

## **PREP Research Associate**

This position is part of the National Institute of Standards (NIST) Professional Research Experience (PREP) program. NIST recognizes that its research staff may wish to collaborate with researchers at academic institutions on specific projects of mutual interest, thus requires that such institutions must be the recipient of a PREP award. The PREP program requires staff from a wide range of backgrounds to work on scientific research in many areas. Employees in this position will perform technical work that underpins the scientific research of the collaboration.

**Research Title:** Robotic Grasping and Manipulation Researcher

**The work will entail:**

NIST is investigating the performance of commercial and custom AI systems (hardware and software) for advanced robotic grasping and manipulation systems, with a focus on grasp path planning and graspability analysis for improved autonomy. The work will involve implementing tactile sensing and developing control strategies for dextrous, multi-finger hands, alongside research into bi-manual manipulation techniques, to conduct experiments that evaluate the efficiency and adaptability of robotic systems in complex environments.

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

- Evaluate and benchmark commercial and custom AI systems (hardware and software) to advance autonomous robotic grasping and manipulation capabilities.
- Research and develop algorithms for grasp path planning and graspability analysis to improve decision-making and autonomy in unstructured environments.
- Integrate tactile sensors into robotic fingertips/end-effectors and develop signal processing, data analysis, and force-control strategies to achieve finger force sensitivity.
- Design and implement control strategies for high-degree-of-freedom, dextrous multi-finger hands and coordinate bi-manual manipulation techniques for dual-arm systems.
- Conduct rig-based and simulation-based experiments to test, evaluate, and benchmark system efficiency, adaptability, and performance in complex manufacturing or assembly environments.
- Write technical reports, contribute to peer-reviewed publications, and deliver weekly presentations to showcase project milestones and research progress.
- Work Schedule: On-campus (Gaithersburg, MD), Full-Time (40 hrs / week)

**Qualifications**

- US Citizen Preferred

- Education: Engineering / Computer Science majors with Master's Degree or Ph.D, or in the final year of degree (e.g., Computer Science, Robotics, Mechanical Engineering or similar)
- Strong technical background in robotic manipulation, kinematics, grasp path planning, and bi-manual control strategies.
- Practical experience with multi-finger, high-dexterity robotic hands and end-effectors.
- Knowledge of tactile sensing principles, sensor integration, signal processing, and force-feedback control.
- Experience with computer vision and sensor fusion for 2D/3D grasp pose estimation and graspability analysis.
- Strong programming proficiency in Python and C++.
- Hands-on experience with ROS / ROS 2 and motion planning toolkits (e.g., MoveIt).
- Familiarity with AI/ML frameworks (e.g., PyTorch, TensorFlow) for learning-based grasping and force sensing strategies.
- Experience with robotics simulation platforms and physics engines (e.g., NVIDIA IsaacSim, Gazebo, MuJoCo, Drake).
- Experience with version control tools (Git, GitHub, GitLab, Bitbucket).
- Experience working on Linux/Unix operating systems.
- Working knowledge of CAD software (e.g., SolidWorks, OnShape) for test fixture or end-effector integration.

## 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.