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: Nonstructural Element Consequence Modeling

U.S. Citizen Preferred

The work will entail:
A part-time senior researcher is sought for a position in Construction Engineering and Cost Modeling to support the development and implementation of a new nonstructural component fragility and consequence database for performance-based hazard assessments of buildings. NIST has recently developed a relational database focusing on nonstructural elements in buildings, NED (Nonstructural Element Database), which collects information from experimental, analytical, and historic performance observations into seismic fragilities and consequence models to support building-specific seismic performance research and assessments, refactoring and expanding upon the FEMA P-58 database as the standard of practice for seismic risk assessment. Currently, the project is still in its active development and does not yet have consequence models or data from historical events, but it has collected over 2500 experimental data points and compiled a fragility data set that includes and expands upon the full FEMA P-58 nonstructural database. NIST will supplement its capacities with input from PREP Fellow experts in the areas of component damage consequence modeling, repair cost estimation, and construction sequencing. The PREP Fellow will work with NIST researchers to develop and implement a new consequence model data schema and consequence estimation procedures within the NED database. The work, to be completed in collaboration with NIST researchers and other external contractors, will be comprised of the following five major tasks: (1) review, refactoring and forward developing of the current database architecture and data schema, (2) development of a general consequence model database architecture and schema, and (3) implementation of new consequence models into the database, (4) back-end and front-end software development, and (5) documentation of developments and tools and dissemination in technical reports and professional conferences.

Key responsibilities will include but are not limited to:

- Review the current design and data schema of the NED database, paying specific attention to missing data representations, duplicity in data design, points of unclarity, and capability to scale with new data and meet future use cases.
- Conceptualize and design a robust and scalable repair cost and repair time model for integration into the NED architecture.
- Work closely with NIST researchers and external collaborators to iterate and improve upon the database design as well as support the implementation of the database.
- Contributing to the publication of a NIST report and data repository documenting the database.

Qualifications

- U.S. citizenship is preferred.
- More than 15 years of experience in professional cost estimation and cost modeling the construction industry.
- A strong background in engineering, natural hazards, and probabilistic risk assessment including uncertainty quantification.
- Experience in the development, application, and implementation of the FEMA P-58 performance-based assessment framework and associated fragility database.
- Proven and documented experience in developing component level repair costs and repair time models for seismic damage.
- The ability to work both independently and as part of a larger, multi-disciplinary team to achieve project objectives and meet project deadlines and reporting requirements.

Please upload the following with your application:

- Curriculum vitae

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.