Opportunity Title: Machine Learning & Environmental Data Summer Internship
Opportunity Reference Code: ERDC-ITL-2023-0009

Organization U.S. Department of Defense (DOD)

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How to Apply Click on *Apply* now to start your application.

Description NIWC Pacific provides development, basic and applied science, test and evaluation, system engineering and integration, installation, and support of fielded Information Warfare systems from seabed to space. (Informally: NIWC provides the Navy with experts on software/cloud, sensors, signal analysis, data science, machine learning, and uncrewed vehicles).

Project: UUV Adaptive Sensing Leveraging Machine Learning and Environmental Data

The operational relevance is that Current UUV operations are 'flying blind', executing planned transects, maneuvers, and sensing regardless of environmental conditions. The goal is to predict UUV performance and data quality before and during missions to ultimately speed UUV operational timelines and reduce costs, and to potentially improve accuracy. The MK-18 UUV is outfitted with active sonar and is deployed to detect mine-like objects on the seabed, and will be used to validate our intuition regarding the utility of environmental data.

What will I be doing?

You will investigate one or both of the following research questions. The first hypothesis to test is "Can using environmental metadata from other instruments produce more accurate machine learning classification of the plankton images?". This hypotheses requires the following experimental setup: A control result where networks are trained using conventional best practices, and a treatment where networks are trained using the described experimental methods, and then the results are compared. This will require using a standard deep learning library (we are currently using pytorch), but writing/using custom data loaders and neural network layers. The second research question is "Does the density and type of 'marine snow' and suspended sediment impact data quality &/or algorithm performance?". The UVP-6 collects images of marine snow and sediment, but in most applications, this data is discarded by the biological oceanographer who is only interested in analyzing living ecosystem participants. Machine Learning will be used to classify particles as plankton vs. marine snow, and traditional image processing techniques, such as segmentation, will be used to further quantify the size and potentially orientation of the particles.

Under the guidance of a mentor, you will gain familiarity with the instrumentation used. Read about the CTD, Transmissometer, Flourometer, and UVP-6 (plankton camera), obtain familiarity with the datasets (e.g. review images/labels), obtain familiarity with pytorch on well-known data sets, create an outline of novel code required to conduct the assessments, write a custom code and validate code by using small subsets of the data and tiny networks, analyze initial results (e.g. write scripts, create figures), create additional trials/replicates, and draft and finalize research presentation (including updating any figures/percentages).

Why should I apply?

This fellowship provides the opportunity to independently utilize your skills and engage with experts in innovative ideas to move the proposed research forward.

Where will I be located? San Diego, California

What is the anticipated start date? June 2023

Exact start dates will be determined at the time of selection and in coordination with the selected

candidate.

What is the appointment length?

This appointment is a ten week summer research appointment. Appointments may be extended depending on funding availability, project assignment, program rules, and availability of the participant.

What are the benefits?

You will receive a stipend to be determined by the sponsor. Stipends are typically based on a participant's academic standing, discipline, experience, and research facility location. Other benefits may include the following:

- Health Insurance Supplement (*Participants are eligible to purchase health insurance through ORISE)*
- Relocation Allowance
- Training and Travel Allowance

About ORISE

This program, administered by Oak Ridge Associated Universities (ORAU) through its contract with the U.S. Department of Energy (DOE) to manage the Oak Ridge Institute for Science and Education (ORISE), was established through an interagency agreement between DOE and DoD. Participants do not enter into an employee/employer relationship with ORISE, ORAU, DoD or any other office or agency. Instead, you will be affiliated with ORISE for the administration of the appointment through the ORISE appointment letter and Terms of Appointment. Proof of health insurance is required for participation in this program. Health insurance can be obtained through ORISE. For more information, visit the ORISE Research Participation Program at the U.S. Department of Defense.

Qualifications

Experience and a high level of skill with Python is essential. A moderate familiarity with Unix environment is required. Previous machine learning experience, such as an undergraduate course, would be preferred but not required. An interest in physical science/oceanography would be preferred but not required. Experience with a relational database may be helpful, but is not required. Experience with virtualization, such as docker containers, may be helpful, but is not required.

Security Investigation: Applicants should be able to pass a National Agency Check and Inquiries (NACI) security investigation should they be selected and accept the internship offer.

Application Requirements

A complete application consists of:

- Zintellect Profile
- Educational and Employment History
- Essay Questions (goals, experiences, and skills relevant to the opportunity)
- Resume (PDF)
- Transcripts/Academic Records - For this opportunity, an official transcript or copy of the student academic records printed by the applicant or by academic advisors from internal institution systems may be submitted. Click here for detailed information about acceptable transcripts.
- One recommendation. Your application will be considered incomplete and will not be reviewed

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until one recommendation is submitted. We encourage you to contact your recommender(s) as soon as you start your application to ensure they are able to complete the recommendation form and to let them know to expect a message from Zintellect. Recommenders will be asked to rate your scientific capabilities, personal characteristics, and describe how they know you. You can always log back in to your Zintellect account and check the status of your application.

If you have questions, send an email to USACE@orise.orau.gov. Please list the reference code of this opportunity in the subject line of the email. Please understand that ORISE does not review applications or select applicants; selections are made by the sponsoring agency identified on this opportunity. All application materials should be submitted via the “Apply” button at the bottom of this opportunity listing. Please do not send application materials to the email address above.

Connect with ORISE...on the GO! Download the new ORISE GO mobile app in the Apple App Store or Google Play Store to help you stay engaged, connected, and informed during your ORISE experience and beyond!

Eligibility Requirements

- **Citizenship:** U.S. Citizen Only
- **Degree:** Bachelor's Degree, Master's Degree, or Doctoral Degree received within the last 60 months or currently pursuing.
- **Overall GPA:** 3.00
- **Discipline(s):**
  - **Chemistry and Materials Sciences** (12 👁)
  - **Computer, Information, and Data Sciences** (17 👁)
  - **Earth and Geosciences** (21 👁)
  - **Engineering** (27 👁)
  - **Environmental and Marine Sciences** (14 👁)
  - **Mathematics and Statistics** (11 👁)
  - **Physics** (16 👁)
- **Age:** Must be 18 years of age
- **Veteran Status:** Veterans Preference, degree received within the last 120 month(s).