Polytech network form for PhD Research Grants from the China Scholarship Council

This document describes the PhD subject and supervisor proposed by the French Polytech network of 14 university engineering schools. Please contact the PhD supervisor by email or Skype for further information regarding your application.

Supervisor information	
Family name	SANTISI D'AVILA
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Lab name	Laboratoire Jean Alexandre Dieudonné
Lab web site	https://math.unice.fr/
Polytech name	Polytech Nice – Safe and Smart Building Departement
University name	Université Côte d'Azur
Country	France

PhD information	
Title	Estimation of building structure safety using motion records
Main topics regards to CSC list (3 topics at maximum)	VI-2 VI-4

Required skills in science and engineering	Basis of Mathematics and Physics
	Good level of computer skills and Informatics
	Good level of oral and written English
	Knowledge of Building design would help

Subject description (two pages maximum)

Nowadays, we talk often about smart buildings. From the point of view of structural safety, it is important to develop tools that can estimate the level of security after a damaging event (earthquake, fire, strong wind, etc.). This kind of tool would help decision-makers that are called to decide if each building is safe enough to still accommodate people after a damaging event.

Smart buildings are equipped with sensors that record and give informations. Motion sensors (accelerometers, velocimeters) placed at the top and bottom of the building and at some intermediate floors would record the structural motion before and after the damaging event.

The proposed research aims at developing a software that analyses motion records and estimates the damage level of the structure (and eventually the damage localization). An alert system would be coupled to give warning when a fixed damage threshold is attained.

A first part of the study consists of a bibliography research to understand past studies and learn about existing techniques of signal processing.

A second part of the research consists of selecting the most promising signal processing technique, implementing a software and do verifications of the efficiency using a finite element numerical model. The latter allows the analysis of the structural response of a building, numerically modeled, first without damage and after introducing progressive damage.

A second part of the research aims to identify mechanical parameters directly connected with damage and fix limit thresholds. This to develop an alert system.

The proposed research will be developed at the Safe and smart building Department of Polytech Nice. This work can use the support of other laboratories as Geoazur, where motion sensors are used by seismologists to measure soil motion and building motion, and PolytechLab, where sensors are studied and developed by researchers in Eletronics and Informatics.