

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:

Readout/Adaptive Control for NV-Diamond Vector Magnetometry

The work will entail:

The Information Technology Laboratory at the National Institute of Standards and Technology (NIST) is seeking a highly motivated postdoctoral researcher to help build a deployable, calibration-free, SI-traceable vector magnetometer based on diamond nitrogen-vacancy (NV) centers—technology with the potential to enable secure, GPS-free navigation when GPS is degraded, denied, or unavailable. This is a chance to work at NIST, where the mission is to deliver world-leading measurement science and standards with direct national and economic impact, and to do so in a highly collaborative, well-resourced research environment. This project sits at the intersection of quantum sensing, real-time control, and data-driven inference. The postdoc will lead efforts on parallelized readout and real-time adaptive control for high-sensitivity measurement of 3D magnetic fields and temperature—capabilities needed to push magnetic navigation beyond today's ~km-scale uncertainty toward practical, robust performance. This position is ideal for someone excited to translate cutting-edge quantum sensing into a field-ready instrument, while contributing to NIST's broader effort to make next-generation navigation and timing technologies more trustworthy, secure, and SI-linked.

U.S. Citizen Preferred

Key responsibilities will include but are not limited to:

- Developing and implementing real-time, parallel readout schemes for vector magnetometry and thermometry using diamond NV centers
- Designing and deploying adaptive measurement and control algorithms (e.g., Bayesian/adaptive protocols) to improve sensitivity and measurement efficiency
- Building and validating numerical simulations of adaptive sensing strategies, including performance vs. computational-cost tradeoffs
- Integrating adaptive algorithms with experimental hardware for multi-channel, real-time device control and readout

Qualifications

- Ph.D. in physics, computer science, or related field,
- Relevant work experience with machine learning (PyTorch) or physics and programming in Python,
- Excellent communication skills, both oral and written,
- Experience with quantum sensing/NV centers, Ramsey/ODMR control

- Experience with real-time experiment automation, estimation/inference (Bayesian/optimal design)
- Adaptive sensing, signal processing, and performance-driven algorithm–hardware co-design
- Curious mindset with a strong interest in the project.

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.