Opportunity Title: EPA Research Opportunity in Software Engineering and Artificial Intelligence (Systematic Review)
Opportunity Reference Code: EPA-ORD-CPHEA-HEEAD-2024-02

Organization U.S. Environmental Protection Agency (EPA)

Reference Code EPA-ORD-CPHEA-HEEAD-2024-02

How to Apply ***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!

A complete application consists of:

- An application
- Transcript(s) – For this opportunity, an unofficial transcript or copy of the student academic records printed by the applicant or by academic advisors from internal institution systems may be submitted. All transcripts must be in English or include an official English translation. Click here for detailed information about acceptable transcripts.
- A current resume/CV, including academic history, employment history, relevant experiences, and publication list
- Two educational or professional recommendations. Click here for detailed information about recommendations.

All documents must be in English or include an official English translation.

Application Deadline 4/25/2025 3:00:00 PM Eastern Time Zone

Description ***Applications may be reviewed on a rolling-basis and this posting could close before the deadline.** Click **here** for information about the selection process.

EPA Office/Lab and Location: A research opportunity is available at the U.S. Environmental Protection Agency (EPA), Office of Research and Development (ORD), Center for Public Health and Environmental Assessment (CPHEA), Health and Environmental Effects Assessment Division (HEEAD) located in Research Triangle Park, North Carolina. If selected for the opportunity, the participant will need to relocate to the appropriate EPA facility. The relocation costs are not reimbursable. The opportunity is not 100% remote, but limited remote participation may be considered at the mentor's discretion.

HEEAD is responsible for maintaining a suite of software application systems (HERO, HAWC, BMDS) which are used by scientists to generate scientific assessments related to the health effects of chemicals and pollutants. These assessments typically require reviewing tens to hundreds of thousands of scientific literature and carefully curating the strengths, limitations, and underlying data, broadly applying techniques and approaches from the field of systematic review. Due to the large scale of these assessment and regulatory requirements for products, software applications are an essential component of conducting these assessments and tracking the data and decisions made.

Research Project: The participant will have the opportunity to be part of a team of software developers, data scientists, and systematic review scientists who are responsible for developing new features and functionalities into new and existing software applications. Under the guidance of a mentor, the participant will interact with a team of scientists to develop requirements to support data analysis methods and systematic

review workflows and implement these methods into software applications. This opportunity involves extensive collaboration EPA scientists who are subject matter experts, as well other partners to implement novel statistical or data visualization methods for systematic review and data analysis.

This opportunity is suited for someone with interests in the following fields: software application development, data science, biological health sciences, and the intersection of these domains.

Under the guidance of a mentor, the research participant may be engaged in one or more of the following research activities:

- Developing and/or evaluating artificial intelligence (AI), large language models (LLM), natural language processing (NLP), and related machine learning (ML) methods for efficient literature searching, screening, and data extraction from literature.
- Designing, architecting, and implementing software applications to support systematic review and data analysis workflows, in collaboration with the needs of our research scientists.
- Applying systematic review methods for scientific assessments, including development and application of literature search and screening strategies, study evaluation, data extraction, data visualization, dose response analysis, meta-analysis, and other techniques to synthesizing health effects evidence within and across lines of evidence.
- Collaborating with existing software and data analysis teams to integrate novel analyses, methodologies, and visualizations into existing systems.
- Investigating and implementing data analysis pipelines, dashboards, and visualizations for systematic reviews and AI model evaluation.
- Synthesizing and communicating various kinds of scientific information in scientific assessments.

Learning Objectives: The research participant will have the opportunity to learn software engineering principles and will become proficient in implementing, releasing, and supporting production-grade software applications as they are used by EPA scientists. They will also have the opportunity to learn approaches for the evaluation, analysis, and integration of scientific evidence on the health effects of environmental pollutant exposures that inform EPA's scientific assessments and be involved in a variety of projects that can include qualitative or quantitative analyses of study findings and data. The research participant will gain understanding of how scientific evidence is integrated to create policy-relevant assessments and how those assessments ultimately inform EPA's decision-making processes.

Mentor(s): The mentor for this opportunity is Andy Shapiro (shapiro.andy@epa.gov). If you have questions about the nature of the research, please contact the mentor.

Anticipated Appointment Start Date: Winter/Spring 2025. All start dates are flexible and vary depending on numerous factors. Click **here** for detailed information about start dates.

Appointment Length: The appointment will initially be for one year and may be renewed up to three or four additional years upon EPA recommendation and subject to availability of funding.

Level of Participation: The appointment is full-time.

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Participant Stipend: The participant will receive a monthly stipend commensurate with educational level and experience. Click here for detailed information about full-time stipends.

EPA Security Clearance: Completion of a successful background investigation by the Office of Personnel Management (OPM) is required for an applicant to be on-boarded at EPA.

ORISE Information: This program, administered by 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 EPA. Participants do not become employees of EPA, DOE or the program administrator, and there are no employment-related benefits. Proof of health insurance is required for participation in this program. Health insurance can be obtained through ORISE.

ORISE offers all ORISE EPA graduate students and Postdocs a free 5 year membership to the National Postdoctoral Association (NPA).

The successful applicant(s) will be required to comply with Environmental, Safety and Health (ES&H) requirements of the hosting facility, including but not limited to, COVID-19 requirements (e.g. facial covering, physical distancing, testing, vaccination).

Questions: Please see the FAQ section of our website. After reading, if you have additional questions about the application process please email ORISE.EPA.ORD@orau.org and include the reference code for this opportunity.

Qualifications

The qualified candidate should have received a bachelor's degree in one of the relevant fields or be currently pursuing. Degree must have been received within five years of the appointment start date.

Preferred skills/experience:

- Interest in developing and applying machine learning methods to peer-reviewed scientific literature (classic machine learning methods, large language models, retrieval augmented generation).
- Experience with computer programming, including with one or more of the following languages: Python, JavaScript, R, Java, SQL.
- A working knowledge of relational databases (PostgreSQL, sqlite).
- Experience with software version control (Git).
- Strong written, oral and electronic communication skills.
- Possesses the skills for data analysis, visualization, critical thinking, and problem solving.
- Strong networking and communication skills with a broad range of peers, awareness of strategic relationships, and adaptability to collaborate with diverse groups of people.

Point of Contact Debi

Eligibility

- **Citizenship:** U.S. Citizen Only

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Requirements

- **Degree:** Bachelor's Degree received within the last 60 months or currently pursuing.
- **Discipline(s):**
  - **Chemistry and Materials Sciences** (12 👁)
  - **Computer, Information, and Data Sciences** (17 👁)
  - **Earth and Geosciences** (21 👁)
  - **Engineering** (27 👁)
  - **Environmental and Marine Sciences** (14 👁)
  - **Life Health and Medical Sciences** (51 👁)
  - **Mathematics and Statistics** (11 👁)
  - **Other Non-Science & Engineering** (2 👁)
  - **Physics** (16 👁)
  - **Social and Behavioral Sciences** (1 👁)