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: Low-Damage Rocking Structures

U.S. Citizen Preferred

Description of Work:

A structural engineering researcher is being sought to support a project investigating the seismic performance of low-damage structural systems. Despite progress made in the development of building codes to protect lives, communities continue to face costly and sometimes lengthy recoveries following major earthquakes. Interest in designing structures to achieve post-earthquake functionality has created the opportunity for innovative approaches to be brought into the mainstream of building design.

Rocking structural systems are designed to allow all or a portion of the seismic force-resisting system to uplift or rock, providing a form of "isolation" from the earthquake motion thus minimizing damage. Over the past several decades, the feasibility of rocking systems has been demonstrated through peer-reviewed research and implementation in buildings and bridges. Particularly, recently constructed buildings have demonstrated that rocking systems can provide cost-effective solutions to help meet recovery-based design objectives (e.g., functional recovery).

The successful candidate will conduct research evaluating the performance benefits of rocking structural systems in comparison to conventional systems. This work is intended to help advance the understanding of low damage rocking systems and provide new comprehensive guidelines for practicing engineers. Additionally, the researcher will investigate the influence of ground motion selection and scaling procedures and identify ground motion parameters that most affect rocking behavior. This work will contribute to current NIST research projects and will be synergistic with ongoing NIST collaborations with external researchers and practitioners.

Key responsibilities:

- Conduct parametric studies of rocking and conventional buildings to understand the most influential ground motion characteristics on a variety of engineering demand parameters
- Develop nonlinear structural models and conduct evaluations of conventional and low-damage systems
- Develop design guidelines for low-damage structural systems to promote wider use
- Develop and test new low-damage technologies that focus on implementation

- Develop a structural component database, utilizing past experimental testing expertise and programming expertise.
- Evaluate the cost-benefits of rocking systems over a range of seismic hazards and building types.

Qualifications

- U.S. Citizenship is preferred
- A Ph.D. in Civil Engineering or Structural Engineering, with a focus on Earthquake Engineering
- Extensive experience in nonlinear modeling using OpenSees
- Expertise in programming in python, MATLAB, and tcl.
- Familiarity with performance-based seismic design
- Expertise in rocking structural systems and low-damage structural systems, including past publications demonstrating modeling ability
- Experience in large scale structural testing, component testing, and shake table testing.
- Strong oral and written communication skills.

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.