feel confident in their work. Whenever possible, I will assign tasks that align with each student's interests and skills, helping them connect the project to their own academic passions.Students will

also have opportunities to share their work more broadly. They will present updates during team meetings, and at the end of the project, they will prepare a poster or talk for the Undergraduate Research Conference. Depending on their level of involvement, students may also be included as co-authors on publications, posters, or public-facing materials produced from this research. I am committed to recognizing their contributions and supporting their growth beyond this project, including providing strong letters of recommendation for students who demonstrate dedication and excellence in their work.

Applicant Requirements: Confidence with Google drive and openness to learning new toolsGood time management and ability to meet agreed upon deadlinesGood Communication (asks questions, communicates issues or challenges, notifies mentor of personal issues or unforeseen complications) Attention to detail Has taken at least one course in the social sciences, humanities, geography, Latin American Studies, Environmental sciences, computer/data science or any related discipline.

Applicant Preferences: Spanish Speaker at an Advanced or Native Speaker level Experience with GIS or google earth pro is a plusExperience in statistical analysis using R is also a plus but not a requirement

Specific Time considerations/conflicts: Research will be set depending on student schedules and availability. Once schedules are determined students will need to attend weekly team meetings on zoom or in person at the agreed upon time.

App ID #: 2014

Mentor: Ghasemi, Amirhossein Email: ah.ghasemi@charlotte.edu

Title: Associate Professor

Department: Mechanical Engineering

Co-mentor:Yes

Anthony Bombik, abombik@charlotte.edu,

Community engaged research: No

Title: Electrifying and Automating a Golf Cart

Description: The BATT CAVE is working on modifying some old university golf carts to become a testbed for battery and autonomous driving research. With the help of faculty mentors Anthony Bombik and Amir Ghasemi, who have backgrounds in Li-ion Batteries and Autonomy, respectively, you will be responsible for replacing the old lead-acid battery system and interfacing with the control unit of the golf cart. While one student works on getting the electric powertrain up and running, the other student will work on a computer-controlled system that steers the car. Students will work together on both tasks, with the aid of faculty mentors, to complete the autonomous golf cart project by the end of the semester and collect battery and driving data for research purposes.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

1 positions available

Anticipated Student Learning Outcomes: Students will learn to think critically about a multifaceted engineering problem that impacts society. Students will practice classical research skills, gathering information about electric vehicle powertrains and autonomous measurement systems. Depending on the student's background, there will be opportunities for streamlining with computer coding and mathematic algorithms. This project will require a lot of hands-on work and skills with tools to disassemble a golf cart and re-assemble it with new components. At the end of this experience, the student should be well prepared to make their own decision about continuing research in autonomous vehicles or batteries.

Required training of 10 hours with Description: The student will need to be added to the BATT CAVE register for lab access. There may be some basic virtual training required by the university if the student has never conducted research or worked in a lab space before. The faculty mentors will provide additional material as necessary to onboard students with respect to battery science and autonomous control theory.

Mentoring plan: Our goal is to introduce undergraduate students to the lifestyle of a research group, and keep them on to research more if they enjoy it. The OUR students will attend biweekly lab meetings and present on their progress in front of their group. I make myself available for 1 on 1 support for all of my students weekdays 9-5 as long as I am not teaching, but in the past I have additionally scheduled weekly meetings with OUR students to help in their first research experience. Some of our PhD students have been known to step in and help from time to time. The

research groups are generally pretty friendly, and the students (ranging from undergrad to PhD) organized lab intramural teams, running groups, study groups, and social gatherings.

Applicant Requirements: Some prior lab experience (Biology, Physics, or Chemistry lab for example) Basic computer skills (microsoft office, email) Self starter, motivated, and can make progress independently Previous experience working with hand tools

Applicant Preferences: None of the following are necessary but would speed up the onboarding process:---- College of Engineering student Student with prior research experience Student that is considering a long term interest in research Student who has taken one of the mentor's courses

Specific Time considerations/conflicts: The only requirement is that we can find some mutually agreeable time to hold a weekly 1-on-1 meeting. The summer lab group meetings will be organized according to everyone's schedule and are difficult to predict. Ideally, the OUR student will also attend the lab group meetings; however, attendance is not required.

App ID #: 2015

Mentor: Chen, Yuting Email: ychen106@charlotte.edu

Title: Assistant Professor

Department: Engineering Technology and Construction Management

Co-mentor:No

Community engaged research: No

Title: RailRisk Advisor: A Web-GIS Tool for Assessing Railroad Trespassing Risk and Recommending Countermeasures

Description: I am seeking to hire an undergraduate research assistant to support initial data collection and preparation for the RailRisk Advisor project, which focuses on railroad trespassing risk and safety countermeasures in North Carolina. Responsibilities will include compiling and organizing spatial and historical data (e.g., railroad segment shapefiles, trespassing injury records, train operations data, and contextual factors such as population density), preprocessing data for geospatial analysis, and assisting with risk scoring model inputs.This position is ideal for students interested in transportation safety, GIS, and data analytics. Prior experience with ArcGIS, QGIS, or data processing is helpful but not required; training will be provided. Strong attention to detail and willingness to learn are essential.The role may also serve as an entry point for students considering graduate study in construction management, transportation engineering, or safety research. Students who demonstrate strong performance and sustained interest will have opportunities to continue into advanced research roles, including possible graduate assistantships.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

1 positions available

Anticipated Student Learning Outcomes: Participation in this project will provide undergraduate students with valuable technical skills, applied research experience, and professional development opportunities that extend well beyond the classroom. Students will directly engage with cutting-edge issues in transportation safety, geospatial analytics, and risk modeling, preparing them for future graduate study or professional careers in construction management, civil engineering, transportation planning, and related fields.

Required training of 0 hours with Description: Not aware as of now.

Mentoring plan: Mentoring PhilosophyMy goal is to help you grow into an independent, confident researcher who can translate data into real-world safety improvements. I emphasize clear expectations, steady coaching, and frequent feedback. You will learn by doing (guided practice on real project tasks), reflecting (short written updates), and sharing (presenting to peers and stakeholders).Who You'll Work WithPI (Dr. Yuting "Tina" Chen): overall supervision, weekly 1:1 check-ins, feedback on methods, writing, and presentations.Collaborators/Advisors: exposure to agency and industry experts during advisory calls and demos (listen-in at first; present later as you're ready).What You Can Expect From MeWeekly 1:1 (30–45 min): research planning, blockers, and feedback.Weekly group touchpoint (45–60 min): share progress, learn from others, and

practice concise updates.Clear scopes & timelines: every task includes a definition of done, due date, and example outputs.Skill building: structured mini-trainings (GIS fundamentals, data QC, version control, risk scoring, visualization, briefings).Professional development: support for posters, abstracts, resumes/CVs, and—if you're interested—grad school advising (SOP review, recommendation letters, timeline planning).

Applicant Requirements: These are the essentials that will help you succeed. If you bring these, we can teach you the rest.Reliability & professionalism: you keep agreed hours, meet deadlines, communicate early if blocked, and respect data/privacy guidelines.Clear communication: concise weekly updates (done/doing/blocked), responsive email, and willingness to ask specific questions.Attention to detail: careful file naming, versioning, and documentation so others can reproduce your steps.Basic data comfort: able to organize spreadsheets, clean simple tables, and follow a checklist; comfortable learning new tools.Growth mindset: curiosity about transportation/public safety problems and patience to iterate when data are messy.Availability: ~8-10 hours/week during the semester, plus a weekly 1:1 check-in.

Applicant Preferences: Dependable and detail-oriented: reliable with weekly hours, careful with data, and organized in documentation.Curious and eager to learn: interested in transportation safety, GIS, or data analytics; willing to try new tools.Good communicator: comfortable giving short weekly updates, asking questions, and working with peers/mentors.Some data/GIS experience helpful but not required: familiarity with spreadsheets, mapping, or simple analysis is a plus, but training will be provided.

Specific Time considerations/conflicts: The student can work on the project depending on his/her class schedules and available time.

App ID #: 2017

Mentor: Freeman, Heather Email: hdfreema@charlotte.edu

Title: Professor of Art

Department: Art & Art History (Project related to communications, creative writing, and technical writing, however.)

Co-mentor:No

Community engaged research: No

Title: Non-fiction and Fictional Podcast Writing

Description: OUR research scholars are sought for creative writing and editing on a new podcast series written and hosted by Prof. Heather Freeman. Freeman's podcast credits include 'Familiar Shapes' and the PRX series 'Magic in the United States'. Scholars will co-write and edit several episodes of thehybrid fictional-fact podcast seriesSpider Queen Road Trip, which is currently in pre-production. In this series, a protagonist drives across the country to retrieve information from a supernatural 'Spider Queen', which they hope will stop habitat loss in North Carolina. Instead, however, the trip turns into an odyssey or personal loss and growth, as the protagonists learns to weave the webs of their own fate, no matter the cost or resistance. Each episode will be co-written by Freeman and another creative writer (in this case, OUR student scholars). The team will work together to craft the main story beats of the series as well as those of individual episodes; time allowing, several episodes may also be recorded and begin post-production. Additionally, OUR student scholars have the option to learn about OOUX (Object-oriented User Experience) design, which will be employed to structure the major beats of the 38 episodes within the series.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

6 positions available

Anticipated Student Learning Outcomes: Students will learn about the process of drafting podcast episode outlines, recording draft episodes, editing and polishing writing for audio podcasts, and about the history of marginalized magical and esoteric practices in American history and the intersections of these histories with folklore, from the 19th century to contemporary social media. Students will have editorial and writing credits on episodes completed, and listed on the series as a whole.

Required training of 0 hours with Description: N/A

Mentoring plan: I will work with students to establish a weekly production meeting, and develop a production schedule collaboratively with them to track both milestones and assure that goals are realistic. Most of the meetings will be via Zoom or Riverside (for recording sessions). Students will be taught how to use Descript for draft edits, and use the editing process itself to build skill in the software. Students will work directly with me as the producer and lead writer, but if there is more than one students, we will also engage in synchronous peer editing sessions. The podcast itself will be the major output. If there are at least three students, it's likely we can complete the first season of the podcast series before the end of the semester, and we will have launch party at the end and

invite local media outlets. We will also go over marketing skills although unless they have some background in design, this will be handled by Freeman.

Applicant Requirements: Students should have had at least one the following classroom or practical experiences: creative writing, writing for podcasts, writing for audio, serial literature analysis (the course title might be different, as long as they have these practical experiences.) This could be college level or highschool work, but they should have complete, edited writing as a result of one of these experiences.

Applicant Preferences: Students should be able to respond to emails within 24 hours, commit to a regularly scheduled Zoom meeting time, and have, or be in the process of learning, good school-work-life boundaries.

Specific Time considerations/conflicts: I will work with students to find a time that fits in all our schedules, but they must have at least one-hour of availability between 9 - 12 or 1-4 pm on Mondays, Wednesdays, or Fridays.

App ID #: 2018

Mentor: Yang, In Hong Email: iyang3@charlotte.edu

Title: Assistant Professor

Department: Mechanical Engineering

Co-mentor:No

Community engaged research: No

Title: Electrical Stimulation of neurons and Schwann Cells

Description: This project explores how electrical stimulation (ESTIM) can influence communication between nerve cells (dorsal root ganglion, or DRG, neurons) and supporting cells called Schwann cells. We use a device (ESTIM) that delivers small electrical fields to cultured neurons. The system is designed so that the cell bodies of DRG neurons are on one side and their axons, along with Schwann cells, are on the other. This setup lets us observe how tiny structures inside cells, such as mitochondria and lysosomes, move between these two cell types. Understanding this process is important for research on how nerves regenerate after injury and how chemotherapy can lead to nerve damage, a condition known as chemotherapy-induced peripheral neuropathy (CIPN). Undergraduate students working on this project would help with preparing and maintaining the neuron and Schwann cell cultures, as well as assisting in experiments with the ESTIM device. They may also contribute to imaging studies, learning to use microscopes to capture live cell activity, and helping to track organelle transfer between cells. For students interested in computational work, there are opportunities to assist with AI-based image analysis or to support computer simulations that model how cells behave and how fluids move in the system. This combination of lab and computational tasks gives undergraduates a hands-on introduction to both neuroscience and bioengineering research.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

3 positions available

Anticipated Student Learning Outcomes: Students who participate in this project will gain a combination of technical, analytical, and professional skills that will prepare them for future careers in science, engineering, or healthcare. On the technical side, students will develop hands-on experience with cell culture techniques, electrical stimulation devices, and advanced microscopy, skills that are highly valuable in neuroscience, biomedical engineering, and biotechnology research. They will also practice AI-based image analysis and be introduced to computational modeling, which strengthens their data analysis and problem-solving abilities. Beyond technical expertise, students will build competencies emphasized by NACE. For example, they will strengthen their critical thinking and problem solving skills by troubleshooting experiments and interpreting data. They will develop teamwork and collaboration through working closely with graduate students and faculty, as well as communication skills by presenting their findings in lab meetings or conferences. The project also fosters career and self-development, as students explore potential paths in neuroscience, medicine, or bioengineering, while practicing professional lab conduct and time management. Afterward, we envision students describing this experience as

transformative, something that gave them confidence in a laboratory setting and showed them how classroom knowledge connects to cutting-edge research. Many will likely highlight their ability to work independently on meaningful tasks, contribute to a larger scientific question, and use advanced tools like microscopy and AI analysis. This experience will help them stand out for graduate school, medical school, or industry careers, as they will be able to clearly articulate both the technical skills and the transferable competencies they gained through their involvement.

Required training of 5 hours with Description: Before joining the project, students will complete all required compliance training through ORPI, which may include CITI Program modules on Working with the IACUC, Working with Rats in Research Settings, Reducing Pain and Distress in Laboratory Mice and Rats, Laboratory Personnel BSS, Biomedical Research (IRB), Animal Biosafety, OSHA Bloodborne Pathogens, Aseptic surgery, Conduct of Research (RCR), Human Subjects Research, and Animal Care and Use. In addition, all students will complete Laboratory Safety Training, Chemical Hygiene, Biosafety (BSL-2) Training, and Bloodborne Pathogens Training.

After completing the required online training, students will participate in hands-on onboarding within the lab. This begins with shadowing graduate students to learn sterile technique, proper handling of neuronal and Schwann cell cultures, and the safe use of the electrical stimulation (ESTIM) device. They will also be introduced to advanced imaging methods, first by observing, then practicing with non-experimental samples before working with live cultures.

Students focusing on the computational side will receive additional onboarding in AI-based image analysis software and basic fluid dynamics modeling, starting with tutorials and guided exercises.

Mentoring plan: Students in this project will be supported through a combination of structured mentorship and ongoing feedback. Day-to-day, they will work closely with graduate students, who will provide direct guidance on experimental techniques, data collection, and analysis. As the faculty mentor, I will meet regularly with the student to discuss progress, answer questions, and connect their lab work to the bigger picture of the research. Students can expect to have both scheduled weekly check-ins and opportunities for informal conversations whenever they need support. To help students build confidence and professional skills, I will encourage them to present their work during lab meetings once they have made progress on a project. For students who stay with the project long-term, there may also be opportunities to present at campus research symposia or external conferences. My commitment is to help each student prepare for these experiences, so they feel supported and successful, whether that means practicing presentations, reviewing data together, or connecting them with collaborators

Applicant Requirements: We are looking for students who are curious, motivated, and eager to learn. This project blends laboratory and computational work, there are multiple entry points depending on a student's background and interests. For students interested in the wet lab side, prior coursework in introductory biology or neuroscience will be helpful, but not strictly required. What matters most is a willingness to learn careful laboratory techniques, patience when working with cell cultures, and strong attention to detail. Students who enjoy hands-on problem solving and working as part of a team will be especially successful in this environment. For students drawn to the computational side, familiarity with basic coding (e.g., Python or MATLAB), image analysis, or

simulation tools is a plus, but again, not a prerequisite. Students who are comfortable troubleshooting, enjoy working with data, and are open to learning new software will find this aspect of the project rewarding.Across both areas, we value reliability, good communication, and a collaborative mindset. Research often involves trial and error, so persistence and the ability to learn from mistakes are key. We encourage applications from students at all levels, including those in their first or second year, as this project is designed to provide training and growth opportunities regardless of prior experience.

Applicant Preferences: Microfabrication techniques (soft lithography, PDMS molding).Cell culture experience, particularly with neuronal and glial cells.Familiarity with fluorescence microscopy and live-cell imaging.Proficiency in AI tools for image analysis.Experience with simulation software (e.g., COMSOL Multiphysics) for microfluidic design.

Specific Time considerations/conflicts: To be determined in the future.

App ID #: 2019

Mentor: Suresh Babu, Arun Vishnu Email: asures10@charlotte.edu

Title: Teaching Assistant professor

Department: MEES

Co-mentor:No

Community engaged research: No

Title: Gust mitigation on aircraft wings

Description: Airplane wings and helicopter blades encounter atmospheric gusts which can pose danger to the aircraft and its passengers. Can we adjust a flap or tab on a wing to negate the effect of a gust? If so how should we move them? This project will explore the effect of the gusts on the wing: how the air flow around the wing is affected due to the gust and how the sudden forces generated with the aim of developing strategies to counteracting the gust effects. The project will use the computational fluid dynamics (CFD) software STARCCM simulate a wing encountering various types of gusts. An undergraduate student with some background in introductory fluid mechanics and CFD shall be a able to, with the guidance of the mentor, develop an understanding of the basic aerodynamics of wings, and further study a wing or blade encountering a gust. The research will also involve the use of MATLAB for calculations and visualization.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

1 positions available

Anticipated Student Learning Outcomes: Students will have an excellent opportunity to apply classroom knowledge to tackle an interesting and critical real-world engineering problem. The project will also further enhance their understanding of fluid mechanics and enable them to further explore the concepts of aerodynamics. Besides, the project will also be a great platform to enhance the students' problem solving and mathematical modeling skills. Finally, through the use of STARCCM, the students will be able to expand their skillsets for a successful career.

Required training of 0 hours with Description: The students will be initially guided by the mentor to develop an understanding of the relevant aerodynamic theory and the software. The students will also be initially guided to operate some existing MATLAB programs for visualization and calculations. Through the course of the project, the student will develop simulation frameworks in STARCCM and make small-scale modifications to the existing setups to simulate and various scenarios.

Mentoring plan: Mentoring meetings will be set up with the mentor weekly on a recurring basis during weekdays 9-5. The mentor will also be available to meet more often whenever needed. Smaller discussions will also be addressed through email communications .

Applicant Requirements: Familiarity with undergraduate-level fluid dynamicsExperience with STARCCM

Applicant Preferences: Interest in aerodynamics

Specific Time considerations/conflicts: NA

App ID #: 2020

Mentor: Pieper, Kelsey Email: kpieper@charlotte.edu

Title: Assistant Professor

Department: Civil and Environmental Engineering

Co-mentor:No

Community engaged research: Yes

Title: NC well water surveillance system

Description: We are partnering with the North Carolina Department of Health and Human Services to develop a well water surveillance system. Private wells are a primary drinking water supply in North Carolina, but there are known widespread contamination issues. To support local health departments, our team is building an interactive mapping tool that will help identify at-risk private wells and enable more targeted outreach and monitoring campaigns.As part of this project, students will contribute to the design of a well water geodatabase and associated training modules, citizen science sampling approaches, and/or spatiotemporal data analysis using machine learning. Specific activities will be tailored to student interests and may include:Curating remotely sensed data products and/or datasets from organizations such as NC Department of Environmental Quality, NC Department of Health and Human Services, and US CensusAnalyzing data to evaluate trends in water quality based on natural, built, and social driversDeveloping geodatabase training materials for local health departmentTranslating scientist sampling strategies into user-friendly, accessible processesPresenting findings and/or materials to local health departments

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

4 positions available

Anticipated Student Learning Outcomes: Students who participate in this project will gain and/or strengthen: Technical skills in areas such as GIS, data management, and data analysis Community engagement skills through collaboration with the North Carolina Department of Health and Human Services and local health departments Applied research experience, including design or interpreting disparate sampling procedures, conducting data analyses to inform policy, and presentation of findings to diverse audiences Interdisciplinary expertise at the intersection of environmental science, engineering, and public health

Required training of 0 hours with Description: None but students will participate in the Private Well Class over the course of the semester

Mentoring plan: With the faculty advisorParticipate in weekly one-on-one meetingsComplete structured onboarding and training in datasets, GIS, programming (R/Python), and citizen science approaches as appropriateDevelop project milestones and deliverables for the semesterWithin the research teamParticipate in biweekly/monthly team meetings to learn about the boarder research Collaborate with other faculty and graduate students to broaden training opportunities Engage with professionals from the North Carolina Department of Health and Human Services and local health

departments to understand context of their workOther activities Present findings to local health departments to receive feedbackBegin developing findings into a report and/or manuscript

Applicant Requirements: Students should be willing to learn and grow within the project, and will receive training and mentorship to build technical and professional competencies. Preferred qualifications include:Motivated and eager to learn new skills Strong scientific communication skills Background knowledge of GIS software (e.g., ArcGIS), if interested in GIS-focused work Experience with spatial analysis, if interested in data analytics Experience coding in R or Python, if interested in data curation

Applicant Preferences: We are looking for students who are motivated, curious, and eager to engage in interdisciplinary research. Successful applicants will demonstrate initiative, the ability to work collaboratively, and a willingness to learn new technical and professional skills.

Specific Time considerations/conflicts: Available for a weekly meeting, with the time to be determined based on the team's schedule

App ID #: 2021

Mentor: Suresh Babu, Arun Vishnu Email: asures10@charlotte.edu

Title: Teaching Assistant professor

Department: MEES

Co-mentor:No

Community engaged research: No

Title: Fluid -flow energy harvesting mechanism using oscillating wings

Description: This project will explore the idea of a fluid-flow energy harvesting mechanism using oscillating wings. The project will use the computational fluid dynamics (CFD) software STARCCM simulate the energy harvester under various incoming flow conditions. An undergraduate student with some background in introductory fluid mechanics and CFD shall be a able to, with the guidance of the mentor, develop an understanding of the basic fluid dynamics of the harvester, and further study the energy harvesting mechanism. The research will also involve the use of MATLAB for calculations and visualization.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

1 positions available

Anticipated Student Learning Outcomes: Students will have an excellent opportunity to apply classroom knowledge to tackle an interesting and critical real-world engineering problem. The project will also further enhance their understanding of fluid mechanics and enable them to further explore the concepts of aerodynamics. Besides, the project will also be a great platform to enhance the students' problem solving and mathematical modeling skills. Finally, through the use of STARCCM, the students will be able to expand their skillsets for a successful career.

Required training of 0 hours with Description:

The students will be initially guided by the mentor to develop an understanding of the relevant theory and the software. The students will also be initially guided to operate some existing MATLAB programs for visualization and calculations. Through the course of the project, the student will develop simulation frameworks in STARCCM and make small-scale modifications to the existing setups to simulate and various scenarios.

Mentoring plan: Mentoring meetings will be set up with the mentor weekly on a recurring basis during weekdays 9-5. The mentor will also be available to meet more often whenever needed. Smaller discussions will also be addressed through email communications .

Applicant Requirements: familiarity with undergraduate fluid dynamicsexperience with STARCCM

Applicant Preferences: interest in fluid/aerodynamics

Specific Time considerations/conflicts: NA

App ID #: 2022

Mentor: Suresh Babu, Arun Vishnu Email: asures10@charlotte.edu

Title: Teaching Assistant Professor

Department: MEES

Co-mentor:No

Community engaged research: No

Title: Modeling and Simulation of electric aircraft

Description: This project focuses on the modeling and simulation of electric aircraft. It will explore the design, dynamic performance, energy efficiency, and environmental impact of next-generation electric propulsion technologies using simulation tools such as MATLAB and Simulink. Students will gain hands-on experience in system modeling, aircraft performance, flight dynamics, and multidisciplinary design, contributing to the development of sustainable aviation solutions. Ideal for students interested in aerospace, energy systems, and mathematical modeling.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

1 positions available

Anticipated Student Learning Outcomes: Students will have an excellent opportunity to apply textbook knowledge to tackle an interesting and critical real-world engineering problem. The project will also further enhance their understanding of concepts from mechanics and enable them to further explore the concepts of aircraft performance and design. Besides, the project will also be a great platform to enhance the students' problem solving and mathematical modeling skills. Finally, through the use of MATLAB and Simulink, the students will be able to expand their skillsets for a successful career.

Required training of 0 hours with Description:

The students will be initially guided by the mentor to develop an understanding of the relevant theory and the software. The students will also be initially guided to operate some existing MATLAB programs for visualization and calculations. Through the course of the project, the student will develop simulation frameworks in MATLAB and SIMULINK and make small-scale modifications to the existing setups to simulate various scenarios.

Mentoring plan: Mentoring meetings will be set up with the mentor weekly on a recurring basis during weekdays 9-5. The mentor will also be available to meet more often whenever needed. Smaller discussions will also be addressed through email communications .

Applicant Requirements: Familiarity with MATLAB and SIMULINKComfortable with concepts from dynamic systems

Applicant Preferences: Passionate about aircraft/aerospace

Specific Time considerations/conflicts: NA

App ID #: 2023

Mentor: Peterson, Nicole Email: npeters8@uncc.edu

Title: Professor

Department: Anthropology

Co-mentor:No

Community engaged research: Yes

Title: Improving health outcomes for Black women in Mecklenburg County

Description: In collaborating with the Madie Maddox Smith Women's Health Equity Institute (WHEI, https://ncwomenshealthequityinstitute.org/), we will be collecting and analyzing qualitative data analysis to examine: (1) impacts of (not having) support on the wellbeing of Black women in Charlotte, (2) the forms of support that would have the most impact on these women, and (3) the barriers to these forms of support. In North Carolina, Black Women are more likely than white non-Hispanic women to die from cancer (21.2 vs 19.3%), diabetes (5.1 vs 2.3%), or nephritis, nephrotic syndrome and nephrosis (3.8 vs 1.8%) (NCSCHS nd). In addition, Black women report experiences of discrimination during healthcare encounters that include dismissed concerns, decreased empathy, and lack of awareness of the impact of racism on health (Wright, McFarlane, and Francis 2022; Janevic et al. 2020; Hardeman, Medina, and Kozhimannil 2016). Given the increased health risks and discrimination among Black women, the proposed research project will examine what kinds of programmatic support might help decrease these impacts on Black women and their health. We have determined through previous conversations with Black women Leaders and research that there are unmet needs around understanding and accessing the available resources. In particular, while there is heterogeneity in their experiences, our research documented many women experiencing challenges related to the Superwoman complex, secrecy norms that prevent sharing challenges particularly around mental health, and problems communicating with medical professionals due to racism and cultural norms. The listening sessions also revealed the value of spaces like group discussions for overcoming challenges around secrecy and norms, and that efforts that build trust and relationships, and increase the visibility of a variety of providers can help address some of the health disparities. The OUR student would work with WHEI leadership and the faculty mentor (who is part of the WHEI leadership team) to conduct and analyze interviews, participate in WHEI efforts, and present on findings to WHEI and potentially other partners. We expect to conduct 20 interviews that will last about 60-90 minutes, and be conducted via zoom or phone, or in a room on a UNC Charlotte campus. Researchers will correct Zoom transcriptions of the interviews, removing any identifying information. Transcripts will be coded using nVivo with codes developed from the questions above and those that emerge during coding. This is a continuation of research from Spring 2024, so some interviews from that period may be analyzed. Results will be compiled into a presentation for the WHEI and participants wishing to learn about these, and will be shared on the WHEI website, with policymakers involved with WHEI and others, to inform the WHEI Summer Institute in 2026 and other activities. A research paper will also be published. References Hardeman, Rachel R., Eduardo M. Medina, and Katy B. Kozhimannil. 2016 Structural Racism and Supporting Black Lives — The Role of Health Professionals. New England

Journal of Medicine 375(22): 2113–2115. Janevic, Teresa, Naissa Piverger, Omara Afzal, and Elizabeth A. Howell. 2020 “Just Because You Have Ears Doesn’t Mean You Can Hear”—Perception of Racial-Ethnic Discrimination During Childbirth. Ethnicity & Disease 30(4): 533–542. North Carolina State Center for Health Statistics (NCSCHS). Nd. Leading Causes of Death in North Carolina, 2019. https://schs.dph.ncdhhs.gov/interactive/query/lcd/lcd.cfmWright, Kallia O., Soroya Julian McFarlane, and Diane B. Francis. 2022 When Race and Agency Collide: Examining Pregnant Black Women’s Experiences in Healthcare. Journal of Applied Communication Research 50(3). Routledge: 291–308.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: Students will gain expertise in qualitative research, including interviews, coding, and analysis. Students will also learn about research ethics and confidentiality. Students will have an opportunity to improve their skills in writing about research for the general public and policymakers. The student may also be involved in writing an academic paper, depending on their interests. Students may also learn how to use ArcGIS (the project includes a map using this software), nVivo, and/or Wordpress, depending on their interests. Working in a team with community members and other students will also mean students will learn strategies for working collaboratively and with community members, including skills around listening, leadership, and professionalism.Finally, students will gain knowledge about health disparities and how these are experienced by Black women in Mecklenburg County, as well as some of the efforts intended to reduce these disparities. Students will thus also gain skills in critical thinking, equity, and inclusion.

Required training of 3 hours with Description: Before working on the project, students will complete the CITI training for human subjects research, as well as methodological training in interviews and data analysis offered by the team. Students will also read project documents, including papers and theses, as well as related literature around health disparities.

Mentoring plan: Students in my projects learn how to engage with community members to design and implement research projects that not only prepare them to be good practitioners of anthropology, but also ask them to grapple with important ethical and intellectual questions around applying social science with integrity and respect. Helping students gain expertise in research and community engagement is also reinforced through my mentorship efforts, which aim to help students learn through experiences while recognizing the unique backgrounds, skills, and challenges that each student brings to class or research. For me, this often means meeting students where they are, and helping them develop new skills. I provide some flexibility for assignments and support as needed, and provide support or opportunities for leadership, where appropriate. I mentor students in a way that helps them both to address personal challenges and to plan for a future with meaningful and fulfilling careers. I do this by setting up weekly meetings, though students can ask to meet whenever this would be useful, in person or via zoom. I prefer emails, but know some field issues require more immediate contact through texts or calls. Students, if comfortable, can present to the team or general public. I have worked with several students who needed to gain confidence to do this, but also respect students who are not ready to do this.

Applicant Requirements: Applicants should have some coursework in social sciences (sociology, geography, anthropology, etc), and an interest in working with community partners. They should have the ability to talk with someone they do not know, about topics that may be uncomfortable or emotional. Applicants should have the ability to travel around the Charlotte area in a car or on public transit to attend events.

Applicant Preferences: Experience with interviews or similar data collection is a benefit, as is experience working on community engaged research projects.

Specific Time considerations/conflicts: Schedules will be set in consultation with the student(s)

App ID #: 2047

Mentor: Faklaris, Cori Email: cfaklari@charlotte.edu

Title: Assistant Professor

Department: Software and Information Systems

Co-mentor:No

Community engaged research: No

Title: Actionable Support to Combat Mobile Scams and Privacy Concerns

Description: Mobile phone users are increasingly targeted by sophisticated threats like SMS phishing ("smishing") and face complex privacy decisions, yet they often lack immediate, understandable resources to protect themselves. The Security and Privacy Experiences (SPEX) group is tackling this challenge by developing novel, on-device support tools that empower users directly at their moment of need. The selected student will be a key contributor, working with a PhD mentor, other students, and faculty to conduct literature reviews, recruit participants for studies, analyze data, and help refine a mobile-friendly web app prototype, with the ultimate aim of making digital safety more accessible and manageable for everyone.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

2 positions available

Anticipated Student Learning Outcomes: This project provides invaluable, real-world experience in how human-centered technology is formally studied and built. The selected student will get experience in-demand technical and methodological skills that are valuable in both academia and industry, such as User Research Methods, Data Analysis, Prototyping, and Literature Review. They will engage in applied learning in the domains of Usable Security and Privacy, Mobile Development, and GenAI interactive applications.

Required training of 20 hours with Description: We want students to complete the CITI certifications for social-behavioral research and for responsible conduct of research. This can be done in the first few weeks if not already achieved. Students will also have to come up to speed on our existing research in this domain.

Mentoring plan: We are a big research group in CCI. Our approach is centered on fostering the student's growth as a researcher by providing a structured yet flexible environment. We believe in social learning and co-located work to spark innovation. We believe in learning by doing, with guidance and support readily available. We expect both undergraduates and faculty/graduate students to maintain regular communication on progress and obstacles. Faculty may take the lead in mentorship for some weeks, with a graduate student stepping up in other weeks. Weeks 1-3 will be dedicated to getting up to speed and organizing specific plans, including establishing 1:1 and group meeting schedules. Weeks 4-9 are the main push to make progress. Weeks 10-16 are dedicated to wrapping up specific threads, preparing presentations or publications, planning for next steps, and ensuring a smooth handoff of all files and code. Expectations for all involved are as follows: Mentor (Faculty/Graduate Student):Provide overall project direction and context.Guide

student's learning of core concepts in Usable Security and Privacy, Mobile Development, and Human-AI Interaction.Assign tasks that are challenging but achievable.Offer regular, constructive feedback.Connect the student with relevant resources and networking opportunities.Foster a supportive and inclusive research environment.Mentee (Undergraduate Student):Actively engage in learning and ask questions.Manage time effectively to meet deadlines and contribute to meetings.Maintain and share a research log to document progress, challenges, and solutions.Be proactive in seeking help and feedback.Contribute positively to the research team.Adhere to research ethics and data privacy protocols.

Applicant Requirements: The student should have course experience or prior research experience that indicates familiarity with human-centered computing, psychology, communication, education, or related social and information sciences. Additionally, the student should be a good writer, reader, and note-taker.

Applicant Preferences: We prefer students who already have some experience with research methods and/or with mobile interface design, especially if they have worked on a similar project in the past. We will short-list students who are a good fit based on characteristics and skills for one of the following specific projects: (1) experimental testing of visual trust indicators for mobile messaging; (2) evaluation and refinement of a GenAI-powered mobile app for security and privacy advice; (3) creating on-device education interventions or games to mitigate scam vulnerability and to assist in privacy choices.

Specific Time considerations/conflicts: We will set a weekly meeting for the project between the student and mentors. We would like the student to use the Human-Centered Computing Lab in Woodward 300 and be present there for work at least some of the week so that they can talk with others and get help as needed.

App ID #: 2031

Mentor: Noras, Maciej Email: mnoras@charlotte.edu

Title: Associate Professor

Department: Engineering Technology and Construction Management

Co-mentor:No

Community engaged research: No

Title: Multi-Modal Energy Harvester

Description: OverviewThe student will work with a team of graduate students to develop, build and validate devices that can harvest energy from light, vibrations, temperature differences and convert it to electricity. Project Goal Build an energy conversion device that combines electric energy from different harvesters and powers critical accessories. For this part of the project the target device is a cell phone.Undergraduate researcher contribution: Assist in designing and building of circuits and circuit boards. Assemble and test circuits developed during the project. Report on the test results. Maintain engineering records and documentation (journal).Why join? You will learn how to design electrical circuits using professional software, you will learn how to design and make circuit boards using a prototyping system and how to test electronic devices. NetworkingYou will interact with three graduate students, some of them are working professionals.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

1 positions available

Anticipated Student Learning Outcomes: Technology skills: The student will learn hands on skills such as circuit design, circuit board making, soldering, use of testing equipment. Teamwork skills: The student will engage in teamwork with a group of graduate students.Critical thinking: Occasional problem solving and troubleshooting of the built circuits will be needed.Communication skills: The student will participate in publication writing - a conference and a journal paper publications are planned.Professionalism: The student will participate in weekly meetings and report on the progress of the project.Skills acquired through this project will be very useful for future electrical and electromechanical engineers. Proficiency in designing, building, testing and troubleshooting is important for professionals working in technical fields, especially for design, manufacturing and service companies.

Required training of 8 hours with Description: Training will be provided on use of the software for circuit and circuit boards design (Altium Designer), operation of a printed circuit board milling machine (QCJ5)

The student will also be taught how to solder, test and troubleshoot electronic circuits using laboratory equipment: power supplies, multimeters, oscilloscopes and signal generators.

Mentoring plan: Training and GuidanceYou'll receive direct training on how to use Altium Designer for circuit and PCB design, and how to operate the QCJ5 PCB milling machine. You will be taught how to solder, test, and troubleshoot electronic circuits using lab equipment like power supplies,

multimeters, oscilloscopes, and signal generators.Weekly MeetingsWe'll meet once a week to talk through your progress, answer questions, and plan next steps. These meetings are a chance for you to share what you've learned, get feedback, and stay on track.Documentation HelpI'll show you how to keep proper engineering records, including a project journal and test reports. You'll learn how to document your work clearly and professionally.Writing and PresentingYou'll have the chance to help write a conference paper and a journal article. I'll guide you through the writing process and help you prepare if you're interested in presenting your work at a conference.Team CollaborationYou'll work closely with three graduate students. Some of these students are working professionals. They'll help you with day-to-day tasks and share practical advice from their own experience.

Applicant Requirements: Willingness to LearnYou'll be trained in tools and techniques that may be new to you. We're looking for someone who is open to learning, asks questions, and takes initiative when faced with unfamiliar tasks.Reliability and ResponsibilityThis project involves teamwork and regular progress updates. We need someone who follows through on commitments, communicates clearly, and respects deadlines.Attention to DetailCircuit design and testing require careful observation and documentation. If you're someone who notices small things and takes pride in doing work carefully, you'll thrive here.Problem-Solving MindsetYou'll encounter challenges—whether it's a circuit that doesn't work or a design that needs tweaking. We're looking for someone who enjoys troubleshooting and thinking through solutions.Team PlayerYou'll be working with graduate students and attending weekly meetings. Being respectful, collaborative, and open to feedback is essential.

Applicant Preferences: Desired Skills and ExperiencesYou don't need to have all of these, but having some will help you get started faster:Basic Knowledge of Electrical CircuitsIf you've taken a course like Intro to Electrical Engineering or Circuits I, that's helpful. If not, we'll teach you the fundamentals.Experience with Lab EquipmentFamiliarity with multimeters, oscilloscopes, or power supplies is a plus—but not required. You'll be trained on how to use all lab tools.Comfort with Computers and SoftwareYou'll be using Altium Designer for circuit and PCB design. If you've used any design or simulation software before (like LTspice, MATLAB, or Fusion 360), that's great—but we'll provide full training.Hands-On ExperienceIf you've built a project in a lab course, participated in a makerspace, or done any soldering or prototyping, that experience will help. But again, we'll teach you everything you need to know.

Specific Time considerations/conflicts: No specific dates and times for the meetings and work time have been established yet. We will adjust to the team's academic schedule for Spring 2026.

App ID #: 2024

Mentor: Wang, Miao Email: mwang25@charlotte.edu

Title: Assistant Professor

Department: ECE

Co-mentor:No

Community engaged research: No

Title: DER-centered Resilient Power Grid Design by Exploiting Machine Learning

Description: Recently, extreme events in the power grid have become more common which can be caused by extreme weather such as thunderstorms, hurricanes and tornadoes or human threats such as cyberattacks. As extreme events may lead to outages on the grid (e.g., Helene knocked out power across the Western North Carolina mountains for more than two weeks in Oct. 2024), improving grid resilience has been raised in future power system framework planning. On the other hand, to achieve a carbon-neutral society, future power grids are expected to be dependent upon a high penetration of variable resources such as renewable distributed energy resources (DERs), which may include solar panels, electric vehicles, battery storages, etc. For example, due to the increasing environment concerns by petroleum combustion, electric vehicles (EVs), powered up by the electric batteries, will become the most important components in the future transportation systems, reducing the greenhouse gas emission by the transportation sectors. Massive adoption of DERs may need more complicated and multilayer coordination between grid operators and other stakeholders. To design a cyber-physical resilience framework for a future DER-centered power grid becomes urgent and challenging, which may rely on computing technologies of sensing, analysis, tracking, controls, connectivity, coordination, and human-system interaction, etc. Historically, the traditional cyber-physical power framework is studied based on the separate transmission and distribution (T&D), with preset assumptions to represent each other's dynamics at the interconnected boundary. However, the dynamics of modern power systems with the integration of DERs have brought more challenges in the traditional model. The boundary between transmission and distribution operations is now increasingly blurred, which leads to co-simulation between Transmission and Distribution (T&D). In addition, how to coordinate and control DERs with the ability to prepare for threats and hazards, adapt to changing conditions, and withstand and recover rapidly from adverse conditions and disruptions, is also challenging. There is a particular need to better link power grids to emergency preparedness and resilience planning in the future cyber-physical resilience framework of DER-centered power systems. In this project, firstly, we aim to design and build the DER-centered co-simulation testbeds for resilient power system study, which can emulate the transmission, storage, consumption tracking, communication, coordination and control components of the future grid in digital twin. Our proposed testbeds will be able to provide real-life context and massive scaling capabilities required for modeling a DER-centered cyber-physical resilient power system, including solar inverters and flexible loads. Secondly, we aim to develop DER management modeling for grid diagnosis and recovery response integrated DER control by Machine Learning. For enabling research of DER devices and aggregators, we will establish a DER aggregator virtualization platform and software models of DER devices that can

quickly generate DER aggregation environments with heterogeneous capabilities, capacities, and functionalities. The virtualization and hosting of management modules on our testbeds will enable researchers to access detailed interaction data among different modules, which may allow users not only to identify damages, threats and vulnerabilities but also to provide grid diagnosis and stress-test defense solutions.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

2 positions available

Anticipated Student Learning Outcomes: Hands-on technical depth (power & cyber physical system):Build and run a DER-centered T&D co-simulation testbed using HELICS with GridPACK (transmission dynamics) and GridLAB-D (distribution/delta-mode) Develop and experiment with DER management , grid diagnosis, and recovery algorithms by machine learning; profile how device telemetry (e.g., inverter/battery states) drives coordinated control and resilience.

Required training of 0 hours with Description: Working plan for this project:

Phase 1. DER-centered resilient power system testbed building

Literature review

Gridlab-d building and testing

GridPACK building and testing

HELICS interaction building and testing

Paper writing

Phase 2. DER management and Grid diagnosis and recovery

DER aggregator virtualization platform

Software models of DER devices

Task 1 DER management algorithm design and implementation by Machine learning

Task 2 Diagnosis and recovery algorithm design and implementation based on Machine learning

Documentation, closed beta testing and video taking

Mentoring plan: I will have the weekly meeting with the students. The students will work together with my Ph.D. students and have the weekly group meeting in the lab. At the end of the project, the students will draft the conference paper based on the project, and attend the conference supported by my research funds.

Applicant Requirements: experience in Python or C++

Applicant Preferences: experience in Linux

Specific Time considerations/conflicts: N/A

App ID #: 2025

Mentor: Chen, Gongfan Email: gchen12@charlotte.edu

Title: Assistant Professor

Department: Department of Engineering Technology and Construction Management

Co-mentor:No

Community engaged research: No

Title: Investigating Edge AI Applications to Support Informed Construction Jobsite Decision-Making

Description: Generative artificial intelligence (GenAI) has rapidly transformed the world over the past few years, and the construction industry is beginning to see significant opportunities as well. However, a major challenge lies in the practical use of GenAI tools, such as large language models (LLMs) and vision-language models (VLMs), which require substantial computing resources, cloud connectivity, and Internet access. These models are extremely large, energy-intensive, and not always compatible with field conditions. In construction projects, particularly in rural or remote areas, reliable Internet access and advanced computing infrastructure are often unavailable. As a result, applying GenAI tools in real time on jobsites remains far from reality. This project aims to address that challenge by developing an edge computing–powered framework capable of running construction-specific language models in real time without dependence on Internet services or external infrastructure. The aim is to provide jobsite construction workers with a personalized physical AI assistant that leverages construction-specific knowledge to collaboratively support their decision-making. Dr. Gongfan Chen is seeking to mentor a promising undergraduate researcher to help design and test a prototype of edge AI that can be deployed directly on construction sites to support real-time decision-making.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

1 positions available

Anticipated Student Learning Outcomes: The expected learning outcomes for the student on this project include the following: Critical Thinking development by gathering and analyzing information from a diverse set of sources to fully understand a problem. Communication development by asking questions, seeking feedback, providing feedback appropriately to seek guidance and informing others of your needs and progress during the research process. Professionalism development by prioritizing and completing tasks to accomplish goals within the broader research environment.

Required training of 5 hours with Description: The student will receive training on how to use Generative AI tools, and python as part of the research process.

Mentoring plan: Dr. Chen will have regular weekly project update meetings that are scheduled based on the team's availability during the period of performance for the project. The specified project tasks will be performed based on the project schedule. The student will get the opportunity to practice their professional communication skills with weekly, in-person presentations based on

aforementioned aspects to report on task completion updates, action items, and discuss questions.

Applicant Requirements: The student should be familiar with general generative AI tools (e.g., ChatGPT), possess strong oral and written communication skills, and demonstrate a genuine passion for research.

Applicant Preferences: Students with proficiency in Python programming and embedded system are desired and would be strongly considered. Training can be provided to students who are willing to learn.

Specific Time considerations/conflicts: The student must be available to meet in person for up to 1 hour for research team meetings.

App ID #: 2026

Mentor: Chen, Gongfan Email: gchen12@charlotte.edu

Title: Assistant Professor

Department: Department of Engineering Technology and Construction Management

Co-mentor:No

Community engaged research: No

Title: Investigating the Role of Multimodal AI in Supporting Engineering Plan Reading for Undergraduate Education

Description: Engineering plan reading is a fundamental skill for engineers because it serves as the primary means of communication between design and construction. Accurate interpretation of drawings ensures that projects are built as intended, reducing errors, delays, and safety risks. For undergraduate students, developing strong plan reading skills builds spatial reasoning, problem-solving ability, and professional readiness, making it a cornerstone of engineering education. Interpreting the different aspects of engineering plan readings often requires years of on-site experience. For senior professionals, this knowledge gradually becomes a form of "muscle memory," shaped by case-specific situations and accumulated practice. However, acquiring such expertise is costly and impractical to replicate for daily teaching in higher education settings. Recently, multimodal AI has advanced significantly, with the ability to process and understand multiple forms of input such as images, audio, and video. Preliminary findings from our pilot study indicate that multimodal AI is capable of interpreting certain aspects of engineering plan drawings. This research seeks to explore the potential of multimodal AI in supporting undergraduate students as they learn to interpret engineering drawings. Dr. Gongfan Chen is seeking to mentor a motivated undergraduate researcher to investigate students' learning experiences with multimodal AI in plan reading. The student's primary responsibilities will include conducting focus interviews, organizing and analyzing data, and contributing to reports or research papers.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

1 positions available

Anticipated Student Learning Outcomes: The expected learning outcomes for the student on this project include the following: Critical Thinking development by gathering and analyzing information from a diverse set of sources to fully understand a problem. Communication development by asking questions, seeking feedback, providing feedback appropriately to seek guidance and informing others of your needs and progress during the research process. Professionalism development by prioritizing and completing tasks to accomplish goals within the broader research environment.

Required training of 5 hours with Description: The student will receive training on how to use Generative AI tools, and python as part of the research process.

Mentoring plan: Dr. Chen will have regular weekly project update meetings that are scheduled based on the team's availability during the period of performance for the project. The specified

project tasks will be performed based on the project schedule. The student will get the opportunity to practice their professional communication skills with weekly, in-person presentations based on aforementioned aspects to report on task completion updates, action items, and discuss questions.

Applicant Requirements: The student should be familiar with general generative AI tools (e.g., ChatGPT), possess strong oral and written communication skills, and demonstrate a genuine passion for research.

Applicant Preferences: Students with proficiency in generative AI tools and data analysis skills are desired and would be strongly considered. Training can be provided to students who are willing to learn.

Specific Time considerations/conflicts: The student must be available to meet in person for up to 1 hour for research team meetings.

App ID #: 2027

Mentor: Williams, Tamara Email: twill260@charlotte.edu

Title: Associate Professor of Dance

Department: Dance

Co-mentor:No

Community engaged research: Yes

Title: Brazilian & African Diasporic Dance Research and Community Engagement: Lavagem Celebration 2026

Description: This project focuses on research and community engagement in preparation for a four-day festival, the Lavagem Celebration, scheduled for April 2026 in Charlotte, NC. The Lavagem Celebration highlights Brazilian and African diasporic dance, music, and cultural practices through workshops, performances, and community events. Various guest artists will include master teachers in Brazilian dance, capoeira, percussion, and music, who will lead sessions with university students, campus members, and the broader Charlotte community.Undergraduate research assistants will play an important role in both the planning and implementation phases of the project. Students will help identify and communicate with local museums, cultural organizations, and community partners to explore opportunities for collaboration around workshops and performances. This may include scheduling conversations, gathering information about possible venues, and documenting community interest in Brazilian and African diasporic dance traditions. During the Lavagem Celebration itself, research assistants will help with on-site support by recording the number of participants at workshops and performances and documenting activities through notes, photos, or short summaries. Students will also assist in gathering contextual information about the history and cultural significance of Brazilian and African diasporic traditions to support the broader research goals of the project. This project combines dance performance and pedagogy, ethnographic and community-based research through the study of movement, music/percussion studies, capoeira, museum and community partnerships, event production/logistics, and arts administration while offering interdisciplinary training across the humanities, performing arts, and community engagement.This opportunity allows undergraduate students to gain experience in arts-based research, community engagement, and event documentation while working directly with international artists and community partners. Students will also strengthen their communication, organizational, and research skills while contributing to a significant representation of Brazilian culture in Charlotte. This project is grounded in reciprocal partnerships with local museums, cultural institutions, and community members in Charlotte. Undergraduate research assistants will contribute to documenting participation and facilitating communication among artists, students, and community partners. Students will engage in research processes that advance academic inquiry while also affirming and sustaining community histories and practices that hold significance for the broader public.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: Students who complete this project will be able to:Conduct arts-based field research: design and apply attendance logs and dance observation field notes. (Research & Analysis)Communicate with community partners: draft outreach emails, schedule meetings with museums/partners, and represent the project professionally. (Oral/Written Communication; Professionalism)Demonstrate cultural/intercultural fluency: articulate basic historical/contextual knowledge of Brazilian and African diasporic forms and practice globally responsive engagement. (Global/Intercultural Competence)Manage event logistics: assist with on-site setup, participant registration, timekeeping, and troubleshooting during workshops and performances. (Project Management; Teamwork)Document performances and workshops: capture accurate participant counts, summarize activities, produce photo/short written documentation respecting consent protocols. (Digital Literacy; Ethical Practice)Build professional networks: work with master teachers, community partners, and campus units(Networking; Career Readiness)Present research outcomes: prepare a concise final report and present findings at a departmental and OUR undergraduate research showcase. (Communication; Leadership)

Required training of 8 hours with Description: Students will begin with a live project orientation session (60–90 minutes) that provides an overview of the Lavagem Celebration's goals, schedule, roles, communication protocols, and expectations. They will then participate in a data collection and documentation workshop (60–90 minutes) focused on completing field note templates and applying movement analysis. A cultural competency and safety briefing (60 minutes) will follow, addressing respectful engagement with artists and participants, accessibility and inclusion practices, and on-site safety procedures. To prepare for the festival environment, students will also take part in a shadowing or practice session (1–2 hours) during a rehearsal or simulated event, where they can practice check-in procedures, equipment handling, and interactions with artists. Finally, ongoing "just-in-time" training will be provided in the form of brief pre-event check-ins and role-specific micro-trainings (10–20 minutes) before festival days to ensure readiness.

Mentoring plan: I am committed to helping students succeed in this research experience by providing structured, frequent contact, clear deliverables, and scaffolded responsibility so that they can learn through practice while receiving consistent support. As the project mentor and director, I will meet with students weekly for 30–45 minutes in either one-on-one or small-group check-ins throughout the semester. During the Lavagem Celebration, when the pace of work intensifies, students can expect daily briefings and debriefings to ensure clarity and responsiveness. Communication will be regular: students should expect an email response within 48 hours during the semester, with more immediate replies during the festival window. Group text will be used for urgent on-site coordination.To help students manage their responsibilities, they will receive a clear task list and timeline at the start of the project, which will outline assignments such as outreach calls, documentation, on-site shifts, and deliverable deadlines. Progress will be structured around milestones, including a mid-term check-in, a pre-event readiness sign-off, and a final submission of a report and presentation. Feedback will be integrated throughout the process, including formative comments during weekly check-ins, a short mid-term evaluation, and a final written evaluation with actionable suggestions for growth. Finally, students will have the opportunity to disseminate their work in the Department of Dance. Each student will present a 5–10 minute summary of their research and will prepare a short (1–2 page) final report for the Office of Undergraduate Research. They will also be encouraged to submit abstracts to the campus

undergraduate research symposium and to dance education conferences. Through this combination of structured mentoring, regular feedback, and opportunities for public presentation, students will gain valuable professional and research skills that will serve them well beyond this project.

Applicant Requirements: We are seeking motivated, reliable undergraduate students who are curious about Brazilian and African-diasporic movement/dance practices and committed to community-engaged research. At minimum, applicants must be enrolled and in good standing and able to meet the project's time commitments. Successful candidates will demonstrate dependable digital literacy (comfortable using email, Google Drive/Sheets, social media and a smartphone for documentation), strong written and oral communication (able to draft professional messages and keep clear notes), and a willingness to complete required trainings (OUR professional development hours, and project-specific media and documentation procedures). In addition to the semester preparations, applicants must be available for the Lavagem Celebration from April 9-12, 2026 (including evenings, weekends, and meeting days), comfortable working in public, and multi-age settings and interacting respectfully with artists and participants. While these items represent the minimum qualifications, we value qualities that predict success on-site and over the semester including attention to detail, community humility, adaptability under pressure, initiative, and a collaborative attitude. We welcome students from a range of majors and experience levels; prior coursework or practical experience in dance, community arts, museum studies, basic photography/video, Portuguese/Spanish, or data management are advantageous but not required.

Applicant Preferences: Some qualifications and experiences can strengthen a student's application and enhance their success in this project. Coursework or practical experience in dance technique (in any form), research methods, anthropology, community arts, museum studies, or event production provides a useful foundation. Applicants with prior experience in volunteer projects or outreach will be well-prepared for the collaborative and public-facing nature of this work. Familiarity with Brazilian or African diasporic practices, whether through direct participation in dance forms such as samba or capoeira, percussion, or through academic study, will be considered an asset. Similarly, language skills in Portuguese or Spanish, can help facilitate communication with artists and participants. Skills in data management (Sheets/Excel), photography or short-form video documentation, and accessibility practices (such as working with interpreters, adaptive dance, or disability and accessible events) are also highly valued. Previous experience in museums or cultural organizations is particularly beneficial for students interested in liaison or organizational roles. Because the project involves event-based work, applicants should also be comfortable lifting and moving light equipment (around 25 lbs) and standing for extended shifts. Importantly, technical prerequisites such as advanced dance training are intentionally kept as "preferred" rather than required to ensure students across the arts and various other fields of studies are able to participate in this project. Roles that involve direct rehearsal shadowing or movement notation may favor applicants with dance training, while documentation, outreach, and data-focused roles remain accessible to students with strong organizational and communication skills regardless of prior movement experience.

Specific Time considerations/conflicts: Students must be available for preparation meetings early in the semester to learn about the research process, movement analysis, and strategies for working with community partners. They are also required to attend weekly 30–45 minute mentorship

meetings and fulfill weekly commitments involving direct contact with community partners. The most critical time commitment will be participation in the Lavagem Celebration from April 9–12, 2026, in addition to at least one setup day. During the festival, students should expect shifts lasting between 4–6 hours. A comprehensive schedule will be shared well in advance, and students will be required to confirm their availability for the full festival window once dates are finalized.

App ID #: 2029

Mentor: Tiwari, Arjun Email: atiwari5@uncc.edu

Title: postdoc

Department: Biological Sciences

Co-mentor:Yes

Pinku Mukherjee, pmukherj@charlotte.edu, Biological Sciences

Community engaged research: No

Title: Targeting sialic acid biosynthesis enhances chemotherapy sensitivity to pancreatic ductal adenocarcinoma

Description: Pancreatic ductal adenocarcinoma (PDAC) is a highly aggressive cancer with a high mortality rate, posing a major challenge for effective treatment. Currently, chemotherapy remains the primary therapeutic option for PDAC. However, the development of the chemoresistance during or following treatment remains a main obstacle in PDAC therapy, yet the underlying mechanisms are largely unknown. N-acetylneuraminic acid (sialic acid) is a terminal component of glycoproteins and glycolipids on the cell surface, incorporated through a process known as sialylation. The glycosylation is highly abundant in cancer cells compared to their normal counterparts, contributing to immune evasion, metastasis, and cellular survival. Our recent preliminary findings demonstrate that chemo-resistant cell lines exhibit further elevated levels of intracellular sialic acid following chemo-drug treatment, whereas chemo sensitive cells show reduced levels compared to non-treated cells. This suggests that the increased intracellular sialic acid content in resistant cells may play a role in the adaptive response to chemo treatment. Herein, this work will find out the underlying mechanism of sialic acid dependent chemo adaptation of resistant cells. To that, two aims are set to study, 1. CRISPR-Mediated Knockout of upstream genes of sialic acid synthesis to investigate sialic acid-dependent chemotherapy response in PDAC cells and 2. Validate the results in multiple cells lines with different degrees of chemo sensitivity. In overall, this project aims to develop new therapeutic target that can enhance chemotherapy sensitivity and improve treatment outcomes for PDAC treatment.The undergraduate student will work under the supervision of postdoc. His/Her contributions to these projects will be as followsLiterature reviews about sialylation and chemo-resistance Performing cell assay such as cell viability, invasion, and migration following different chemo-treatmentsExpanding CRISPR knocked out cells colonies and perform experiments as mentioned no 2.Support data processing and initial analysis (spreadsheets, plotting, basic stats).Prepare figures, and present short updates to the lab Present the key results in posters in undergraduate related symposium

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

1 positions available

Anticipated Student Learning Outcomes: The expected benefits for students participating in this research project are: Scientific literature review and critical readingHands-on exposure to cell-biology workflows and instrument operationsThis includes design research experiments, execute

experiments, data acquisition, data analysis and report writing. She/He will have hands-on experience in cell biology experiments such as cell culture, drug treatment, western blot, PCR, electrophoresis, CRISPR, immunostaining, microscopy etc.Basic data analysis and figure preparation (Excel/GraphPad).He/she will have knowledge with sialylation and MUC1 biology in terms of contentsProfessional skills: scientific communication, presentation and teamworkBy that time, the student will have developed the necessary competencies to pursue molecular biology–based research and development positions as part of their career growth

Required training of 4 hours with Description: The expected students need to complete Biosafety training.

Mentoring plan: I mentor with a growth-mindset. I balance high expectations with structured training and frequent feedback so students can take ownership. I, Arjun Tiwari, a postdoc in Dr. Mukherjee's lab, will provide hands-on training, and support daily in-person basis. Communication can also be done via email. Dr. Mukherjee will also respond to emails as soon as possible on weekdays. Students will update their research outputs in one-on-one meetings every week to Dr. Mukherjee. Besides, he/she will present the results along with their direct mentor (postdoc) in biweekly lab meeting. Students will present project results in undergraduate biomedical symposium. We will discuss time conflicts early and we'll create a workable plan. I encourage open conversations about workload and try to accommodate them in research work.

Applicant Requirements: We are looking for students who are interested in working in chemo-resistance mechanism. Besides that, other preferences for picking up students are who can work 3-4 hours a day at least for 2-3 days. So that he/she can finish one experiment at a time.

Applicant Preferences: Students with an interest in cancer biology, particularly in understanding the mechanisms of chemotherapy resistance, are encouraged to apply. Prior experience with cell culture is preferred. Familiarity with aseptic technique, and ability to commit 3-4 hours per day and 3-days a week.

Specific Time considerations/conflicts: The student should be available to work 3–4 consecutive hours on any three days per week (weekdays only). In addition, they will be required to attend biweekly lab meetings. Lab meeting times will be adjusted to fit students' class schedules, ensuring their full participation.

App ID #: 2028

Mentor: Tiwari, Arjun Email: atiwari5@uncc.edu

Title: postdoc

Department: Biological Sciences

Co-mentor:Yes

Pinku Mukherjee, pmukherj@charlotte.edu, Biological Sciences

Community engaged research: No

Title: Copy of Targeting sialic acid biosynthesis enhances chemotherapy sensitivity to pancreatic ductal adenocarcinoma

Description: Pancreatic ductal adenocarcinoma (PDAC) is a highly aggressive cancer with a high mortality rate, posing a major challenge for effective treatment. Currently, chemotherapy remains the primary therapeutic option for PDAC. However, the development of the chemoresistance during or following treatment remains a main obstacle in PDAC therapy, yet the underlying mechanisms are largely unknown. N-acetylneuraminic acid (sialic acid) is a terminal component of glycoproteins and glycolipids on the cell surface, incorporated through a process known as sialylation. The glycosylation is highly abundant in cancer cells compared to their normal counterparts, contributing to immune evasion, metastasis, and cellular survival. Our recent preliminary findings demonstrate that chemo-resistant cell lines exhibit further elevated levels of intracellular sialic acid following chemo-drug treatment, whereas chemo sensitive cells show reduced levels compared to non-treated cells. This suggests that the increased intracellular sialic acid content in resistant cells may play a role in the adaptive response to chemo treatment. Herein, this work will find out the underlying mechanism of sialic acid dependent chemo adaptation of resistant cells. To that, two aims are set to study, 1. CRISPR-Mediated Knockout of upstream genes of sialic acid synthesis to investigate sialic acid-dependent chemotherapy response in PDAC cells and 2. Validate the results in multiple cells lines with different degrees of chemo sensitivity. In overall, this project aims to develop new therapeutic target that can enhance chemotherapy sensitivity and improve treatment outcomes for PDAC treatment.The undergraduate student will work under the supervision of postdoc. His/Her contributions to these projects will be as followsLiterature reviews about sialylation and chemo-resistance Performing cell assay such as cell viability, invasion, and migration following different chemo-treatmentsExpanding CRISPR knocked out cells colonies and perform experiments as mentioned no 2.Support data processing and initial analysis (spreadsheets, plotting, basic stats).Prepare figures, and present short updates to the lab Present the key results in posters in undergraduate related symposium

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

1 positions available

Anticipated Student Learning Outcomes: The expected benefits for students participating in this research project are: Scientific literature review and critical readingHands-on exposure to cell-biology workflows and instrument operationsThis includes design research experiments, execute

experiments, data acquisition, data analysis and report writing. She/He will have hands-on experience in cell biology experiments such as cell culture, drug treatment, western blot, PCR, electrophoresis, CRISPR, immunostaining, microscopy etc.Basic data analysis and figure preparation (Excel/GraphPad).He/she will have knowledge with sialylation and MUC1 biology in terms of contentsProfessional skills: scientific communication, presentation and teamworkBy that time, the student will have developed the necessary competencies to pursue molecular biology–based research and development positions as part of their career growth

Required training of 4 hours with Description: The expected students need to complete Biosafety training.

Mentoring plan: I mentor with a growth-mindset. I balance high expectations with structured training and frequent feedback so students can take ownership. I, Arjun Tiwari, a postdoc in Dr. Mukherjee's lab, will provide hands-on training, and support daily in-person basis. Communication can also be done via email. Dr. Mukherjee will also respond to emails as soon as possible on weekdays. Students will update their research outputs in one-on-one meetings every week to Dr. Mukherjee. Besides, he/she will present the results along with their direct mentor (postdoc) in biweekly lab meeting. Students will present project results in undergraduate biomedical symposium. We will discuss time conflicts early and we'll create a workable plan. I encourage open conversations about workload and try to accommodate them in research work.

Applicant Requirements: We are looking for students who are interested in working in chemo-resistance mechanism. Besides that, other preferences for picking up students are who can work 3-4 hours a day at least for 2-3 days. So that he/she can finish one experiment at a time.

Applicant Preferences: Students with an interest in cancer biology, particularly in understanding the mechanisms of chemotherapy resistance, are encouraged to apply. Prior experience with cell culture is preferred. Familiarity with aseptic technique, and ability to commit 3-4 hours per day and 3-days a week.

Specific Time considerations/conflicts: The student should be available to work 3–4 consecutive hours on any three days per week (weekdays only). In addition, they will be required to attend biweekly lab meetings. Lab meeting times will be adjusted to fit students' class schedules, ensuring their full participation.

App ID #: 2069

Mentor: Byker, Erik Email: ebyker@uncc.edu

Title: Professor

Department: REEL and Honors College

Co-mentor:No

Community engaged research: No

Title: Advancing Undergraduate Research: Exploring the Impact of CUREs on Undergraduate Researcher Identity

Description: The Global-ready Research and Equitable Education in Teaching (GREET) Center in the Cato College of Education seeks to mentor one or two undergraduate scholars for a Spring 2026 OUR Scholars mentored research project. This research project focuses on the impact of Course-based Undergraduate Research Experiences (CUREs) in relationship to the development of students' researcher identity. This project aligns directly with the GREET Center's mission to equip undergraduate students, particularly preservice teachers, with research skills to support their career goals.This project is uniquely designed for scholars with an interest in teaching, counseling, and school administration. Participants will engage in a hands-on research process that contributes to the field of undergraduate research and will also prepare them with research skills related to data analysis. The project will begin with scholars completing the required Institutional Review Board (IRB) training, ensuring they understand ethical research practices. Following this, scholars will receive an introduction to qualitative research methods, focusing on thematic analysis of data. They will learn to code and analyze existing survey data, including open-ended survey responses, from students who have participated in CUREs relate to the topics: “Research as Inquiry” and “Quantitative Data Analysis.”This data collection and analysis will explore how participation in a CURE influences undergraduate students' (especially preservice teachers) perceptions of themselves as researchers. Key areas of investigation will include their confidence in conducting research, their understanding of the research process, and their integration of research skills into their developing professional identity. The project will culminate in the collaborative writing of a research poster and the presentation of findings at the Undergraduate Research Conference (URC) at UNC Charlotte. This mentored experience will provide scholars with an invaluable opportunity to develop critical research and analytical skills, which are essential for evidence-based practice in any professional setting.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: There are a number of expected benefits for scholars who participate in this mentored research project. Students will gain research skills, content knowledge related to the process of research and research methods, and practical experience of analyzing data. They will also be IRB trained and equipped with ethical practices in research. The project provides hands-on training in qualitative research methods, data coding, and thematic analysis. This is not just a theoretical exercise; students will work with real data, developing a deep

understanding of what it means to be a researcher. This experience is a powerful tool for those considering graduate school or careers that demand analytical and research skills.The project's focus on researcher identity is particularly relevant for future educators. Students will learn to see research not as an abstract academic exercise but as a core component of their professional selves. The scholars will be better prepared for a future career grounded in inquiry and continuous improvement. The skills gained here are directly transferable, whether they're planning a lesson as a teacher, designing a program as a school administrator, or helping a student as a counselor. They will learn to ask the right questions and find the data to answer them, a skill set that will set them apart.After participating in this mentored projects, scholars will talk about how the project opened their eyes to data analysis and the importance of research in relation to career development. They will likely describe the project as a valuable experience to gain skills related to the power of inquiry and data analysis. As well as, how research can be quite engaging related to analyzing themes in the data, professionally presenting findings from the research, and the value of having a mentor guide them through the process. It is likely the scholars will talk about how this was a foundational experience equipping them with career skills and informing their professional identity.

Required training of 5 hours with Description: The students will complete the IRB CITI Training to be added to the existing IRB for this project in order to analyze the project data. It is estimated the IRB CITI Training will take about 5 hours.

Mentoring plan: My goal is to be an intentional and reliable mentor, providing a structured yet supportive environment for the scholars' success. The student will work directly with me as the Executive Director of the GREET Center. They can expect weekly check-ins, either in-person or Zoom check-in type meeting, to discuss progress, troubleshoot challenges, and plan next steps. Beyond these scheduled meetings, I will be available for questions via email, with a commitment to respond within 24 business hours.I will guide the student through every stage of the project, from IRB training to data analysis and the URC presentation. My commitment is to help them not just complete tasks, but to understand the "why" behind each step of the research process. I will provide constructive feedback on their work and provide practice opportunities to develop their professional research communication skills. A key part of this experience will be presenting their work at the URC. I see this mentorship as a partnership. I am committed to provide the guidance, resources, and support necessary for the student to build confidence and develop as an emerging scholar.

Applicant Requirements: What I am looking for in the scholar applicant(s) is curiosity, a strong work ethic, and a genuine interest in how research can improve educational practice. Prior research experience is not required; in fact, this project is designed to be an entry point into the field. I am more interested in the scholar(s) potential and their eagerness to learn and gain valuable research skills. The most important characteristics are being a curious person and being dependable. For this mentored project, it also helps to have a keen interest in teaching, counseling, or school administration. A student who has taken foundational education courses or has experience mentoring or tutoring students will have a valuable frame of reference for the project's content. This is not a requirement, though. Strong written and verbal communication skills are also important, as the project involves data analysis and the presentation of findings at the URC. Overall, my focus is on finding scholar(s) with a growth mindset and ready to engage in a rewarding research experience.

Applicant Preferences: As stated earlier, I would give preferences to scholar applicant(s) who are curious about the topic, have a strong work ethic, and a genuine interest in how research can improve educational practice. Prior research experience is not required; in fact, this project is designed to be an entry point into the field. I am more interested in the scholar(s) potential and their eagerness to learn and gain valuable research skills. The most important characteristics are being a curious person and being dependable. For this mentored project, it also helps to have a keen interest in teaching, counseling, or school administration. A student who has taken foundational education courses or has experience mentoring or tutoring students will have a valuable frame of reference for the project's content. This is not a requirement, though. Strong written and verbal communication skills are also important, as the project involves data analysis and the presentation of findings at the URC. Overall, the focus for this mentored project is finding scholar(s) with a growth mindset and ready to engage in a rewarding research experience.

Specific Time considerations/conflicts: There is some flexibility regarding the meeting days/times for this mentored research project. That being stated, the scholar(s) should be available during the day (most likely Monday-Thursday) for in-person or Zoom check-in times. An agreed upon schedule will be discussed early in the semester and regular meeting times will be set up on a shared calendar. The scholar(s) must be able to present at the URC 2026 on Friday, April 24 at the Popp Martin Student Union.

App ID #: 2032

Mentor: Akella, Srinivas Email: sakella@charlotte.edi

Title: Professor

Department: Computer Science

Co-mentor:No

Community engaged research: No

Title: Autonomous Robotic Coverage, Inspection, and Informative Path Planning

Description: In this project, the undergraduate students will learn about state-of-the-art algorithms for autonomous robot coverage, inspection, and informative path planning. The goal is to develop and implement new online approaches that incorporate streaming sensor data. Applications include autonomous vehicles, inspection of critical infrastructure (e.g., power lines, roads) and search and rescue (e.g., after disasters). Students will work on cutting edge research in robotics and learn about optimization and machine learning algorithms and ROS (robot operating system). The research will be conducted in the Robotics Laboratory in the Computer Science Department. In addition to validation of the algorithms in simulation, there will be opportunities to implement and demonstrate the algorithms on wheeled mobile robots, autonomous surface vehicles, and drones.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

2 positions available

Anticipated Student Learning Outcomes: The students will be exposed to cutting-edge research in robotics and AI and have access to a wide variety of robots (mobile robots, drones, manipulator arms) in our active Robotics Lab. They will closely interact with graduate students. They willÂ gain experience with ROS 2 (Robot Operating System).

Required training of 10 hours with Description: The students will work through ROS 2 tutorials and read selected research papers as preparation.

Mentoring plan: The mentor will meet with the student on a regular basis (weekly or more frequent if needed). The student will also have the opportunity to interact with graduate students involved in robotics research. The student will receive guidance on their research and will be taught how to write research abstracts, posters, and present their research work.

Applicant Requirements: Familiarity with algorithms and data structures, and a proficiency in C++/Python is preferred. A good background in math (linear algebra, calculus) is desirable. Familiarity with Robot Operating System (ROS 2) or ArduPilot is a plus. Familiarity with robot electrical design is also a plus.

Applicant Preferences: Coursework in Algorithms and Data Structures (ITSC 2214), Linear Algebra (MATH 2164), and Calculus III (MATH 2241). Experience in Robotics (ITCS 4150: Mobile Robotics or ITCS 4151: Intelligent Robotics) and/or Artificial Intelligence (ITCS 3153) or equivalent courses will

be a plus. Should be comfortable with programming in C++ and/or Python. Enthusiasm and willingness to take on open-ended projects.

Specific Time considerations/conflicts: Student should be prepared to come to the lab for about 10 hours per week between 9am and 5pm on weekdays. This will enable face-to-face communication in the lab and also the opportunity to attend research presentations.

App ID #: 2033

Mentor: Agarwal, Ankit Email: aagarw31@charlotte.edu

Title: Assistant Professor

Department: Engineering Technology and Construction Management

Co-mentor:No

Community engaged research: No

Title: Generation of Adversarial and Model Evasion Datasets for Robust Cutting Tool Condition Monitoring

Description: Scenario: In the machining industry, accurate monitoring of cutting tool condition is critical. Misidentification of an unworn tool as a worn tool leads to premature replacement of the cutting tool and increased production costs. Conversely, identifying a worn tool as unworn can result in catastrophic failure or poor-quality products. Both scenarios significantly impact safety, efficiency, and cost.Background: Modern manufacturing increasingly relies on Artificial Intelligence (AI) models to automate tool condition monitoring using image-based approaches. These AI-based models have demonstrated high accuracy under normal operating conditions, but their deployment exposes manufacturing systems to cyber vulnerabilities, such as adversarial and model evasion attacks. Adversarial attacks add small perturbations to the images that are visually imperceptible to humans but mislead the AI model and cause misidentification. On the other hand, model evasion attacks subtly modify input images, forcing the trained AI model to misidentify an image into a specific category chosen by the attacker. Aim and Objectives: The project aims to generate adversarial and model evasion datasets for tool wear images to evaluate and improve the robustness of the AI model, thereby ensuring reliable tool condition monitoring even under such cyber vulnerabilities. The objectives of the work are as follows:Generate an adversarial dataset – Create perturbed tool wear images from an existing clean and labeled dataset to simulate adversarial attacks. It includes implementation of techniques like, FGSM -Fast Gradient Sign Method, UAP – Universal Adversarial Perturbations, and DeepFool.Create a model evasion dataset – Introduce targeted modifications into tool wear images to force the model to misidentify tool condition in a specific wear category. It includes implementation of techniques like masked overlay, texture/style transfer, Targeted-FGSM, and Targeted-UAP.Assessment Plan: The effectiveness of the generated adversarial and model evasion datasets will be assessed by evaluating the performance of existing Convolutional Neural Network (CNN)-based AI models for tool wear identification [https://doi.org/10.1016/j.jmsy.2024.12.004]. Key metrics will include: Identification accuracy: Compare model performance on the clean dataset versus the adversarial and model evasion datasets.Confusion matrix analysis: Examine specific misidentification patterns to understand the most affected tool wear categories.Explainable AI (XAI) analysis: Using XAI techniques such as Grad-CAM, LIME or SHAP, interpret the features in the misidentified tool wear images that make the model vulnerable to cyberattacks.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

1 positions available

Anticipated Student Learning Outcomes: By the end of this project, students will be able to:Understand the significance of tool condition monitoring in machining and the consequences of misidentifying wear stages.Learn to implement techniques such as FGSM, UAP, DeepFool, masked overlay, texture/style transfer, Targeted-FGSM and Targeted-UAP.Develop coding skills for integrating mechanical engineering knowledge with AI and cybersecurity concepts.Communicate findings effectively through reporting and presentations.

Required training of 5 hours with Description: The faculty will work directly with the student to provide hands-on training on topics relevant to the project. This includes fundamentals of machining processes, tool wear mechanisms, and the application of AI and cybersecurity in manufacturing. The student will also gain practical experience collecting data during machining experiments, preparing them to implement and evaluate AI models for tool condition monitoring.

Mentoring plan: The mentoring plan aims to provide the skills, knowledge and experience necessary to prepare undergraduate students to excel in their careers. It will specifically include the following activities:Meetings and Technical Support: Regular meetings to review progress, discuss challenges, and provide technical support in coding, dataset preparation and evaluation of AI models to ensure hands-on skills. Guidance on reading and understanding relevant literature on tool wear monitoring, adversarial attacks, and model evasion techniques.Documentation of Progress: The student will summarize weekly work and findings through short presentations to track progress, facilitate discussions, and learn research communication skills.Career Development Support: Guidance on building a strong CV, highlighting project and technical skills, and advice on professional development to achieve career goals.

Applicant Requirements: This project would require learning skills related to the mechanical and computer science engineering domains. The student should be interested in applying AI and cybersecurity concepts in manufacturing and possess basic programming skills, preferably in MATLAB and Python.

Applicant Preferences: A student from the computer science or related domain with experience handling image datasets and advanced programming skills is preferred.

Specific Time considerations/conflicts: The faculty plans to meet with the student weekly to review progress on assigned tasks. The meeting day and time will be scheduled based on mutual availability and can be adjusted as needed during the project period.

App ID #: 2034

Mentor: Dasgupta, Aneesha Email: adasgup2@charlotte.edu

Title: Assistant Professor

Department: Biological Sciences

Co-mentor:No

Community engaged research: No

Title: Molecular targets in cancer-associated muscle wasting

Description: The focus of the Dasgupta Lab is to study cancer-associated muscle wasting or cachexia. Cachexia is a multifactorial syndrome which entails lean mass loss with or without the loss of adipose tissue. Pancreatic cancer patients have the highest incidence of cachexia at 80%. Cachectic patients have poor prognosis and don't respond well to chemotherapy. Our lab studies the molecular mechanisms that lead to pancreatic tumor-induced muscle loss. We utilize cancer and muscle cell lines and have in vitro models of muscle atrophy (wasting).Please feel free to see more on this website : https://pages.charlotte.edu/adasgup2/

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

1 positions available

Anticipated Student Learning Outcomes: Literature awareness about cancer and muscle biology, critical reading/thinking, molecular biology techniques, scientific writing and communication.

Required training of 4 hours with Description: CITI trainings and Learning and Development trainings for biosafety and chemical safety hazards

Mentoring plan: Dr. Dasgupta is a new faculty in the Department of Biological Sciences. The student will work directly with her. The mentoring plan is as follows:Dr. Dasgupta will ensure the student has access to literature and understands the basic concepts of the research/study topic.The student will have access to specialized topics working group meetings in the department of biological sciences. This will provide exposure to different research topics in DBS. Dr. Dasgupta will train the student in molecular biology techniques.The student will be guided for hypothesis building and testing.

Applicant Requirements: The ideal candidate would :Be a biology major Be curious, driven and willing to master molecular biology concepts and techniquesHave attention to detail

Applicant Preferences: The ideal student will be a biology major, preferably in their sophomore year, but freshmen are welcome to apply. Students having molecular biology or related coursework completed are preferred.

Specific Time considerations/conflicts: No conflicts.

App ID #: 2035

Mentor: White III, Richard Allen Email: rwhit101@charlotte.edu

Title: Assistant Professor

Department: Bioinformatics and Genomics

Co-mentor:No

Community engaged research: Yes

Title: BITE (Bat Immunology Training and Education) computational immunoverse

Description: Bats represent 25% of all the mammals on Earth, and are elite suppressors of highly pathogenic viruses, rarelydevelop cancer, and have very long lifespans relative to body size. T cells are essential in the long-termsuppression of viruses and cancer via the adaptive immune system leading to limited disease and long lifespan.Fundamentally, T cells arise from the bone marrow, they then migrate to thymus where they develop into naïveT cells, that circulate in peripheral tissues and blood – where they act as 'sentinels cells' (e.g., CD4 + helper,CD8+ cytotoxic) that suppress viral infection. However, after 100 years of anatomical study in bats, the role ofthe thymus in T cell development has not been described, nor has how T cell development occurs in the thymusor other lymphoid organ, which is the fundamental tenet of T cell immunology. This is the computational (dry-lab only) side of this grant. No wet-lab work or field work with live bats or tissues

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

4 positions available

Anticipated Student Learning Outcomes: Bioinformatics relating to immunology and virology

Required training of 1 hours with Description: This would be the dry lab part of the project. No active research with wet-lab or

viewing bats in the field. This is for computational design of antibodies,

phylogenetics, and primer design only.

Mentoring plan: Honesty, critical thinking, and problem solving are helpful in success. This is key to successful outcomes. Allknowledge is possible but you must first take that first step forward. We will help you the rest of the way

Applicant Requirements: None. No skills required - we will train you. But, biological background is helpful.

Applicant Preferences: biological background preferredpython, R, rust, unix, machine learning very helpful

Specific Time considerations/conflicts: Monday lab meetings and every other week journal club are required unless during class time.

App ID #: 2036

Mentor: Juengst, Sara Email: sjuengst@charlotte.edu

Title: Associate Professor

Department: Anthropology

Co-mentor:No

Community engaged research: No

Title: Study and Curation of Forensic Skeletons

Description: Human skeletal remains reflect information about a person's life and death, and are critical to studies of both the ancient past and recent human experiences. In modern cases, human skeletons are recovered from situations resulting from a variety of causes, including accidental death in remote locations, mass disasters, and violent crime. Addtionally, skeletons are used for teaching and learning human anatomy and osteology. UNC Charlotte Bioarchaeology and Forensic lab houses a small collection of forensic and teaching skeletons that require curation and study. While this lab is not involved in active casework, these remains still provide key opportunities to investigate life experiences, such as chronic drug use, correlations between tooth loss and health, trauma before and around the time of death, and links between age, sex, and health. This project will complete a full assesment of all the skeletal remains currently housed at UNC Charlotte and create an organized database so that future student and faculty research and teaching can easily access information about these skeletons. The student(s) involved in this project would contribute in several keys ways. First, they will assist directly with data collection from the remains, particularly focused on demographic and pathological features of the skeletons. This will be the primary task, and will involve training on methods of data collection, photography of the remains after data is collected, and analyses of patterns of health/trauma/etc noted during data collection. Additionally , they will help create an organized database to store these data and photos.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: Students will be trained in advanced human osteology and anatomy, forensic analysis and reporting, and database creation and curation. This will most directly help prepare them for careers in forensic anthropology or bioarchaeology but can also contribute to advancing relevant skills and knowledge for careers in medicine and quantitative and qualitative data assessment. These benefits are not easily accessible in classroom settings, as they require intensive hands-on experience with skeletons themselves as well as individual mentoring.

Required training of 2 hours with Description: Training will involve safety and ethical protocols when working with human skeletons. Since these remains are unidentified IRB will not be required.

Mentoring plan: Mentoring students is central to my pedagogy as the mentorship process stimulates innovative research and learning for both mentor and student. In this project, I will work with students directly to develop the necessary methodological skills and be available for consultation while they continue to collect data and create the database. We will meet weekly for

the first month, and every two weeks for the second and third months. They will also attend monthy lab meetings that include other undergraduate and graduate students working on parallel but separate projects. They will present at one of these group meetings and also prepare an abstract to submit to the American Association of Biological Anthropology meetings in 2027. I will work with them to develop skills in the lab setting as well as presentation skills, so that they are prepared for future projects in a variety of settings once they move beyond UNC Charlotte.

Applicant Requirements: Student applicants should have completed ANTH 3141 (Human Osteology) and ANTH 4141 (Forensic Anthropology). Comfort handling human skeletal remains is also critical for success. The ideal student applicant will be curious and self-motivated, and wishing to gain hands-on research experience. Experience with ethical conduct in anthropology (either through an ethics course or other anthropology coursework) is also required since while these are unidentified individuals, they are still humans who deserve to be treated with respect.

Applicant Preferences: Students who have experience with statistical analysis, broader human anatomy, isotope chemistry, and/or museum curation would be preferred. While not required to complete the tasks in this project, these skillsets would complement the work and could lead to engagment on future projects.

Specific Time considerations/conflicts: The student must be available Monday or Wednesday between 10am and 2pm (or some subset of that time) for our weekly meetings. The exact schedule can be negotiated.

App ID #: 2037

Mentor: Li, Xingjie Email: xli47@uncc.edu

Title: Associate Professor

Department: Department of Mathematics and Statistics

Co-mentor:No

Community engaged research: No

Title: Shuffled Regression via Computational Optimal Transport

Description: This project introduces undergraduates to modern data science methods by studying shuffled regression—a statistical problem where the correspondence between predictors and responses is partially lost or scrambled. Traditional regression methods fail under such conditions, but recent advances in optimal transport (OT) provide powerful tools to realign and recover these hidden structures.Students will develop computational algorithms using OT to match and analyze shuffled data, explore robustness to noise and incomplete information, and apply the methods to synthetic and real-world datasets (e.g., image alignment, biological measurements).

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: Through this work, students will gain experience in applied mathematics, optimization, and computational statistics, while contributing to ongoing research in data-driven modeling. The students are anticipated to complete a project report with testing examples that they define and find from real world application.

Required training of 2 hours with Description: Students on this project will gain sufficient training and experience in mathematical modeling, coding python, data finding, modeling testing and validation.

Mentoring plan: As a mentor, I will provide regular guidance through weekly meetings and invite the students to the group discussions to build collaboration and communication skills. The students will work directly with me on the shuffled regression project using optimal transport, gaining both theoretical and computational experience. I will provide structured feedback on coding, presentation, and writing, and encourage the student to give oral and poster presentations at the undergraduate research conferences.

Applicant Requirements: Students should have completed at least Calculus I, Matrices and Linear Algebra, and Linear Regression in Statistics, as well as have at least one semester of coding experience in Python.

Applicant Preferences: Preference for experienced students with foundational knowledge in mathematics and statistics. Experience identifying relevant data and real-world applications, developing and implementing models, and testing and validating those models.

Specific Time considerations/conflicts: The students must attend the OUR conference in spring 2026.

App ID #: 2041

Mentor: Amengonu, Yawo Email: yhameng1@charlotte.edu

Title: Advanced Wireless Power Transfer via Inductive Resonant Coupling

Department: Electrical and Computer Engineering

Co-mentor:No

Community engaged research: No

Title: Advanced Wireless Power Transfer via Inductive Resonant Coupling

Description: Wireless Power Transfer (WPT) stands at the forefront of technological innovation, offering transformative solutions for consumer electronics, medical devices, and electric transportation. This proposal outlines a comprehensive research and development initiative focused on advancing Inductive Resonant Coupling techniques to achieve higher efficiency, extended operational range, and enhanced system robustness. By leveraging state-of-the-art simulation tools and prototyping methodologies, the project aims to deliver scalable solutions adaptable to multiple industry applications.Project ObjectivesDesign and simulate advanced resonant coupling circuits to maximize energy transfer efficiency.Develop functional prototypes for both low- and high-power applications, with an emphasis on safety and reliability.Conduct rigorous testing and analysis to evaluate system performance under varied environmental and load conditions.Deliver a comprehensive final report detailing findings, recommendations.Proposed TimelinePhaseMilestoneEstimated CompletionPhase 1Simulation & DesignTBDPhase 2Prototype DevelopmentTBDPhase 3Testing & AnalysisTBDPhase 4Final Report & RecommendationsTBDProject SignificanceThe proposed research will contribute significantly to the evolution of wireless power systems, offering practical solutions for real-world challenges such as misalignment tolerance, energy loss mitigation, and system miniaturization. Resource RequirementsAccess to simulation software.Procurement of high-quality magnetic and electronic components for prototype construction.Laboratory facilities equipped for high-frequency electromagnetic testing.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: After completing the project, students will be able to confidently discuss their expertise, prototype development, and technical analysis, as well as their ability to synthesize complex information into actionable project outcomes. This background will be a strong asset when pursuing advanced studies or entering the workforce, equipping them to become innovators and leaders in their chosen careers.Students participating in this research project will develop a robust set of engineering competencies that directly support their academic growth and future careers. They will gain the ability to identify, formulate, and solve complex engineering problems by integrating principles of engineering, science, and mathematics into practical applications. Through hands-on involvement in designing and constructing prototypes, students will learn to apply engineering design to create solutions that not only meet technical requirements but also account for safety, and welfare. In addition, students will refine their

communication skills by engaging with diverse audiences, including academic peers, industry collaborators, and stakeholders as they will present their project to a broader audience. The project environment will emphasize ethical and professional responsibility, enabling students to make informed decisions that consider the far-reaching impact of engineering solutions. Through experimental work, students will develop the capacity to design and conduct meaningful experiments, analyze and interpret data, and exercise sound engineering judgment to draw valid conclusions. They will also cultivate the ability to acquire and apply new knowledge independently, using effective learning strategies to stay at the forefront of a rapidly evolving field. After completing the project, students will be able to confidently articulate their experience, technical problem-solving, and professional growth—attributes that will serve as a strong foundation for advanced studies or successful entry into the engineering workforce.

Required training of 0 hours with Description: No training or on-boarding process is necessary for the students.

Mentoring plan: I will be available for scheduled weekly meetings, where we will discuss project milestones, address challenges, and set actionable goals, as well as for additional consultations as needed to ensure continuous progress and guidance.The students will also have opportunities to present their findings during group meetings and, when appropriate, at departmental seminars and external conferences and especially during the college recruitment events. These experiences are designed to hone their communication skills and broaden their professional network. I am committed to facilitating their learning by providing access to relevant resources, fostering connections and encouraging their participation in interdisciplinary discussions. My goal is to cultivate not only their technical abilities but also their confidence and leadership as they navigate the research process. Together, we will celebrate their achievements and work through obstacles, ensuring that their time in this project is both transformative and rewarding.

Applicant Requirements: Yes, I am looking student applicants. The applicants must be rising juniors capable of conducting rigorous literature reviews; extracting and synthesizing the essential findings of scientific publications; and preparing clear written summaries

Applicant Preferences: The preferred student would be an Electrical Engineer junior or senior.

Specific Time considerations/conflicts: I will be available to meet the students as needed.

App ID #: 2040

Mentor: Shuster, Martin Email: mshuste2@uncc.edu

Title: Professor of Philosophy and Isaac Swift Distinguished Professor of Jewish Studies

Department: Philosophy

Co-mentor:No

Community engaged research: No

Title: The Political Economy of Policing

Description: This project is one of the inaugural endeavor's of the newly established Philosophy and Critical Theory Lab (https://pages.charlotte.edu/pact/) at UNC-Charlotte. The project will involve an inquiry into the political and economic basis of policing, especially around police misconduct settlements, police militarization, and police administration. This project will revolve around compiling data on police misconduct settlements in preparation for theoretical/philosophical analysis. Students will be involved in the first phase of data compilation. Students are expected to have (1) superior organizational skills, (2) excellent communication skills, whether via phone, in person, or in writing (e-mail and/or print), (3) facility with computers, including the GoogleDocs, GoogleDrive, and entering data into spreadsheets, and (4) tenacity (they are liable to deal with a range of bureaucratic structures).

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: Learn how to navigate government agencies and bureaucraciesLearn to gather quantitative and qualitative data from public sourcesPractice dealing with unexpected obstacles and problem solving in response to themLearn how to safeguard and collate dataDevelop written and oral communication skillsDevelop organizational skillsDevelop theoretical and analytical skills related to complex issues around policing

Required training of 2 hours with Description: Students will receive training in how the lab approaches this project and will be socialized into lab culture while learning technical aspects of our work.

Mentoring plan: This is a position that has well defined goals but offers a motivated students a lot of possibility for innovation and creative thinking with regard to problems that arise when gathering data from government agencies that may be resistant to providing that data. This requires good social skills and an ability not to be flustered by recalcitrant bureaucratic agents. The student can expect to have a mentor available to answer questions but will also be performing a lot of independent work. You will work directly with Dr. Shuster. We will generally have regular meetings. We are happy to have students participate at conferences but it is not required.

Applicant Requirements: Students are expected to have (1) superior organizational skills, (2) excellent communication skills, whether via phone, in person, or in writing (e-mail and/or print), (3)

facility with computers, including the GoogleDocs, GoogleDrive, Excel, Dropbox, and entering data into spreadsheets, and (4) tenacity (they are liable to deal with a range of bureaucratic structures).

Applicant Preferences: Problem solving and ability to think outside of the box when possible are huge pluses.

Specific Time considerations/conflicts: n/a

App ID #: 2042

Mentor: Subramanian, Kalpathi Email: krs@charlotte.edu

Title: Associate Professor

Department: Computer Science

Co-mentor:No

Community engaged research: No

Title: Engaging CS students in Early Computing Courses

Description: This project will contribute to an ongoing efforts in building CS education tools that are aimed at engaging CS majors in early computing courses, such as CS2, Data Structures, Algorithm Analysis. A large body of programming assignments have been built as part of the BRIDGES project and is actively being used by multiple CS programs across the United States The undergraduate student will contribute to ongoing efforts in the project. This could be looking into building and publishing new assignments, involving detailed project descriptions, starter code and documentation and possibly using external data sources, such as WikiData(https://www.wikidata.org/wiki/Wikidata:Main_Page). The project encourages OUR students to bring their own ideas and interests to the project.Alternately, it is of interest to analyzing the existing library of (nearly 70) assignments, their learning goals and identify possible gaps in assignments that are yet to be built to cover the topics in early CS courses..The student will have the opportunity to explore new datasets and tools (that sparks his/her interests) and work in a highly creative and flexible environment. The student will work as part of a research group with other undergraduate and graduate students and participate in weekly meetings for reviews and feedback. Benefits to the OUR scholar include gaining valuable training in software design, learning new and current technologies, documentation and working on challenging projects, and contributing to an assignment repository.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

2 positions available

Anticipated Student Learning Outcomes: Learn new software technologieswork together with other students and faculty in the group using shared software toolsLearn to build production quality software, testing, documentation

Required training of 5 hours with Description: The student needs to learn the BRIDGES project toolkit by going through and experimenting with the tutorials. They might need to understand learning goals relating to ACM curriculum standards, if their project is related to analyzing the existing assignments.

Mentoring plan: Weekly research group meetings with mentors and other research students.A discord channel will be available for additional questions/issues outside of weekly meetings.Mentors will be available outside of these meetings as needed.

Applicant Requirements: Students should have completed the first 2 programming courses in CS and Data Structures at a minimum. Knowledge and coursework on Algorithm Analysis is also a plus. Should be a competent programmer and the ability to work independently on given problems.

Applicant Preferences: As listed in the requirements above. Looking for highly motivated students who can learn and complete tasks on their own.

Specific Time considerations/conflicts: None.

App ID #: 2043

Mentor: Shuster, Martin Email: mshuste2@uncc.edu

Title: Professor of Philosophy and Isaac Swift Distinguished Professor of Jewish Studies

Department: Philosophy

Co-mentor:No

Community engaged research: No

Title: Mapping How US History is Taught

Description: This project is a brand new project launching in the Philosophy and Critical Theory Lab (https://pages.charlotte.edu/pact/) at UNC-Charlotte. The project begins with the basic observation that there is great debate about how United States history ought to be taught, especially when it comes to the ills of United States society (slavery, destruction of indigenous peoples, etc.) The aim of this project is to see how US history is in fact taught across different secondary schools. The project will begin with gathering data about Charlotte, but will then move to other cities in North Carolina and eventually other states, depending on how quickly we acquire data. Students will be responsible for (1) researching curricula across public, private, and semi-private schools; (2) understanding features of this curricula and what it means about how such education is relating to the past; and creating and situating this data for public availability. Students are expected to have (1) superior organizational skills, (2) excellent communication skills, whether via phone, in person, or in writing (e-mail and/or print), (3) facility with computers, including the GoogleDocs, GoogleDrive, and entering data into spreadsheets, and (4) tenacity (they are liable to deal with a range of bureaucratic structures).

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

1 positions available

Anticipated Student Learning Outcomes: Learn how to navigate various education agenciesLearn to analyze a wide range of educational materialsLearn to extrapolate quantitative and qualitative data from mixed sourcesPractice dealing with unexpected obstacles and problem solving in response to themLearn how to safeguard and collate dataDevelop written and oral communication skillsDevelop organizational skillsDevelop theoretical and analytical skills related to complex issues around what it means to pursue history

Required training of 4 hours with Description: Students will receive training in how the lab approaches this project and will be socialized into lab culture while learning technical aspects of our work.

Mentoring plan: Students can expect to work directly with Dr. Shuster. He will train them in how to perform the desires functions and procedures related to this project, but it will be largely up to them to navigate the various bureaucratic and interpersonal issues that will arise when gathering this kind of data (Dr. Shuster will of course be available for consultation, but the ideal student will have initiative and the capacity to problem solve). The student can thereby expect to have a mentor available to answer questions but will also be performing a lot of independent work. We will

generally have regular meetings. We are happy to have students participate at conferences but it is not required.

Applicant Requirements: Students are expected to have (1) superior organizational skills, (2) excellent communication skills, whether via phone, in person, or in writing (e-mail and/or print), (3) facility with computers, including the GoogleDocs, GoogleDrive, and entering data into spreadsheets, and (4) tenacity (they are liable to deal with a range of bureaucratic structures).

Applicant Preferences: Students who have facility with education or history are considered an asset, as are students who are capable of problem solving.

Specific Time considerations/conflicts: n/a

App ID #: 2044

Mentor: Clinton, Sandra Email: sandra.clinton@charlotte.edu

Title: Research Associate Professor

Department: Earth, Environmental and Geographical Sciences

Co-mentor:No

Community engaged research: No

Title: Dragonfly genetic connectivity in urban freshwater systems

Description: Urbanization leads to an increase in impervious cover which results in increased flow, increased contaminants, and decreased biodiversity. Stream invertebrates, such as dragonflies and other insects, are monitored to determine ecosystem health. To better understand the impacts of urbanization on stream communities, we are mapping stream invertebrates across an urban gradient in Mecklenburg County and identifying them using both traditional (taxonomy) and molecular (DNA, PCR) methods. We are using these data to better understand urban impacts on biodiversity and genetic connectivity for better management and conservation of freshwater resources.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

2 positions available

Anticipated Student Learning Outcomes: The Student Learning Outcomes include:Gaining field experience in urban freshwater ecosystems.Skills using a dichotomous key and microscope.Exposure to DNA methodologies and bioinformatics skills.Training in using excel, GIS, and potentially R.Training in data management and good data practices.

Required training of 3 hours with Description: Students will be required to complete the University EHS laboratory safety training (online).

Mentoring plan: The scholar will complete a mentor-mentee contract at the beginning of the semester that outlines the goals of everyone participating in the project. The OUR scholar(s) will be directly advised by graduate students (PhD, MS) in the Clinton research group and will work with these students to collect and analyze data. The graduate students and Dr. Clinton will help the student gain the needed skills for data analysis and presentation. The scholar(s) and the graduate student(s) will meet weekly to set goals for the week and review tasks from the previous week. The student will also meet ~1x/week with Dr. Clinton to discuss any questions related to the research or deliverables. The student(s), if time allows, will also join the Clinton lab meeting (2x/month).At the beginning of the semester the scholar(s) will be assigned 5 journal articles to read for background information. These articles will be discussed with the mentors to make sure the scholar understood the key concepts. The OUR scholar(s) are expected to present their research at the 2026 Undergraduate Research Conference at the end of the semester. Depending on progress and interest, Dr. Clinton will help support the scholar(s) to attend a state or national research conference.

Applicant Requirements: Students should be interested in learning traditional taxonomy and willing to work several hours on a microscope. This project will also involve a field component, and students should be comfortable working in urban streams and ponds. The research program will provide transportation and boots. The department also maintains a field closet for students who may need field clothes (these are free to students).

Applicant Preferences: Students should have completed introductory Earth Science (ESCI 1101) or introductory biology. While students who have completed an introductory environmental science or ecology course are preferred, this is not required. An enthusiasm for freshwater science and field work is encouraged. Both lab-based taxonomy and field work can be challenging and students should be willing to work through difficulties.

Specific Time considerations/conflicts: Students must be able to work 1 day per week (a morning or afternoon) in the field per week.

App ID #: 2045

Mentor: Clinton, Sandra Email: sclinto1@charlotte.edu

Title: Research Associate Professor

Department: Earth, Environmental and Geographical Sciences

Co-mentor:No

Community engaged research: No

Title: Review of Beaver Science and Management in the Eastern United States

Description: Beavers are often called "nature's engineers" due to their ability to build dams that create ponds and wetlands. These freshwater features are important for storing water, protecting against floods and drought, and increasing biodiversity. Beavers were almost hunted to extinction in the United States from the mid-1600-1800s to supply pelts to the fur trade. Beavers numbers however, are increasing again in the United States due to population expansion and reintroductions. While it is well understood that beavers provide many benefits, beaver-human conflicts exist due to the flooding of landowner property as well as an overall negative association with this species. Many states are working to create beaver management plans with the goal of increasing beaver activity while decreasing conflicts. In the eastern United States there is little information on beaver population numbers and distribution which impacts the development of beaver management plans from local to state levels. The goal of this project is to analyze beaver science and management in the eastern United States. The student will research, summarize, and compare beaver science for this region.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

1 positions available

Anticipated Student Learning Outcomes: SLO1: Communicate the benefits of beavers for climate resilience in the eastern United States. SLO2: Research and summarize the primary literature and government documents. SLO3: Become proficient in coding information from the primary literature and government documents.

Required training of 3 hours with Description: While this project involves reading document sources, the student will need to complete EHS training so they can have access to the computer space in my lab.

Mentoring plan: The student will work with the MS student currently conducting this research. The student will meet 1x/week to set and evaluate weekly project goals. This project is part of a larger NSF funded study and the study will have the opportunity to join the larger group zoom meetings involving researchers from Minnesota and Washington as well as a non-profit (Beaver Institute). Depending on student interest, this project can be further developed to incorporate data analysis and GIS mapping of beaver science outcomes.In addition to the required URC presentation in spring 2026, the scholar will be offered opportunities to present this work at state and national meetings.

Applicant Requirements: 1. Willingness to scour the internet for any document related to beaver policy in the southeast. 2. Independently write (or call) different agencies in the southeast to ask for documents. 3. Ability to read government reports and code them for specific information (training provided). 4. Ability to work independently.

Applicant Preferences: 1. Strong writing skills. 2. Attention to detail, especially when reading the primary literature and government documents. 3. Independent work but mature enough to ask for help when needed.4. Ability to work in Excel or Access database.

Specific Time considerations/conflicts: The student must be able to meet 1x/week with the graduate student and Dr. Clinton. Some of the project can be completed independently using web resources; however, the student will need to keep a log of progress and provide updates.

App ID #: 2048

Mentor: Amengonu, Yawo Email: yhameng1@charlotte.edu

Title: Teaching Assistant Professor

Department: Electrical and Computer Engineering

Co-mentor:No

Community engaged research: No

Title: Robot dynamic modeling and Control design in DRAKE

Description: Many tools exist for robot design and simulation, but most behave like black boxes, offering little visibility into the underlying physics and algorithms. MIT Drake is on the other hand different: it's an open-source systems simulation library originating from MIT's Robot Locomotion Group and widely used in research and industry. Drake provides transparency and unifies key capabilities in one stack—high-fidelity multibody dynamics, automatic differentiation for gradients (enabling optimization and control design), and an in-browser 3D visualizer (Meshcat).In this project, Drake will be used to validate robot dynamics and controls. The student will:build a physics-faithful multibody model (URDF/SDF), and learn how to derive equation of motion of mobile robots,design baseline controllers (PID/LQR) and potentially an advanced controller (iLQR / trajectory optimization), andevaluate performance using quantitative metrics (tracking error, robustness to disturbances, and constraint satisfaction).

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: After completing the project, students will be able to confidently discuss their expertise, prototype development, and technical analysis, as well as their ability to synthesize complex information into actionable project outcomes. This background will be a strong asset when pursuing advanced studies or entering the workforce, equipping them to become innovators and leaders in their chosen careers.Students participating in this research project will develop a robust set of engineering competencies that directly support their academic growth and future careers. They will gain the ability to identify, formulate, and solve complex engineering problems by integrating principles of engineering, science, and mathematics into practical applications. Through hands-on involvement in designing and constructing prototypes. In addition, students will refine their communication skills by engaging with diverse audiences, including academic peers, as they will present their project to a broader audience. The project environment will emphasize ethical and professional responsibility, enabling students to make informed decisions that consider the far-reaching impact of engineering solutions. Through simulation and validation, students will develop the capacity to design and conduct meaningful experiments, analyze and interpret data, and exercise sound engineering judgment to draw valid conclusions. They will also cultivate the ability to acquire and apply new knowledge independently, using effective learning strategies to stay at the forefront of a rapidly evolving field. After completing the project, students will be able to confidently articulate their experience, technical problem-

solving, and professional growth—attributes that will serve as a strong foundation for advanced studies or successful entry into the engineering workforce.

Required training of 0 hours with Description: No training or on-boarding process is necessary for the students.

Mentoring plan: I will be available for scheduled weekly meetings, where we will discuss project milestones, address challenges, and set actionable goals, as well as for additional consultations as needed to ensure continuous progress and guidance.The students will also have opportunities to present their findings during group meetings and, when appropriate, at departmental seminars and external conferences and especially during the College of Engineering recruitment events and Outreachs. These experiences are designed to hone their communication skills and broaden their professional network. I am committed to facilitating their learning by providing access to relevant resources, fostering connections and encouraging their participation in interdisciplinary discussions. My goal is to cultivate not only their technical abilities but also their confidence as they navigate the research process. Together, we will celebrate their achievements and work through obstacles, ensuring that their time in this project is both transformative and rewarding.

Applicant Requirements: The applicants must be rising juniors capable of conducting rigorous literature reviews; extracting and synthesizing the essential findings of scientific publications; and preparing clear written summaries

Applicant Preferences: The student must be an Electrical, a computer or a mechanical engineering student.

Specific Time considerations/conflicts: I will be available to meet the students as needed.

App ID #: 2046

Mentor: Shuster, Martin Email: mshuste2@uncc.edu

Title: Professor of Philosophy and Isaac Swift Distinguished Professor of Jewish Studies

Department: Philosophy

Co-mentor:Yes

Fred Batista, fbatist1@uncc.edu, Political Science

Community engaged research: Yes

Title: Logics of Exclusion

Description: This project is part of an ongoing cluster of inquiry in the Philosophy and Critical Theory Lab (https://pages.charlotte.edu/pact/) at UNC-Charlotte. The project involves gathering data with/from and working with a “Logics of Exclusion" questionnaire that the lab is developing about “logics of exclusion” (defined presently as anti-Black racism, antisemitism, and Islamophobia). This project revolves around developing a qualitative questionnaire and also administering it to students and members of the Charlotte community. Students are expected to have (1) superior organizational skills, (2) excellent communication skills, whether via phone, in person, or in writing (e-mail and/or print), (3) facility with computers, including the GoogleDocs, GoogleDrive, Excel, and entering data into spreadsheets, and (4) tenacity (they are liable to deal with a range of bureaucratic structures).

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: Learn questionnaire design and qualitative measurement skillsDevelop theoretical and analytical skills around “logics of exclusion”Develop skill interacting with a range of peoplePractice dealing with unexpected obstacles and problem solving in response to themLearn how to safeguard and collate dataDevelop written and oral communication skillsDevelop organizational skills

Required training of 2 hours with Description: Students will receive training in how the lab approaches this project and will be socialized into lab culture while learning technical aspects of our work.

Mentoring plan: Students will meet weekly or biweekly with Dr. Shuster and Dr. Batista, working directly with them. Students will be supported in pursuing research and are encouraged to voice their opinions. This is a position that has well defined goals but offers a motivated student a lot of possibility for innovation and creative thinking.

Applicant Requirements: Students are expected to have (1) superior organizational skills, (2) excellent communication skills, whether via phone, in person, or in writing (e-mail and/or print), (3) facility with computers, including the GoogleDocs, GoogleDrive, and entering data into spreadsheets, (4) tenacity (they are liable to deal with a range of bureaucratic structures), and (5) ability to conduct research within well-defined parameters.

Applicant Preferences: Problem solving and ability to think outside of the box when possible are huge pluses.

Specific Time considerations/conflicts: n/a

App ID #: 2099

Mentor: Yarmand, Matin Email: myarmand@charlotte.edu

Title: Assistant Professor

Department: Software and Information Systems

Co-mentor:No

Community engaged research: No

Title: MetaLens: Unlocking Interdisciplinary Texts via Metaphors

Description: Think about the last time you read a research paper from an unfamiliar field: how did you find the experience? Disciplines often have unique jargon and writing style that can make reading these texts daunting to people outside the discipline. In a world increasingly in need of interdisciplinary collaboration, engaging with different disciplines is a crucial step for making meaningful change. As long as humans have existed, metaphors have been instrumental in bridging and sharing knowledge. For example, we might find reading interdisciplinary papers to be an uphill battle. Of course, no such battle takes place; the metaphor is abstract to the target concept. But, this common idiomatic metaphor allows us to imagine the difficulty in our own experience and ascribe qualities to it (e.g., the metaphor implies the task gets more difficult over time, like going uphill). This project broadly aims to design and develop MetaLens, a novel reading tool that generates and presents metaphors to complement the reading experience. Here is a sample scenario: Jennifer, an LLM engineer, has increasingly become interested in learning about the history of AI to better equip herself with the future direction of this technology. As such, she turns to Science and Technology Studies (STS), a sub-domain of social sciences that discusses the historical and cultural contexts of technology. She opens an STS paper in MetaLens and starts reading. MetaLens tracks Jennifer's reading, and especially paragraphs that she finds challenging. MetaLens then produces a metaphor linked to the main text in which she can interact with and better tailors according to her experience.Specifically, this project involves a variety of human-centered computing skills, including:designing interaction techniques for a digital reading tool via existing guidelines,creating user scenarios and storyboards that convey these techniques,developing a web-based interface for reading PDFs and showing metaphors, andImplementing LLM APIs to input information and output metaphors. This project especially suits students who want to pursue academic research, especially in the field of Human-Computer Interaction (HCI). Given excellent progress and commitment in the Spring semester, you will also have the opportunity to continue working on it over the summer, and submit it to the premier HCI conference (CHI). Upon acceptance, you will have a funded trip to the venue to present the work and meet many researchers from around the world – the next CHI is set to take place in Barcelona, Spain!

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

2 positions available

Anticipated Student Learning Outcomes: If you seek graduate school — you will get to experience an end-to-end workflow in Human-Computer Interaction (HCI) research. You will be able to develop

highly sought-after skills like storyboarding, design, prototyping, and tool implementation. There will further be opportunities for engagement that can help develop your communication, writing, and presentation skills. This project prepares you for your research career, and will give you enough insight and material that you can use to prepare a strong application for graduate school. If you seek industry — the design and development portions of the project closely align with many industry requirements, especially for User Experience (UX), Engineering, and Product Management (PM) roles. You will practice what it means to develop solutions that solve a real-world problem: Aligned with a PM role, you will develop broad principles that capture the essence of the problem and solution, and then you use a variety of UX strategies to design granular interaction techniques. Lastly, the front-end (website interface) and back-end (API linkage) portions of the project are crucial skills in the current landscape of LLM-focused engineering. If you are open to both — you have the opportunity to benefit from both categories! Show up motivated with open eyes, learn and practice these skills (that often overlap between academia and industry), and you will be able to know for sure which career path you gravitate towards.

Required training of 0 hours with Description: There is no on-boarding process needed for this project.

Mentoring plan: We will collaboratively work on a mentoring plan that works for your schedule and mine. Having worked with many undergraduate students in the past, here is what I have found to be helpful: Phase 1: Project Setup and Early GuidanceMeetings: 3x per week (two short check-ins + one long co-working session)Duration: Weeks 1-3Mentor Role: Offer close guidance on project goals, co-work to model research and design processes, help with problem scoping and solution planningPhase 2: Independent Design and DevelopmentMeetings: 1x per week (one long check-in)Duration: Weeks 4-12Mentor Role: Provide targeted feedback on the design process, offer clues for technical obstacles, and track alignment with project goalsPhase 3: Consolidation and PresentationMeetings: 2x per week (one long and one short check-ins)Duration: Weeks 13-15Mentor Role: Advise on clear presentation strategies and provide support for integrating the work into a cohesive final outcome Besides our 1-on-1 engagement, I would also encourage you to talk to other students and faculty, and at least once, present to the HCC research group. These interactions can help you build a broader network, and especially, learn how to communicate your progress to a wider audience.

Applicant Requirements: The following skills are crucial for success in this project:Programming — You must have prior coding experience in full-stack development, either as part of previous classes or personal projects. You should have strong familiarity with front-end development, including HTML, CSS, JS. Strong familiarity with back-end workflows (e.g., Python Flask) is also necessary. It is also important that you are fairly familiar with project management on Github.Design — You must be able to prototype different design interactions via low-fidelity techniques like user interface sketching.Independence — You must be able to think and work independently, always aspiring to discuss your new ideas and explorations. I will be helping you along the way, but you will be the one driving the work according to your interest and expertise.Motivation and Curiosity — You must be motivated and curious to pursue this line of work. This interest can especially stem from your past experience when you might have experienced challenges when reading interdisciplinary papers.

Applicant Preferences: The following skills can put you on a path to success:Programming — Prior experience in LLM prompting and scripting via online APIs (e.g., OpenAI API) can especially be helpful as this is how you will produce the metaphors (recommended courses: ITIS 2300, ITIS 3135).Design — Prior design skills (e.g., user scenario and storyboarding) is a plus, not a must (recommended courses: ITIS 3130).Writing — Strong writing skills can help you transform your work into a manuscript that will publicize your work to a broad audience.

Specific Time considerations/conflicts: There is no specific day or hour for engagement in this research. We will collaboratively find times that work for both of us.

App ID #: 2049

Mentor: Falaggis, Kosta Email: kfalaggi@charlotte.edu

Title: Associate Professsor

Department: Mechanical Engineering and Engineering Science

Co-mentor:No

Community engaged research: No

Title: Vision-Ray Alignment Assistant (VRAA): A precision instrument for optical alignment

Description: Optical systems only perform well when lenses are precisely aligned. In this project you will build a simple, low-cost alignment instrument that helps measure and correct misalignment (tip/tilt and decenter) in small optical assemblies. The setup uses a camera that views a patterned target; software converts the image into alignment numbers and on-screen guidance.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

2 positions available

Anticipated Student Learning Outcomes: You will learn hands-on opto-mechanical skills, camera acquisition, basic data processing, and engineering documentation—excellent preparation for internships or graduate research, as well as exposure to relevant work for Industrial Members of the Center for Freeform Optics, see https://centerfreeformoptics.org/

Required training of 8 hours with Description: Complete ORPI/CITI and EHS (Laser/LED + General Lab Safety) training first. Orientation covers lab rules, PPE, SOPs, emergency procedures, and data practices. Technical onboarding includes camera/projector checkout, MATLAB template walkthrough (~6–8 hours), followed by daily micro-check-ins as independence increases

Mentoring plan: Work with me and a grad mentor. Expect daily huddles (10–15 min) and a weekly 1:1. I provide 24-hr weekday feedback, a safe lab, and presentation chances (updates, practice talk, Summer Symposium; maybe a conference). You commit to solid notes, proactive communication, steady progress to prototype+code+brief report, and reviews.

Applicant Requirements: Skills: Basic MATLAB Safety: Complete EHS General Lab and Laser/LED safety before bench work.Professionalism: Reliable, detail-oriented, communicates blockers early.

Applicant Preferences: Linear Algebra (Matrices, Vectors), Physics 1+2

Specific Time considerations/conflicts: Daily Scrum Meetings (Monday - Friday).

App ID #: 2050

Mentor: Falaggis, Kosta Email: kfalaggi@charlotte.edu

Title: Associate Professor

Department: Mechanical Engineering and Engineering Science

Co-mentor:No

Community engaged research: No

Title: SpeckleScope: Digital speckle photography for deformation and vibration mapping

Description: Build a bench-top speckle photography system to visualize tiny surface motions. A laser or LED illuminates a matte, speckled surface; a camera records intensity patterns before/after loading or at different phases. Software tracks speckle shifts to estimate in-plane displacement/strain and small out-of-plane motions.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

2 positions available

Anticipated Student Learning Outcomes: Your role: assemble optics (illumination, diffuser, sample mount), capture image sequences, write MATLAB/Python code for correlation (windowed NCC or phase-based), run repeatability/uncertainty tests, and prepare a short user guide + poster.

Required training of 6 hours with Description: Complete ORPI/CITI and EHS (Laser/LED + General Lab Safety). Orientation: PPE, SOPs, eye safety, data practices. Technical: camera/illumination checkout, speckle capture basics, MATLAB template for correlation and displacement maps, lab-notebook conclude onboarding.

Mentoring plan: Work with me and a grad mentor. Expect daily huddles (10–15 min) and a weekly 1:1. I provide 24-hr weekday feedback, a safe lab, and presentation chances (updates, practice talk, Summer Symposium; conference abstract if results justify). You commit to solid notes, proactive communication, steady progress to prototype+code+brief report, and reviews.

Applicant Requirements: Skills: Basic MATLAB (image I/O, arrays, plotting; correlation or least-squares), careful lab notebook.Safety: EHS General Lab + Laser/LED safety completed before bench work.Availability: Summer (10 weeks, 20–40 h/wk).Professionalism: Reliable, detail-oriented, communicates blockers early.

Applicant Preferences: Linear Algebra, Signals/Systems, basic Matlab or Python; experience with cameras/lighting;

Specific Time considerations/conflicts: Daily scrum (Mon–Fri); core lab window Mon–Thu 10:00–16:00 for supervised bench work;

App ID #: 2051

Mentor: Cross, Donald Email: dcross8@charlotte.edu

Title: Assistant Professor of Translation

Department: Department of Languages, Cultures and Translation

Co-mentor:No

Community engaged research: No

Title: Translation Project: "Literary Experience" by Alfonso Reyes

Description: For this project, the OUR Scholars will help with manuscript preparations for the publication of an English translation of Alfonso Reyes's La experiencia literaria ("Literary Experience"). Although this book makes important contributions to literary criticism and theory, it remains largely unknown in the English-speaking world because it has never been translated. The OUR Scholars will thus have a chance to help introduce an important book to the anglophone audiences throughout the world. In fact, very few of Reyes's works have been translated into English. So, by helping with this project, the OUR Scholars will also be helping to introduce this important Mexican philosopher and critic to the world. This translation project is student-driven. I am working on the translation itself with graduate students in the Department of Languages, Cultures and Translation. The OUR Scholars will have five principal tasks: 1. Help track down Reyes's sources in the J. Murrey Atkins Library or through online resources. Throughout La experiencia literaria, Reyes quotes numerous works from the history of literature, philosophy, and popular culture. Sometimes, these works are easy to find; sometimes, they are obscure and not widely available. Reyes often provides the author's name and a title, but he rarely provides information about the publisher. The majority of the OUR Scholars' task will consist in finding these sources to complete the bibliography for the book translation. 2. Once the OUR Scholars have located a source, they will help check the accuracy of Reyes's quotation. Are Reyes's quotations correct? Does he misquote? Reyes often quotes from memory, so it is important that the translation keep a record of any moments in which his quotations depart from the material that he is quoting. 3. Help search for English translations of the material that Reyes quotes. At times, Reyes quotes works in English, but the majority of his quotations are in Spanish, and a few are in French and Portuguese. The OUR Scholars will help determine if there are English translations of the different works that Reyes quotes. If an English translation does exist, the OUR Scholars will attempt to find and transcribe the passages that Reyes quotes in the English translation. 4. Proofread translation drafts. 5. Research secondary sources about Alfonso Reyes. By compiling interesting articles or books about Reyes's life and work, the OUR Scholars will help the translation team develop a better grasp of scholarship on Reyes's work. This background information will also help ensure a more accurate translation of Reyes into English.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: The translation of Reyes's book will eventually be published with a university press. Generally speaking, university presses are the most rigorous and

the most prestigious. The OUR Scholars names will appear in the published book in acknowledgement of work they that they do throughout the semester. The OUR Scholars will also be able to add their role as an assistant researcher in the translation project to their CV or résumés. Very few students at the undergraduate level – or even at the graduate level – have the opportunity to work on the publication of an academic book. This experience will be a wonderful advantage when applying for jobs or for graduate programs. In addition to these professional considerations, the OUR Scholars will also develop invaluable research skills. These skills include but are not limited to: 1. Retracing references to original sources. While this skill might seem relatively straightforward, it lies at the heart of research in the humanities, and it is all the more important in today's age of the internet and misinformation. This sort of source work also develops a sort of critical thinking since it requires decisions concerning which references need to be retraced to their sources. References can take many forms (quotations, paraphrases, allusions, etc.), and some of Reyes's sources in particular can be hundreds or even thousands of years old. 2. Navigating the industry of academic publishing. Even if the OUR Scholars do not intend to pursue a career with a relation to the publishing industry, the experience of helping with the publication of an academic book is highly valued in all sectors. The very fact that the OUR Scholars participates in the publication of an academic book will serve future employers as proof of the quality of their work ethic. 3. Developing an awareness of translation studies. Since the work carried out by the OUR Scholars assist in the publication of a book translation, they will gain firsthand experience of the vital role research plays in the practice of translation. They will also gain professional experience working with multilingual documents. 4. Identifying genres and trends in Latin American and world literature. Reyes has an encyclopedic knowledge of the history of Latin American literature, and he draws on numerous examples in his discussion of literature in La experiencia literaria. As the OUR Scholars retrace his references, we will also discuss his understanding of literary genres and movements.

Required training of 3 hours with Description: At the beginning of the semester, I will meet with the OUR Scholars to discuss the project, define expectations, and provide any materials necessary to get started. To ensure that OUR Scholars are familiar with the various resources necessary to complete their tasks easily and successfully, I will arrange for them to meet with the Humanities Librarian who can offer them further assistance as they begin their research. I have also created a "Source Work" orientation module on Canvas for them to complete.

Mentoring plan: The OUR Scholars and I will meet once a week in order to discuss progress. If issues arise that need immediate attention, we will schedule supplementary meetings. I also encourage OUR Scholars to keep in contact with me regularly by email as their research progresses. In addition, OUR Scholars might have the opportunity to work with the graduate students involved in this translation project. OUR Scholars will be working with translations initially drafted by graduate students, so we might need to keep in contact with the translators about their work. OUR Scholars will also be invited to any meetings I have related to the project. These meetings might take place with graduate students working on the project or with the university press where the work will be published. These meetings will give OUR Scholars hands-on experience of both graduate studies and the publishing industry. We will dedicate a portion of our regular meetings to talking about ways in which to transform their experience into a formal conference paper for the Undergraduate Research Conference at UNC Charlotte. If students are

interested in continuing their work, I will also help find additional conferences at which they might present their work. Finally, we will regularly discuss ways in which to narrativize and market their experience as an OUR Scholar. Having worked closely with the OUR Scholars, I will be in a good position to offer help for job applications or graduate school applications.

Applicant Requirements: While the OUR Scholars will not undertake any translations, their research will be part of a translation project, and many of the sources will be in Spanish. So, competency in Spanish is necessary. In addition, the OUR Scholars should be self-motivated. I will meet with the OUR Scholars regularly, but much of the work will be carried out independently. At the same time, the OUR Scholars should be vocal about their needs and the difficulties they encounter. They should not hesitate to reach out to me whenever an issue arises concerning tasks, deadlines, meetings, or any other aspect of this project.

Applicant Preferences: The OUR Scholars will preferably have some interest in literature, Latin American culture, or Hispanic culture more broadly. Undergraduate students majoring or minoring in Spanish are a natural fit, but the position is open to anyone who meets the requirements listed above.

Specific Time considerations/conflicts: There are no fixed meetings for this project. Meetings will be arranged on days and at times that cater to the availability of both mentor and mentees.

App ID #: 2053

Mentor: Eppes, Missy Email: meppes@charlotte.edu

Title: Professor of Earth Sciences

Department: Earth, Environmental and Geographical Sciences

Co-mentor:Yes

Yao Li, yao.li@charlotte.edu, EEGS, CAGIS Center

Community engaged research: No

Title: Why are those leaves so red!?! Investigating Leaf Anthocyanin Synthesis Using Remote Sensing and Geospatial Analysis

Description: Background. Tourism around Fall Leaf colors produces $30 billion in annual revenue for local economies across 24 eastern states!! While it is well-understood how the yellow and orange colors come about - as leaves die off - the occurrence of Anthocyanins that are responsible for the vivid reds in fall leaves is widely debated in Biology. Anthocyanins are energetically expensive pigments produced during senescence (autumn die-off). It has long been a mystery as to why a tree would expend energy to make them! Past work has focused on the physiology of the plants themselves, with very little investigation between the production of those red colors and the landscapes that the trees are growing in. This project will begin to make crucially needed links between Anthocyanins and landscapes! Our past preliminary work remarkably suggests that the landscape is very important, and that anthocyanin presence may correlate with nutrient stress. It therefore may be modulated by environmental variables such as soil chemistry and geomorphic position (on a floodplain, on a hillslope, etc). Previous field-based research has demonstrated links between anthocyanin content and geomorphic features such as slope, soil development (rubification), and landform stability. However, no large-scale study has leveraged the amazing modern geospatial tools we now have to quantify these patterns across entire landscapes. This project builds on past work by Eppes to explore the relationship between landscape topography and anthocyanin production (the pigment that makes leaves red) in deciduous trees during autumn, using remote sensing technology to map and analyze patterns of red coloration across varied terrain. The student(s) will use remote sensing imagery (e.g., multispectral drone, aerial, or satellite data) to index anthocyanin-rich foliage by isolating red spectral signatures during peak autumn coloration. These color indices will be spatially analyzed against topographic variables such as slope, aspect, elevation, and surficial geology using GIS software (ArcGIS/QGIS). Depending on student interest, lab work and field work could be acquired to validate the measurements, and/or statistical modeling could be employed to evaluate the strength of these correlations and determine whether landscape stability or nutrient availability inferred from topography plays a significant role in foliar anthocyanin expression.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: Research and Analytical SkillsHands-on experience with remote sensing image processing, including classification and spectral analysis (e.g., isolating anthocyanin-associated red spectral signatures).Deepened understanding of landscape ecology, geomorphology, and their intersection with plant physiological responses - or if you are purely an IT person, experience in applying your skills to these fields.Experience applying statistical and spatial modeling to real-world environmental datasets.Geospatial and Technical ExpertiseAdvanced training in GIS software (ArcGIS, QGIS) and digital elevation model (DEM) analysis for extracting topographic features (slope, aspect, curvature).Exposure to multispectral satellite or drone imagery, including data acquisition, pre-processing, and analysis.Opportunities to develop scripts or workflows in Python or R to automate and analyze spatial data.Academic and Professional DevelopmentClose mentorship on research design, data interpretation, and scientific communication.Potential for co-authorship on a peer-reviewed publication and/or conference presentation.Real-World ImpactContribute to an emerging body of research on climate-resilient landscape ecology and forest response to environmental stressors.Help uncover novel patterns linking vegetation physiology to landform evolution, with potential implications for conservation and land management.Potential for Student Publication/Presentation: High. This project builds upon novel hypotheses linking landscape processes with plant physiological expression and offers potential for co-authorship on a peer-reviewed journal article and presentation at conferences such as AGU or the Southeastern Division of the AAG.

Required training of 4 hours with Description: No formal training required. Student will be instructed and given background on the project overall. There will be some reading to catch up on different concepts.

Mentoring plan: This is truly a multidisciplinary project - biology, Earth sciences, GIS and Remote sensing. The student will be closely mentored by both Dr. Eppes and Dr. Li (for GIS) as well as by Dr. Jiaming Lu - who has her PhD in remote sensing. We all maintain an 'open door' policy, where we are always available to help and answer questions. We will start off with regular meetings to develop a research plan. Then, in addition to open door, students can also meet with Dr. Yang and/or Dr. Eppes as required or preferred by the student. Ex: weekly meetings, bi-monthly, etc. We want the student(s) to feel confident to work independently, but also to know their limitations and to reach out for help when needed, rather than struggling and not making any progress.

Applicant Requirements: Experience in Geographic Information Systems (GIS)Familiarity with Remote Sensing techniques (e.g., NDVI, image classification, spectral indices)Interest and curiosity about plant ecology, biogeography, soils and/or landscapes!

Applicant Preferences: Experience with Remote Sensing, spatial statistics, LiDAR, and/or Python scripting in GIS (through coursework or other opportunities)Experience or ability to work independently (through coursework or other opportunities)Experience or ability to troubleshoot Computer Science applications (through coursework or other opportunities)

Specific Time considerations/conflicts: None

App ID #: 2054

Mentor: Wakeman, Shawnee Email: slwakema@charlotte.edu

Title: Clinical Professor

Department: SPCD

Co-mentor:Yes

Holly Johnson, hjohns76@charlotte.edu, SPCD

Community engaged research: No

Title: Project get OTR p2

Description: The current project targets developing Artificial Intelligence (AI) using a language learning model (LLM) to identify opportunities to respond (OTR) in lesson plans and audio transcripts. There is a preponderance of research regarding the benefits of effective class-wide instructional practices to establish classroom environments that promote positive outcomes across domains (i.e., academics and behavior) and student populations (e.g., Van Camp et al., 2020). Practices that increase active student engagement have been shown to be one of the critical components in producing overall positive outcomes for all students (Franklin & Harrington, 2019) including (a) increases in students' on-task behaviors, academic performance, and demonstration of desired behaviors and (b) decreases in demonstrations of challenging behaviors (e.g., Common et al., 2020; MacSuga-Gage & Simonsen, 2015; Menzies et al., 2017). One of the most efficient and effective methods for improving student engagement is by providing all students with frequent and varied opportunities to respond (OTR). Despite the well documented benefits of delivering increased rates of varied OTR, teachers' naturally occurring delivery rates still fall well below that of recommended rates to improve student outcomes (Scott, 2021). Teachers often receive limited training or instructional support in OTR (Simonsen et al., 2010), which impacts teachers' self-efficacy of implementation. Given the inadequate amount of preparation and training many teachers receive, there is an urgent need for teachers to engage in high-quality professional development (PD) and continued coaching support (Mitchell et al., 2017). While research suggests coaching models with 30 or more hours of direct support following an initial PD are needed to produce significant desired changes in teacher behavior and delivery of effective practices (Grasely-Boy et al., 2019; Yoon et al., 2007), programs with this kind of extensive time and resource commitment may be difficult for a majority of schools to implement and sustain (Gage et al., 2018; Grasley-Boy et al., 2019). Therefore, there is an urgent need to develop and implement a more efficient and effective way for teachers, and those who support them, to collect and analyze data associated with their delivery of OTR. Once available, this data could then be used to efficiently inform and guide decision making related to teachers' delivery of OTR. To support educational professionals in efficiently and effectively capturing accurate measures of their delivery rates of OTR, this project (getOTR) will work to accurately identify OTR in both lesson plans and audio transcripts from videos. We will work as a team to code existing plans and transcripts for four types of OTRs and align our human coding to the coding completed by AI to accurately capture teachers' delivery of OTR. The undergraduates in this project would be trained to identify the four types of OTRs, come to consensus with the coding with the faculty members, and as part of the data

analysis, work with the team to support the alignment of coding with the AI. This is a cyclical process that will be repeated with new plans and transcripts to hone both the human coding and the LLM to be more intuitive. Students will work independently after training and establishing reliability. Weekly meetings will occur with faculty. Students familiar with instruction and teacher delivery are preferred.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

1 positions available

Anticipated Student Learning Outcomes: The undergraduate student will participate in coding lesson plans and transcriptions for the four types of OTRs. The undergraduate student will participate with faculty in data analysis and alignment using data generated by AI and human coding. The undergraduate student will draft sections within a manuscript outline in regards to the study.

Required training of 15 hours with Description: The student would begin by completing CITI training if not already complete. The student would also be trained to code lesson plans and audio transcripts for OTRs as well as reviewing data between human and AI coding. When a manuscript is written, the student will also be provided support for writing.

Mentoring plan: The faculty will support the student by: (a) training the student for each task; (b) meeting weekly with the student to discuss progress, questions, and next steps for each task; (c) providing space on campus to work and access to any documents (via Google Drive space) and software needed to complete the work. Both faculty as well as the research team will make themselves available and engage with the student. We will create a timeline for the semester with the student to lay out the task milestones and activities the first week the student is in place.

Applicant Requirements: The student must be organized and have an eye for detail in narrative data. The ability to both complete work autonomously once task assignments are understood and work collaboratively with faculty to establish clean reliable data and results are a must.

Applicant Preferences: We are looking for a computer science student with an interest and experience related to coding, AI, or LLM.

Specific Time considerations/conflicts: The student must be available one day a week to meet with the research team. The day would be a mutually agreed upon time.

App ID #: 2055

Mentor: Sun, Mei Email: msun8@charlotte.edu

Title: Removing "forever chemicals" (PFAS) from drinking water by filtration

Department: Civil and Environmental Engineering

Co-mentor:No

Community engaged research: No

Title: Removing "forever chemicals" (PFAS) from drinking water by filtration

Description: PFAS are a group of organic contaminants toxic to human beings and the ecosystem. PFAS are widely used in many products like nonstick cookware and fire-fighting foams, and end up everywhere in our environment. They are very resistant to many existing treatment methods and stay in our body/the environment for years or even decades, therefore are called "forever chemicals". This project aims to improve current filtration methods to remove PFAS from our drinking water. We will use small lab setups to simulate treatment processes in water treatment plants, and optimize PFAS removal by adding different types of chemical reagents and controlling the reaction conditions.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

1 positions available

Anticipated Student Learning Outcomes: •Hands-On Experience: Work closely with our experienced research team, gaining practical skills in research laboratories and environmental monitoring.• Cutting-Edge Research: Contribute to groundbreaking studies on emerging contaminants, addressing real-world environmental challenges and shaping future solutions.• Methodology to explore new areas: learn how to get started with an unfamiliar territory by finding relevant information, reading literature, making testable hypothesis, implementing a realistic workplan, critically thinking about results, and effectively communicating ideas with others.• Professional Development: Brighten your resume with enhanced problem-solving, data analysis, and teamwork skills, preparing you for a successful career.

Required training of 10 hours with Description: The student will first receive lab safety training and then learn basic protocols for conducting experiments, using instruments, and collecting data.

Mentoring plan: I and other members of my research team will teach the student the skills needed to conduct this project and, in general, how to do research in a wet lab. The students will also learn how to analyze the results, draw conclusions, and represent the research findings. I will meet with the student weekly to keep up with progress, answer questions, provide feedback, and finalize action plans.The student can expect timely communication, resources for help, and opportunities for authorship if they produce high-quality results that can be published in conference presentations or scientific papers.

Applicant Requirements: •Enthusiasm for water quality and curiosity about emerging contaminants.• Strong attention to detail and ability to quickly learn new techniques.• Ability to

work effectively both independently and as part of a team.• Prior coursework in environmental science/engineering and chemistry

Applicant Preferences: Good at time management and communication, interest and background knowledge in chemistry

Specific Time considerations/conflicts: N/A

App ID #: 2086

Mentor: Moglen, Glenn Email: gmoglen@charlotte.edu

Title: Professor and Chair

Department: Civil and Environmental Engineering

Co-mentor:No

Community engaged research: No

Title: Forecasting Civil and Environmental Engineering Design under Climate Change

Description: Engineers base their designs on a strong understanding of risk. When designing for infrastructure to manage flowing water, risk-based design means sizing pipe diameters, inlet areas, and bridge heights appropriately so that floods are safely managed. But how do we quantify risk when climate change is making extreme events more common? In this proposed research, the student will work with a newly released data set from NOAA that quantifies the risk associated with extreme precipitation under various climate change scenarios. The student will use these data to model future flood runoff at the national scale and examine how the application of a widely-used runoff model may need to change to accommodate evolving risk under climate change. The student working on this project will develop strong modeling skills, skills at applying geographic information systems for data visualization, and both written and oral presentation skills. All are good preparation for entering the workplace or pursuing graduate studies.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

1 positions available

Anticipated Student Learning Outcomes: Students will develop:Modeling skills, most likely using a mixture of Matlab and pythonSkills using geographic information systems (ArcGIS and/or QGIS)Presentation skills: effective communication in both written and oral forms

Required training of 0 hours with Description: There is no training required. However the student will need to develop proficiency in using several different kinds of software.

Mentoring plan: I will meet with the student at least weekly throughout the experience. Initially our meetings will focus on understanding of the problem and the solution approach. With time, the meetings will focus on the resolution of research hurdles that are encountered and eventually on the analysis of results. Effective presentation of results for best communication and understanding will be the focus at the project's end. The student should be prepared to work independently, but can count on weekly (or even more frequent) meetings to resolve difficulties and identify next steps. Ideally, this work will result in materials for an academic publication, as was the case in a recent OUR project I led during Summer 2025.

Applicant Requirements: A basic understanding of hydrology is needed. Coursework in this area would have been encountered in either civil or environmental engineering in the geological sciences.

Applicant Preferences: Strong computational skills and a good grounding in mathematical tools are a strong plus. Skills using (for instance) Matlab, python, or other computational software beyond excel would be very helpful in this work. Beyond that, motivation to work hard and to be creative will be the best assets a student can bring to this project.

Specific Time considerations/conflicts: N/A

App ID #: 2089

Mentor: Stearns, Elizabeth Email: mestearn@charlotte.edu

Title: Professor

Department: Sociology

Co-mentor:Yes

Heather Coffey, hcoffey@charlotte.edu, Department of Middle, Secondary, and K-12 Education

Community engaged research: No

Title: Cultivating civic empathy in college

Description: Our project examines the causes and consequences of civic empathy among college students. We conceptualize civic empathy as a virtue that involves the awareness of and ability to understand and engage with different worldviews in order to actively participate in community. This definition emphasizes the complementary role that civic literacy, community engagement, and social empathy play in promoting active citizenship and openness to diverse viewpoints. By fostering civic empathy, we see the potential to foster agency and increase hope and optimism about the future of democracy. Cultivating civic empathy is a way to simultaneously address concerns related to declining political participation, increasing political polarization, and a growing "empathy gap" in society. Our study asks: 1. What is civic empathy and how do we measure it? 2. What are the causes of civic empathy and how can it be cultivated?3. What are the effects of civic empathy on acceptance of political or viewpoint diversity? Researchers often treat concerns about youth political disengagement, civic illiteracy, and political polarization as separate issues; we see civic empathy as a holistic, multi-dimensional virtue that can address such concerns. Amid efforts to promote civic engagement and viewpoint diversity in higher education, our study focuses on factors that cultivate civic empathy during the transition to college and the extent to which those efforts promote acceptance of viewpoint diversity on campus as well as agency and optimism about civic engagement. In one paper on this topic, a survey experiment and focus groups showed how and why students are apprehensive about interacting and working with people who hold political views that diverge from their own. At the same time, a pre-post survey showed that first-year students encountered situations that introduced them to new perspectives and even inspired empathy. This study uses mixed-method and longitudinal design to measure civic empathy among college students. We employ surveys, focus groups, and interviews with students during their transition to college and through their first two years. Incoming students will complete a survey about their opinions and experiences with social and political issues, their level of civic knowledge, the extent of their community and civic engagement, and empathetic feelings. They will again complete the survey after their first semester, after their first year, and at the start and end of year two. We use focus groups with first-year students in general education classes to explore their attitudes, experiences, and feelings related to empathy and viewpoint diversity. 40 students in each cohort will participate in interviews at the start of their first year and to interview them at regular intervals during their first two years about their college experiences related to the components of civic empathy. Sampling from different types of courses and recruiting students involved in different types of extracurricular activities, including some that emphasize community engagement, will

help us understand the perceived benefits and potential barriers to engaging with diverse political viewpoints on campus as well as factors that enable or constrain the cultivation of civic empathy. Our research design benefits from a general education curriculum that emphasizes exposure to multiple perspectives and a new requirement in North Carolina public universities to teach texts foundational to American democracy. During the first year, nearly all students will take a course that emphasizes multiple perspectives on local or global issues, a course that emphasizes civic knowledge, or both. This provides a natural experiment of sorts that will allow us to examine how the type and timing of these courses as well as other curricular interventions and extracurricular activities shape the development of civic empathy during this formative transition to college. Students working with this project will be involved in data analysis and presentation or with various aspects of data collection, depending on their interests. The research team, which includes faculty from Communication Studies, Middle, Secondary, and K-12 Education, Political Science and Public Administration, and Sociology, meets every other week.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: Students will gain experience with data collection and analysis. Depending on their interest, data may be quantitative, qualitative, or both. They will also gain skills in presentation of research findings, including poster presentations. Students may contribute to peer-reviewed journal submissions as well.

Required training of 5 hours with Description: IRB CITI training on social and behavioral research

Mentoring plan: Mentor and Advise: The project team will involve students in all facets of the ongoing research, per their interest. PI Stearns will be the designated advisor and mentor. The rest of the team would participate in the mentoring process based on the project phase and their expertise including scholars' activities in research, academic support, etc. The team will have biweekly meetings where the PIs and the student will discuss the specific research objectives for each phase and follow up on the progress, outcomes, evaluation, and dissemination activities. The meetings will have specific agendas based on the project plan and the student can report progress, share insights, ask questions, and seek feedback in these meetings. The PIs will offer an open-door policy whereby the student can reach out whenever they think the PI's insights would be helpful. The PIs will not only provide feedback and suggestions on the issues related to this project but also on issues such as career counseling and job applications. Provide opportunities for Interdisciplinary Collaborations: In this project, the student will conduct interdisciplinary research under supervision of the PIs. They will assist in data collection efforts, coding and analyzing data, developing dissemination products to include manuscripts and conference presentations, and disseminating the findings. Through these activities, the student will gain valuable experiences on how to collaborate toward achieving short-term and long-term goals with researchers and end-users from diverse backgrounds and disciplinary areas. Expect authorship of both publications and presentations: The students will receive guidance and training in the preparation of their research achievements into manuscripts for peer-reviewed journals and presentations at scholarly conferences. Provide opportunities for Grant Proposals. We will involve students in any future proposals stemming from this project so that they can learn best practices in proposal preparation,

including identification of key research questions, definition of objectives, description of approach and rationale, and construction of a work plan, timeline, and budget.

Applicant Requirements: major in a social science field or in data sciencestudent has taken at least one introductory social science courseattention to detailexperience working in diverse teams, either in-class or out-of-class

Applicant Preferences: experience with quantitative data analysis, including software like Excel and PowerBIexperience with data visualization techniques

Specific Time considerations/conflicts: Research team meetings are Tuesdays from 11:30-1:00

App ID #: 2057

Mentor: Xue, Hongfei Email: hongfei.xue@charlotte.edu

Title: Assistant Professor

Department: Computer Science

Co-mentor:No

Community engaged research: No

Title: Human Activity Sensing and Understanding using Wireless Signals

Description: Our project aims to develop cutting-edge systems capable of sensing and recognizing human activities through the analysis of the physical properties of wireless signals. These systems repurpose the wireless signals typically used for communication, such as WiFi and millimeter-wave (mmWave), to enable activity sensing. Unlike traditional human sensing methods that rely on cameras and wearable sensors, our research leverages the ubiquity and non-invasiveness of wireless signals. These signals offer unique advantages, including the ability to work in environments where visual methods fail due to poor lighting or occlusions and preserve privacy more effectively. Undergraduate students participating in this project will have the opportunity to engage in various aspects of research and development, including:- Data Collection and Preprocessing: Assist in setting up experimental environments for data collection using WiFi and mmWave technologies. Learn to preprocess the collected signal data to prepare it for analysis.- Model Training and Evaluation: Participate in training machine learning and deep learning models on processed datasets. Gain hands-on experience in evaluating model performance and making iterative improvements.- Software Development: Contribute to developing the software tools and interfaces needed for data collection, model training, and activity recognition testing.- Research Documentation: Assist in the documentation process by compiling results, conducting literature reviews, and contributing to the writing of research papers or reports.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: Participating in the research project on human activity recognition using wireless signals offers undergraduate students a multifaceted learning experience, rich in both theoretical knowledge and practical skills. Here are the anticipated learning outcomes categorized into skills, content knowledge, and experience:Skills:- Technical Proficiency in Deep Learning: Students will learn to implement and optimize deep neural networks, gaining hands-on experience with PyTorch. This includes data preprocessing, model architecture design, training, and evaluation.- Signal Processing and Analysis: Participants will develop skills in processing and analyzing wireless signals, such as WiFi and mmWave, understanding how human activities alter these signals and can be inferred from them.- Research Methodology: Students will acquire a rigorous approach to scientific research, including hypothesis formulation, experimental design, data collection, statistical analysis, and result interpretation.- Collaborative Software Development: Working on a project of this scale provides practical experience in collaborative software development practices, including version control with Git, code review, and continuous

integration tools.- Problem-Solving and Critical Thinking: The challenges faced during the project will hone students' problem-solving skills, requiring them to apply critical thinking to overcome obstacles and achieve project goals.Content Knowledge:- Human Activity Recognition (HAR) Fundamentals: Students will gain a deep understanding of the principles and state-of-the-art techniques in HAR, focusing on device-free methods using wireless signals.- Data Privacy and Ethics: Students will learn about the ethical considerations and privacy concerns inherent in human activity recognition research, especially regarding device-free monitoring methods.- Machine Learning and Deep Learning Theory: Participants will deepen their knowledge of machine learning and deep learning theories, understanding how these models can be applied to interpret complex signal data.Experience:- Real-World Application of Theoretical Knowledge: Students will apply their classroom learning in computer science and engineering to address real-world problems, bridging the gap between theory and practice.- Interdisciplinary Collaboration: The project offers the chance to work in an interdisciplinary team, fostering collaboration skills and exposing students to different perspectives and expertise areas.- Research Innovation: By contributing to cutting-edge research in HAR, students will experience the innovation process firsthand, including the excitement of discovery and the potential for real-world impact.- Professional Development: Participation in this research project can significantly enhance students' resumes, providing them with a competitive edge for future academic or industry opportunities in high-tech fields.- Publication and Presentation Skills: Students will have the opportunity to contribute to research reports and presentations, gaining valuable experience in scientific communication and the publication process.

Required training of 0 hours with Description: N/A

Mentoring plan: Short Responses:- The student will directly work with me and one of my PhD students on the project.- We will have weekly meetings with the students.- Yes, the student is expected to present at the group meetings and conferences.- I will work closely with the student to provide guidance and materials. And my PhD student will be open to the questions of the student. My Mentoring Philosophy: My mentoring approach is built on the foundation of support, growth, and collaboration. I believe in creating an inclusive, encouraging environment that promotes curiosity, critical thinking, and innovation. My goal is to guide students through their research journey, helping them to apply theoretical knowledge to practical problems, develop new skills, and grow both personally and academically.Success Plan- Goal Setting: At the beginning of the program, goals will be set collaboratively with the student, aligning their interests with the project objectives.- Skill Assessment and Development Plan: An initial assessment of the student's skills will be conducted to identify areas for development. A personalized plan will be created to address these gaps throughout the course of the project.- Feedback and Evaluation: Constructive feedback will be provided regularly, focusing on achievements and areas for improvement. Mid-term and end-of-term evaluations will assess progress toward the set goals.- Encouragement of Independence: While providing the necessary support, students will be encouraged to take initiative, make decisions, and lead parts of the project, fostering independence and confidence.- Recognition of Contributions: Student contributions will be acknowledged in presentations, publications, and reports. They will also be encouraged to present their work in academic forums.What Students Can Expect- Regular Check-Ins: Students can expect regular meetings to discuss progress, challenges, and next steps. These sessions provide an opportunity for feedback, reflection, and adjustment of

goals and strategies.- Clear Communication: Open lines of communication are vital. Students will receive clear instructions on tasks, expectations, and timelines and are encouraged to express their thoughts, concerns, and ideas freely.- Access to Resources: Students will be provided with the necessary resources and tools to successfully engage in the research project. This includes access to literature, software, databases, and any required hardware.- Skill Development: Apart from project-specific skills, students will be guided in developing soft skills such as teamwork, time management, problem-solving, and scientific communication.- Intellectual Challenge: The mentoring experience is designed to push students out of their comfort zones in a supportive way, encouraging them to tackle difficult problems, think critically, and engage deeply with the research content.- Professional Networking: Students will be introduced to professionals in the field, including guest speakers, faculty members, and industry experts, to expand their professional network and understand the broader implications of their work.- Ethical Guidance: Students will learn about the ethical considerations in research, ensuring they understand the importance of privacy, consent, and ethical data handling.

Applicant Requirements: Required skills, courses, or experiences - Basic Programming Knowledge: Proficiency in at least one programming language (e.g., Python, C++) is essential for coding, data analysis, and model development.- Fundamental Mathematics: A grasp of basic mathematics, including calculus and linear algebra, to understand the algorithms and models used in the project.- Introduction to Machine Learning: Having a basic knowledge of machine learning concepts and techniques.- Data Analysis Skills: Experience with data processing and analysis, understanding how to clean, interpret, and derive insights from data.- Problem-Solving Ability: Demonstrated ability to approach and solve problems systematically and creatively.- Communication Skills: Effective written and verbal communication skills for documenting research findings and collaborating with the team.

Applicant Preferences: Recommended or preferred characteristics, skills, courses, or experiences - Advanced Programming Skills: Proficiency in Python with libraries such as PyTorch for deep learning model development is highly desirable.- Signal Processing Coursework: Courses or experience in signal processing, especially related to wireless signals, would be advantageous.- Experience with Deep Learning: Prior experience or coursework involving deep learning, particularly in the context of activity recognition or related fields.- Project Management Skills: Ability to manage time effectively and contribute to multiple aspects of the project, showing initiative and independence.- Collaborative Experience: Experience working in teams, especially in multidisciplinary settings, demonstrating the ability to collaborate and communicate effectively with peers from different backgrounds.- Research Methodology: Familiarity with research methods, including experimental design, literature review, and statistical analysis.- Curiosity and Enthusiasm for Learning: A strong desire to learn new concepts, explore innovative solutions, and engage deeply with the research topic.- Critical Thinking: The ability to critically evaluate information, challenge assumptions, and contribute original ideas to the research.- Presentation Skills: Experience with or willingness to learn how to present research findings to both technical and non-technical audiences.

Specific Time considerations/conflicts: Weekly Lab Meetings: It's standard for research groups to have weekly lab meetings where all members discuss their progress, challenges, and next steps. Once a week, 1-2 hours, preferably scheduled during a common free period for all team members.

Research Team Meetings: Smaller team meetings focusing on specific aspects of the project might occur more frequently than full lab meetings. 1 hour per week, timing to be determined based on the specific subgroup members' schedules within the larger project team.

Data Collection Sessions: For projects involving wireless signal processing, data collection is a critical component that might require all hands on deck. Variable, depending on the phase of the project.

App ID #: 2060

Mentor: Saule, Erik Email: esaule@charlotte.edu

Title: Professor

Department: Computer Science

Co-mentor:No

Community engaged research: No

Title: Performance and Cost of Web Backends

Description: Web backends are common in the computing stack and they are usually programmed through a back end frame. Popular ones include flask, django, and node/express.The question at hand in this project is to determine how expensive these back ends are, not only in term of computing power, but also in term of associated resources like memory.The project will entail programming the same back end across different frameworks in different languages, spanning interpreted languages like python and javascript, to compiled ones like go and C++. And we will benchmark the different back ends to see performance difference and resource utilization differences.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

1 positions available

Anticipated Student Learning Outcomes: programming web back endsbenchmarking applications

Required training of 0 hours with Description: N/A

Mentoring plan: I'll meet the student at least every other week to discuss progress.I will guide the student to learn the different back end that they will need.we will discuss and design the benchnmark .I will help facilitate the access to virtual machines for testing purposes.

Applicant Requirements: You would need to know how to program in at least one interpreted language (python, javascript, perl, ruby, ...) and one compiled one (c, c++, go, rust, ...)

Applicant Preferences: Someone interested in systems and performance.

Specific Time considerations/conflicts: N/A

App ID #: 2061

Mentor: Saule, Erik Email: esaule@charlotte.edu

Title: Professor

Department: computer science

Co-mentor:No

Community engaged research: No

Title: Optimizing a bioinformatics application

Description: We will look at a particular bioinformatics application (OpenRDP) that help bioinformaticians solve recombination problems. These problems are quite computationally expensive and we will look at how we can benchmark and optimize the application.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

1 positions available

Anticipated Student Learning Outcomes: program a scientific application.develop and adapt an existing code base.benchmark and profile an application.optimize performance of an application.

Required training of 0 hours with Description: N/A

Mentoring plan: I'll meet with the student at least every other week.I'll show the student how to install and run OpenRDP and provide with test datasets.I'll show the student the basics of performance profiling.we will discuss avenues for optimization and how to implement them.

Applicant Requirements: You need to be somewhat good at Python. Experience with the system layers can help but is not required.Having studied data structures and algorithms (either throguh a class or independently)

Applicant Preferences: Experience with the system layers can help but is not required.someone interested in scientific computing; possibly bioinformatics.someone interested in performance of computing.

Specific Time considerations/conflicts: N/A

App ID #: 2062

Mentor: Arthur, Susan Email: sarhtur8@charlotte.edu

Title: Associate Professor

Department: Applied Physiology Health and Clinical Sciences

Co-mentor:No

Community engaged research: No

Title: The effect of Car T Cell Therapy on Skeletal Muscle in Breast Cancer.

Description: The purpose of the projects would be to investigate the role of cell signaling pathways in skeletal muscle with the model of cancer cachexia. During cancer, skeletal muscle is severely weakened yet the mechanisms for increased degradation is not known. Students will be using cellular techniques of western blotting and immunofluorescence to study the effect of cancer treatment on skeletal muscle quality. Specifically, students will learn how to: 1) measure proteins of muscle repair in cancer mice exposed to cancer treatment.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

1 positions available

Anticipated Student Learning Outcomes: At the end of the fall semester, the students will be exposed and aquire skill in:Explaining the skeletal muscle repair process and how cancer affects skeletal muscle quality.Perform experiments that measure skeletal muscle quality. Create experiments to measure muscle repair markers in muscle exposed to cancer.Solve technique problems associated with their data. Appraise their results and determine the next course of action.Experience in being a team leader for the laboratory.

Required training of 10 hours with Description:

a. The training/on boarding process will be:

i. Read current review article on the topic.

ii. Attend and take notes on Dr. Arthur's presentation on the theoretical foundation of the project and the specific questions that are to be answered.

iii. Successfully pass the training protocol in Canvas which the student learns basic lab techniques. It is a series of videos, readings, and lab tasks. Also training for IACUC and EHS.

iv. Be paired with current lab members and Dr. Arthur to learn the techniques specific to the project (western blot, immunofluorescence). Once proficient, the student can perform the techniques on their own.

v. Attend bi weekly lab meetings and individual meetings.

vi. Meet with Dr. Arthur to discuss professional development series.

Mentoring plan: Dr. Arthur's mentoring philosophy is to introduce students to STEM-research; especially it's clinical application. Also, to help instill confidence and courage in students to step outside of their comfort zone and learn techniques that are not taught in the classroom. In addition, another philosophy that I have is to provide students' opportunities for leadership and independence as well as opportunities to present their work to people outside of the laboratory. THe students will initially work independently with online training followed by basic lab techniques training administered by current team leaders. Dr. Arhtur will verify their training and will guide thrm through their initial techniques to verify their validity and reliability of the experiments.Dr. Arthur will have regular laboratory meetings and individual meetings to connect with the scholar and have mini-research and professional development discussions. Will make sure that the scholar has appropriate guidance and direction. Will have daily contact.Personal training the scholar in the skills required to be successful in his/her research project.Have a contract of the expectations of the scholar with deadlines. I will expect them to present at laboratory meetings and the departmental conference.Dr. Arthur will expect to scholar to attend all laboratory meetings which are scheduled based off of their schedule.

Applicant Requirements: IntegrityBiology or Exercise Science Background

Applicant Preferences: Interest in the topic.Bsaic Biology courses.Willingness to be a part of the team.Willingness to work at least 5-10h/week

Specific Time considerations/conflicts: None that I can think of.

App ID #: 2063

Mentor: Smith, Michael Email: mssmith1@charlotte.edu

Title: Assistant Professor

Department: Engineering Technology and Construction Management

Co-mentor:No

Community engaged research: No

Title: Development of Marine Energy Technologies to Enhance Device Reliability

Description: Marine energy (ME) focuses on harnessing kinetic energy in the world's oceans to generate electricity. For example, point-absorber wave energy converters (WECs) harvest incoming wave-energy in marine environments. In recent years, there has been much interest and advances in ME technologies to support Powering the Blue Economy (PBE) applications. However, much work is still needed to develop, optimize, and test such marine energy systems (e.g., improve resilience, increase efficiency, reduce costs, etc.). To address these challenges, this project focuses on device / component design, process modeling, simulation, prototype fabrication, and testing of marine renewable energy devices to enhance reliability and performance. For example, the design goals are focused on reducing expenses, reducing hardware costs, increasing device resilience, and minimizing energy losses, all of which must be addressed in order to advance the marine energy industry.Dr. Michael Smith is seeking to mentor promising undergraduate researchers on this interdisciplinary project to help address the critical problems that the marine energy industry is facing (e.g., damaged marine energy system components, etc.). This project focuses on developing and enhancing the design of marine energy devices (e.g., WECs) to enhance reliability and performance. The student's duties will include gathering and sorting relevant peer reviewed literature on the topic, collecting and analyzing data, mechanical/electrical component design, creating applicable physics-based models for analysis, prototype fabrication, conducting experimental tests, writing summaries of their work, and collaboration with the research team through regular meetings, as directed.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: Anticipated student learning outcomes include critical thinking, teamwork, communication, and technology skills to advance the research area. The student's duties will include gathering and sorting relevant peer reviewed literature on the topic, collecting and analyzing data, mechanical/electrical component design, creating applicable physics-based models for analysis, prototype fabrication, conducting experimental tests, writing summaries of their work, and collaboration with the research team through regular meetings, as directed.

Required training of 10 hours with Description: Students will be on-boarded through a combination of training activities to quickly equip students with the skills needed to contribute to the project. There will be an initial kick-off meeting to orient the students to the project (e.g., meet the team

members, identify the goals/objectives, specify the tasks, etc.). Then, students will work through guided training exercises (e.g., instructional videos, literature review, example representative learning activities/tasks, etc.) to help equip the students with the needed skills to perform the associated tasks. As the project progresses, additional skills/tools will be introduced (with the necessary training/instruction) for the project tasks, as applicable.

Mentoring plan: Mentoring on the project will include regular (e.g., weekly) meetings to discuss the project tasks, feedback on the research work, and action items. Students get the opportunity to practice their professional communication skills with weekly presentations based on the aforementioned aspects.

Applicant Requirements: Students with good academic records and related research interests are encouraged to apply. The student must be competent in Microsoft Excel, have strong communication skills (oral and written), and demonstrate keen data organization skills.

Applicant Preferences: Additionally, students with proficiency in machine design (mechanical / electrical devices) and software applications such as Mathcad, MATLAB/Simulink, and SolidWorks (or similar CAD application) are desired and will be strongly considered. Training can be provided to students who are willing to learn.

Specific Time considerations/conflicts: We will have regular weekly meetings that are scheduled based on the team's availability during the period of performance for the project.

App ID #: 2064

Mentor: Arthur, Susan Email: sarthur8@charlotte.edu

Title: Associate Professor

Department: Applied Physiology, Health, and Clinical Sciences

Co-mentor:No

Community engaged research: No

Title: The effects of High Fat Diet and Notch Inhibition on Signaling in Exercise Muscle

Description: The purpose of the project is to investigate the effect of high fat diet on signaling pathways important for muscle repair, including mTOR and WNT signaling. The student will learn cellular techniques including western blotting and Immunofluorescence. Obesity results in poor skeletal muscle quality but the mechanisms are not clear. Mice were exposed to a high fat diet and exposed to exercise. The students will work with the skeletal muscle lysates to measure markers fo signaling pathways to determine what their effect on muscle repair is.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: At the end of the Spring semester, the students will be exposed and aquire skill in:Explaining the skeletal muscle repair process and how obesity affects skeletal muscle quality.Perform experiments that measure skeletal muscle quality. Create experiments to measure muscle repair markers in muscle exposed to high fat diet.Solve technique problems associated with their data. Appraise their results and determine the next course of action.Have an opportunity to be a team leader.

Required training of 10 hours with Description: a. The training/on boarding process will be:

i. Read current review article on the topic.

ii. Attend and take notes on Dr. Arthur's presentation on the theoretical foundation of the project and the specific questions that are to be answered.

iii. Successfully pass the training protocol in Canvas which the student learns basic lab techniques. It is a series of videos, readings, and lab tasks. Also training for IACUC and EHS.

iv. Be paired with current lab members and Dr. Arthur to learn the techniques specific to the project (western blot, immunofluorescence). Once proficient, the student can perform the techniques on their own.

v. Attend bi weekly lab meetings and individual meetings.

vi. Meet with Dr. Arthur to discuss professional development series.

Mentoring plan: Dr. Arthur's mentoring philosophy is to introduce students to STEM-research; especially it's clinical application. Also, to help instill confidence and courage in students to step outside of their comfort zone and learn techniques that are not taught in the classroom. In addition, another philosophy that I have is to provide students' opportunities for leadership and independence as well as opportunities to present their work to people outside of the laboratory. THe students will initially work independently with online training followed by basic lab techniques training administered by current team leaders. Dr. Arthur will verify their training and will guide thrm through their initial techniques to verify their validity and reliability of the experiments.Dr. Arthur will have regular laboratory meetings and individual meetings to connect with the scholar and have mini-research and professional development discussions. Will make sure that the scholar has appropriate guidance and direction. Will have daily contact.Personal training the scholar in the skills required to be successful in his/her research project.Have a contract of the expectations of the scholar with deadlines. I will expect them to present at laboratory meetings and the departmental conference.Dr. Arthur will expect to scholar to attend all laboratory meetings which are scheduled based off of their schedule.

Applicant Requirements: IntegrityBiology or Exercise Science backgroundWillingness to work as a team playerWillingness to work 5-10h/wk

Applicant Preferences: IntegrityBiology or Exercise Science backgroundWillingness to work as a team playerWillingness to work 5-10h/wk

Specific Time considerations/conflicts: None that I can think of. Lab meetings will be based off of their schedule.

App ID #: 2065

Mentor: Gilson, Cindy Email: cgilson@charlotte.edu

Title: Associate Dean, Professor of Gifted Education

Department: Honors College

Co-mentor:No

Community engaged research: No

Title: Diving Deep Into Research Literature!

Description: Are you interested in building your foundational research skills? Then this is the project for you! High quality research is grounded in a solid understanding of what has already been published in scholarly journals about a particular research topic. Information gathered from the existing literature is used to write new literature review sections in subsequent research reports. The information is also used to design the research steps for a study or grant proposal. This OUR project would be a valuable learning experience for undergraduate students of any major interested in learning more about the research process. The OUR student(s) who will work on this project will support an ongoing scoping review team study about differentiated curriculum for gifted students.The project will involve a combination of the following research skills: generating keywords, conducting Boolean searches through Atkins library databases, screening articles for inclusion or exclusion, organizing research articles into a Google Drive folder, data extraction, checking coding, and summarizing the research literature. The OUR Scholar on this project will participate in a supportive, collaborative, and intellectually stimulating mentorship experience!

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

3 positions available

Anticipated Student Learning Outcomes: The OUR scholar will gain valuable life and research experience working collaboratively on a team research project. Collaboration is an essential skill that is applicable to all careers and professions. Learning to identify, locate, and understand components of high-quality research is a transferable skill that can be applied to students' educational and life pursuits. Specifically, the OUR scholar will be able to do the following as a result of working on this project:-Describe the difference between a literature review, scoping review, and systematic review-Generate specific keywords for targeted literature searches-Apply search parameters and Boolean strings to conduct searches in the Atkins Library databases-Organize articles in Google Drive apps-Screen articles using inclusion/exclusion criteria-Extract data from research articles-Check team members' coding-Summarize and synthesize research articles

Required training of 0 hours with Description: The OUR scholar will receive training on all of the foundational research skills to ensure they can confidently and successfully complete the objectives listed above. Training may be in person or via zoom. The OUR scholar will receive the training throughout the program as each new skill is introduced.

Mentoring plan: The OUR scholar can expect to engage in a positive and encouraging mentorship. Members of the research team include Dr. Gilson, 1-2 doctoral students, and 2 professors. Dr. Gilson will be the lead mentor who will engage with the OUR scholar. She has worked with OUR scholars for 6 years and encourages OUR scholars to ask curious questions about research and share ideas/input about matters related to the research studies. The OUR scholar will be a valuable contributing team member and treated professionally. Communication will be through zoom meetings, emails, and organized to do lists in Google Docs. Presentations at group meetings or UNC Charlotte conferences are possible depending on when the project is completed. The OUR scholar will be successful if they communicate regularly, complete assigned tasks on time, ask questions, and have fun learning!

Applicant Requirements: Required student qualifications include the following: -Basic computer skills -Familiarity with Google Drive, Sheets, and Documents -Ability to participate in Zoom meetings -Strong work ethic (e.g., meeting deadlines, asking for help, detailed oriented) -Familiarity with identifying research articles versus general sources -Familiarity with using Atkins library search engine

Applicant Preferences: Preferred student qualifications include the following:-Interest in reading and summarizing research literature-Interest in research-Interest in learning about curriculum and instruction for gifted students

Specific Time considerations/conflicts: Research team meetings will occur one time per week on a day/time that works for everyone, typically on Wednesdays or Thursdays. The meetings will be held via zoom.

App ID #: 2066

Mentor: Adnot, Mindy Email: madnot@charlotte.edu

Title: Assistant Teaching Professor

Department: Honors College

Co-mentor:No

Community engaged research: No

Title: Exploring Interdisciplinary Learning in the University Honors Capstone

Description: Honors education, according to the National Collegiate Honors Council, aims to provide students with intellectually rigorous and integrative experiences that transcend disciplinary boundaries. Central to the honors curriculum is the capstone project, which functions as the culmination of an honors student's academic journey. At UNC Charlotte, the University Honors Program (UHP) capstone project asks students to identify an interdisciplinary research question, complete an in-depth literature review, and design and lead a series of six seminars for incoming honors students under the mentorship of a faculty committee. Our research team is studying how this unique model uses interdisciplinarity to foster deeper learning and shape students' experiences and learning outcomes in the capstone sequence. In earlier work, we conducted a literature review and created a conceptual model that highlights the relationship between interdisciplinarity and deeper learning in the UHP capstone. Now, we are moving to the next phase of the project: gathering qualitative data to see, in practice, how students experience their capstone work. The OUR Scholar will play an active role in the next stage of this project, helping to design effective interview questions, participating in interviews with UHP alumni, reviewing and synthesizing data, and contributing to the writing of an article intended for publication in an academic journal.

Accepting applications for: Only 75 hours over an academic semester (~5h per week)

1 positions available

Anticipated Student Learning Outcomes: Critical thinking: Develop interview questions, analyze qualitative data, connect findings to a conceptual model of capstone learning Communication: Strengthen oral communication through conducting interviews and presenting findings at honors conferences; strengthen written communication through contribution to journal article draft Teamwork: Collaborate with the faculty mentor and members of the Honors College team to interpret research findings for programmatic decision making Leadership: Take initiative on specific research tasks, contribute to project planning Professionalism: Meet deadlines, maintain confidentiality, learn and uphold ethical standards in human subjects research. Career and Self-Development: Reflect on strengths and areas for growth, build research skills relevant for future graduate study or career

Required training of 6 hours with Description: The OUR Scholar will need to complete CITI (Collaborative Institutional Training Initiative) training to be able to engage in human subjects research at UNC Charlotte. I anticipate this training will require approximately 6 hours. Additional

training in qualitative research methods will be embedded into in-person working sessions throughout the semester.

Mentoring plan: My mentoring philosophy emphasizes building strong relationships with students through regular in-person meetings and collaborative work. The OUR scholar will have a standing weekly meeting with me for guidance, feedback, and reflection. While the OUR scholar will work most directly with me, they will also have the opportunity to work with and learn from our small, tight-knit Honors College team. I expect that the OUR scholar and I will share the results of this work by submitting an article to the Journal of NCHC, and presenting at local and national honors conferences. I am committed to creating an environment where students feel comfortable asking questions and feel valued as partners in the research process. Additionally, I understand the importance of helping students connect their research experience to their future goals, either in graduate study or their career path, and intend to build opportunities for this work into our meeting structure.

Applicant Requirements: Strong critical thinking, communication skills, professionalism, organizational skills, and time management are required for this role. No prior experience with qualitative research methods is necessary, just enthusiasm for learning!

Applicant Preferences: Prior experience with honors education and/or familiarity with interdisciplinary learning is preferred.

Specific Time considerations/conflicts: Availability for a weekly meeting during business hours Monday-Friday; will be scheduled to accommodate the OUR scholar's class times.

App ID #: 2067

Mentor: Suresh Babu, Arun Vishnu Email: asures10@charlotte.edu

Title: Teaching Assistant Professor

Department: MEES

Co-mentor:No

Community engaged research: No

Title: Bio-inspired flapping propulsion systems

Description: This project will explore the fluid dynamics of bioinspired propulsion systems. The project will use the computational fluid dynamics (CFD) software STARCCM and airfoil theory to model flapping wing propulsors resembling fish and birds. An undergraduate student with some background in introductory fluid mechanics and CFD shall be a able to, with the guidance of the mentor, develop an understanding of the basic fluid dynamics involved, and further study the bioinspired propulsion systems. The research will also involve the use of MATLAB for calculations and visualization.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

2 positions available

Anticipated Student Learning Outcomes: Students will have an excellent opportunity to apply classroom knowledge to tackle an interesting and critical real-world engineering problem. The project will also further enhance their understanding of fluid mechanics and enable them to further explore the concepts of aerodynamics. Besides, the project will also be a great platform to enhance the students' problem solving and mathematical modeling skills. Finally, through the use of MATLAB and STARCCM, the students will be able to expand their skillsets for a successful career.

Required training of 0 hours with Description: The students will be initially guided by the mentor to develop an understanding of the relevant aerodynamic theory and the software. The students will also be initially guided to operate some existing MATLAB programs for visualization and calculations. Through the course of the project, the student will develop simulation frameworks in STARCCM and MATLAB and make small-scale modifications to the existing setups to simulate and various scenarios.

Mentoring plan: Mentoring meetings will be set up with the mentor weekly on a recurring basis during weekdays 9-5. The mentor will also be available to meet more often whenever needed. Smaller discussions will also be addressed through email communications .

Applicant Requirements: Familiarity with STARCCM and MATLAB

Applicant Preferences: Passionate about fluid dynamicsPassionate about bioinspired systems

Specific Time considerations/conflicts: NA

App ID #: 2073

Mentor: Mathews, Jay Email: jay.mathews@charlotte.edu

Title: Associate Professor

Department: Physics and Optical Science

Co-mentor:No

Community engaged research: No

Title: Ge and GeSn materials for infrared photonics

Description: Germanium (Ge) and germanium-tin (GeSn) alloys are materials that are of interest for use in photonic devices that are compatible and integrable with silicon (Si). These materials can be grown directly on Si, and they are compatible with complementary metal-oxide-semiconductor (CMOS) processing used for fabrication of Si microelectronics. Due to its optical properties, Si cannot be used for detection of light at wavelengths longer than 1200 nm, and it does not have the right band structure for making a laser. Ge and GeSn have been demonstrated to work at wavelengths of 2000 nm and beyond, and both materials have been used to demonstrate lasing on a Si chip. This project involves measuring the optical and structural properties of Ge and GeSn films grown on Si by our collaborators at institutions such as Air Force Research Laboratory, University of Arkansas, or Australia National University.Photoluminescence (PL) spectroscopy is a technique that involves shining laser light on the material and then looking at the spectrum of light that is produced by band edge luminescence in the material. The spectrum and intensity of the PL is dependent on many material properties, including the defects in the material. The student will perform PL measurements on samples that were grown by different growth techniques or have been subjected to different types of thermal processing. The student may also perform other types of optical measurements such as reflection/transmission or spectroscopic ellipsometry, as well as structural characterization techniques such as scanning electron microscopy or atomic force microscopy. The student will gain knowledge of crystalline semiconductor materials and their properties, and they will learn experimental techniques for materials characterization as well as soft skills like written and oral communication. These skills will be directly transferrable to other research or to industry, helping prepare them for their future career as a scientist or engineer. They will work directly with graduate students, one postdoctoral researcher, and the primary investigator Dr. Jay Mathews. This work may lead to publication in a peer-reviewed journal and/or a conference presentation.Physics majors or dual-degree with Physics as one major are preferred, but students from other disciplines will be considered.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

1 positions available

Anticipated Student Learning Outcomes: The student will gain knowledge of crystalline semiconductor materials and their properties, and they will learn experimental techniques for materials characterization as well as soft skills like written and oral communication. These skills will be directly transferrable to other research or to industry, helping prepare them for their future career as a scientist or engineer. They will work directly with graduate students, one postdoctoral

researcher, and the primary investigator Dr. Jay Mathews. This work may lead to publication in a peer-reviewed journal and/or a conference presentation.

Required training of 2 hours with Description: Students must complete online safety training for lab safety, lasers, and chemical storage. Students working in the cleanroom will undergo additional training from cleanroom staff.

Mentoring plan: The student will work directly with other undergraduate students, graduate students, one postdoctoral researcher, and the primary investigator Dr. Jay Mathews. The student will be expected to give presentations at weekly or biweekly group meetings, and Dr. Mathews will meet with them regularly one-on-one for additional mentoring. Dr. Mathews has had multiple trainings in mentoring students and has mentored 22 undergraduate students in the past. He is committed to helping students navigate the next steps of their career, and he is always available for advice after the student leaves the group.

Applicant Requirements: Enthusiasm, work ethic, and a willingness to learn new things.

Applicant Preferences: A rising junior or senior Physics major or dual-degree with Physics as one major is preferred. Previous research experience is helpful. Knowledge of materials and/or optics is also helpful.

Specific Time considerations/conflicts: N/A

App ID #: 2074

Mentor: Perry, Heather Email: hrperry@charlotte.edu

Title: Associate Professor of History

Department: History Department

Co-mentor:No

Community engaged research: Yes

Title: Resurrecting Camp Greene: Digital History of WWI Charlotte

Description: I am working on a project that uses digital tools to re-create the lost history of Camp Greene – the U.S. Army Training Camp that was located in Charlotte from 1917-1919. Camp Greene was an army training camp located in Charlotte's west end during the First World War. Like most Training Camps during this war, the camp was meant to be temporary and was demobilized after the war. Over the past 100 years, Charlotte has changed so much through urban development and expansion, and today you can barely find any trace of this once vibrant episode in local history. However, I am working with the Charlotte Mecklenburg Parks & Rec Department to create a digital – or virtual – version of Camp Greene. Using photographs, maps, and other artefacts, we are creating first a 2D and then a 3D virtual reality version of Camp Greene. And we are looking for an undergraduate students who wants to help us do that. The student research intern would help with researching historical data and digitizing material in the Carolina Room of the Char-Meck Public Library. They might also do some research in the Johnson C Smith University Library. And, they would help us to collect the data that we need in order to use ArcGIS and StoryMap GIS to re-create a virtual Camp Greene.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: Students have the opportunity to:1) develop and refine archival research skills2) develop their data organizational skills using Bibliography software3) develop their professional communication skills via ongoing interaction with the Historian and Communications/Graphic Designer at the Meck Co. Parks and Rec Office as well as the CML Carolina Room4) create website content via narrative story-telling programs5) learn more about Public History and how historians work with museums and public facing projects6) develop their ArcGIS data-mapping skills7) learn more about historical preservation.

Required training of 1 hours with Description: Students will need to spend some learning the basic history of the camp.

Mentoring plan: I will meet weekly with the OUR intern -- alternating between in person meetings one week followed by Zoom meetings the next week. Depending on where we are in the research process, these meetings might be on campus, or in the Char-Meck Library's Carolina Room. During these meetings I work with the student to outline the data we are seeking and demonstrate how to find these via the archival materials. I will instruct the student in how to digitize archival materials in a usable format and how to organize and record these. I will also set up meetings with Brandon

Lunsford (the Historian at Meck Co Parks & Rec) and the intern will likely need to attend a couple of these.

Applicant Requirements: Students should have: 1) experience using Zotero (or some other bibliography software); 2) familiarity with using ArcGIS to create maps and/or data driven stories (or something similar);3) excellent communication skills in person, in writing, and via email; 4) the flexibility to meet on campus in the Public History Lab and/or Area49 for in-person project work;5) the flexibility to meet off campus with our project partners and/or in off-campus research archive locations;5) genuine curiosity and interest in how digging into the local past that history has forgotten.

Applicant Preferences: Students should be reliable communicators who can work independently towards a collaborative goal. The student in this position must be willing to work with off campus professionals and communicate with them as needed. Data-driven projects require students who can pay close attention to spelling, numbers, and other written details. Students should have a genuine curiosity about history and be genuinely interested --and willing – to devote several hours per week focused using specific tools and archives to find the kind of information that is not available in basic web searches or google.

Specific Time considerations/conflicts: Because this research position entails doing research work in local archives and computer work in the Public History Lab, the student must be able to meet and work in-person at these locations during regular business hours. The research archives are not open in evenings or weekends, so the archival and digitization work would have to be conducted during regular business hours (35-40 hours a week). Some of the data and visual programming can be conducted in the PH Lab (History Dept) or Area49 -- which has slightly more flexible hours.

App ID #: 2075

Mentor: Dahl, Alicia Email: adahl3@charlotte.edu

Title: Associate Professor, PH-HSMT Honors Program Director

Department: Epidemiology & Community Health

Co-mentor:No

Community engaged research: Yes

Title: Community-Driven Solutions for Improving Maternal and Child Health Outcomes

Description: Ensuring access to high-quality perinatal care is vital for the health and well-being of children and families in Charlotte. In 2024, the March of Dimes delivered a "D+" report card grade to North Carolina for preterm births, which happen at a rate of 10.7% in the state. Despite these challenges, communities also demonstrate resilience and joy in the perinatal process - narratives that should be highlighted. A public health response requires comprehensive research to improve the accessibility of community resources promoting perinatal health. Moreover, resources that improve perinatal care should focus on fostering physical, psychological, and social well-being for marginalized groups. This project builds on previous work to improve inequities affecting marginalized pregnant populations by championing local community resources and hands-on communication training throughout the perinatal cycle. Students will gain hands-on experience with data analysis, developing health communication toolkits, and academic writing. This project will include:analyzing quantitative data from a survey collected in fall 2025. analyzing qualitative data from a focus group with 10 perinatal health providers. revising a social marketing toolkit based on quantitative and qualitative data. assisting with a literature review for a manuscript on simulation-based trainings for improving patient-provider communication during pregnancy.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: Students will gain hands-on experience with quantitative and qualitative data analysis, developing health communication toolkits for healthcare providers, and academic writing through literature review assistance. I envision students talking about two key public health strategies to close health equity gaps locally. The students will become very familiar with a community-driven resource that was developed to assist families with getting connected to resources during pregnancy and postpartum. They will also learn about our Respectful Maternity Care Simulation that the Charlotte MCH Workgroup hosts annually by supporting the evaluation report. All of these experiences will connect them with perinatal health advocates, providers, community resources, and people with lived experience.

Required training of 10 hours with Description: Students would complete the CITI Certification for Social and Behavioral Sciences.

Mentoring plan: Students would work directly with Dr. Dahl on a research development plan with specific and actionable goals that build on existing strengths and create opportunities for new growth. Each lab group member is expected to attend weekly lab meetings so that they can be part

of the continuing conversations about the projects. Each lab member gives a brief report of the progress made since the last meeting, and uses the space to ask questions or gather insights from others. There are 2 doctoral students in the lab who can provide additional mentorship support. The undergraduate student trainees get to share ideas in the meetings and their voice and viewpoints are considered valuable from day 1. Individual support on tasks is typically communicated via brief 1:1 meetings, scheduled as needed and approximately 30 minutes in length, or via email. Lab group time is also dedicated for special reviews, like providing feedback on conference abstract drafts or posters. This is great exposure for undergraduates to see how these materials come together and evolve over time. Lastly, in spring, we will be working on at least one manuscript for peer-review submission. Students will get to be directly involved and receive co-authorship credit if they participate in the "paper chase" exercise to bring the paper from concept to final draft. Undergraduate trainees will be encouraged but not required to submit an abstract to the Office of Undergraduate Research Conference.

Applicant Requirements: Coursework in communication studies or public health. Excellent written and oral communication skills.

Applicant Preferences: Self-identifies as creative. Comfortable with public speaking. Willing to attend community events (1-2 in spring).

Specific Time considerations/conflicts: Weekly team meeting on Monday or Tuesday (time TBD, based on lab group availability)

App ID #: 2077

Mentor: Grant-Kahan, Lynnora Email: lgrant19@charlotte.edu

Title: Assistant Professor

Department: Mechanical Engineering & Engineering Science

Co-mentor:Yes

Brigid Mullany, bamullan@charlotte.edu, Mechanical Engineering & Engineering Science

Community engaged research: No

Title: Exploring Curing Parameters and Surface Topography in Photocurable Resin

Description: Vat photopolymerization is one of the highest-resolution additive manufacturing techniques, capable of producing features as fine as tens of micrometers. While CAD files define the overall geometry, there is significant potential to tailor print outcomes by adjusting process parameters such as scan speed, exposure duration, and layer curing strategy. These adjustments can influence surface quality, microstructure, and the resolution of features not explicitly defined in the CAD model.This research will contribute to understanding how to fine-tune additive manufacturing processes for improved performance and precision in ceramic and polymer-based systems.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

1 positions available

Anticipated Student Learning Outcomes: The student will learn to design experiments that isolate and evaluate curing parameters (e.g., exposure time, hatch pattern, layer thickness).The student will interpret surface topography data and connect it to process variables and material behavior.The student will be able to explain how they approached a complex materials problem and refined their methods based on results.

Required training of 5 hours with Description: The student will be required to take lab-specific and general lab safety trainings ~5 hours total.

Mentoring plan: As a mentor for this project, I plan to provide consistent guidance, hands-on training, and opportunities for growth through weekly meetings, technical support, and integration into our research group.The student will work closely with the two co-mentors and the graduate students in the lab, present at group meetings, and share their work at the OUR symposium.My goal is to help the student build confidence, develop research skills, and explore their future academic or professional path in a supportive and intellectually engaging environment.

Applicant Requirements: For this project, we are seeking an upper-level undergraduate student (ideally a junior or senior) who has completed coursework in MEGR 3161 Introduction to Engineering Materials and has prior experience working with 3D printing systems.The ideal candidate should demonstrate a level of independence in the lab, including the ability to follow protocols, troubleshoot equipment, and document results thoughtfully. Curiosity, reliability, and a willingness to engage in iterative experimentation are essential for success in this research.

Applicant Preferences: We would like a student who has some previous lab-based research experience.Independence, attention to detail, and a willingness to learn through experimentation are key traits that will enable the student to succeed and contribute effectively to the project.

Specific Time considerations/conflicts: The student must be available for the weekly group meetings which will be determined at the beginning of the Spring 26 semester.

App ID #: 2080

Mentor: Wang, Jun Email: jun.wang@charlotte.edu

Title: Associate professor

Department: Bioinformatics and Genomics

Co-mentor:No

Community engaged research: No

Title: Development of mobile health technology to reduce heat and pesticides-induced health disparity

Description: Farmworkers are predominantly Hispanic and continue to face serious health inequity and disparity in the United States. They are at high risk of developing acute and chronic diseases that can be caused by two top hazards at work: extreme heat and pesticides. Extreme heat exposure can cause underlying health conditions that may develop into chronic kidney disease (CKD) while pesticides exposure can lead to acute or chronic poisoning. The combination of heat and pesticides could exacerbate health conditions for farmworkers. Moreover, farmworkers have limited access to regular healthcare due to physical, economic, infrastructural, knowledge, and culture barriers, with the result being that sick farmworkers cannot get diagnosed and treated in a timely manner. Thus, early detection and timely intervention is critical for farm workers to reduce the risk of developing various diseases caused by heat and pesticides. Existing diagnostic assays for the detection of CKD and pesticides poisoning such as calorimetric creatinine assays and Ellman assays for measuring blood acetylcholinesterase (AChE) are generally performed in centralized laboratories, are expensive, and have a long turnaround time. Thus, there is a critical need to develop new point-of-care (POC) technologies and new approaches for farmworkers to overcome these barriers to get healthcare and health literacy and improve their quality of life. We are developing a smartphone-based multiplex nanosensing platform for farmworkers. The multiplex nanosensing platform can be applied for early and fast screening of pesticide exposure and kidney diseases using a tiny finger-stick blood for farmworkers. The long-term goal of this research is to reduce farmworker health disparity and improve farmworker health through providing farmworkers with inexpensive, efficient, and new mobile health technology for rapid home screening, point-of-care (POC) testing.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

2 positions available

Anticipated Student Learning Outcomes: wet lab skills, learn nanotechnology and its applications for biosensor development. technical methods, etc.

Required training of 4 hours with Description: Lab safety training and OSHA bloodborn pathogen training.

Mentoring plan: The student will be assigned to work with either a PhD student or a postdoctoral researcher in the lab. Both the student and an assigned supervisor will meet with PI weekly and

discuss research, progress, issues, and how to address the issue during the research. the student will attend group meeting weekly and present results if possible.

Applicant Requirements: the student applicants have either chemistry or biology courses taken. Previous wet-lab research experience are preferred.

Applicant Preferences: Seniors and self-motivated and passion with research.

Specific Time considerations/conflicts: NA

App ID #: 2081

Mentor: Amburgey, James Email: james.amburgey@charlotte.edu

Title: Associate Professor

Department: Civil and Environmental Engineering

Co-mentor:No

Community engaged research: No

Title: Making and Testing Inventions

Description: Each undergraduate student will be provided with a new invention idea. The student will be asked to make and test invention prototypes in a research lab. The student will need to research and select components to order, and collaboration with the Super Fab Lab staff could be necessary to create new parts. After each round of prototype testing, the student will modify the design and retest it. The student will build and present the final design.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

2 positions available

Anticipated Student Learning Outcomes: Each undergraduate student will learn and apply the design process. The student will design and execute test procedures based on the scientific method. The student will learn to make inventions and modify designs based on their test results in research lab. Each student will learn to use 3D printers to create prototypes.

Required training of 8 hours with Description: Students will undergo 3D printer training in the Super Fab Lab and complete all necessary safety training to work in a research laboratory.

Mentoring plan: Each undergraduate student will meet at least weekly with a mentor and more often during training or as problems arise to ensure success. Each student will present at weekly research meetings along with fellow students.

Applicant Requirements: No skills or coursework are required, but the student must be ready to learn new skills.

Applicant Preferences: An ideal candidate would like to tinker with things and be comfortable making mistakes and learning from them.

Specific Time considerations/conflicts: n/a

App ID #: 2082

Mentor: Morse, Edward Email: emorse@charlotte.edu

Title: Distinguished Professor

Department: Mechanical Engineering

Co-mentor:No

Community engaged research: No

Title: 3D Scanner Accuracy Testing

Description: A popular class of "3D scanners" projects a pattern on the object being measured, and then using calibrated cameras, constructs a surface point cloud. These scanners can produce very accurate data (~20 micron accuracy) but are often expensive. This project will experimentally evaluate the accuracy of an inexpensive scanner to evaluate its performance for less critical applications. The student will learn to use the scanner, read and implement the standard (ISO) testing protocols, and prepare a report on the scanner performance.

Accepting applications for: Only 75 hours over an academic semester (~5h per week)

2 positions available

Anticipated Student Learning Outcomes: Familiarity with modern measurement equipmentUnderstanding of how written metrology performance standards are usedExposure to metrology as a field and potential career opportunities

Required training of 3 hours with Description: Short lab safety briefing

Familiarization with equipment

Mentoring plan: The student(s) and I will meet weekly to discuss progress. The student(s) will be expected to attend the ASPE student meetings each Friday to gain an appreciation for the other metrology research being done. There is also a cohort of graduate students who will assist the student(s) in the research – some of them are very familiar with the ISO standards and their application.

Applicant Requirements: Being patient and detail-oriented are important to any measurement research, since measurements are often repeated and subtle differences in the results can be important.Prefer students in the Mechanical Engineering program.

Applicant Preferences: It is helpful is the student has good spatial reasoning skills – i.e. be able to visualize how collections of points will look when rotated in 3D space. Also helpful to be comfortable with Matlab or a similar programming environment.

Specific Time considerations/conflicts: Most important is 11:30-12:45 on Fridays – this is when the ASPE student chapter meets.

App ID #: 2085

Mentor: Hewlin, Rodward Email: rhewlin@charlotte.edu

Title: Associate Professor

Department: Engineering Technology and Construction Management

Co-mentor:No

Community engaged research: No

Title: Development of an Acoustic- and Magnetic-Assisted Direct Ink Writing (DIW) 3D Printing Platform for High-Performance Thermoset Composites

Description: Additive manufacturing, or "3D printing," is changing how we build the next generation of spacecraft and aircraft components. This project focuses on creating a new kind of 3D printer that uses sound waves (acoustics) and magnetic fields to carefully align tiny fibers inside advanced composite materials. These fibers make parts much stronger and more heat resistant—properties that are vital for aerospace, automotive, and defense applications.As a student on this project, you will contribute to designing, building, and testing a custom print head that can print thermoset composites—materials that can withstand extremely high temperatures. Student tasks may include:Assisting with CAD design and fabrication of printer components.Helping set up and run printing experiments with carbon fiber and resin mixtures.Collecting and analyzing data on part strength and accuracy.Supporting lab documentation, safety practices, and research presentations.This project is highly interdisciplinary and involves aspects of mechanical design, materials science, and electronics.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

2 positions available

Anticipated Student Learning Outcomes: Develop technical skills in advanced manufacturing – gain hands-on experience with 3D printing systems, CAD design, and testing of composite materials.Build knowledge of materials science and aerospace applications – understand how thermoset composites are fabricated, why they are critical for high-strength and high-heat environments, and how this connects to NASA and industry needs.Enhance problem-solving and critical thinking – learn to troubleshoot experimental setups, address challenges such as fiber alignment and nozzle clogging, and apply systematic design of experiments.Strengthen data analysis and digital literacy – use tools such as MATLAB, CAD, or machine learning approaches to analyze print quality and material performance.Practice professional communication – prepare lab notes, assist in writing abstracts or posters, and present results in group meetings or undergraduate research symposia.Grow teamwork and leadership abilities – collaborate with faculty, graduate students, and peers in a multidisciplinary lab environment.Advance career readiness – connect their research experience to future opportunities in aerospace, mechanical engineering, defense, or graduate studies, and learn to articulate these skills on resumes and in interviews.

Required training of 2 hours with Description: Students will begin with required UNC Charlotte research compliance trainings as outlined by the Office of Research Protections and Integrity (ORPI). These may include:

General Laboratory Safety Training (chemical handling, PPE, emergency procedures).

Responsible Conduct of Research (RCR) training modules.

Specialized safety training if working with resins, high-temperature equipment, or electronics.

Following compliance training, students will complete a lab-specific onboarding sequence:

Lab Orientation: Introduction to the research space, safety procedures, and equipment usage policies.

CAD & Prototyping Training: Hands-on instruction in SolidWorks/other CAD tools and safe use of fabrication tools for 3D printer components.

Printer System Training: Guidance on operating the DIW 3D printer testbed, syringe pumps, acoustic nozzle, and magnetic coil systems.

Materials Handling: Safe mixing and handling of thermoset resins and fiber suspensions.

Data Collection & Analysis: Training on digital tools (MATLAB, Arduino, data acquisition systems) and best practices in record-keeping.

This ensures that students are not only ORPI compliant but also technically prepared to safely and effectively engage in the research.

Mentoring plan: Mentoring Plan / PhilosophyGoal. Equip students with the skills, habits, and confidence to do safe, reproducible research—and to clearly communicate what they built and learned.Who the student works withPI (Dr. Rodward L. Hewlin, Jr.) — primary mentor. Sets scope, approves plans, provides technical and professional feedback, evaluates progress, and writes recommendation letters.Graduate mentor(s) (ME/ECE as available). Day-to-day bench guidance on CAD, electronics (PWM/stepper drivers), DIW operation, materials handling, and data.Peer undergraduates (if ≥2 students). Paired work for safety, replication, and code/data review.Contact & meeting cadenceWeekly 1:1 with PI (30–45 min). Priorities, blockers, design/test decisions, and career coaching.Weekly lab meeting (60 min). Short stand-ups, safety notes, data read-outs, and next steps.Bench mentoring. 2–3 supervised lab blocks/week (3–4 hrs each) with a grad mentor or the PI.Async support. Lab Slack/Teams channel; typical response within one business day.We will protect the 1 hr/week OUR professional development time and schedule lab work around it.Onboarding & early training (Weeks 1–2)Compliance & safety. ORPI/RCR, PPE, resin/electronics SOPs, emergency procedures.Core tools. DIW printer testbed, syringe pump control, acoustic nozzle, tri-axial coils, DMM/oscilloscope, calipers/micrometers.Workflow. SolidWorks/Fusion basics, slicer/G-code handoff, Git/versioning, file hygiene.Reproducibility. Lab-notebook standards, data provenance, naming/versioning conventions.Structure, milestones, and deliverablesWeeks 1–2 (Ramp-up). Complete trainings; shadow a print; reproduce a demo print.Deliverables: safety sign-offs, notebook check, 1-page reflection on what was learned.Weeks 3–5 (Skill-building). Own a subtask (e.g., nozzle characterization, coil PWM sweep, resin mix trial,

DOE pilot).Deliverables: short test plan, data table/plots, 5-minute stand-up.Weeks 6–8 (Execute & analyze). Run a small DOE on print accuracy or fiber alignment; analyze with basic stats (and ML if ready).Deliverables: figures + caption(s), 1–2 page memo with result summary.Weeks 9–10 (Communicate). Prepare a poster/lightning talk for the OUR symposium or department venue; draft methods/results suitable for a future abstract/co-authored paper.Deliverables: poster or 6–8 slide deck; archived data and README.Expectations & how I help you succeedClear scopes. Every task begins with a written mini-charter (goal, method, safety notes, definition of done).Fast feedback. Written comments on plans/figures within 48 hours during the summer.Iterative improvement. "Plan → do → check → adjust" cycles; we prioritize small, winnable experiments.Safety first. No solo work on high-risk tasks; stop-work authority for any student at any time.Access. Scheduled bench time; shared calendar for equipment; PI open-door policy during lab hours.Equity & inclusion. Pairing and code/data reviews are structured to ensure every student contributes meaningfully and gets visibility.Presentations, authorship, and professional developmentGroup meetings. Yes—students present brief updates weekly.Symposia. Yes—students present a poster/lightning talk at an OUR or department venue.Conferences. If results warrant, the student will be supported to co-author an abstract/manuscript; travel is pursued when feasible.Career prep. Resume/LinkedIn review, skills translation (bullets from your deliverables), and a drafted recommendation letter outline based on your outputs.Assessment & continuityWeekly progress rubric. Safety/compliance, preparation, execution quality, documentation, communication.Midpoint check-in. Adjust scope, confirm milestones, identify stretch goal(s).Exit package. Poster or slides, cleaned data with README, and a short reflection on technical and transferable skills gained.

Applicant Requirements: Required skills, courses, or experiences (must-have)Reliability & professionalism: shows up on time, communicates setbacks early, keeps a clean and organized workstation.Safety mindset: willing to complete ORPI trainings; follows SOPs for resins, electronics, and tools.Hands-on aptitude: comfortable using basic tools and measuring equipment; careful, detail-oriented work.Documentation & communication: maintains a lab notebook; shares weekly progress in short updates.Foundational prep (any one is fine): an intro course or experience in materials, mechanical systems, manufacturing, CAD, or circuits —OR equivalent maker/club experience (e.g., robotics, makerspace, personal builds).Basic computing: spreadsheets plus willingness to learn MATLAB or Python for data logging/analysis.Availability: able to attend weekly lab meeting and 2–3 in-person lab blocks (3–4 hr each) per week.

Applicant Preferences: Recommended / preferred characteristics, skills, courses, or experiences (nice-to-have; we will train)CAD & prototyping: SolidWorks/Fusion, basic design for 3D printing; prior 3D printing (FDM/DIW) a plus.Electronics control: Arduino/microcontrollers, stepper drivers, PWM, basic soldering and DMM use.Materials & processing: exposure to polymers/composites, resin mixing, curing, or rheology.Data & analysis: MATLAB/Python, data acquisition, statistics/DOE; interest in ML for print quality.Shop skills: safe use of drill press, bandsaw, or hand tools; fixture/jig building experience.Testing & QA: measurement planning, calipers/micrometers, microscopy/imaging basics.Scientific communication: posters, abstracts, or prior technical writing/presentations.Curiosity for aerospace/additive manufacturing and enthusiasm for learning across disciplines.

Specific Time considerations/conflicts: Students must be available for:

Weekly lab meeting (1 hr, scheduled with the team — typically mid-week mornings).

Hands-on lab sessions (2–3 blocks per week, each 3–4 hrs, scheduled during standard weekday lab hours, e.g., Mon–Fri between 9:00 am and 5:00 pm).

Other work such as literature review, CAD modeling, or data analysis may be completed more flexibly, outside of lab hours.

App ID #: 2087

Mentor: Wu, Youjun Email: youjun.wu@charlotte.edu

Title: Postdoctoral Research Associate

Department: Biological Sciences

Co-mentor:Yes

Pinku Mukherjee, pmukherj@charlotte.edu, Biological Sciences

Community engaged research: No

Title: Exploring the role of tumor-derived IFN-γ in chemotherapy in pancreatic cancer

Description: The overarching goal of our lab is to find improved therapeutic strategies for pancreatic cancer, which is one of the deadliest types of cancer. We recently discovered that when pancreatic cancer cells are treated with a protein called interferon gamma (IFN-γ), chemotherapy works much better. IFN-γ is normally made by immune cells and helps the body fight infections and other diseases. It has long been thought that cancer cells do not make this protein. However, our recent findings suggest that pancreatic cancer cells may produce small amounts of IFN-γ themselves, which could change how they respond to chemotherapy. This project will test that idea.Aim 1 Measure IFN-γ made by cancer cells.In this aim, the student will learn how to use Enzyme-Linked Immunosorbent Assay (ELISA) to measure how much IFN-γ pancreatic cancer cells release.Aim 2: Remove the IFN-γ gene from cancer cells.The student will learn to use a modern gene-editing tool called CRISPR/Cas9 to delete the gene that makes IFN-γ. They will also learn how to check that the edit worked.Aim 3: Test how the loss of IFN-γ affects chemotherapy.The student will compare normal cancer cells with edited ones to see if removing IFN-γ changes how well chemotherapy kills the cells. We expect that cells without IFN-γ will be more resistant to chemotherapy.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

1 positions available

Anticipated Student Learning Outcomes: Through this project, the student will gain hands-on experience with key techniques in biomedical research, including tissue culture (growing human cells in the lab), ELISA (a method to measure proteins), drug treatment studies, and CRISPR (a state-of-the-art gene-editing tool). These skills provide a strong foundation for students interested in pursuing advanced degrees such as a Ph.D. in biomedical sciences or an M.D. in medicine.In addition to technical skills, the student will strengthen their critical thinking by designing experiments, analyzing data, and considering alternative explanations. They will also develop their communication skills through daily discussions with mentors and lab members, participation in bi-weekly lab meetings, and presenting their findings in formal oral presentations.Finally, the student will learn the value of teamwork by contributing to a larger research effort in the lab and collaborating closely with other researchers. This combination of technical training, problem-solving, communication, and teamwork will prepare the student for success in future scientific or medical careers.

Required training of 10 hours with Description: The student will be required to take a few online training modules as directed by Biosafety and EHS offices. These include but not limited to the "Laboratory Personnel BSS" course, the"Bloodborne Pathogens Training" course and the "Recombinant and/or Synthetic Nucleic Acid Molecules" course.

Mentoring plan: The postdoctoral mentor will work closely with the student, guiding experimental design and providing hands-on training for all required techniques. The student will be encouraged to ask questions freely and actively engage in the learning process. The student will meet the co-mentor to discuss project progress as needed. To build communication and presentation skills, the student will participate in bi-weekly lab meetings, where they will share their progress and receive feedback from lab members. In addition, the student will present their research at the undergraduate research symposium, gaining experience in presenting to a broader scientific audience.

Applicant Requirements: Students should have completed introductory biology courses. No prior laboratory experience is required. We are looking for students who are passionate about scientific research, curious, and willing to work hard.

Applicant Preferences: Students who have taken cell biology, molecular biology or genetics courses are preferred.

Specific Time considerations/conflicts: Students are expected to attend lab meetings, and the meeting schedule can be adjusted as needed to avoid conflicts with their classes.

App ID #: 2088

Mentor: Hewlin, Rodward Email: rhewlin@charlotte.edu

Title: Associate Professor

Department: Affiliate in: Mechanical Engineering

Co-mentor:No

Community engaged research: No

Title: Next-Generation Flow Visualization: Light-Field Cameras and Rainbow Illumination

Description: How do engineers measure the invisible motion of air and water around objects like airplane wings, blood vessels, or jet engines? One of the most powerful tools for this is called Particle Image Velocimetry (PIV)—a method that uses cameras and lasers to track tiny particles suspended in a fluid. By following how the particles move, researchers can reconstruct the flow of air or liquid in three dimensions. This information is crucial for designing safer airplanes, improving energy efficiency, and even understanding blood flow in the human body.Traditional PIV systems use multiple cameras and expensive laser setups that can cost hundreds of thousands of dollars. They are powerful, but they are also complex, difficult to calibrate, and often limited in resolution. Our project seeks to create a new, low-cost, high-accuracy PIV system that overcomes many of these challenges. The system combines a light-field camera (a camera that captures both position and angle of light rays) with a pulsed rainbow illumination source (a special high-energy light that encodes depth information using color). This innovative approach could allow us to reconstruct 3D fluid motion using just a single camera—making the system simpler, cheaper, and more precise than current methods.As an undergraduate student in this project, you will:Assist in setting up and calibrating the optical system (cameras, lenses, and illumination).Learn how to safely run experiments with seeded flow tanks (e.g., simple lid-driven cavity or jet flow setups).Collect high-speed images of particle motion and help process them with software tools like MATLAB or Python.Contribute to testing new algorithms that improve how particle positions and flow fields are reconstructed.Document results and share your findings during lab meetings and at the Undergraduate Research Symposium.This project is highly interdisciplinary—blending mechanical engineering, optics, computer science, and applied physics. It's a great opportunity if you are curious about hands-on experiments, imaging systems, or computational data analysis. No prior research experience is required; we will provide all training. What matters most is enthusiasm, attention to detail, and a willingness to learn.By the end of the summer, you will not only gain new technical skills but also see how fundamental research in fluid mechanics connects directly to solving problems in aerospace, biomedical, and industrial applications.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

2 positions available

Anticipated Student Learning Outcomes: By participating in this project, students will:1. Develop Technical Skills in Optical Diagnostics and Experimental ResearchLearn how to safely set up and operate light-field and high-speed cameras, synchronized pulsed light sources, and flow tank systems.Gain experience in optical alignment, calibration, and data acquisition for fluid mechanics

experiments.Understand how to handle seeding particles, manage experimental timing, and troubleshoot hardware/software systems.2. Strengthen Data Analysis and Computational AbilitiesUse MATLAB/Python for image pre-processing, particle tracking, and flow field reconstruction.Gain exposure to iterative solvers and optical flow algorithms (e.g., ADMM, Horn-Schunck variants) and learn how they are applied to reconstruct velocity fields.Apply principles of design of experiments (DOE) and statistical analysis to evaluate accuracy, uncertainty, and repeatability in PIV data.3. Expand Knowledge of Fluid Mechanics and Flow PhysicsConnect experimental results to fundamental principles of laminar, turbulent, and pulsating flows.Interpret reconstructed velocity and vorticity fields in biomedical, aerospace, and industrial flow contexts.Learn how advanced diagnostics complement computational fluid dynamics (CFD) in validating models.4. Build Professional and Career-Readiness Skills (NACE Competencies)Critical thinking & problem solving: Troubleshoot experimental setups, interpret complex datasets, and adapt to challenges.Teamwork & collaboration: Work alongside graduate mentors and peers in a shared lab setting, practicing mutual accountability and respect.Professional communication: Document lab work in a professional notebook, prepare weekly updates, and create clear figures and captions.Equity & inclusion: Learn to collaborate in a diverse research environment that values contributions from students of different majors and backgrounds.Digital technology literacy: Operate advanced imaging systems and apply computational tools to analyze results.Career & self-development: Translate research tasks into resume-ready skills, prepare abstracts/posters, and connect lab experiences to aerospace, biomedical, and engineering industries.5. Gain Experience in Scientific Communication and DisseminationPresent short updates at weekly lab meetings to practice clear, professional communication.Prepare a poster or lightning talk for the Undergraduate Research Symposium or a departmental showcase.Contribute to data and figures for potential conference abstracts or manuscripts, with opportunities for co-authorship when appropriate.6. Foster Independence and Confidence in ResearchProgress from guided onboarding (safety training, shadowing experiments) to independent tasks (running calibration, coding routines, analyzing data).Build confidence in designing, executing, and interpreting a small-scale experiment.Leave the experience with a clear narrative of what they accomplished and how it connects to their future goals in engineering, graduate school, or industry.

Required training of 2 hours with Description: Training or On-Boarding Process

All students will complete required UNC Charlotte ORPI compliance trainings prior to beginning lab work. These include:

General Laboratory Safety Training (chemical handling, PPE, emergency procedures).

Responsible Conduct of Research (RCR) modules.

Laser/optical safety training (since high-energy pulsed light sources and optical setups are involved).

Electrical and equipment-specific training (for working with high-speed cameras, synchronized LED systems, and motion stages).

Following compliance training, students will undergo a structured onboarding process:

Lab Orientation: Tour of facilities, introduction to safety procedures, research goals, and team structure.

Optics and Camera Familiarization: Hands-on training with CMOS and light-field cameras, alignment procedures, and data capture basics.

Software & Data Training: Introduction to MATLAB/Python scripts for image reconstruction, data management, and version control.

Experiment Setup & Protocols: Calibration with lid-driven cavity flow tank, seeding particles, and ensuring safe operation of light sources.

Documentation & Reporting: Lab notebook standards, data logging practices, and expectations for weekly updates.

This onboarding ensures students are ORPI compliant, technically prepared, and able to work safely and effectively in an optical diagnostics lab.

Mentoring plan: Mentoring Plan / Philosophy (PIV Project)Philosophy. My goal is to provide a supportive, structured, and engaging environment that allows students to succeed in cutting-edge experimental fluid mechanics research while developing transferable career skills. Students will gain confidence in designing, operating, and analyzing optical flow measurement systems and will leave the project with a clear sense of how their contributions fit into the broader research effort.Who the student will work withPI (Dr. Rodward L. Hewlin, Jr.) – primary mentor, responsible for overall guidance, weekly check-ins, and professional development coaching.Graduate mentor (doctoral student on the PIV project) – day-to-day technical support for experiments, camera setup, calibration, and algorithm development.Other undergraduate or community college students (if multiple are selected) – peer collaboration on hardware assembly, coding, or data collection tasks.Student contact and engagementWeekly 1:1 meetings with PI (30–45 minutes) to review progress, set goals, and troubleshoot challenges.Weekly lab team meetings where students present updates, share results, and practice scientific communication.Supervised lab sessions (2–3 times per week, 3–4 hours per session) for experiments, imaging, and data processing.Ongoing contact via Teams/Slack and email for quick questions and feedback.Student contributionsStudents can expect to be directly involved in:Assisting with camera calibration and optical setup for the PIV system.Supporting data acquisition during flow experiments.Learning how to apply MATLAB/Python algorithms to reconstruct velocity fields.Helping prepare figures, plots, and short summaries for internal reports and presentations.Expectations for presentation and disseminationLab group meetings: Students will present short updates weekly.Undergraduate Research Symposium: Students are expected to prepare a poster or presentation by the end of summer.Conference/Publication Opportunities: Exceptional contributions may be included in abstracts or manuscripts, with co-authorship considered.Commitments to studentsTraining & Onboarding: Students will receive structured training in lab safety, camera systems, and computational tools.Intentional mentoring: Students will get regular, timely feedback (within 48 hours for short reports/figures).Professional growth: Guidance will extend beyond technical work to include resume review, connecting research skills to career goals, and discussion of graduate school or industry pathways.Inclusive environment: Students from diverse backgrounds and

experiences will be supported, and teamwork will be emphasized to build confidence and shared ownership of results.

Applicant Requirements: What we're looking for in a student applicantRequired skills, courses, or experiences (must-have)Reliability & professionalism. Shows up on time, communicates setbacks early, follows through on tasks, and keeps a tidy bench and shared data folders.Safety mindset. Willing to complete ORPI trainings; follows SOPs for optics/lasers, electronics, resins, and high-speed equipment; asks before proceeding when unsure.Careful, hands-on work. Comfortable measuring, aligning, tightening, labeling, and double-checking; can follow a step-by-step protocol without skipping steps.Documentation & communication. Maintains a lab notebook (dates, settings, sketches, photos), writes short weekly updates, and can explain results clearly to peers.Foundational preparation (any one is fine). Prior exposure to any of the following through a course or practice:– optics/photography or imaging (camera settings, alignment, or microscopy), or– circuits/electronics (Arduino, sensors, safe multimeter/oscilloscope use), or– programming/data (MATLAB or Python basics, spreadsheets, plotting), or– fluids/mechanics (intro fluid mechanics, CAD for fixtures, or shop skills).(Maker club or personal projects count—e.g., building a 3D printer, a camera rig, a robot, or a lighting system.)Availability. Can attend one weekly lab meeting (1 hr) and schedule 2–3 in-person lab blocks (3–4 hr each) during weekday lab hours.

Applicant Preferences: Recommended / preferred characteristics, skills, courses, or experiences (nice-to-have; we will train)Optics & imaging: Basic alignment (post/rail mounts), focus/exposure, lenses/filters, light paths; comfort working in darkened rooms; interest in calibration.Cameras & synchronization: Experience with high-speed or DSLR/mirrorless cameras, frame timing, triggers; curiosity about light-field or plenoptic imaging.Programming & data: MATLAB or Python for image I/O, filtering, plotting; version control (Git), clean folder structures, and README habits.Algorithms / numerical methods: Curiosity about optical flow, ADMM/LASSO, or vector calculus; any prior exposure to linear algebra and basic optimization.Fluids & experiment design: Seeding particles, tank/loop experiments, Reynolds number intuition; planning small design-of-experiments (DOE).Electronics / motion control: Microcontrollers, stepper drivers, PWM/LED drivers, safe soldering, wiring, and using a DMM or oscilloscope.CAD & fixtures: Simple jigs/mounts in SolidWorks/Fusion; 3D printing or laser-cut parts to hold optics or cameras.Testing & QA: Calibration mentality (checklists, ground truth, repeatability), using calipers/micrometers, camera calibration targets, or checkerboards.Scientific communication: Posters, abstracts, or short talks; clear figures (axes/units), captions, and slide storytelling.Personal qualities we value (how you'll thrive here)Curiosity & patience. You like to tinker, iterate, and improve signal quality one small step at a time.Attention to detail. You notice when a mount is slightly skewed or an exposure is off—and you fix it.Team player. You're respectful in shared spaces, give credit, and ask for help early.Growth mindset. You're comfortable learning new tools and receiving constructive feedback.Examples of backgrounds that fit (not exhaustive)Students from ME/MET, ECE/EET, Physics, BME, CS/SE, or related areas are all encouraged to apply. Successful past students have included:a physics major who aligned cameras and led image calibration;an EET student who built LED driver boards and timing hardware;a MET student who designed and printed alignment fixtures;a CS student who cleaned and analyzed image stacks in Python.What not to worry aboutPrior research experience is not required.If you haven't used a light-field camera, we will train you.If you're stronger in hardware

than coding (or vice versa), we can tailor tasks so you contribute meaningfully while building new skills.

Specific Time considerations/conflicts: Specific Days/Times Required

Students must be available for:

Weekly research team meeting (1 hour, typically mid-week in the morning or early afternoon; scheduled based on team availability).

Two to three laboratory sessions per week (3–4 hours each, scheduled during standard weekday lab hours, e.g., Monday–Friday between 9:00 am and 5:00 pm). These sessions are needed for experiments with cameras, flow tanks, and calibration.

Undergraduate Research Symposium presentation (end of summer, exact date provided by the OUR office).

Other work, such as literature review, coding, or data analysis, may be completed on a more flexible schedule outside of the lab.

App ID #: 2090

Mentor: Bahamon, Julio Email: jbahamon@charlotte.edu

Title: Teaching Associate Professor

Department: Computer Science

Co-mentor:No

Community engaged research: No

Title: Glitch Defense: An Educational Game to Teach Cybersecurity Concepts

Description: The student would work on Glitch Defense, an educational computer game designed to teach basic cybersecurity concepts. The initial implementation of the game is complete and we have developed a general a plan to evaluate the effectiveness of this game-based learning approach. Hence, the student would work with Principal Investigator Bahamón on: (1) conducting a pilot study (or preliminary evaluation) of the game, (2) refinement of the game to address feedback from the pilot study, (3) design and deploy a formal evaluation of the game and (4) collect study data, analyze results and prepare an academic publication targeted at a Computer Science Education conference.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

2 positions available

Anticipated Student Learning Outcomes: Upon successful completion of this project, students will be able to:Design and implement software that uses Game Design and Development methods to assist in research.Create detailed and polished documentation.Utilize source control in a software development project.Utilize standard software development techniques to ensure the development of a working product.Utilize standard software testing techniques to ensure the quality and correct functionality of the software product.Report on the outcomes of the project.Design and deploy evaluation protocols.Engage on the ethical conduct of research involving human subjects.Prepare scholarly manuscripts suitable for publication at a peer reviewed venue (e.g., conference, workshop, academic journal).

Required training of 5 hours with Description: I am waiting from a response from ORPI; however, these types of projects only require IRB CITI training.

Mentoring plan: Students will work directly with the faculty member (Dr. Bahamón) on the development and/or enhancement of game functionality to enable teaching cybersecurity concepts. Work will include the design and deployment of evaluation protocols that involve human participants. The students will also participate in data collection efforts, as well as data analysis, research literature search and preparing a manuscript for submission to a peer reviewed conference.Students will meet with Dr. Bahamón weekly to discuss progress and make plans. Additionally, regular communication will be available over electronic means.One of the key goals of this research effort will be a scholarly publication, with a presentation at a top-rated conference. Students will have the opportunity to be the presenters at such conference (assuming our submission is accepted).

Applicant Requirements: Prior experience developing Video Games using GameMaker.Ideal candidates will have completed ITCS 4230 - Intro to Game Design and Development or an equivalent course.

Applicant Preferences: Students in the AI, Robotics and Gaming concentration.Students who have an interest in attending graduate school.

Specific Time considerations/conflicts: N/A

App ID #: 2091

Mentor: Dreau, Didier Email: ddreau@charlotte.edu

Title: Professor

Department: Biol Sci

Co-mentor:No

Community engaged research: No

Title: CXCL12 chemokine dimerization and signaling

Description: Cell migration is key to cancer spreading to various key organs such as bone, liver or brain. In particular the CXCL12-CXCR4 axis is critical to breast cancer metastasis. We have demonstrated the presence of CXCL12-CXCL4 hetero-dimers and are assessing their roles in CXCL12-CXCR4 driven cancer cell migration. Currently, we are developing biological assays to assess the binding of CXCL12-CXCL4 in physiological conditions. Using mainly immunological tools and fluorescent approaches, the student will participate in experiments to validate the role of specific physiological conditions including glyco-amino-glycan concentrations, other extra cellular matrix proteins in the formation of CXCL12-CXCL4 or CXCL4-associated peptide binding. Duties include testing of increasing concentrations of individual components and/or mixture on binding, readout and analysis. In addition, the student will be expected to present his data during our weekly lab meetings. Ideally, the results will also be presented at local /national undergraduate meeting.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

1 positions available

Anticipated Student Learning Outcomes: 1- Biological knowledge of CXCL12-CXCR4 axis and cancer metastasis2- Research approach iteration vs. hypothesis driven research 3- 1-2 specific techniques4- data management & data analyses5- research presentation, oral/written presentation skills6- working in a research team, time management

Required training of 5 hours with Description: Onboarding include

1- Lab access requires the completion of multiple general modules

2- Biosafety requires additional modules including the blood borne pathogen training

Mentoring plan: 1- Early, student will work with me (meeting 2/week) + 1 weekly meeting2- As the student gain independence, the meeting will continue weekly3- additional communications will be through intereactions in the lab (w/ me and other labmates)4- expectation are at least 1-2 presentation during lab meeting (per semester); local conferences will be considered on the basis of the progress made

Applicant Requirements: Applicant should have a solid scholarly background in Biology.

Applicant Preferences: Applicant that have already taken BIOL3111 (Cell Biology) are preferred

Specific Time considerations/conflicts: There are no specific time/day of the week, the lab is open 7AM-6-PM (Mon-Fri), the UG applicant should work within that those time windows

App ID #: 2092

Mentor: Benjamin, Michael Email: mbenjam3@charlotte.edu

Title: Assistant Professor

Department: Engineering Technology and Construction Management

Co-mentor:No

Community engaged research: No

Title: Firefighter Mental Health Resources

Description: Firefighters are exposed to traumatic events on a regular basis in the course of their work and can impact their mental and emotional well-being. However, resources to address those traumatic exposures are lacking and stigma about requesting mental health assistance is prevalent. This project will have students collect data from fire departments and compare the resources available to firefighters working in those environments.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: Students will learn how to perform a literature review, form a scientific hypothesis, design an experiment to test that hypothesis, and analyze the data to form conclusions. They will then present their results to others during and at the end of the term.

Required training of 5 hours with Description: Depending on the project, students will be expected to complete trainings on the Responsible Conduct of Research and Human Subjects Research. (IRB CITI Training)

Mentoring plan: Students will meet with the mentor once a week. If multiple students are working in the term, there may be opportunities to share results in a weekly research meeting as well.

Applicant Requirements: Competency in Microsoft Excel and Word, strong communication skills (oral and written), ability to write technical summary reports, and organize data effectively.Must be able to manage time effectively and finish work on time.Work hours can be flexible (and literature reviews/writing can be done at any time), but physical lab work should be done on campus during typical work hours (M-F, 8-5) based on the number of hours the student is approved for.

Applicant Preferences: Work hours can be flexible (and literature reviews/writing can be done at any time), but physical lab work should be done on campus during typical work hours (M-F, 8-5) based on the number of hours the student is approved for.

Specific Time considerations/conflicts: Work hours can be flexible (and literature reviews/writing can be done at any time), but physical lab work should be done on campus during typical work hours (M-F, 8-5) based on the number of hours the student is approved for.

App ID #: 2093

Mentor: Deeba, Farah Email: fdeeba@charlotte.edu

Title: Assistant Professor

Department: Electrical and Computer Engineering

Co-mentor:No

Community engaged research: No

Title: From Pixels to Prognosis: Using Deep Learning to Explore Placenta Pathology

Description: The placenta is one of the most fascinating and vital organs during pregnancy. It serves as the life-support system for the developing fetus, providing oxygen and nutrients while removing waste. However, complications in placental function can result in severe pregnancy outcomes such as preeclampsia, fetal growth restriction, and even stillbirth. To better understand placental health, researchers typically rely on histopathological analysis While this approach provides valuable insights, it is often subjective, time-consuming, and limited by the need for highly trained specialists. This project seeks to change that by integrating deep learning, a branch of artificial intelligence (AI), into the analysis of placental pathology. By applying AI models to histopathological images, we aim to automate the detection of abnormalities and uncover subtle patterns that may not be visible to the human eye. Ultimately, the goal is to provide a fast, non-invasive, and scalable tool that can predict pregnancy complications and improve pregnancy outcomes. What You Will Do:As an undergraduate student participating in this project, you will gain hands-on experience at the cutting edge of biomedical engineering and artificial intelligence. You'll work alongside a team of researchers and experts, learning about both the biological aspects of placental health and the technical skills needed to develop and deploy machine learning models.Your duties will include:1. Data Management and PreparationOrganize and preprocess histopathological images of placental tissues.Annotate regions of interest (e.g., areas of inflammation, abnormal structures) using specialized software tools.Split the dataset into training, validation, and test subsetsto ensure robust model performance.2. Deep Learning Model Development Implement and train deep learning models using open- source frameworks such as TensorFlow or PyTorch. Experiment with different architectures to optimize model performance.3. Evaluation and ReportingEvaluate the model's accuracy, sensitivity, and specificity using quantitative metrics. Compare model outputs to expert pathologist. Present findings through written reports or presentations to the research team. Who Should Join?This project is ideal for students with an interest in artificial intelligence, machine learning, biomedical engineering, and healthcare technologies. Prior experience in deep learning is necessary. Familiarity with programming languages like Python will be beneficial. Students who are passionate about applying their skills to solve real-world health challenges, and who want to contribute to research with the potential for significant impact in pregnancy care, will thrive in this project.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: Participation in this research project, “From Pixels to Prognosis: Using Deep Learning to Explore Placenta Pathology,” will provide students with a rich, interdisciplinary experience that combines technical skills in artificial intelligence with impactful applications in biomedical research. By the end of the project, students will have gained valuable knowledge, hands-on experience, and career-enhancing skills in the following areas:1. Technical Skills Developmenta. Deep Learning Fundamentals: Students will develop a strong foundation in deep learning techniques.They will learn to design, train, and optimize machine learning models using popular frameworks like PyTorch.b. Biomedical Image ProcessingGain expertise in preprocessing histopathological images, including resizing, normalization, and augmentation, which are essential steps for preparing data for AI models.Learn to annotate images for supervised learning tasks, understanding the importance of data quality and labeling in AI applications.c. Model EvaluationUnderstand and apply metrics such as accuracy, precision, recall, F1 score, and area under the curve to evaluate model performance. 2. Research Experiencea. Data Science WorkflowFollow the complete workflow of an AI research project, from data acquisition and preprocessing to model implementation, validation, and deployment.Experience working with large-scale datasets, managing data pipelines, and ensuring reproducibility in experiments.b. Collaborative ResearchWork as part of a multidisciplinary team that bridges fields like biomedical engineering, placenta-fetal pathology and imaging.Develop skills in effective communication, collaboration, and project management.c. Problem-Solving SkillsTackle real-world challenges by designing innovative solutions using AI.Learn to iterate on experiments, adapt to setbacks, and refine methodologies based on results.4. Communication and Presentation Skillsa. Reporting ResultsLearn to document research findings through clear, structured reports that summarize methods, results, and insights.Understand how to present data visually using tools like matplotlib, seaborn, or other visualization libraries.b. Presenting ResearchGain experience presenting project outcomes to a broader audience, including peers, faculty, and potentially at academic conferences or industry events.Build confidence in explaining technical concepts and their applications in an accessible way.5. Career Preparationa. Technical Career ReadinessDevelop a portfolio of work, including AI models, data analyses, and research presentations, that students can showcase to prospective employers or graduate schools.Acquire skills that are highly sought after in fields like data science, AI, and biomedical research.b. Research ExposureGain an authentic research experience, preparing students for potential graduate studies or roles in research and development (R&D).Understand the interdisciplinary nature of modern scientific problems and how to navigate collaborations across fields.c. Professional NetworkingBuild connections with faculty mentors, researchers, and peers that can serve as valuable professional contacts for future opportunities. How Students Will Talk About Their Experience:Students who participate in this project will leave with a compelling story about their involvement in cutting-edge research at the intersection of AI and healthcare. They will likely describe their experience as:A unique opportunity to apply deep learning to solve real-world biomedical challenges.A chance to contribute to research that has the potential to directly improve maternal and fetal health.A hands-on learning environment where they developed valuable technical and collaborative skills.An inspiring glimpse into how technology and healthcare can work together to transform lives.Students may also highlight the project’s relevance to their future goals, such as pursuing advanced degrees in AI, biomedical engineering, or medicine, or entering careers in AI-driven innovation. They will be able to articulate the tangible outcomes of their work, from building functional AI models to interpreting the biological

significance of their findings, making their experience stand out on resumes, graduate school applications, and in professional interviews.

Required training of 7 hours with Description: The student will be onboarded through a hands-on assignment hosted on GitHub. They will be given a specific dataset and a structured problem, which they must solve as a homework task. This will help them become familiar with the research context, data structure, and basic analysis pipeline before participating further.

Mentoring plan: Regular Meetings:I will hold weekly group check-ins with students to review their progress, provide feedback, and address questions or concerns.Clear Expectations:I will provide students with well-defined milestones and goals for their contributions to the project, ensuring they understand their role and how it fits into the larger research context.Graduate Students and Postdoctoral Fellows:Students will receive additional mentoring from senior lab members who can provide day-to-day guidance on technical tasks, such as coding, data analysis, and troubleshooting.Personal Support and Long-Term CommitmentPersonalized Guidance:I will meet with students individually to discuss their interests and aspirations, tailoring their experience to align with their long-term goals.For students considering graduate school or industry positions, I will provide advice on applications, resumes, and interviews.Students who demonstrate dedication and growth will receivepersonalized, detailed letters of recommendation highlightingtheir contributions and skills.

Applicant Requirements: Skills and ExperiencesRequired SkillsDeep Learning Experience: Familiarity with deep learning concepts and frameworks such as PyTorch or TensorFlow. Students should have implemented at least one project involving neural networks (e.g., classification, segmentation, etc.).Programming Skills: Proficiency in Python is essential, particularly in using scientific and machine learning libraries such as NumPy, pandas, matplotlib, and scikit-learn.Preferred (but not required)Data Analysis: Experience handling and organizing datasets using tools like pandas or Excel.Image Processing: Familiarity with tools like OpenCV, scikit-image, or ImageJ.

Applicant Preferences: Additional Desirable Skills (Not Required)Image ProcessingFamiliarity with libraries such as OpenCV, scikit-image, or platforms like ImageJ is helpful. Prior work with biomedical or grayscale imaging data (e.g., ultrasound, MRI, histology) is a plus.Data HandlingExperience working with large datasets, especially in .csv, .npy, or image folder formats. Comfort with cleaning, preprocessing, and organizing data is useful.Version Control & CollaborationBasic experience using GitHub for version control and collaboration is preferred, as all work will be tracked in shared repositories.Scientific CommunicationStudents interested in scientific writing, figure preparation, or contributing to manuscripts will have opportunities to grow in these areas as well.Characteristics for SuccessInitiative and IndependenceWhile mentorship and technical guidance will be provided, students are expected to take ownership of their tasks and troubleshoot independently when possible.Commitment to LearningResearch is a dynamic environment, and students should be willing to read papers, explore tutorials, and seek help as needed to overcome technical challenges.Team-Oriented MindsetThe lab environment encourages collaboration, constructive feedback, and mutual respect. Students should be open to peer learning and interdisciplinary discussion.

Specific Time considerations/conflicts: The students must attend the lab group meeting. The date of the meeting for next semester is yet to be determined.

App ID #: 2098

Mentor: Martins do Outeiro, Jose Email: jc.outeiro@charlotte.edu

Title: Professor

Department: MEES

Co-mentor:No

Community engaged research: No

Title: Manufacturing Education and Training Using Immersive Digital Twins

Description: The education and training of manufacturing processes require students to acquire knowledge and skills in both fundamentals and technologies. Given the wide range and complexity of processes, understanding the underlying physics and gaining knowledge and hands-on experience with various technologies is challenging and time consuming, which can negatively affect students' motivation and success in learning these processes. To address this issue, Immersive Digital Twin (IDT) offers a transformative solution for teaching manufacturing processes. By creating highly interactive and visually immersive simulations of manufacturing processes, IDT enables students to acquire knowledge and skills more efficiently. IDT results from the combination of Digital Twins (DT) with Immersive Technologies (IT), also called Extended Reality (XR). DT is the creation of a digital representation of a real-world physical asset (system, process, or product), to enable management, simulation, and optimization. IT like Virtual Reality (VR) and Mixed Reality (MR) are advanced digital technologies that create or enhance a sense of presence in a simulated reality, allowing users to interact with digital environments as if theywere part of them. The objective of this project is to create interactive IDTs for education and training of machining processes. These IDT are developed using specific software (Unity, Creo Illustrate, Vuforia Studio and Reality Composer) and hardware (Oculus Rift, Microsoft HoloLens 2 and Apple Vision Pro).

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

1 positions available

Anticipated Student Learning Outcomes: At the end of this project the student should: 1) be able to conduct a literature review and collect valuable information required for research, 2) have knowledge in manufacturing processes, in particular machining fundamentals and technology, 3) understanding the principles behind IoT (sensors) and its applications in manufacturing, 4) have skills on developing digital models of machines and processes, 5) have skills on visualizing these models in MR and VR using specific software (Unity, Creo Illustrate, Vuforia Studio and Reality Composer) and hardware (Oculus Rift, Microsoft HoloLens 2 and Apple Vision Pro).

Required training of 5 hours with Description: The faculty will spend time with the student educating him/her on the topics related to the project, which includes: 1) machining process fundamentals and technology, and 2) fundamentals of Immersive Technologies (Augmented and virtual realities) and their applications in manufacturing. He/she will also learn about conducting machining experiments along with collecting data from sensors implemented in the process.

Mentoring plan: The faculty and the student will meet on a regular basis (weekly or as needed) to discuss the progression of the project, the challenges and difficulties, trouble shooting. He/She will get guidance on formulating research questions, developing AR experiences in manufacturing and testing them through teamwork and collaborative efforts.The instructor will be lenient towards small mistakes made during the time and would make sure that the student learns from their mistakes so that they can be successful when it comes to launching their own project.

Applicant Requirements: This is a multidisciplinary project requiring skills in different engineering concentrations. For this reason, it is recommended to have at least two students from different engineering disciplines (including but not limited to Mechanical, Electrical and Computer). 1. 3D CAD modeling.2. Programming skills.

Applicant Preferences: The student should be self-motivated, eager to learn.

Specific Time considerations/conflicts: The student must work in the lab as required and be available to meet with faculty members and PhD/Master students as needed.

App ID #: 2094

Mentor: Bennett, Jeanette Email: jbenne70@charlotte.edu

Title: Associate Professor

Department: Psychological Science

Co-mentor:No

Community engaged research: No

Title: Investigating how the world “gets under our skin”: Biobehavioral influences on human health and well-being

Description: Globally, my research lab, StressWAVES BRL, examines how our experiences "get under the skin" via stress and affects our health, both physical and mental. Although chronic stress can harm the body and mind, acute or manageable stress improves our cognitive, emotional, mental and physical functioning. We attempt to understand how acute, healthy stress becomes derailed and toxic as well as investigate innate individual differences that inhibit or reverse the negative effects of stress, whether acute like job loss or major like traumatic events. If concepts like mind-body, stress, blood pressure, trauma, resilience, depression, cortisol, are interesting to you, you should consider this opportunity. It is especially good for those who envision a career in biopsychology, health psychology, psychoneuroimmunology, or a health-related field. Psychosocial, culture, and emotional as well as biological factors are assessed in all studies, including but not limited to handling and processing of blood or saliva, guiding participants through data collection protocols, as well as data entry, cleaning, and analysis. Through this experience, you will assist with data collection on a grant funded behavioral intervention. Research scholars will conduct literature reviews, engage with participants, analyze data, and disseminate findings.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

4 positions available

Anticipated Student Learning Outcomes: By the end of their research experience in the StressWAVES BRL, students will be able to:Explain how psychosocial stress influences physical and mental health through biopsychosocial mechanisms.Describe the role of biomarkers (e.g., cortisol, blood pressure, inflammation) in stress and resilience research.Articulate the ways psychosocial, cultural, and biological factors interact in health psychology.Demonstrate proficiency in participant-facing research tasks (e.g., guiding participants, administering questionnaires, processing saliva/blood samples).Apply data management techniques including entry, cleaning, coding, and basic statistical analysis.Conduct literature reviews that synthesize current evidence in stress, health, and resilience research.Collaborate with research team members to design, execute, and refine behavioral health protocols.Communicate scientific concepts via lab meetings and local conferences.Practice ethical standards in human subjects research, including respect for confidentiality and sensitivity to trauma.Demonstrate teamwork, time management, and accountability in a lab setting.Critically evaluate empirical findings and connect them to theoretical frameworks in health psychology.Contribute to dissemination of research (e.g., presentations, posters, manuscripts, community reports).Reflect on the role of

individual differences in stress responses and resilience, considering implications for future research and practice.

Required training of 10 hours with Description: There is online CITI training for IRB and IBC protocols (~10 hrs). The trainee can't begin to interact with participants or data collection until they have completed their CITI training and are added to the IRB and IBC protocols.

There is also ~20 hrs of lab specific training which will start day 1.

Mentoring plan: The StressWAVES BRL is a teaching lab. My team and I prioritize creating a space for learning and growth. Here are some of the things my lab uses to support trainee development:Clear onboarding & training. Trainees receive access to the written protocols, a safety and human subjects training checklist, and step-by-step SOPs for each task (saliva/blood handling, questionnaires, data entry). I will ensure you complete required certifications (e.g., IRB/human subjects, biospecimen training).Structured mentorship. Trainees are paired with a graduate student mentor and a post-bac (when available) for regular lab tasks, and I will oversee progress through weekly group lab meetings and one-on-one monthly meetings.Regular meetings & timely feedback. I will meet with you personally on a regular cadence and provide written feedback on major deliverables (e.g., poster/abstract/manuscript drafts, fellowship statements).Professional development. Trainees will engage in lab meetings, journal clubs, and will coach you on presenting, writing, and preparing for career/graduate school applications.Opportunities to present & publish. Trainees will prepare for lab meeting presentations and support conference abstracts and co-authorship when you meet contribution standards.Letters, networking & career advising. When merited by a trainee's performance, I will write tailored letters of recommendation, do mock interviews, and introduce you to relevant collaborators or programs.Safe, inclusive environment. My lab and I work to maintain a professional, respectful lab culture and respond promptly to concerns about supervision or working conditions.Equitable access to resources. I will work to secure some funding for conference travel or research costs when available and help you apply for travel or trainee awards.

Applicant Requirements: Entry level biology courses (e.g., BIOL 1110/1115) Entry level psychology courses (e.g., PSYC 1101)Willingness to work on lab protocols where biological specimens (e.g., saliva, blood, etc.) are collectedEngaging personality and able to talk and work easily with strangersAbility to work in 3-4 hour windowsApproach duties with curiosity and confidenceEnjoy repetitive tasks while ensuring you focus on the details.Work collaboratively within a team environment and thrive when taking on individual responsibilities.Be active in your approach to their training; seek out opportunities.

Applicant Preferences: Biopsychology courses (e.g., PSYC 2113) with B or betterResearch methods course (e.g. PSYC 2391/3292) with B or better OR previous research experienceExperience with SPSS, Qualtrics and proficient in Microsoft Excel/WordIntended goals of seeking graduate or professional degree (e.g., MS/MA, PhD, MD, DO, RN, PT, etc.) in a health & well-being focused area/fieldNot overcommitted with other extra curricular activities/clubs

Specific Time considerations/conflicts: We are always working based on the participants schedule; thus, there aren't any set times yet, especially for Spring.

App ID #: 2095

Mentor: Levens, Sara Email: slevens@charlotte.edu

Title: Associate Professor

Department: Psychological Science

Co-mentor:No

Community engaged research: No

Title: Finding Joy in Physical Activity: Developing Interventions to Increase Physical Activity Enjoyment for Promoting Health and Longevity

Description: Physical activity offers substantial mind-body health benefits and reduced mortality, while insufficient physical activity is associated with chronic disease, physical disability and mobility issues, stress, and reduced mental well-being. Despite the known benefits of physical activity and risks of inactivity, many individuals are chronically underactive. Physical activity engagement is frequently characterized by an intention-behavior gap, and many current physical activity interventions are not tailorable or scalable, necessitating novel physical activity engagement intervention approaches. Broadly research in my lab seeks to design interventions and advance research in physical activity promotion. My lab uses an integrative interdisciplinary approach that brings together the fields of exercise science, affective science, behavioral science, neuroscience, behavioral medicine, and health psychology, and methodologies such as mindfulness, guided imagery, participatory intervention development, and qualitative and quantitative research techniques. We explore avenues of physical activity engagement to promote health across the lifespan, with current efforts aimed at promoting physical activity in midlife for healthy aging and in women undergoing menopausal transition. Our goal is to develop effective, tailorable, scalable, and accessible interventions that increase physical activity engagement by increasing physical activity enjoyment.We are currently recruiting students interested in being a part of this effort to help with one or more projects underway in the lab. Current areas in which an OUR scholar can assist include 1) setting up and testing a new recumbent exercise bike for conducting physical activity experiments in the lab, 2) assisting with data collection testing a novel physical activity intervention, 3) assisting with intervention development and refinement, 4) scheduling and tracking participants, 5) assisting with focused literature reviews on physical activity interventions, physical activity engagement, physical activity across the lifespan, and behavior change techniques, and 6) assisting with preparing conference abstracts and manuscripts. OUR scholars will have the opportunity to select one or more of the developmental opportunities above to comprise their individual research project. OUR scholars will also have the opportunity to identify personal interests that they would like to explore in the lab and potentially incorporate those into their research project. OUR scholars will also have the opportunity to join Dr. Levens and her lab to attend either the Society of Behavioral Medicine or the Society of Affective Science national conference in April 2026 (should they wish to). Hands-on mentorship and training for all opportunities will be provided by Dr. Levens and advanced doctoral students in her lab.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: Students will gain a wide variety of career enhancing skills during their training in the Levens Lab. Students will be a part of a thriving research lab with other undergraduate students, and masters and doctoral students. Through participation at lab meetings, working with peers and graduate students, and one-on-one professional development meetings with Dr. Levens, students will gain career and self-development experience working in a team to move lab initiatives and advance health behavior research. Dr. Levens will work with OUR scholars to develop an individualized development plan (IDP) to guide their training and professional development. The IDP plan process will allow students to identify areas of strengths and growth opportunities, and help students identify professional development and networking opportunities inside and outside the lab. Students will develop strong communication skills through lab discussions, idea exchanges, and presentations. Students will also have the opportunity to develop their written communication skills by contributing to literature reviews and assisting with manuscript preparation. Dr. Levens and her graduate students will also train OUR scholars in cutting-edge research methods to provide OUR scholars with methodological and technological expertise in the field of health psychology and experimental medicine. Dr. Levens engages in interdisciplinary Team Science practices by integrating diverse perspectives and dividing responsibilities to advance common goals, providing OUR scholars with extensive opportunities to strengthen teamwork skills. Through personalized training in research methods, assisting with data collection, advancing a research project, professional development exercises, and engaging in team science, students will also strengthen their leadership skills and refine their professionalism. By assisting with intervention development and refinement, synthesizing literature, and conducting literature reviews in research databases, OUR scholars will have the opportunity to engage in critical thinking and knowledge application. Students will also be guided in how to conduct research and design interventions that ensure all people have an equal opportunity to achieve positive health outcomes. Finally, Dr. Levens will assist OUR scholars in developing and sustaining a growth orientation mindset that confers value on the process of growth and learning, and endeavor to instill a love of inquiry and research that will be beneficial in whatever career and future endeavors OUR scholars aspire to.

Required training of 3 hours with Description: All OUR scholars will be required to obtain Human Subjects CITI certification . This certification is provided by the CITI website and should take approximately 2 to 3 hours.

Mentoring plan: Dr. Levens is extremely passionate about mentorship and undergraduate research. Dr. Levens is a certified CIMER mentor (https://cimerproject.org/) and will develop an individualized development plan (IDP) with all OUR scholars in her lab. Dr. Levens will also provide professional development guidance incorporating CIMER materials into her mentorship practice. OUR scholars will be considered full members of Dr. Levens lab and receive weekly hands-on mentorship and training from Dr. Levens and advanced doctoral students in her lab. OUR scholars will be required to attend and participate in weekly lab meetings (the timing of which is set each semester at time that lab members are available to attend), and additional scheduled meetings (at a mutually agreed upon time) with Dr. Levens and/or her graduate students for OUR scholars to receive individualized skill based training in lab tasks and projects, such as training in how to operate the exercise bike, scheduling and tracking participants, conduct literature reviews, etc… OUR scholars will also be

expected to read assigned relevant articles, participate in lab discussions and share ideas, complete training tasks in a timely manner, and occasionally present their progress and contributions at lab meetings. Dr. Levens will oversee all mentorship and training of OUR scholars and commit time and resources to their training and professional development. Dr. Levens has been training undergraduates in research for over 20 years; it is something that she deeply enjoys. At the onset of the semester Dr. Levens will meet with OUR scholars in her lab to guide them through their Individualized Development Plan (IDP). Once a month thereafter Dr. Levens will meet individually with OUR scholars to review their IDP, update their goals and growth areas, and identify additional areas of training of interest to the student. At the end of the semester Dr. Levens will meet with OUR scholars to review and update their IDP in preparation for their future endeavors.

Applicant Requirements: Requirements:We are interested in students with an intrinsic interest in research and healthful living and behavior change. Students should be committed, reliable, punctual, and have good attention for detail and a good work ethic. Strong written communication skills. A sense of professionalism and ability to work directly with participants for in-person data collectionFamiliarity using Microsoft Word and Excel and Google Workspace (google docs and sheets)

Applicant Preferences: Preferences:Some familiarity/interest in psychology and health literature.Ability to conduct a literature review searchAbility to follow detailed instructions and protocolsCoursework in research methods and/or data analysis. Ideally students would be interested in working in the lab for an additional semester or more after their participation in the OUR program so that they have time to more fully develop their skills and interests, and benefit from their training. Interest in careers that overlap with Lab interests, training and expertise (e.g. advanced graduate training, careers in medicine or nursing, physical therapy, mental health, etc...) is desirable in terms of match between interest and training. Prior research experience would enable an OUR scholar to be involved in more advanced lab projects and opportunities.

Specific Time considerations/conflicts: There are no currently set meeting times.

At the end of the Fall semester OUR scholars and other lab members will identify a Spring Semester lab meeting time that fits the schedule of all lab members. OUR scholars will be required to attend this weekly lab meeting.

All other required meetings will be determined in the Spring Semester at mutually available times.

App ID #: 2096

Mentor: Smith, Megan Email: ssmit392@charlotte.edu

Title: Assistant Teaching Professor

Department: Sociology

Co-mentor:No

Community engaged research: No

Title: Why is Gen Z so Lonely?

Description: Loneliness was declared a public health crisis in the United States in 2023. In 2025, the World Health Organization published an almost 300 page document entitled "From Loneliness to Social Connection." Loneliness is pervasive and Gen Z self reports the highest levels of loneliness, which is counter to previous decades of research. This begs the question, "Why is Gen Z so lonely?" The research provides a number of theoretical frameworks and social causes. They do contradict prevailing common wisdom, that social media use is the root cause, and may explain why loneliness persists. This project focuses on the loneliness experiences of UNC Charlotte undergraduate students. First identifying how many students lonely, the symptoms they experience, and their demographic characteristics, the project will focus on three different interventions over the course of a semester. Then focus group follow ups on the effectiveness of each intervention strategy. Ideally, the intervention data will allow for a more targeted recommendation to help lonely students at Charlotte.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: Students will learn how to identifying gaps in current research on Gen Z and loneliness. Students will learn how to administer online surveys and analyze results. Students will learn how to effectively implement interventions (workshop series, film and social event, service project series). Students will learn how to manage focus groups and analyze data.

Required training of 10 hours with Description: Students will need to complete the CITI research training.

Students will complete an Atkins Library Research Resources module that I am creating.

Mentoring plan: Students will work directly with me. They can expect email communication and in person/Zoom meetings.The expectation is that they will present at UCR in April and another state level conference. Three of my summer OUR students plan on presenting at a conference and one of my fall students plans on presenting. I invited them and will be working with them on writing abstracts. The same is the case for students I would mentor in the spring. Students will be provided weekly tasks and present at weekly meetings. Students are taught collaboration skills and communicate with each other during the week. My commitment is consistent communication,

feedback on work, identifying research presentation or community engagement opportunities on the topic.

Applicant Requirements: The ideal student candidate is curious, motivated, and independent. They should possess strong communication skills both verbal and oral. They should be dependable and responsive to me and their peers. They should be problem solvers. Ideally, the student is a major in the social sciences or health related fields and has a baseline understanding of social determinants of health. It is also expected that they remain highly engaged with OUR during the time period we are working together, such as turning work in on time and attending events or webinars.

Applicant Preferences: I am looking for students with content knowledge about society and health. I want students who are dependable, show up on time, and complete the assignments to the best of their ability. I want students that have confidence in completing a task, but will ask for help when they need it. I want to work with students who recognize that certain social groups have varying health outcomes when it comes to loneliness; students who appreciate consistent research on health disparities. I'd prefer students who have some understanding (or a full class experience) on research methods in a social science.

Specific Time considerations/conflicts: There are no required times. We can collectively agree on a time once we are working together.

App ID #: 2097

Mentor: Ogunro, Tobi Email: vogunro@charlotte.edu

Title: Associate Professor

Department: Civil & Environmental Engineering

Co-mentor:No

Community engaged research: No

Title: Translating Engineered Water Repellency Research on Soil to Field Application: Accelerated In-Situ Drying

Description: Significant advancements have been made in the research on engineered water repellency (EWR) to mitigate the adverse effects of high moisture content of the mechanical properties of soils. EWR primarily focuses on surface treatment of soil particles to render them non-wettable, thereby preventing water ingress and maintaining soil moisture optimal levels for enhanced material performance. Our team has successfully conducted bench-scale tests of EWR using organosilane (OS) treatment in the laboratory. However, field pilot tests have yielded mixed results, with limited success. The main challenges in translating this technology to field applications include the slow drying process of the treated soil layer and insufficient data to simulate fieldrelevant conditions. To address these challenges, our team has identified the following research topics to facilitate the field applications of the technology: Optimizing the drying agent content of organosilane-treated silty and clayey soil in the laboratory. This study involves characterizing soil index properties, mixing OS and drying agents with soil, performing compaction test, and measuring the wettability of the treated soil by assessing the contact angle of water droplets using an imaging device.Laboratory simulation of the effectiveness of drying agents on organosilane-treated soil under field conditions. This study will explore an innovative and easily implementable method for rapidly reducing excess water in treated soils. It will investigate the drying process of instrumented O- treated soil samples amended with various drying agents (such cement and potassium polyacrylate Super Absorbent Polymer (SAP)). The samples will be subjected to different environmental conditions of humidity and temperature in an environmental chamber. Assessing the long-term performance of organosilane-treated soil subjected to wetting solutions with high ionic concentrations. Given that brine and other products are used to de-ice roads and bridges during winter, ingress of these solutions could weaken the bonds between OS and soil surfaces. This study will examine the impact of water with varying ionic concentrations on the contact angles, the breakthrough pressure, and ponding resistance of OS treated soils. The outcomes of these research topics will significantly contribute to the successful field application of our research in engineered water repellency of soils.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

3 positions available

Anticipated Student Learning Outcomes: Students will learn critical thinking and effective collaboration skills. The student education, training and careers advising will be led by me. Each student will participate in the professional & career development training offered by the university

during the project. The students will learn skills that are crucial for their academic and professional success, chart a well-defined professional development plan (including self-assessment, goalsetting, action plan, milestones, resources, evaluation and reflection), explore effective ways to foster teamwork, and improve communication.

Required training of 2 hours with Description: Since this research exclusively uses organosilane, a chemical that is environmentally benign and safe for handling, our team has trained several undergraduate to work with it. Consequently, student training will be limited to a one-hour online the online laboratory safety course. Additionally, students will be required to attend a one-hour in-person laboratory orientation with our environmental lab and geotechnical lab managers before gaining access to the labs.

Mentoring plan: My mentoring is developed in the context of regular meetings (weekly, standing meeting with research team every Friday) and an individual meeting prior to this group. During the team meeting students will describe their work to colleagues and assist each other with solutions to challenging research problems, explore issue- rather than discipline-based solutions, peer and faculty mentoring. Student will work directly with me but will be assist in laboratory activities by my graduate students. Students will develop multidisciplinary and leadership skills, and acquire teamwork skills.

Applicant Requirements: No specialized skills and courses or experiences required, however, students must be interested to work in a team and open to learn new skills.

Applicant Preferences: Civil Engineering, Geology, Chemistry, Engineering disciplines, and Science disciplines

Specific Time considerations/conflicts: None

App ID #: 2100

Mentor: Yarmand, Matin Email: myarmand@charlotte.edu

Title: Assistant Professor

Department: Software and Information Systems

Co-mentor:No

Community engaged research: No

Title: First Steps Matter: Evaluating On-campus Orientation Programs

Description: On-boarding programs make new experiences feel less daunting and more exciting. Starting something new (whether a new class, project, or job) can feel quite overwhelming. These programs aim to provide necessary information, clear roadmap, and helpful tips. Think about the last time you on-boarded into a new program or job. How did you find the exercises? Did you dive in, taking notes and engaging with the process, or were you wishing for a fast-forward button to skip ahead straight to the final quiz? Looking back on your orientation experience, what would you have wished you did differently in the first couple of weeks to expedite your learning? This project aims to capture and examine these experiences and feelings at scale. Specifically, you will:read relevant literature to better understand the existing work in this space,devise an anonymized survey that gathers perceptions around orientations,distribute the survey to collect responses from the UNC Charlotte community (students, staff, and faculty), andanalyze the collected data to reveal patterns. The World Economic Forum predicts that by 2028, 23% of jobs will change: 69 million new jobs will be created and 83 million existing positions will disappear. In today's dynamic labour market — supercharged by the unprecedented advances in Generative AI — effective on-boarding programs help people adapt and excel when switching jobs. Understanding current practices and perceptions is the first key step.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

1 positions available

Anticipated Student Learning Outcomes: If you seek graduate school — you will learn the end-to-end process of conducting survey studies, one of the most important tools in Human-Computer Interaction (HCI) and psychology research. You will learn how to craft a survey that is both engaging for the audience, and informative for the researchers, as well as how to quantitatively and qualitatively analyze the data. There will further be opportunities for engagement that can help develop your communication, writing, and presentation skills. This project prepares you for your research career, and will give you enough insight and material that you can use to prepare a strong application for graduate school. If you seek industry — the survey design and analysis components of the project closely align with many industry requirements, especially for User Experience (UX) and Data Science (DS) roles. Developing a concise and informative survey is a sought-after skill by many companies that aim to evaluate their product at mass. Data analysis is also a critical component of all companies, used to organize and make sense of information at scale. In this project, you will develop these two types of skills extensively. If you are open to both — you have the opportunity to benefit from both categories! Show up motivated with open eyes, learn and practice

these skills (that often overlap between academia and industry), and you will be able to know for sure which career path you gravitate towards.

Required training of 5 hours with Description: You will need to complete the IRB CITI training before distributing the survey. This ensures curating a survey that aligns with ethical human-subject protocols.

Mentoring plan: We will collaboratively work on a mentoring plan that works for your schedule and mine. Having worked with many undergraduate students in the past, here is what I have found to be helpful: Phase 1: Project Setup and Early GuidanceMeetings: 3x per week (two short check-ins + one long co-working session)Duration: Weeks 1-3Mentor Role: Offer close guidance on project goals, co-work to model research and design processes, help with problem scoping and solution planningPhase 2: Independent Survey Design, Distribution, and AnalysisMeetings: 1x per week (one long check-in)Duration: Weeks 4-12Mentor Role: Provide targeted feedback on the survey design process and track alignment with project goalsPhase 3: Consolidation and PresentationMeetings: 2x per week (one long and one short check-ins)Duration: Weeks 13-15Mentor Role: Advise on clear presentation strategies and provide support for integrating the work into a cohesive final outcome Besides our 1-on-1 engagement, I would also encourage you to talk to other students and faculty, and at least once, present to the HCC research group. These interactions can help you build a broader network, and especially, learn how to communicate your progress to a wider audience.

Applicant Requirements: The following skills are crucial for success in this project:Literature Review — You should be able to read academic papers from a variety of disciplines to get a better understanding of the existing work in the space, and later synthesize the information.Independence — You must be able to think and work independently, always aspiring to discuss your new ideas. I will be helping you along the way, but you will be the one driving the work according to your interest and expertise.Motivation and Curiosity — You must be motivated and curious to pursue this line of work. This interest can especially stem from your past experience when you might have experienced prior frustration with orientation programs.

Applicant Preferences: The following skills can put you on a path to success:Data Analysis — Prior experience in Data Science can be very helpful for survey analysis, such as existing familiarity with Python Pandas or R.Design — Prior design skills (e.g., user scenario and storyboarding) is a plus (Recommended course: ITIS 3130).Writing — Strong writing skills can help you transform your work into a manuscript that will publicize your work to a broad audience.

Specific Time considerations/conflicts: There is no specific day or hour for engagement in this research. We will collaboratively find times that work for both of us.

App ID #: 2101

Mentor: Hopper, Lorenzo Email: lhopper6@charlotte.edu

Title: Assistant Professor

Department: Epidemiology and Community Health

Co-mentor:No

Community engaged research: No

Title: Understanding Young Males' Perceptions of Fatherhood: Anticipated Challenges and Supports

Description: We know that fathers play an important role in improving birthing outcomes and child development. We know less about what young men think about becoming fathers in the future? What challenges do they expect, and what kinds of support do they believe they would need? These are important questions because young men's thoughts about fatherhood can shape their future health decisions, relationships, and how they prepare for entering fatherhood. This project will explore how college-aged males (at UNC Charlotte and possibly beyond) view fatherhood by asking male students about their expectations, worries, and hopes for becoming fathers. The insights we gather may also help shape future health education programs that better include men in conversations about family and child health.The student researcher(s) will work closely with Dr. Hopper to design and collect data and help summarize key findings. They will have the opportunity to read and discuss articles on the impacts of fatherhood, then use that knowledge to develop the study materials. You will help with recruiting participants, collecting survey responses, and organizing the data. Once the data is collected, you will work with Dr. Hopper to look for patterns and themes in the answers, and together you will interpret what the results mean. Finally, you will learn how to prepare and present the research study in academic settings.No prior research experience is required, but an interest in maternal and child health research is preferred. The experiences gained from this project will help the student(s) to build confidence in public speaking and professional communication. This project will help uncover unique insights into the role young men see themselves playing in family and child health, including the challenges they anticipate and the supports they believe will help them succeed.Dr. Hopper will provide mentorship and training throughout the semester, meeting with the student(s) regularly to provide guidance and feedback. He will provide guidance through the research process, from reviewing articles and creating questions to collecting data, analyzing results, and preparing your presentation. This supportive mentorship will ensure that the student(s) feel confident in completing the project and engaging in similar future research.This is a unique opportunity for those who are curious about health, families, or social issues to explore an important and often overlooked topic—how young men think about fatherhood. The project is designed to be both engaging and manageable, with clear steps leading to a final presentation that will highlight the contributions as a student researcher.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: There are multiple benefits to engaging in this project. Student(s) will gain hands-on experience conducting original research from start to finish. They will build practical skills in designing surveys and interview questions, recruiting participants, collecting and managing data, and identifying key findings. They will also gain exposure to academic literature, learn how to interpret findings in the context of existing research, and get experience presenting results in one or more academic settings. Alongside these technical skills, student(s) will grow in communication, time management, and problem-solving, which are all valuable across academic and future career paths.In terms of content knowledge, student(s) will deepen their understanding of maternal and child health and the important role that fathers play. This knowledge can be useful for students considering careers in many fields including public health or any field that engages with families and communities. Findings from this project are important because they can inform the design of health education programs, campus initiatives, and community interventions that better include men in conversations about family and reproductive health. Understanding young men's perceptions can also help educators and health professionals to identify potential misconceptions, barriers, or unmet needs before they arise in adulthood.The experience is also designed to build confidence in engaging in research. By presenting their work , students will practice sharing ideas in a professional setting, an experience that can help the student(s) to standout in graduate school applications or job interviews. Dr. Hopper is the co-director of the Charlotte MCH Workgroup and organizes a Crucial Conversations speaker series where the student(s) might also present the study findings.

Required training of 10 hours with Description: The student will be required to complete IRB-required CITI human subjects training (~3 hours) before beginning data collection. Additional training in project procedures, ethical data collection, and data management (~7 hours) will be provided by Dr. Hopper.

Mentoring plan: As the faculty mentor, I had a strong record of mentoring students to conduct research. I've worked with both undergraduate and graduate students in the past on similar project designs. For this project, my goal is to ensure that the student researcher(s) feels supported, confident, and fully engaged in the process of working on a research project. The student will work directly with me, and we will meet at least once a week for dedicated one-on-one sessions. These meetings will provide space to review progress, answer questions, address challenges, and outline next steps, ensuring the student feels guided throughout the project. I will also be available between meetings by email and during office hours for additional support.At the beginning of the project, I will provide clear onboarding that includes training in research ethics, project expectations, and step-by-step guidance for each research activity. I think that understanding research ethics is perhaps the most important step before engaging in the project. I understand that students have varying levels of research experience, so I will intentionally break tasks down into manageable pieces and provide tools and examples that help them succeed. For example, when working on recruitment materials, I will first share examples from previous projects and work with the student(s) to design strong recruitment materials while encouraging creativity. Throughout the semester, the student will gain experience in literature review, question design, participant recruitment, data collection, and some analysis. To support their growth, I will offer feedback on written work, coach them on how to communicate with participants, and model strategies for ethical and professional research conduct. I will also help them connect their project tasks to the

bigger picture so they see the value of their contributions beyond the classroom. I believe it is important to share webinars and talks on similar topics so they can continue to learn from other experts in the field.A very important part of this experience is the dissemination of the findings so I will be sure to prepare the student(s) to share their work publicly. I will guide them through creating a research poster and help them practice presenting their findings. There's a possibility that we will explore opportunities for the student to co-present with me at a local Maternal Health conference and/or contribute to a scholarly manuscript. I will even make sure the student(s) understands how to add these items to their resume and talk about their work during interviews. My commitment to the student(s) is to create an environment where they feel encouraged to ask questions, make mistakes, and learn from the process. I will provide constructive feedback, celebrate milestones, and help them reflect on the skills they are building.

Applicant Requirements: Strong candidates should have a keen desire to develop research skills and should demonstrate good communication skills, professionalism, and the ability to work responsibly and independently.

Applicant Preferences: Male students are especially encouraged given the project's focus, however, all student(s) are welcome to apply and will be considered.

Specific Time considerations/conflicts: There are no specific days/times as of now that the student(s) must be available. I am flexible in working with them to find a time to meet during the duration of the project.

App ID #: 2102

Mentor: Ramesh, Divya Email: dramesh4@charlotte.edu

Title: Assistant Professor

Department: Software and Information Systems, College of Computing and Informatics

Co-mentor:No

Community engaged research: Yes

Title: Developing Context-Sensitive Mechanisms for Accountable AI

Description: Artificial Intelligence (AI) holds immense promise for society – revolutionizing everything from healthcare and financial services to education and even our social relationships. Yet, despite these high hopes, everyday experiences remind us that we are still far from realizing AI's full potential. In this context, accountability is increasingly recognized as a cornerstone of responsible AI innovation, ensuring that the technology develops in ways that are trustworthy, equitable, and aligned with societal needs. Several accountability mechanisms such as audits of algorithmic systems, transparency reports, and interfaces that explain algorithmic decisions to users have been powerful in advancing responsible AI innovation. For example, when X platform (then: Twitter) released an image-cropping algorithm that cropped men's and women's images differently, users publicly audited the algorithm and influenced the platform to fix its errors. However, these stories are not widespread. Many erroneous, misaligned, and often harmful algorithmic and AI systems continue to impact people despite awareness of their negative impacts (eg., gig work, predatory loan systems etc.). Why does this happen? Recent work suggests that we must develop better mechanisms for accountability that take their contexts into consideration. What is context-sensitivity and how might we develop such accountability mechanisms? Our team aims to answer this broad research question. To do so, we will carry out this research in three parts: Understanding the context-sensitive factors that drive accountability: In this aspect, we will conduct rigorous qualitative empirical research with users on-the-ground to understand questions such as: Why do users adopt high-risk technologies? Do they show reasonable awareness of the risks? How do they reason about and navigate potential risks? Do they take appropriate steps towards safe interactions with this technology? We will study these questions with users of financial technology apps, gig-work apps, users who have experienced micro-targeting etc. Development of a scale for measuring the success of accountability: In this aspect, we will investigate what successful accountability looks like for end-users of high-risk AI systems. What is successful accountability according to users? What factors (such as literacy, public policy, regulation, culture) contribute to helping them achieve successful accountability when they have negative experiences with AI systems? The findings from this study will help us envision new designs for mechanisms of accountability. Design of novel context-sensitive mechanisms for accountability: In this aspect, we will design new accountability mechanisms that are better aligned with the needs and experiences of end users. We will work with communities (such as through community organizations) to understand how we must design accountable AI systems. We will evaluate these designs with the scale we developed in step 2 and inform the future design of accountability mechanisms. In all, this project will advance a novel method to design an

accountable ecosystem for AI innovation. This project will also contribute practical tools and theoretical insights to the fields of human-computer interaction, responsible AI, and public policy.The exact duties of the student will depend on the stage of the project at the time of the student's research experience. In general, the student will be engaged in:literature reviews to understand how the field of responsible AI understands accountability, Empirical data collection – interviewing users, conducting ethnographic observations, and/or administering surveys to answer research questions,Conduct qualitative or statistical analysis on data, Connect the findings to literature on human-computer interaction, and human-centered and responsible AI, and Present the findings and implications to internal and external stakeholders.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

2 positions available

Anticipated Student Learning Outcomes: Students who participate in this project will: Develop a deep understanding and appreciation of the infrastructure behind technical AI innovation in society. Learn systematic application of qualitative and quantitative research methods to calibrate the opportunities and ethical challenges in AI innovation. These methods may help uncover the impacts of AI systems on all the stakeholders involved in the development, deployment, and use of AI systems.Leverage interdisciplinary thinking and perspectives for influencing accountable AI innovation in society. Students will apply both technical understanding of AI and knowledge of social conditions surrounding AI systems to create an appropriate system of checks and balances for AI innovation. Gain familiarity with literature in the fields of Human-Computer Interaction, Responsible AI, and Science and Technology Studies. Gain the ability to critically and systematically analyze a given AI system and identify impacts on hidden sociotechnical infrastructure. Enhance written and oral communication skills through presentations and publications during research meetings, seminars, workshops at conferences and other formal avenues. Develop a professional network of research contacts within the field of Responsible AI through mediated introductions by the mentor and participation in professional gatherings.

Required training of 8 hours with Description:

The student must complete: 1) Responsible Research Conduct Course offered through CITI or an equivalent University Research Ethics course and 2) the Human Subjects Training Course offered through CITI.

Mentoring plan: Meet with the student regularly (at least 1 hr every week) to provide guidance and direction on the research project as well as discuss the progress of the project. During early stages of the project, I am available to meet with the student more often to ensure a smooth start. I will support the student in identifying their next career steps and ensure they contribute to project components that help them develop skills aligned with their career goals. I will provide training and/or resources to help the student gain the necessary mixed methods research skills required to be successful in their research project.I will help the student set-up accountability structures so that they are committed and deliver on the expectations that we mutually agree on.I will provide assistance to the student in writing abstracts, research reports, and posters based on their summer research project by providing constructive criticism.Where appropriate, I will actively introduce the

student to other contacts to help them expand their professional networks.When possible, I will attend cohort events with the student to provide a sense of belonging.

Applicant Requirements: The student is required to have taken at least one course that corresponds to either AI and machine learning OR human-computer interaction, user-centered design, human-centered design OR an ethics, humanities, social science course. The student must be self-directed. The student must possess an interest in developing strong communication skills, including reading and writing extensively. Since the project involves qualitative research and other social interactions, the student must be willing to engage extensively in face-to-face and oral interactions. The student must demonstrate team-player attitude but be willing to take initiative on their project.

Applicant Preferences: Preference will be given to students who have taken a research seminar course like ITIS 4010/5010: AI and Society or another sociotechnical course such as AI ethics, history of computing etc. It is preferred that students possess some basic programming skills in Python. It is preferred that students have a strong interest in studying a particular group of stakeholders (like gig-workers, financially precarious communities, etc.)

Specific Time considerations/conflicts: The student must attend all research lab group meetings (day TBD). Our team is part of the larger human-centered computing (HCC) group within Software and Information Systems. Thus, the student is expected to attend all the meetings organized by the larger HCC group (currently meeting on Wednesdays from 12-1PM, but is subject to change for the next semester).

App ID #: 2103

Mentor: Ogunro, Tobi Email: vogunro@charlotte.edu

Title: Associate Professor

Department: Civil and Environmental Engineering

Co-mentor:No

Community engaged research: No

Title: Investigating the Effect of Water Content on the Modulus of Silty and High Plasticity Clay Soils

Description: Understanding the variation of mechanical properties of soils is critical for geotechnical engineering applications. For highway performance, one of the key parameters influencing the behavior of subgrade is water content, which directly affects the compaction characteristics and modulus/stiffness of subgrade soils and the pavement. This research project presents a structured experimental campaign to study the relationship between moisture content, compaction level, and modulus of silty and high plasticity clay soils (routinely utilized as embankment soils in North Carolina). The objectives of this study are:Quantify the effect of molding water content on the modulus of silty and high plasticity clay soils.Establish correlations between change in water content and modulus (holding dry density constant).Compare the behavior across soil types (silty and high plasticity clay) with different Atterberg indices.Evaluate the effect of wetting versus drying on the modulus values of the soilsThe expected outcomes of this study will include:identification the optimal water content range for the acceptance stiffnessDevelopment of relationships between water content and modulusRecommendations for field compaction specifications and practices to achieve desired stiffness

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

2 positions available

Anticipated Student Learning Outcomes: Students will learn critical thinking and effective collaboration skills. The student education, training and careers advising will be led by me. Each student will participate in the professional & career development training offered by the university during the project. The students will learn skills that are crucial for their academic and professional success, chart a well-defined professional development plan (including self-assessment, goalsetting, action plan, milestones, resources, evaluation and reflection), explore effective ways to foster teamwork, and improve communication.

Required training of 1 hours with Description: students will be required to attend a one-hour inperson laboratory orientation with our geotechnical lab manager before gaining access to the labs.

Mentoring plan: My mentoring is developed in the context of regular meetings (weekly, standing meeting with research team every Friday) and an individual meeting prior to this group. During the team meeting students will describe their work to colleagues and assist each other with solutions to challenging research problems, explore issue- rather than discipline-based solutions, peer and faculty mentoring. Student will work directly with me but will be assist in laboratory activities by my

graduate students. Students will develop multidisciplinary and leadership skills, and acquire teamwork skills.

Applicant Requirements: No specialized skills but students are required to have completed or currently enrolled in Geotechnical Engineering 1, Geotechnical Engineering Lab, or will enrol in the either of the courses in Spring 2026 semester courses. However, students must be interested to work in a team and open to learn new skills.

Applicant Preferences: Civil Engineering, Geology, and Engineering

Specific Time considerations/conflicts: None

App ID #: 2104

Mentor: Martins do Outeiro, Jose Email: jc.outeiro@charlotte.edu

Title: Professor

Department: MEES

Co-mentor:No

Community engaged research: No

Title: Part Distortion in Robot-Assisted Wire Arc Additive Manufacturing

Description: This project aims to investigate part distortion in a robot-assisted Wire Arc Additive Manufacturing (WAAM) process. WAAM is a metal 3D printing process that uses an electric arc as a heat source to melt and deposit metal wire layer by layer to build near-net-shape components. Part distortion in WAAM refers to the undesired geometric deviations or warping of the built component compared to its intended design. It is one of the key challenges limiting dimensional accuracy and functional performance in WAAM.The students would contribute to the development of the experimental setup composed by a collaborative robot and MIG/MAG welding system, to conduct experimental tests and analyze the data. The tasks conducted by the students are:Conducting a literature review on additive manufacturing, welding, sensor technology, robotics, and machine learning.Enhancing an existing experimental setup consisting of a collaborative robot, a welding system, and sensors.Preparing and programming the experimental tests for robot-assisted WAAM.3D printing the parts and collecting data through the integrated sensors.Analyzing the collected data and applying machine learning algorithms.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

1 positions available

Anticipated Student Learning Outcomes: By the end of this project, the student should:Have knowledge on additive manufacturing process technology.Have experience designing and developing an experimental setup.Have skills in programming a collaborative robot.Have skills in measuring part distortion.Have knowledge on Machine Learning and its application to manufacturing.

Required training of 5 hours with Description: The faculty will spend time with the student educating him/her on the topics related to the project, including additive manufacturing, sensor technology, robot programming and machine learning.

Mentoring plan: The faculty and students will meet on a regular basis (weekly or as needed) to discuss the progression of the project, the challenges and difficulties, trouble shooting. The students can expect an exciting and healthy learning experience. It is understandable that the students will not and are not required to know everything beforehand about this project. The instructor will be patient and lenient towards small mistakes made during this participation and would make sure that the students learn from their mistakes and are able to understand and solve the project challenges and difficulties, so that they can be successful when it comes to launching their own project.

Applicant Requirements: This project requires general knowledge in one or more of the following areas: (1) materials and manufacturing processes, (2) instrumentation and signal processing, or (3) programming, especially in Python. Prior experience is helpful but not required; curiosity and motivation to learn are most important.

Applicant Preferences: Experience with CAD software (Solidworks, Autodesk Fusion, etc.) and manufacturing systems (MEGR 2180).

Specific Time considerations/conflicts: The student should work in the lab as required and be available to meet with faculty members and PhD/Master students as needed.

App ID #: 2105

Mentor: Markant, Doug Email: dmarkant@charlotte.edu

Title: Associate Professor

Department: Psychological Science

Co-mentor:No

Community engaged research: No

Title: Do you want to hear what I think about you? Understanding social and cognitive factors in feedback-seeking behaviors

Description: Feedback from others plays a central role in shaping how people view themselves. Whether feedback is from a romantic partner, a teacher, or a therapist, hearing how one is perceived by someone else can change one's beliefs about their own attributes, skills, and potential. However, psychological research has shown that people often prefer feedback that validates what they already think about themselves, a phenomenon known as "self-verification." For instance, individuals with low self-esteem or negative self-beliefs often prefer (or put greater trust in) feedback that confirms those negative self-views, even when other sources of more positive feedback are available. This preference for self-verifying feedback can produce an echo chamber that strengthens existing beliefs while closing off opportunities to learn how to improve or about how one is viewed from someone else's perspective. The goal of this project is to understand why people demonstrate biased feedback-seeking behaviors like self-verification. Through the use of surveys, behavioral experiments and computational modeling, we aim to develop a theory of feedback-seeking decisions that reflect how people weigh the potential costs and benefits of receiving feedback from other people. The ultimate goal of this work is to better understand how to deliver feedback such that individuals are more receptive to feedback that can modify persistent negative self-beliefs like those seen in depression and other mental health conditions. We are seeking students with interests in cognitive science to support a series of ongoing projects related to this theme. This project is well-suited to students who want to learn research methods involved in experimental psychology and/or computational modeling of human behavior. In addition, knowledge gained about the psychology of feedback-seeking behaviors is broadly applicable to a wide range of contexts, including education, clinical psychology, and professional workplaces.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: Critical thinking: Involvement in the project will require students to engage with the scientific literature on feedback-seeking by collecting and analyzing relevant research articles. They will learn about the critical thinking and problem solving skills involved in identifying research questions and designing controlled experiments to test scientific theories. Teamwork: Students will work collaboratively within an active, interdisciplinary research lab that consists of a faculty member, undergraduate students, and graduate students in Psychology, Health Psychology, and Cognitive Science. Technical skills: Students will use a range of computer programs to create research surveys and/or behavioral experiments. They will also gain

familiarity with tools for data processing, statistical analysis, and computational modeling of behavior. Communication: Through interactions with the faculty mentor and research lab, students will gain experience communicating about the process and goals of a scientific research project. This will include presentations to the research lab about research articles or project progress updates. Students will also receive guidance and coaching from the research team when preparing a poster to communicate the results of the project. Career and Self-Development: The research experience will be useful preparation for a broad range of career paths that involve implementing evidence-based principles for understanding and shaping human behavior, including behavioral science, health, and technology. In addition to the skills directly involved in the research project, students will receive advising from the faculty mentor about preparation for graduate school and other career paths.

Required training of 10 hours with Description: Training will include:

- Familiarization with background research through reading research articles

- Ethics training (CITI training for behavioral science) if not already completed

- On-boarding meetings to familiarize students with the research team and project structure

Mentoring plan: Students will work primarily with the principal investigator, Dr. Doug Markant. A meeting at the start of the project will be used to develop an Individual Development Plan that outlines the goals and expectations for the semester. Supervisors will communicate meeting times, expectations, and work directly with students to develop objectives and timelines for project tasks. Students will meet with a supervisor on a weekly basis to ensure steady progress toward the project's goals. Students will also interact with other members of the research lab which includes students and faculty in psychology, cognitive science, and health psychology. Students will be expected to maintain regular involvement in lab activities, including regular attendance at lab meetings. Students will be asked to deliver informal presentations about project updates. They will be advised by the faculty mentor on how to build on the experience on the project to further their professional goals, including opportunities to present at academic conferences or public-facing venues to showcase their work.

Applicant Requirements: Students should have a strong interest in psychology or cognitive science. Required characteristics are strong organization skills, attention to detail, conscientiousness, and strong verbal communication skills.

Applicant Preferences: Recommended: Completed coursework in psychology with good academic performance, especially research methods courses (e.g., Psychology Research Methods I and II). The project is best-suited to students who feel comfortable working with a range of computer-based tools. Prior experience with programming or data analysis is desirable but not required.

Specific Time considerations/conflicts: None

App ID #: 2107

Mentor: Martins do Outeiro, Jose Email: jc.outeiro@charlotte.edu

Title: Professor

Department: MEES

Co-mentor:No

Community engaged research: No

Title: High-Speed Machining of Additive Manufactured Inconel 718 for Aerospace Applications

Description: Inconel 718 is one of the most widely used nickel-based superalloys in the aerospace industry, particularly for manufacturing jet engine components such as turbine disks and blades. Its popularity stems from its exceptional mechanical strength and stability, as well as its resistance to extreme temperatures and harsh operating conditions. However, it is also considered a difficult-to-cut material due to its high strength and work hardening tendency. Improvement of tool performance and productivity in machining of Inconel 718 is considered as a major challenge. This project aims to improve process productivity by investigating the high-speed milling of both wrought and additive manufactured Inconel 718 using ceramic tools while ensuring the surface integrity required for the application. The tasks conducted by the student are:Conducting a literature review on additive manufacturing, machining, data acquisition in machining, and materials characterization.Enhancing an existing experimental setup for measuring the forces and temperatures during the milling operation.Preparing a design of experiments and the program for the CNC machine.Conduct the milling tests and collecting forces and temperatures during the operation.Analyzing the collected data.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

1 positions available

Anticipated Student Learning Outcomes: By the end of this participation, students should:General knowledge on additive manufacturing and machining processes.Gain knowledge and experience in Design of Experiments and programming CNC machines.Acquire knowledge and experience on data acquisition using force and temperature sensors.Gain hands-on experience in material characterizations.

Required training of 5 hours with Description: The faculty will spend time with the student educating him/her on the topics related to the project, including additive manufacturing and machining processes, CNC machining, data acquisition and analysis, and materials characterization.

Mentoring plan: The faculty and the student will meet on a regular basis (weekly or as needed) to discuss the progression of the project, the challenges and difficulties, trouble shooting. The student can expect an exciting and healthy learning experience. It is understandable that the student will not and are not required to know everything beforehand about this project. He will receive guidance in formulating research questions, conduct experimental tests and materials characterization through teamwork and collaboration with Master and PhD students.

Applicant Requirements: This project requires general knowledge in materials and manufacturing processes.

Applicant Preferences: The student should be self-motivated, eager to learn. Experience with CAD/CAM software (Autodesk Fusion, MasterCAM, etc.) and machining are recommended.

Specific Time considerations/conflicts: The student should work in the lab as required and be available to meet with faculty members and PhD/Master students as needed.

App ID #: 2106

Mentor: Martins do Outeiro, Jose Email: jc.outeiro@charlotte.edu

Title: Professor

Department: MEES

Co-mentor:No

Community engaged research: No

Title: Part Distortion in Robot-Assisted Wire Arc Additive Manufacturing

Description: This project aims to investigate part distortion in a robot-assisted Wire Arc Additive Manufacturing (WAAM) process. WAAM is a metal 3D printing process that uses an electric arc as a heat source to melt and deposit metal wire layer by layer to build near-net-shape components. Part distortion in WAAM refers to the undesired geometric deviations or warping of the built component compared to its intended design. It is one of the key challenges limiting dimensional accuracy and functional performance in WAAM.The students would contribute to the development of the experimental setup composed by a collaborative robot and MIG/MAG welding system, to conduct experimental tests and analyze the data. The tasks conducted by the students are:Conducting a literature review on additive manufacturing, welding, sensor technology, robotics, and machine learning.Enhancing an existing experimental setup consisting of a collaborative robot, a welding system, and sensors.Preparing and programming the experimental tests for robot-assisted WAAM.3D printing the parts and collecting data through the integrated sensors.Analyzing the collected data and applying machine learning algorithms.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

1 positions available

Anticipated Student Learning Outcomes: By the end of this project, the student should:Have knowledge on additive manufacturing process technology.Have experience designing and developing an experimental setup.Have skills in programming a collaborative robot.Have skills in measuring part distortion.Have knowledge on Machine Learning and its application to manufacturing.

Required training of 5 hours with Description: The faculty will spend time with the student educating him/her on the topics related to the project, including additive manufacturing, sensor technology, robot programming and machine learning.

Mentoring plan: The faculty and students will meet on a regular basis (weekly or as needed) to discuss the progression of the project, the challenges and difficulties, trouble shooting. The students can expect an exciting and healthy learning experience. It is understandable that the students will not and are not required to know everything beforehand about this project. The instructor will be patient and lenient towards small mistakes made during this participation and would make sure that the students learn from their mistakes and are able to understand and solve the project challenges and difficulties, so that they can be successful when it comes to launching their own project.

Applicant Requirements: This project requires general knowledge in one or more of the following areas: (1) materials and manufacturing processes, (2) instrumentation and signal processing, or (3) programming, especially in Python. Prior experience is helpful but not required; curiosity and motivation to learn are most important.

Applicant Preferences: Experience with CAD software (Solidworks, Autodesk Fusion, etc.) and manufacturing systems (MEGR 2180).

Specific Time considerations/conflicts: The student should work in the lab as required and be available to meet with faculty members and PhD/Master students as needed.

App ID #: 2108

Mentor: Martins do Outeiro, Jose Email: jc.outeiro@charlotte.edu

Title: Professor

Department: MEES

Co-mentor:No

Community engaged research: No

Title: Smart Machining Processes

Description: Smart Machining refers to the integration of advanced sensing, data analytics, and intelligent control systems into conventional machining processes to enhance productivity, quality, and sustainability. By combining real-time monitoring with artificial intelligence, digital twins, and machine learning algorithms, smart machining enables adaptive decision-making during manufacturing operations. This approach helps predict and prevent tool wear, optimize cutting parameters, reduce energy consumption, and minimize defects. Beyond process efficiency, smart machining contributes to a deeper understanding of the interactions between machine, tool, and workpiece, enabling closed-loop control and self-optimizing systems. As part of the broader Industry 4.0 paradigm, smart machining bridges the gap between physical processes and cyber systems, paving the way for autonomous, resilient, and human-centric manufacturing. The tasks conducted by the student are:Conducting a literature review on additive manufacturing, machining, data acquisition in machining, and materials characterization.Enhancing an existing experimental setup for measuring the forces and temperatures during the milling operation.Preparing a design of experiments and the program for the CNC machine.Conduct the milling tests and collecting forces and temperatures during the operation.Analyzing the collected data.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

1 positions available

Anticipated Student Learning Outcomes: By the end of this participation, students should:Have general knowledge on additive manufacturing and machining processes.Have knowledge and experience programming CNC machines.Have knowledge and experience on data acquisition using diverse sensors including force and temperature sensors.Have knowledge and experience in using machine learning.

Required training of 5 hours with Description: The faculty will spend time with the student educating him/her on the topics related to the project, including machining processes, CNC machining, data acquisition and analysis, Internet of Things (sensors), and machine learning.

Mentoring plan: The faculty and the student will meet on a regular basis (weekly or as needed) to discuss the progression of the project, the challenges and difficulties, trouble shooting. The student can expect an exciting and healthy learning experience. It is understandable that the student will not and are not required to know everything beforehand about this project. He will receive guidance in formulating research questions, conduct experimental tests and materials characterization through teamwork and collaboration with Master and PhD students.

Applicant Requirements: This project requires general knowledge in one or more of the following areas: (1) materials and manufacturing processes, (2) instrumentation and signal processing, or (3) programming, especially in Python.

Applicant Preferences: The recommended knowledge and skills include: (1) instrumentation, (2) signal processing, (3) programming, mainly in Python and Matlab, (4) knowledge on machine learning, although is not mandatory. The student should be self-motivated, eager to learn.

Specific Time considerations/conflicts: The student should work in the lab as required and be available to meet with faculty members and PhD/Master students as needed.