UPRM ERIP ERDC
EDUCATION AND RESEARCH INTERNSHIP PROGRAM

Civil Engineering and Surveying Department

ERDC-UPRM 2022 SUMMER RESEARCH INTERNSHIP PROGRAM

For Undergraduate and Graduate Students

PROJECT SUMMARIES *(As provided by ERDC)*
2022 SUMMER RESEARCH INTERNSHIP

PWS Code	Discipline/Level	Laboratory	Summary
1	Software Engineering Graduate or high level/high performing undergraduate	Construction Engineering Research Laboratory (CERL) Champaign, IL Virtual or In-Person	**a. ERDC Mission Area(s) & Support to ERDC Mission:** ROBOTICS FOR ENGINEER OPERATIONS (REO): The REO Site Model team focus is to develop the capability to robotically create a computer model of an environment and then display that model, clearly and accurately, back to the user and the robot. Software engineer roles and responsibilities include a general understanding in coding a user interface (front end and back end), the Robotic Operating System (ROS) framework, and the capacity to learn about robotics on the job. b**. Specific Tasks:** Conduct research with a software team to develop a plug-in application for the Android Team Awareness Kit (ATAK). This plug-in will be used by the operator to control and monitor the robotic vehicle and will therefore need to be well designed, testable, efficient, and in compliance with specifications. An additional task includes testing ATAK and the associated plug-in on each vehicle, documenting each test, and refining the testing process.
2	Environmental Science, Environmental Engineering, or related subject High level/high performing undergraduate or graduate student in.	Construction Engineering Research Laboratory (CERL) Installations Division Ecl Processes Branch Champaign, Illinois Prefer In-Person	**a. ERDC Mission Area(s) & Support to ERDC Mission:** POLLUTION PREVENTION & INFRASTRUCTURE READINESS: As part of a multi-disciplinary research team this research is developing mission critical decision support products for the Department of Defense. Environmental Engineering roles and responsibilities include assisting with compilation of analysis of data, technology specification review, and cost analyses; and may also include field site visits, literature reviews, design sketches, and writing summary documents pertaining to source reduction and resource resilience measures. **b. Specific Tasks:** Assist ERDC researchers on research focused on the integration of sustainability practices on U.S. Army installations. Topics explored include environmental processes and infrastructure readiness such as source reduction and resource resilience (pollution prevention, waste reduction, recycling and landfill diversion), as well as other installation best practices. Research in the past has further expounded upon food waste treatment technologies, composting operations, improvements to recycling programs, and waste-to-energy systems. This ongoing research will further expound upon technologies and systems to reduce the Army footprint).
3	Computer Science, Computer Engineering, or a related subject. High level/high performing undergraduate or graduate student in	Construction Engineering Research Laboratory (CERL) Champaign, IL In-Person	**a. ERDC Mission Area(s) & Support to ERDC Mission**: POLLUTION PREVENTION & INFRASTRUCTURE READINESS: As part of a multi-disciplinary research team this research is developing mission critical decision support products for the Department of Defense. Computer Science/Engineering roles and responsibilities include assisting with data transfer and report automation; and may also include field site visits, literature reviews, design sketches, and writing summary documents pertaining to source reduction and resource resiliency measures. b**.Specific Tasks:** Assist ERDC researchers on projects focused on the integration of sustainability practices on U.S. Army installations. Topics explored include environmental processes and infrastructure readiness such as source reduction and resource resilience (pollution prevention, waste reduction, recycling and landfill diversion), as well as other installation best practices. Research in the past has further expounded upon food waste treatment technologies, composting operations, improvements to recycling programs, and waste-to-energy systems. This ongoing research will further expound upon technologies and systems to reduce the Army footprint. Computer Science/Engineering roles and responsibilities include assisting with data transfer and report automation; and may also include field site visits, literature reviews, design sketches, and writing summary documents pertaining to source reduction and resource resiliency measure..
4	Materials Science, Biological Engineering, or a related subject High level/high performing undergraduate or graduate student in.	Construction Engineering Research Laboratory (CERL) Champaign, IL In-Person	**a. ERDC Mission Area(s) & Support to ERDC Mission:** PREVENTION & INFRASTRUCTURE READINESS: This research is part of a multi-disciplinary research team that is developing mission critical decision support products for the Department of Defense. Materials Science/Biological Engineering roles and responsibilities include assisting other researchers in a lab setting to test biopolymer degradation samples; and may also include field site visits, literature reviews, and writing summary documents pertaining to source reduction and resource resiliency measures. **b. Specific Tasks:** Assist ERDC researchers on projects focused on the integration of sustainability practices on U.S. Army installations. Topics explored include environmental processes and infrastructure readiness such as source reduction and resource resilience (pollution prevention, waste reduction, recycling and landfill diversion), as well as other installation best practices. Research in the past has further expounded upon food waste treatment technologies, composting operations, improvements to recycling programs, and waste-to-energy systems. This ongoing research will further expound upon technologies and systems to reduce the Army footprint. The selected candidate must have previous experience with basic lab procedures.
5	Engineering, Computer Sciences, or Mathematics BS	Coastal Hydraulics Laboratory Flood and Storm Protection Division Coastal Processes Branch In person	a. **ERDC Mission Area(s) & Support to ERDC Mission:** POLLUTION PREVENTION & INFRASTRUCTURE READINESS: This research is part of a multi-disciplinary research team that is developing mission critical decision support products for the Department of Defense. Materials Science/Biological Engineering roles and responsibilities include assisting other researchers in a lab setting to test biopolymer degradation samples; and may also include field site visits, literature reviews, and writing summary documents pertaining to source reduction and resource resiliency measures. **b. Specific Tasks:** Assist ERDC researchers on projects focused on the integration of sustainability practices on U.S. Army installations. Topics explored include environmental processes and infrastructure readiness such as source reduction and resource resilience (pollution prevention, waste reduction, recycling and landfill diversion), as well as other installation best practices. Research in the past has further expounded upon food waste treatment technologies, composting operations, improvements to recycling programs, and waste-to-energy systems. This ongoing research will further expound upon technologies and systems to reduce the Army footprint. The selected candidate must have previous experience with basic lab procedures.
6	Engineering, Computer Sciences or Mathematics MS	Coastal and Hydraulics Laboratory (CHL) Navigation Division Harbors, Entrances and Structures Vicksburg, Mississippi In-Person	**a. ERDC Mission Area(s) & Support to ERDC Mission**: ERDC's hydrodynamic numerical modeling production system (CSTORM) contributes to R&D that support's navigation of this nation's waterways, and flood risk management policy, planning, and design. ERDC-CHL's numerical models inform district decisions when designing national infrastructure, and communicating with stakeholders, as well as contribute to the state-of-the-art in R&D coastal, estuarine, and fluvial resilience planning. **b. Specific Tasks:** The work will include research and assistance in the numerical modeling of hydrodynamics during a variety of coastal storm events. Duties will include developing, maintaining, and monitoring the numerical models and numerical model production systems. Research on model boundary conditions and parameters will be conducted post-run, and validation data will be collected throughout the production system process. To verify the quality, and investigate the meaning of modeling results, the student will need to be able to visualize and analyze model results. A base line understanding of physical oceanographic processes and governing equations is needed, as well as computer coding experience. This work will build both skills and gain knowledge pertaining to the application of numerical modeling, for risk prediction and resilience planning.
7	Computer Sciences (Software), Engineering Major (Programming oriented) MS/ME	Coastal and Hydraulics Laboratory Navigation Division Entrances & Structures Branch Vicksburg, Mississippi In Person	**a. ERDC Mission Area(s) & Support to ERDC Mission:** With today's evolving climate, there is a dire need for more robust and modernized tools to help design coastal protection systems while leveraging coastal hazards. There is currently a USACE-wide effort to develop a Next Generation Coastal Planning model. The idea behind this new planning model is to create self-contained modules that take on specific roles in evaluating any kind of coastal project. These modules include, but are not limited to, existing stochastic design methods. The main task will be to transfer existing MATLAB modules to the Python environment in the form of GUI's and Jupiter notebooks. Functionality within these modules includes high-level computations, mapping capabilities, data visualization, dynamic database querying, etc. **b. Specific tasks include:** • Conversion of existing coastal engineering tools to the Python environment, specifically as python scripts and/or Jupiter notebooks.; • Research and find Python equivalent of MATLAB toolbox functions, including mapping capabilities and accessing MySQL databases or other complex data formats.; • Replicate an existing MATLAB GUI onto the Python environment.; • Assist in creating a centralized hub where developed tools can be called based on user needs. ; • Research, document, and set up a Github wiki page and/or public website to showcase tools documentation and distribution.
8	Civil Engineering, Environmental Engineer Graduate Student	Environmental Laboratory EPE Branch Vicksburg, Mississippi In-Person	a**. ERDC Mission Area – Installation Energy and Water Resiliency:** This research involves assisting with the development of Installation Energy and Water Plans (IEWPs) which will improve energy and water resiliency when implemented. IEWPs are a requirement of Army Directive 2020-03 (Installation Energy and Water Resilience Policy), which establishes energy and water resilience requirements for Army installations in support of the 2018 National Defense Strategy and Army Vision. **b. Specific Tasks:** The research to be conducted will include the following tasks: • Review and analyze Army installation water and energy data related to supply, distribution, system operation, facility usage, and critical mission requirements.; • Develop and document potential solutions and Courses of Action (COAs) to mitigate deficiencies found in Army installation energy supply, distribution, system operation, and critical mission sustainment.; • Develop and document potential energy efficiency measures and renewable energy and water options for Army installation facilities.
9	Environmental Science, Biology, Ecology, Environmental Engineering, Computer Science BS, MS/ME	Environmental Laboratory Ecosystem Evaluation and Engineering Division Ecological Resources Branch Vicksburg, Mississippi Virtual or In person	**a. ERDC Mission Area(s) & Support to ERDC Mission:** The Environmental Laboratory's 200+ scientists and engineers seek to "provide solutions to tomorrow's environmental challenges" through a broad array of basic and applied research. The research team the incumbent will join focuses primarily on using engineering and ecological models to inform water resources decision-making in the US Army Corps of Engineers. **b. Specific Tasks:** This project focuses on development of next generation ecological modeling capabilities. The incumbent will collaborate with environmental scientists on model development with tasks generally related to model communication. Specific tasks include: • Development of data visualization methods for ecological model results in the R Statistical Software Language.; • Assessment of the relative merits of alternative visualization techniques.; • Documentation of model code and procedure for future development.
10	Marine Science, Environmental Science, Biology, Ecology, Environmental Engineering BS, MS/ME, PhD	Environmental Laboratory Ecosystem Evaluation and Engineering Division Ecological Resources Branch Vicksburg, Mississippi Virtual or In-Person	a**. ERDC Mission Area(s) & Support to ERDC Mission:** The Environmental Laboratory's 200+ scientists and engineers seek to "provide solutions to tomorrow's environmental challenges" through a broad array of basic and applied research. The research team the incumbent will join focuses primarily on using engineering and ecological models to inform water resources decision-making in the US Army Corps of Engineers. b**. Specific Tasks:** This project focuses on evaluating the current state of knowledge and identifying critical research gaps on the environmental effects of sediment release from reservoirs to downstream ecosystems. The incumbent will collaborate with environmental scientists and hydraulic engineers as part of a broader team investigating the topic. **Specific tasks include:** • Synthesis and review of literature on existing methods to evaluate effects of sediment release from impoundments in freshwater ecosystems.; • Developing a database of models, tools and protocols relevant to effects of sediment release.; • Continuing current gap analysis efforts evaluating ecological effects of releasing sediment.; • Assisting webinar with stakeholders to report findings.; • Potential reconnaissance site visit to Tuttle Creek Reservoir.; • Documentation of findings.
11	Computer/Software, Mech., Environ, Civil Engineering, Engineering, Computer Science, Math, Geology, Marine Science, Physics MS, PhD (or advance undergrad.)	Geospatial Research Lab Data Representation Branch Alexandria, VA | Los Angeles, CA Virtual	**a. ERDC Mission Area(s) & Support to ERDC Mission:** We have multiple tasks that need to be accomplished in order to meet IEBA goals for the year. These tasks are at multiple skill levels, and all constitute components of a larger work chain to provide advanced understanding of global environmental conditions. This project will support installations management, mobility, warfighter battlefield assessment, health initiatives including vector-borne assessments. **b. Specific Tasks:** For advanced level work we would like contributions made to utilizing a conditional generative adversarial network to perform a semantic segmentation of labeled pixels to landcover types**. For the less experienced level:** we have multiple tools that need to be created in a python environment with established order of operations such as a high-resolution streamflow vector from digital elevation models (DEMs).; **For more complex task:** May be to investigate is streamflow vector alignment correction in which DEM generated stream vectors are aligned with raster pixels identifying surface water.
12	Engineering (Civil, Mechanical, Computer, Electrical), Computer Science, Mathematics BS, MS/ME	Geotechnical & Structures Laboratory Engineering Systems & Materials Division Mobility Systems Branch Vicksburg, MS In-Person	**a. ERDC Mission Area(s) & Support to ERDC Mission:** The Mobility Systems Branch (MSB) supports the US military forces to maintain ground mobility superiority over adversaries in any type of environment. In order to do this, MSB provides physical testing and predictive modeling capabilities. **b. Specific Tasks:** This research analyzes autonomous ground vehicle performance in software-in-the-loop (SIL) simulations using the Virtual Autonomy Navigation Environment (VANE) (M&S) tool suite. It includes using MSB VANE tools to create virtual worlds (i.e. scenes) with parametric content (e.g. vegetation density, obstacles) and environmental conditions (e.g. rain, time of day), conducting co-simulations with VANE sensor and vehicle M&S tools, processing the autonomy performance data, and writing a report about the experiments and results. **Responsibilities and Duties:** Learn how to create VANE scenes and conduct VANE SIL simulations from MSB E&S; Work with MSB E&S to integrate a new autonomy stack into the VANE SIL; Help with experimental design for autonomy performance study; Generate parametric VANE scenes; Run SIL simulations and collect autonomy performance data; Assist with data analysis and presentation; Lead effort to write a draft report for publication in a peer-reviewed journal, as an ERDC technical report, or both.
13	Software Engineering, Computer Science, Computer Engineering Any Level (BS/MS/ME, PhD)	Geotechnical and Structures Laboratory (GSL) Geosciences and Structures Division Survivability Engineering Branch Vicksburg, Mississippi In-Person	a. ERDC Mission Area(s) & Support to ERDC mission: The Survivability Engineering Branch has the mission to develop and demonstrate innovative force protective solutions and capabilities against most current threats in expeditionary environment. From the research and development of these innovative protection systems, survivability decision aids have been developed to not only allow for rapid assessment of current protection postures, but also to provide enhanced designs to increase defense against attacks. This expertise in engineering solutions is shared through algorithms, graphic-user-interface software, manuals, and other means to form an expedient connection between researchers developing the latest protection methods and guidelines and the soldier in the field. This effort sustains ERDC mission by developing efficient methods to evaluate current protective materials/structures performance against air blast effects of conventional weapons. b. Specific Tasks: The first task is to review/evaluate existing fast running tools and identify areas of improvement. The second task is to develop processes and scripts to implement such improvements. The third task is to assist in the development of a Finite Element Model (FEM) in ABAQUS to evaluate blast performance of a protective structure to verify the fast-running tools. The tasks involve structural dynamic basic knowledge, programming knowledge, and understanding of explicit FEM setup.
14	Civil Engineer, Geospatial Science (Geology, GIS, LIS, Computer/Software Engineering, others related) BS, MS	Information Technology Lab. Software Engineering and Informatics Division CAD/BIM Technology Center Branch Vicksburg, Mississippi In-Person	a**. ERDC Mission Area(s) & Support to ERDC Mission:** The built environment informatics research supports national readiness and the delivery of the modernized Army program as it relates to installations and infrastructure. This research will help solve tough problems relating to military engineering, civil works, and geospatial research engineering to deliver military installations and infrastructure of the future capabilities. b. **Specific Tasks:** It will be expected to complete building interior, exterior, LiDAR and photogrammetry surveys on the ERDC campus and surrounding geographical area, as well as natural environment streambank areas. It is needed to collect and utilize point cloud data to achieve various deliverables that support the delivery of 3D models, 2D drawings and registered point cloud datasets that aid in the delivery of facility digital twinning capabilities and engineering with nature solutions. Projects will include the reality capture and 3D modeling of building facades, building interiors, structural components and mechanical, electrical and plumbing systems, as well as natural environment streambank areas. Equipment used will include Matterport cameras, Lecia scanners, iOS and Android devices. Capture and processing software will include Matterport Capture, Leica Cyclone, Cortex AI, Autodesk Recap, and Bentley Context Capture. **Main tasks are:** Complete the building interior and exterior surveys for assigned facilities on the ERDC Campus and the surrounding geographical area. Download collected data for archiving and processing and/or future processing. Document the collection details including what was done, when it was completed, where, who and why. Total estimated collection time, area collected, total number of scans, what equipment was used, and the number of floors and/or site characteristics surveyed.

We invited you to participate of the ERDC-UPRM 2022 Summer Research Internship Program with the Engineer Research and Development Center (ERDC), Corps of Engineers. This internship constitutes an educational model for either UPRM or ERDC which provides excellent academic and professional alternative learning opportunities for our Campus. During a ten-week period students will receive technical and scientific training at various ERDC National Laboratories. The student will earn an assistantship, 3 credit-hour of research course work, a formal research experience, work in a formal professional job environment and will have opportunities of social and cultural growth in one of several states in the USA. If you are aiming at graduate programs and terminal degrees, learned specialized research techniques and training, learn the job environment in federal agencies, and search for a job in the federal government, this internship may be the best pathway to your professional future.

Benefits:

Wages based on federal government classification (Approximately $19.00-$29.00/hour depending on students', merits)
Practice in an English-speaking environment
Report writing
Air and ground transportation
Technical oral presentation
Tuition of 3 credits will be considered by the program (undergraduate research, graduate research, special problem)
Sightseeing and cultural experience
Training and experience
Research and professional practice
Access to the best research laboratories and ERDC computational resources

Requirements:

1. Be a USA citizen or permanent resident
2. Comply with the minimum academic requirements
a. Minimum GPA : 3.0/4.0 (exceptions for under the required GPA may be considered)
b. Minimum credits approved : 2/3 of the credits required in the student program
3. Apply online
4. Enter demographic information
5. Upload an updated resume
6. Upload transcripts (BS, MS, and PhD) (Can be student copy from your counsellor)
7. Select preferred project (PWS) in order of priority
8. Sign the agreement documents
9. Fill traveling orders
10. Participate of the orientation meetings
11. Register in a three credit-hour course with the advisor's recommendation
12. Have authorization from your Graduate advisor (just for graduate students)
13. Federal Government background check required

CONTACTS:

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