PREP/Contract 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.

The selected applicant will join a team of engineers and researchers at the NIST Communications Technology Laboratory (CTL), contributing to the development and dissemination of wireless communications measurement methods, models and datasets to evaluate and benchmark NextG/6G wireless communication and sensing systems. The work targets both rigorous scientific contribution and broad real-world impact, with deliverables intended for public release and adoption by the research and commercial wireless communities.

Research Title:

Wireless Modeling and Performance Evaluation for 6G/NextG, Integrated Sensing and Communications

U.S. Citizen Preferred

Key Responsibilities

Key responsibilities will include but are not limited to:

- Design, implement, and maintain models and software tools that accurately characterize the behavior and functionalities in 5G and 6G wireless communication and sensing systems, targeting public release through platforms such as GitHub.
- Develop simulation and algorithm evaluation frameworks for integrated sensing and communications (ISAC) functionalities, including waveform design, signal detection, channel estimation, and performance benchmarking under realistic propagation conditions.
- Implement and evaluate signal processing algorithms for sensing and communication functions, including range-Doppler processing, beamforming, MIMO precoding, and interference mitigation, with results documented for reproducibility.
- Apply AI/ML techniques — including deep learning-based channel modeling, neural network-aided detection, and data-driven performance prediction — to extend the capabilities of the physical layer simulation platform.
- Contribute software documentation, usage examples, and technical tutorials to support adoption of NIST tools by the wireless research community.
- Publish research results in peer-reviewed journals and conferences; present work at relevant venues including IEEE and standards-oriented workshops.
- Work independently and as part of a multidisciplinary research team to support the mission of the Communications Technology Laboratory at NIST.

Qualifications

Master's degree in Electrical Engineering, Communications Engineering, or a closely related field, OR a Bachelor's degree with significant demonstrated research experience in wireless

physical layer systems. Candidates with a track record of releasing high-quality, publicly adopted research software are strongly preferred.

Required knowledge and skills:

- Strong proficiency in MATLAB, including object-oriented design, toolbox development, and numerical simulation of communication systems; experience with version-controlled, publicly released MATLAB codebases is highly desirable.
- Deep understanding of wireless physical layer principles, including waveform design (OFDM, FMCW), MIMO systems, channel estimation, equalization, and link-level performance evaluation.
- Knowledge of 5G NR physical layer standards (3GPP) and familiarity with emerging 6G/NextG system concepts, particularly ISAC waveforms and sensing signal processing.
- Proficiency in signal processing for wireless sensing, including range-Doppler processing, angle estimation, and target detection under clutter.
- Experience with RF propagation modeling — statistical, ray-tracing, or AI/ML-based — and the ability to integrate measured channel data into simulation frameworks.
- Python proficiency for data processing, pipeline automation, and AI/ML model development; experience with PyTorch or TensorFlow is an asset.
- Demonstrated ability to produce well-documented, reproducible research code suitable for public dissemination and community adoption.
- Ability to define research problems, design and execute evaluation experiments, interpret results with appropriate statistical rigor, and communicate findings in publications and technical reports.
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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 not 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 the information you submit for the purpose stated.