CIVIL AND ENVIRONMENTAL ENGINEERING

DISEG - Improving the resilience of large scale communities using innovative structural health monitoring solutions

Funded By	Dipartimento DISEG

Supervisor	CIMELLARO GIAN PAOLO - gianpaolo.cimellaro@polito.it

Contact	CARDONI ALESSANDRO - alessandro.cardoni@polito.it

Context of the research activity	Governments and local authorities must conduct resilience analyses to assess the level of safety of their communities against natural and manmade hazards. For large-scale resilience simulations, meticulous input data is of paramount importance, as it enables the rigorous testing of various emergency scenarios. Structural Health Monitoring (SHM) can plays a pivotal role in resilience by providing real-time data about the actual condition of structures and infrastructures. The objective of this research activity is to develop methodologies and technical solutions for monitoring and enhancing the resilience of communities. It primarily focuses on establishing inspection programs for structures and infrastructure, incorporating real-time, remotely operated, and automated SHM monitoring systems. Additionally, innovative tools will be used to evaluate the local and global fragilities of structures caused by aging, degradation, events, and other natural and anthropic susceptibility factors. The acquired data will be embedded in large scale FE models for the resilience simulations.

Objectives	The objectives of the research activity, to be carried out by the PhD student, are the following: • Development of new monitoring tools to be implemented on civil infrastructures; such strategies should be based on innovative tools such as UAVs. • Development of new data analysis techniques for the detection of potential degradation and damage in the monitored system. • Development of strategies that allow the integration of the pieces of information derived from monitoring systems into the large-scale models used to assess the resilience of the community.

Skills and competencies for the development of	Experience in coding with MATLAB and Python. Good knowledge of Operational Modal Analysis techniques. Skilled in Finite Element software including ANSYS, etc. Strong problem solving technique.

| **the activity** | Background in ML algorithms. |