CURRENT MSCA PF PROJECT

VIBRATIONCLEAR

Dr. Deastra's MSCA-funded project "VIBRATIONCLEAR" (Inerter-based vibrating barrier for seismic protection of a cluster of building structures) aims to advance the seismic protection of urban areas through innovative buried devices called inerter-based vibrating barriers (I-ViBA). These systems utilize inerters—devices capable of generating substantial vibration mitigation effects without direct attachment to protected structures—offering a low-cost, non-invasive seismic protection method for clusters of buildings. The project objectives include developing advanced analytical and numerical models to optimize and simulate I-ViBA performance in realistic scenarios. Through comprehensive finite element simulations in both 2D and 3D environments, the project will evaluate and validate the effectiveness of multiple I-ViBA installations, significantly contributing to safer and more resilient urban environments in earthquake-prone areas.

ABSTRACT

Earthquakes are one of the deadliest and costliest natural hazards. In Europe, earthquakes have been responsible for more than 200,000 deaths and damage worth at least 250 billion euros during the 20th century. In Italy alone, more than 400 destructive earthquakes have been documented. In more recent history, the Central Italy earthquake in 2016 killed 297 people and caused damage worth at least 4 billion euros. VIBRATIONCLEAR proposes the use of inerter-based vibrating barrier (I-ViBA) for earthquake protection of a cluster of building structures. The I-ViBA is unique because unlike any other currently available earthquake protection technologies, the I-ViBA is buried in the ground and tuned to protect surrounding structures without being directly in contact to them through a structure-soil-structure interaction (SSSI) mechanism. The I-ViBA can be a solution for a low-cost seismic protection technology for existing buildings as one I-ViBA can be designed to protect many surrounded structures, something that has never been explored before. Aiming to address the apparent gap, this VIBRATIONCLEAR project sets two key objectives: (a) propose a novel I-ViBA and its optimisation method; and (b) perform 2D and 3D numerical finite element simulations considering a more realistic environment (multiple I-ViBA with a cluster of building structures). Using both analytical and numerical methods, the I-ViBA will be accurately designed, modelled and simulated using finite element software with various types of earthquake ground motions.

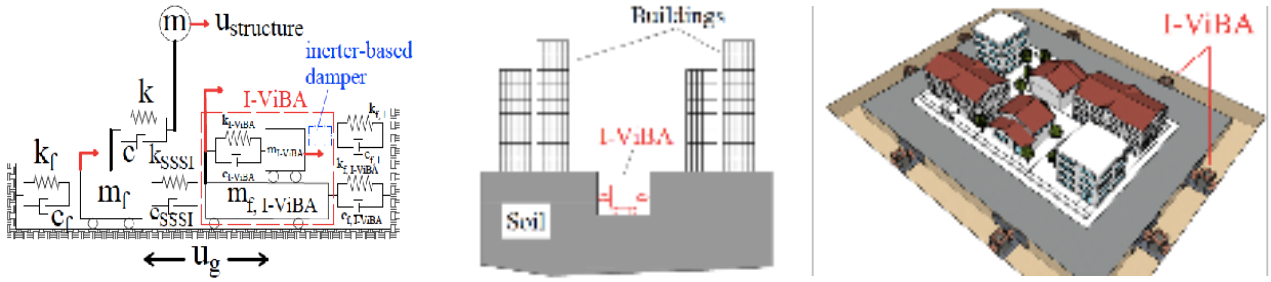

Figure 1: Research and Innovation objectives, (a) I-ViBA analytical model. (b) 2D model of one I-ViBA with many surrounded building structures. (c) 3D model of multiple I-ViBA with a cluster of buildings.

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DISEG

Dr. **Predaricka Deastra** is currently a Marie Skłodowska-Curie Actions (MSCA) Postdoctoral Fellow at the Politecnico di Torino (PoliTO), Department of Structural, Geotechnical, and Building Engineering (DISEG). He received his PhD in Mechanical Engineering from the University of Sheffield (UK), where his research focused on tuned inerter-based dampers for earthquake protection of building structures. Dr. Deastra holds an MSc in Structural Engineering from the University of Manchester (UK) and a BEng in Civil Engineering from the University of Andalas (Indonesia). Prior to joining PoliTO, he held postdoctoral positions at Tohoku University in Japan (JSPS Fellowship), ETH Zurich in Switzerland (Swiss Government Excellence Scholarship), and Dong-A University in South Korea. Dr. Deastra's research focuses on seismic isolation, dynamic vibration absorbers, inerter-based dampers, vibrating barriers, passive vibration control, and soil-structure interaction. His extensive research experience includes both analytical modelling and experimental validation of novel structural vibration control systems aimed at reducing seismic damage to buildings and infrastructures.

SEMINAR

30/06/2025

04.00 p.m.

ALBENGA ROOM

DISEG
Entry 1, 2nd floor

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