A 24-month open position for postdoctoral fellows at IFSTTAR

Tasks & Expectations

The EMGCU (Urban and Civil Engineering Testing and Modeling Laboratory) laboratory at IFSTTAR in Champs-sur-Marne France is looking for a postdoctoral fellow to take part in the European Project PANOPTIS (www.panoptis.eu). This research project aims to improve transportation infrastructure resilience by combining risk based methods with novel measures such as downscaled climate change scenarios (applied to road infrastructures) simulation tools (structural/geotechnical) and actual data (from existing and novel sensors). More precisely, the aim is to develop a decision support system based on combined use of terrestrial and airborne sensors and advanced modeling tools for networks under unfavorable conditions (extreme weather, landslides, and earthquakes). Two real case studies in Spain and in Greece are considered to illustrate the proposed concepts.

A first part of the work will be to participate to an in-depth analysis of the elementary assets for the network system that will be performed applying a hierarchical classification. The objective is to identify which links and nodes of the network are crucial to its performance as a whole. The following elements will be determined: direct assets, auxiliary assets, flow of people, goods and services, input/output, accessibility and capacity. Additionally, the identification of interconnections and interdependencies will be identified depending on the type: physical, systems, geographical, logical. Modeling with complex network tools will then be carried out

A second step of the work will be to develop a risk-based decision support framework including resilience concepts (anticipation, absorption, coping, restoration and adaptation). The threats identified in the first step will be used with complex network tools to develop a method for assessing the vulnerability and criticality of the transport infrastructure network. Different alternative approaches will be investigated by fusing the knowledge generated in the holistic risk and impact assessment. The focus will be on the development of a rapid-response framework (i.e. a component of the decision support tool) that will be based on measured data immediately after the event, and will issue inspection prioritization protocols to facilitate the rapid assessment of the state of road infrastructures along a distributed network. Existing SHM data with new types of sensor-generated data will be combined to feed the decision support model. UAV- and satellite-based observations will be used with robust spectral analysis, computer vision and machine learning-based damage diagnostic for diverse transport infrastructures.

The institute

IFSTTAR is a major player in the European research on the city and the territories planning, transportation and civil engineering. The French Institute of Science and Technology for Transport, Development and Networks is a Public Institution of a Scientific and Technical Nature, under the joint supervision of the ministry of ecology, sustainable development and energy and the ministry of higher education and research.

IFSTTAR's role is to carry out and commission, direct, lead and appraise research, development and innovation in the areas of urban engineering, civil engineering, and construction materials, natural hazards, the transportation of persons and goods, systems and means of transport and their safety, infrastructure, and investigate their uses and impacts from the technical, economic, social, health, energy, environmental and human points of view.

Location

Ifsttar / Materials and Structures Department / EMGCU laboratory, 14-20 Boulevard Newton, Cité Descartes, 77447 Marne-la-Vallée Cedex 2, France.

Job Profile and Qualifications

- PhD graduate should have a technical background with experience in the field of structures and systems, risk management and decision support. They are expected to be fluent in English. It would be preferable for them to have knowledge of French (reading and speaking);
- knowledge in complex systems, networks and graph science will be appreciated;
- Successful publication track record with at least one first-author paper in a peer-reviewed journal;
- Critical, creative, interdisciplinary and proactive mindset;
- Team player with strong communication skills.

Selection process

Document screening and interview.

Contact

Please send your curriculum vitae, a brief description of research interests and career goals, and contact information for three references conjointly (same email, three recipients) to Dr. Christophe Chevalier (christophe.chevalier@ifsttar.fr), Dr. André Orcesi (andre.orcesi@ifsttar.fr) and Dr Franziska Schmidt (Franziska.schmidt@ifsttar.fr).