UPRM ERIP ERDC
EDUCATION AND RESEARCH INTERNSHIP PROGRAM

UNIVERSITY OF PUERTO RICO - MAYAGÜEZ

ERDC-UPRM 2025 SUMMER RESEARCH INTERNSHIP PROGRAM (ERIP-2025)

For UPRM Undergraduate and Graduate Students

PROJECT SUMMARIES *(As provided by ERDC)*
2025 SUMMER RESEARCH INTERNSHIP

PWS Code	Discipline/Level	Laboratory	Summary
CERL-25-01	General, Electrical, or Mechanical Engineering BS, **MS**	Construction Engineering Research Lab - Infrastructure Science and Engineering Division Champaign, IL In-Person	**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) and Zero Emission Grounds Maintenance Equipment (ZEGME) 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. • 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. • Collect and assess data related to Army and DoD transition from traditional grounds maintenance equipment (GME) to zero emission grounds maintenance equipment (ZEGME).
CERL-25-02	Computer Engineering / Software Engineering BS	Construction Engineering Research Lab - Operational Science and Engineering, CEO-W Champaign, IL 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 to assist operators of robotic heavy equipment. The system will enhance the user experience and reduce cognitive load during robotic engineering operations. It must provide users with manual control of the robotic vehicle, access to vehicle status information, sensor data, and autonomous task deployment capabilities. This research will focus on improving user efficiency in completing earthmoving tasks with robotic vehicles, exploring technologies such as large language models and mixed reality to achieve this goal.
CERL-25-03	Computer Engineering / Software Engineering BS, MS	Construction Engineering Research Lab - Operational Science and Engineering, CEO-W Champaign, IL 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 security and diagnostic system for operators of robotic heavy equipment. This system should be capable of recognizing security hazards, such as potential collisions or the presence of a person in the proximity and responding appropriately based on standard operating procedures. Additionally, the system must assess the health of the robotic platform and manage issues that could hinder operation, such as camera failures or communication loss, while informing the operator of the situation. This research will focus on automating the security, diagnostics, and maintenance of robotic heavy equipment.
CHL-25-01	Engineering, Mathematics, Computer Sciences BS, MS	Coastal and Hydraulics Laboratory Vicksburg, MS In-Person	**a.** **ERDC Mission Area(s) & Support to ERDC Mission:** The ERDC performs research and development (R&D) on nearshore processes and navigation in support of USACE mission requirements. ERDC's hydrodynamic numerical and physical modeling contributes to R&D that supports navigation of this nation's waterways, and flood risk management policy, planning, and design. ERDC-CHL's numerical models inform USACE 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. Work will involve the creation of new tools or modification of existing ones for data collection as well as development and/or application of hydrodynamic model data. **b.** **Specific Tasks:** • Sensor and Model Data Processing - Develop computer scripts to analyze collected sensor data or model generated data in Python and/or MATLAB. - Assess or develop scripts for data visualization for validation of hydrodynamic model component. • Model Development and Regression Testing - The work will include research and assistance in the development and testing of hydrodynamic numerical models. Duties will include developing, maintaining, and/or 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, need to be able to visualize and analyze model results.
CHL-25-02	Engineering, Mathematics, Computer Sciences MS, PhD	Coastal and Hydraulics Laboratory - Enter Division, Enter Branch Vicksburg, MS In-Person	**a.** **ERDC Mission Area(s) & Support to ERDC Mission:** The U.S. Army Engineer Research and Development Center (ERDC) has been commissioned with the research and development (R&D) of tools and methods to quantify coastal storm hazards, such as storm surge and waves, that are propagated by tropical and extratropical cyclones (TCs and XCs). Many large-scale regional studies, including the 2014 North Atlantic Coastal Comprehensive Study (NACCS) and the 2022 Coastal Hazards System – Louisiana (CHS-LA) have already been completed to quantify storm hazards at thousands of locations along the United States coastline and thereby inform local, state, and federal stakeholders of the risks posed by storms in any given year. More recently, ERDC has supported federal efforts to assist the Federal Emergency Management Agency's (FEMA's) Future of Flood Risk Data (FFRD) initiative, which among other tasks, worked to develop high resolution flood hazard maps which include scenarios of future sea level rise (SLR). The work proposed in this scope seeks to extend the CHS – Probabilistic Framework (CHS-PF), i.e., the statistical methodologies developed in the regional studies and the CHS-FFRD, to two ongoing efforts being accomplished by the CHL within ERDC. The two efforts are (1) the continuation of the development of the CHS – Rapid Prediction (CHS-RP) tool and (2) the quantification of storm hazards posed within the context of local Coastal Storm Risk Management (CSRM) Study. **b.** **Specific Tasks:** • CHS-RP - Modification of the storm ensemble generation within the CHS-RP PRPF to use a quasi-Monte Carlo (QMC)-based sampling scheme as defined by Kyprioti et al. 2021. - Validation of the revised PRPF by running CHS-RP with certain historical TC advisories from the NHC. Comparisons will be made between the water level hindcasts from CHS-RP to high water marks (HWMs) published by the National Oceanic and Atmospheric Administration (NOAA). - Incorporation of additional CHS-FFRD GPMs within CHS-RP that account for future climate scenarios of up to 2.26 meters of SLR. • CSRM - Exploration of statistical methods to synthesize the CHS-PF results of the regional studies with the hydrodynamic data from the simulations of the CSRM RSS. The current methodology utilizes the training of a delta GPM to account for the added structures with respect to the regional study data. Options for the methods include simple linear regression and cubic regression. - Computation and quality checking hazard curves for the CSRM study, using the various statistical methods in the synthetization process. Comparison of the results to those produced using the current delta-GPM approach. - Modification of the discrete storm weights (DSWs) of the TCs developed in the regional study so that the CSRM hazard curves may be computed directly from the original TC responses.
CHL-25-03	Business Administration, Economy, Project Management, Engineering Any Level	Coastal and Hydraulics Laboratory – Management Integration Office, Business Intelligence Group Vicksburg, MS In-Person	**a.** **ERDC Mission Area(s) & Support to ERDC Mission:** In FY25, the ERDC's Civil Works Research and Development Area will: • Require the implementation of the USACE Project Delivery Business Process (PDBP) across all Civil Works projects across the laboratories. The scope expands to developing Project Management Plans for all research activities before execution. • Prioritize a) the definition of the technology transfer plan in collaboration with sponsor(s) and stakeholder(s), and b) develop a methodology for measuring the return on investment (ROI) from implementing the future-developed technology into practice—both before executing the research. **b.** **Specific Tasks:** In support of ERDC Civil Works Research and Development Area's mission, the tasks will include: • Assist and support ERDC Civil Works Project Managers/Principal Investigators in the implementation of fundamental Project Management practices and innovative approaches to better execute life-cycle programmatic requirements like the development of scopes, schedules, and budget of research projects in adherence with USACE PDBP (https://www.publications.usace.army.mil/Portals/76/EM%205-1-11_Project%20Delivery%20Business%20Process_2024%2008%2030.pdf). • Develop innovative economic approaches to quantify the return on investment (ROI) from implementing specific technologies into practice. • Assist and support Project Managers to develop innovative approaches for developing technology transfer plans. • Assist and support the Management Integration Office on developing strategic initiatives for ensuring that all project milestones and deliverables are accurately reported into the USACE financial reporting systems.
CHL-25-04	Civil, Environmental, and Mechanical Engineering, Geology Any Level	Coastal and Hydraulics Laboratory – Navigation Division, Costal Engineering Branch Vicksburg, MS In-Person	**a.** **ERDC Mission Area(s) & Support to ERDC Mission:** The U.S. Army Corps of Engineers (USACE) invests $1B+ annually in dredging projects to maintain navigation channels and reservoir capacity. Dredging and placement practices have not significantly changed as the cost continues to rise in decades. Therefore, the ERDC was tasked to identify and develop innovative technology to reduce construction and operations costs of dredging projects and expand management options that benefit USACE. **b.** **Specific Tasks:** Leap-ahead dredging and sediment management solutions are required to dramatically reduce costs, increase channel/infrastructure reliability, and add significant economic, environmental, and social value. Thus, the ERDC was tasked to identify and develop innovative technology to reduce construction and operations costs of dredging projects and expand management options that benefit USACE missions. Summer Intern research tasks will include but not be limited to assisting Principal Investigator on: • Analyzing, and documenting data from the FY24 pilot projects • Analyzing and testing image processing techniques for the SandSnap initiative • Monitoring strategic nearshore placement projects for guidance development
CHL-25-05	Civil, Environmental, and Mechanical Engineering, Geology, Physics Any Level	Coastal and Hydraulics Laboratory – Flood & Storm Protection Division, River & Estuarine Engineering Branch Vicksburg, MS In-Person	**a.** **ERDC Mission Area(s) & Support to ERDC Mission:** Ongoing R&D investments aims to develop an Inland Hazards System (HIS) to account for compound flood (CF) hazards in the inland and the creation of a low flow/depth prediction for the nations waterways. This effort supports the U.S. Army Corps of Engineers' (USACE) priority to mitigate and adapt to climate change, resilient support communities, modernize our nation's infrastructure, and accelerate and revolutionize decision making. **b.** **Specific Tasks:** Knowledge gaps continue to exist in the risk based probabilistic analysis of events that contribute to compound floods (CF). CF occurs when two or more flood sources happen at the same time or shortly after each other. The creation of risk-based guidance has a direct reliance on the availability of long-term data to properly analyze and create probabilistic relationships between CF causing events. Nonetheless, substantial amount of these data can be generated synthetically with numerical models, if adequate resources are devoted. Today, the USACE has vast numerical modeling resources that are used to efficiently simulate CF events, yet these are not integrated. Summer Intern will assist Principal Investigator in the assessment of linkage techniques and locations of information hand-off, transition zones, between the hydrologic, hydraulic, estuarine and coastal numerical models to build the foundation for developing an Inland Hazards System (HIS) to account for CF hazards.
GSL-25-01	Mechanical Engineering BS	Geotechnical and Structures Laboratory - ESMD, Mobility Systems Branch Vicksburg, MS 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 of simulated diesel, electric, and hybrid powertrains • Perform verification and validation testing on simulated vehicles in Unreal Engine 5 • Support innovation in accurate real time tracked vehicle simulation
GSL-25-02	Civil Engineering MS, PhD	Geotechnical and Structures Laboratory – Geosciences and Structures Division – Survivability Engineering Branch Vicksburg, MS 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 particular 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. Protective structures shall comply with the latest structural codes to meet all environmental and dynamic load conditions. **b.** **Specific Tasks:** • The first task is to evaluate with Finite Element Analyses (FEAs) in ABAQUS CAE innovative protective structure concepts. The second task is to compare their performance for down selection of concepts. The third task is to develop recommendations for optimization of the down selected conceptual design. The tasks involve structural dynamic basic knowledge, understanding of explicit FEM setup, material models, data post processing and analysis.
GSL-25-03	Civil Engineering (graduating fall 2025 or Summer 2026 preferred) BS, MS	Geotechnical and Structures Laboratory – Engineering Systems and Materials Division – Impacts and Explosion Effects Branch Vicksburg, MS In-Person	**a.** **ERDC Mission Area(s) & Support to ERDC Mission:** The research will support ERDC's work to support development of fast running engineering tools to support warfighter operations. **b.** **Specific Tasks:** • The research will investigate the mitigation of blast overpressure from a detonation inside a building. An exploratory investigation into the variables found in existing data will inform development of an algorithm for predicting the free-field blast pressure from a detonation inside a building.

INVITATION: We invited you to participate of the **ERDC-UPRM 2025 Summer Research Internship Program (ERIP)** with the Engineer Research and Development Center (ERDC), US Army 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 students. During a ten-week period students will receive technical and scientific training at various ERDC National Laboratories. The student will be cover with stipends, 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.

TO APPLY VISIT: https://www.uprm.edu/erdc-erip/

ORIENTATIONS: Find upcoming orientations here:
https://shorturl.at/bznrg

CONTACT:
Prof. Ismael Pagán Trinidad, PI (ismael.pagan@upr.edu)
ERDC-ERIP (srip@uprm.edu)
Office 011-C, Civil Engineering Building Ext. 6744
Department of Civil Engineering and Surveying, UPRM

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 lower 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 (May 2025)
3. Upload online an updated resume
4. Upload transcripts (BS, MS, and PhD; an up-to-date student copy acceptable)
5. Select in the google form online all your preferred project by priority
6. Register in a three credit-hour course during the internship
7. Have authorization from your Graduate Advisor (just for graduate students)
8. Federal government background check required
9. Other requirements, qualifications and benefit will be discussed in the orientations
10. Participate of the orientation.

BENEFITS:

- Stipends based on federal government classification (**Approximately $21 –BS; $26 – MS/ME; $29.00/hour – PhD** depending on students merits)
- Enhance oral and written technical communication skills. (report writing, oral presentations)
- Air and ground transportation (cars will be shared)
- Tuition for 3 credit course (undergraduate research, graduate research, special problem)
- Sightseeing and cultural experiences
- Training and work experience
- Research and professional practice
- Access to the best research laboratories and ERDC computational resources

Scan the QR code below or visit
https://shorturl.at/lz8Lt
to apply today!

You may also copy, paste and open the links in a new tab in your browser