UPRM ERIP ERDC
EDUCATION AND RESEARCH INTERNSHIP PROGRAM

Civil Engineering and Surveying Department
ERDC-UPRM 2024 SUMMER RESEARCH INTERNSHIP PROGRAM
For Undergraduate and Graduate Students

PROJECT SUMMARIES *(As provided by ERDC)*
2024 SUMMER RESEARCH INTERNSHIP

PWS Code	Discipline/Level	Laboratory	Summary
CERL-1	Electrical Engineering Any level acceptable (BS/MS/PhD)	Construction Engineering Research Laboratory (CERL) - Operational Science and Engineering Division - Emergency and Operational Support Branch Champaign, Illinois In-Person	**a. ERDC Mission Area(s) & Support to ERDC Mission**: An Electrical Engineering intern will support the ERDC Operational Energy mission by participating in research tasks focused on microgrid optimization with renewable energy sources, portable power unit development, Deployable Metering and Monitoring System advancements, power generation and battery storage, and EV integration analysis. **b. Specific Tasks:** Assist researchers in all aspects of operational energy research and development, to include: Conduct literature and policy reviews, analyze and optimize power generation and storage systems and work with researchers on integrating AI/ML into metering and monitoring system data collection workflows
CERL-2	Environmental Science Graduate Student (MS)	Construction Engineering Research Laboratory (CERL) - Operational Science and Engineering, CEO-T Champaign, Illinois In-Person	**a. ERDC Mission Area(s) & Support to ERDC Mission:** Installations and Operational Environments/Mitigate and Adapt to Climate Change. This project will begin identifying the parameters necessary to develop a carbon flux model for US tropical and subtropical islands (HI, PR, USVI, Guam, etc.). A carbon flux model for DoD resources in these environments will aid in improving resilience to climate risks through understanding how carbon moves through the system and where and how carbon can be increased to increase ecosystem services. **b. Specific Tasks:** Identify ecosystems and ecotypes on the identified islands. Obtain maps and other geospatial sources of ecosystem extent and environmental data., understand carbon cycling through tropical and subtropical island ecosystem pools and differentiate fluxes, identify and gather existing data from databases and literature that correspond to the identified pools and fluxes, and, as time and experience allows, construct a rudimentary state and transition flux model for island carbon fluxes.
CERL-3	General, Electrical, or Mechanical Engineering BS/MS	Construction Engineering Research Laboratory (CERL) - Construction Engineering Research Laboratory - Energy, Planning & Analysis Branch	**a. ERDC Mission Area(s) & Support to ERDC Mission:** 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). This research also involves assisting with activities that support the transition and adoption of zero emission vehicles (ZEVs) at Army and DoD installations, as directed by Executive Order 14057 (Catalyzing Clean Energy Industries and Jobs Through Federal Sustainability) and Army Implementation Guidance for Electric Vehicle Charging Facility and Electric Vehicle Supply Equipment (EVCF/EVSE) Infrastructure, Charging Operations and Reimbursements. **b. Specific Tasks:** The research to be conducted will include the following tasks: review and analyze Army installation 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 options for Army installation facilities and collect and assess data related to the Army and DoD transition from conventional non-tactical vehicles (NTVs) to ZEVs, and specifically for EV/EVSE planning, acquisition, and implementation.
CERL-4	Geography, Forestry MS	Construction Engineering Research Laboratory (CERL) – Operational Science and Engineering, CEO-T Champaign, Illinois In-Person	**a. ERDC Mission Area(s) & Support to ERDC Mission: :** Sustainable Range Land. Specializing in Geographic Information System (GIS) and Remote Sensing applications supporting the US Army Sustainable Range Program (SRP). **b. Specific Tasks:** Provide GIS support consisting of implementation of standards, completing organizational Taskers, data development and acquisition, training support, GIS application creation, and geospatial analysis per AR 350-19. Work in a shared or distributed Enterprise GIS environment from a variety of sources and formats into a standard GIS Enterprise portal application that complies with US Army SRP Geospatial Data standards.
CERL-5	Hydrology, Electrical Engineering, Physics, Mechanical Engineering, Environmental Engineering BS/MS	Construction Engineering Research Laboratory (CERL) - Construction Engineering Research Laboratory - Power and Mechanical Systems Branch Champaign, Illinois In-Person	**a. ERDC Mission Area(s) & Support to ERDC Mission:** : The Energy Branch conducts research, develops tools and guidance, and demonstrates new and emerging technologies to assist military installations in meeting their resilience, energy and water goals and requirements. Through exploration and analysis of military installations energy and water requirements the team conducts research, develops products, transitions solutions, field technologies, provides technical support, and operationalizes and sustains R&D products. This research includes providing integrated holistic solutions and technical assistance during the planning, design, acquisition, implementation, and renovation phases of facility and installation-wide energy conservation, efficiency, production, and distribution measures and water use. R&D domains include but are not limited to advanced installation planning technologies, energy, power distribution, water use security and building energy systems to include facility related control systems and cyber security requirements. **b. Specific Tasks:** As a summer student assigned to the CERL Power and Energy program, you will work alongside senior researchers whose work supports the generation, distribution, and monitoring of electricity for DoD's military installations. Interests should include microgrids, clean/alternative energy sources, and/or power quality analytics. Efforts may include but are not limited to: feasibility studies on deployment of micro-hydroelectric generation in Puerto Rico, integrating micro-hydroelectric generation into installation and operational microgrids.
CERL-6	Computer Engineering or Software Engineering BS	Construction Engineering Research Laboratory (CERL) Champaign, Illinois In-Person	**a. ERDC Mission Area(s) & Support to ERDC Mission:** The Robotics for Engineer Operations team is currently researching autonomous vehicles for complicated construction and civil engineering tasks. The aim is to develop autonomous mapping platforms and autonomous construction equipment that can keep warfighters out of harm's way. These robotic platforms will be able to map target locations, plan missions, navigate, remove/emplace obstacles, dig sites, and cooperate with other platforms to complete missions **b. Specific Tasks:** Develop a system for lethal/non-lethal obstacle detection and classification. The system will inform autonomous heavy equipment of objects in its direct area of operation and assist in determining whether the obstacles can be addressed or if they must be avoided. This will enhance the task planning and execution of heavy equipment as they carry out activities such as earth moving.
CERL-7	Computer Engineering or Software Engineering BS	Construction Engineering Research Laboratory (CERL) Champaign, Illinois In-Person	**a. ERDC Mission Area(s) & Support to ERDC Mission:** The Robotics for Engineer Operations team is currently researching autonomous vehicles for complicated construction and civil engineering tasks. The aim is to develop autonomous mapping platforms and autonomous construction equipment that can keep warfighters out of harm's way. These robotic platforms will be able to map target locations, plan missions, navigate, remove/emplace obstacles, dig sites, and cooperate with other platforms to complete missions. **b. Specific tasks include:** The Robotics for Engineer Operations team is currently researching autonomous vehicles for complicated construction and civil engineering tasks. The aim is to develop autonomous mapping platforms and autonomous construction equipment that can keep warfighters out of harm's way. These robotic platforms will be able to map target locations, plan missions, navigate, remove/emplace obstacles, dig sites, and cooperate with other platforms to complete missions
EL-1*	Chemistry, Chemical Engineering, Materials, Photochemistry, and related fields. Any level acceptable (BS/MS/PhD) *Multiple projects available (At least two people)	Environmental Laboratory Vicksburg, Mississippi In-Person	**a. ERDC Mission Area(s) & Support to ERDC Mission:** One project focuses on the development of supramolecular architecture scaffolds for enhanced military infrastructure resilience and fortification. The second available project focuses on pioneering an eco-friendly approach to carbon dioxide mitigation, converting CO2 into useful products through the use of model algae. The third project and fourth project are dedicated to addressing all invasive aquatic animals and harmful algae species threatening the nation's waterways, infrastructure, and associated resources. **b. Specific Tasks:** Option to conduct research in any of the listed projects depending on the discipline and interest.
GSL-1	Civil Engineering Any level acceptable (BS/MS/PhD)	Geosciences Structures Laboratory (GSL) - Engineering Systems & Materials Division - Mobility Systems Branch Vicksburg, Mississippi In-Person	**a. ERDC Mission Area(s) & Support to ERDC Mission:** Furthering the development of digitally twined vehicles allows for ERDC to better support the warfighter in training efforts and autonomy development. **b. Specific Tasks:** Support the development, calibration, and validation of a simulated 8-wheeled robotic vehicle, support modeling of a 4-wheeled scout vehicle, support innovation in accurate real time tracked vehicle simulation
GSL-2	Civil Engineering BS/MS	Geosciences Structures Laboratory (GSL) - Engineering Systems & Materials Division - Airfields and Pavements Branch Vicksburg, Mississippi In-Person	**a. ERDC Mission Area(s) & Support to ERDC Mission:** The applicant will be contributing to an ongoing research project sponsored by the Air Force Civil Engineer Center to investigate a new technique for cement stabilization of assault landing zones composed of problematic natural sands. **b. Specific Tasks:** Complete a literature search to identify potential approaches to apply cement stabilizers to medium-scale soil specimens, perform and collect data from soil site investigations at selected field sites to document the in-place condition of deposits of natural sands, conduct extensive laboratory characterization of natural sands including testing protocols for natural sands with and without chemical stabilizers, perform tests on medium-size soil specimens with properties similar to those encountered during soil site investigations, investigate selected application techniques to stabilize the medium-size soil samples with chemical stabilizers such as Portland cement, determine feasibility of using alternative chemical stabilizers to improve the stabilization quality of soil materials, document research work and develop a scientific paper for presentation at an international transportation conference.
GSL-3	Civil Engineering BS/MS	Geosciences Structures Laboratory (GSL) - Engineering Systems & Materials Division - Airfields and Pavements Branch Vicksburg, Mississippi In-Person	**a. ERDC Mission Area(s) & Support to ERDC Mission:** Through this project, the applicant will be contributing to developing a small testing kit that can be easily deployed during contingency pavement reconstruction projects to ensure the quality of the recycled pavement. **b. Specific Tasks:** Document best practices on pavement construction on remote locations as well as availability of test methods for characterization of in place pavement materials, collect and characterize the basic properties of recycled pavement materials to be further treated with stabilizing agents and used for laboratory and field testing, investigate the use of a portable mold for preparation of laboratory-scale specimens for rapid assessment of materials' engineering properties, evaluate two nondestructive testing protocols that can be readily used to produce quality control data in the field during pavement construction projects, conduct a comparison between laboratory and field test results to verify the applicability of the rapid testing kit, document research work and develop a scientific paper for presentation at an international transportation conference.
GSL-4	Civil Engineering BS	Geosciences Structures Laboratory (GSL) - Engineering Systems & Materials Division - Airfields and Pavements Branch Vicksburg, Mississippi In-Person	**a. ERDC Mission Area(s) & Support to ERDC Mission:** Conduct research to develop longer lasting asphalt pavement materials by using nanomaterials, specifically graphene. **b. Specific Tasks:** Work will be helping with a laboratory research project to test the durability of graphene-asphalt pavement mixtures. Specific tasks will include blending aggregates, preparing asphalt samples, performing asphalt durability tests, analyzing test data, and preparing data plots for the project engineer.
GSL-5	Civil Engineering BS (Senior Undergrad or higher)	Geosciences Structures Laboratory (GSL) - Engineering Systems & Materials Division - Impact and Explosion Effects Branch Vicksburg, Mississippi In-Person	**a. ERDC Mission Area(s) & Support to ERDC Mission:** The student will be working on the various sponsored projects within the branch. The objectives of these projects focus mainly on research concerning weapon effects protection for our armed forces. Student will engage in research that encompasses the evaluation of post attack weapon signatures and assessment of explosive threats on structures. **b. Specific Tasks:** Data analysis and interpretation, database input and evaluation, image analysis and reporting, and field experiment preparation with data collection,
GSL-6	Computer Science and Software Engineering, Civil, or Mechanical Engineering MS or higher	Geosciences Structures Laboratory (GSL) - Geosciences and Structures Division - Survivability Engineering Branch Vicksburg, Mississippi In-Person	**a. ERDC Mission Area(s) & Support to ERDC Mission:** Develop and demonstrate innovative force protective solutions and capabilities against most current threats in expeditionary environment. 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.
ITL-1	Computer Science, Computer Engineering, Software Engineering	Information Technology Laboratory (ITL) - Computational Science & Engineering Division - Scientific Software Branch Vicksburg, Mississippi In-Person	**a. ERDC Mission Area(s) & Support to ERDC Mission:** ERDC has partnered with the Department of Homeland Security (DHS) to research domestic special event security practices and develop an online portal to house ERDC produced decision support tools. These tools allow DHS event security planners to increase the physical security posture at various types of special events (sporting events, concerts, parades, etc.). An ERDC developed web-portal interface makes locating and executing the tools simple and intuitive. **b. Specific Tasks:** Research best practices for user interface design and code user interface elements, participate in code repository maintenance and application deployment to production environments, convert Excel formulas to coded functions within web applications, convert legacy codes to modern web-based languages and frameworks, participate in customer reviews and demonstrate their work

Requirements:
1. *Be a USA citizen*
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 by the end of the semester*
3. *Upload an updated resume transcripts (BS, MS, and/or PhD) (Can be an unofficial copy to apply)*
4. *Register in a three credit-hour course with the advisor's recommendation*
5. *Have authorization from your Graduate Advisor (just for graduate students)*
6. *Federal Government background check required*
7. *Participate in required orientations*

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