

## 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:

Measurement Science for AI Decision-Making in Automated Driving Systems

### The work will entail:

The Measurement Science for Automated Vehicles project at NIST is seeking a candidate to support measurement science research for AI decision-making in automated vehicles. The position requires multidisciplinary skills spanning building evaluation infrastructure including simulation environments, an Evaluation Gateway for interfacing with automated driving stacks, and a Measurement System for computing behavioral planning metrics. The candidate will follow guidance from the project leaders.

### U.S. Citizen Preferred

### Key responsibilities will include but are not limited to:

- **Scenario Database Development**
  - Build and curate a database of behavioral planning test scenarios sourced from Safety Pool™ and other relevant datasets
  - Develop scenario classification and tagging systems to support systematic evaluation of behavioral competencies (e.g., lane changes, merges, yielding, intersection navigation)
  - Implement tools for scenario selection, parameterization, and configuration for use in simulation-based testing
  - Create methods for generating scenario variants to ensure comprehensive coverage of edge cases and challenging traffic situations
- **Measurement Science**
  - Implement Tier 1 real-time monitoring of surrogate safety metrics (e.g., Time-to-Collision, Post-Encroachment Time) from vehicle actions during each scenario
  - Develop Tier 2 outcome prediction methods that use Tier 1 data to predict likely outcomes through forward simulation during scenarios
  - Implement Tier 3 decision quality assessment by comparing selected actions against NIST-defined optimal baselines computed through counterfactual simulation
  - Design and build the metric computation pipeline integrating with the NIST evaluation server architecture, CARLA simulation environment, and the physical research vehicle
  - Conduct experiments to validate that simulation-derived metrics are meaningful on physical systems and analyze results against expert evaluations

### Qualifications

- MS or (BS + 2 years of experience) in Computer Science, Robotics, AI/Machine Learning, or related engineering fields

- Strong programming experience in Python and C++, with familiarity with AI/ML frameworks (TensorFlow, PyTorch, etc.)
- Experience with autonomous vehicle simulation environments (CARLA, SUMO, or similar)
- 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)
- Understanding of data modeling principles and validation methodologies
- Familiarity with database design and management for storing and querying structured scenario data
- Knowledge of scenario-based testing methodologies for autonomous vehicles
- Experience with computer vision and sensor fusion techniques

### **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.