

PREP Research Associate

This position is part of the National Institute of Standards and Technology (NIST) Professional Research Experience Program (PREP). NIST recognizes that its research staff may want to collaborate with researchers at academic institutions on specific projects of mutual interest and, therefore, requires those institutions to be recipients of a PREP award. The PREP program involves staff from a wide range of backgrounds conducting scientific research across various fields. Individuals in this position will perform technical work supporting the collaboration's scientific research.

Research Title:

Independent Evaluation of AI Decision-Making for Automated Vehicles

The work will entail:

The Measurement Science for Automated Vehicles (MSAV) project at NIST is seeking a candidate to support its effort on independent evaluation of AI-enabled decision-making in automated driving systems. This effort develops a measurement science framework and an open-source toolkit that evaluate ADS decision quality as a black box, across four progressive tiers (real-time safety monitoring, predictive outcome analysis, decision comparison against reference baselines, and systematic weakness diagnosis), without access to proprietary algorithms. The candidate will focus on two core areas: 1) simulation engineering for scenario-based ADS testing in CARLA and 2) software integration for the open-source evaluation toolkit and Evaluation Gateway.

U.S. Citizen Preferred

Key responsibilities will include but are not limited to:

- **Simulation Engineering**
 - Manage the CARLA simulation infrastructure and build the scenario execution pipeline that runs OpenSCENARIO 2.0 test cases.
 - Configure multi-agent traffic behavior using layered modeling (scripted, reactive car-following models such as IDM and MOBIL, stochastic, and learned agents) for large-scale evaluation runs.
 - Integrate hardware-in-the-loop testing and optimize performance for large-scale multi-agent test runs.
 - Support integration of open-source automated driving stacks (for example, Autoware) to test against diverse architectures.
- **Software Integration**
 - Develop the open-source evaluation toolkit and design the Evaluation Gateway API and standardized interfaces.
 - Implement the standardized behavioral data logging schema that defines the observable ADS output required for interoperable evaluation.
 - Build the containerized deployment pipeline (for example, Docker) and the Cryptographic Hashing Message Schema enabling any ADS to connect as a black-box client without exposing source code, model weights, or training data.
 - Produce automated reporting templates and technical documentation supporting reproducible, auditable evaluation.

Qualifications

- MS required (PhD preferred) in Computer Science, Robotics, AI/Machine Learning, or related engineering fields.
- Strong programming experience in Python and C++.
- Experience with autonomous vehicle simulation environments (CARLA, SUMO, or similar) and scenario description languages (OpenSCENARIO).
- Experience building software toolkits, APIs, and standardized interfaces; familiarity with containerized deployment (Docker).
- Knowledge of autonomous vehicle systems architecture and behavioral planning concepts.
- Experience with ROS 2 on Linux systems.
- Experience with version control software and workflow (Git/GitHub/GitLab).
- Familiarity with data modeling, schema design, and validation methodologies.

Privacy Act Statement

Authority: 15 U.S.C. § 278g-1(e)(1) and (e)(3) and 15 U.S.C. § 272(b) and (c)

Purpose: The National Institute for Standards and Technology (NIST) hosts the [Professional Research Experience Program \(PREP\)](#) which is designed to provide valuable laboratory experience and financial assistance to undergraduates, post-bachelor's degree holders, graduate students, master's degree holders, postdocs, and faculty.

PREP is a 5-year cooperative agreement between NIST laboratories and participating PREP Universities to establish a collaborative research relationship between NIST and U.S. institutions of higher education in the following disciplines including (but may not be limited to) biochemistry, biological sciences, chemistry, computer science, engineering, electronics, materials science, mathematics, nanoscale science, neutron science, physical science, physics, and statistics. This collection of information is needed to facilitate administrative functions of the PREP Program.

Routine Uses: NIST will use the information collected to perform the requisite reviews of the applications to determine eligibility, and to meet programmatic requirements. Disclosure of this information is also subject to all the published routine uses as identified in the Privacy Act System of Records Notices: NIST-1: NIST Associates.

Disclosure: Furnishing this information is voluntary. When you submit the form, you are indicating your voluntary consent for NIST to use of the information you submit for the purpose stated.