PennState College of Engineering | Systems, Controls, and Robotics Seminar Series

Bio-inspired vibration control of civil structures during extreme events

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ABSTRACT

Extreme events pose a significant threat to critical infrastructure that directly affect people's lives. With the increased interest in smart cities, there is a need for an intelligent built environment. This research talk will present on-going projects towards the Design of Resilient, Engineered, Autonomous, and Multifunctional (DREAM) structures. The latest innovation to fight natural hazards is the development of smart structures. Smart structures are equipped with sensors and control devices that can react in real-time during multiple hazards. We create these adaptive structures with human-like capabilities by using agent-based modeling, vibration control, evolutionary game theory, and neural dynamic optimization. We tested the method on buildings and bridge structures during earthquake event. To bring computational discovery to reality, we study control methodologies for novel cyber-physical testing technologies such as hybrid simulation that combines numerical and experimental substructures. These efforts open the pathways for the next generation of sustainable smart communities. Check out our work at sotostructures.com

BIOGRAPHY

Dr. Mariantonieta Gutierrez Soto is an assistant professor in Engineering Design and the Director of the DREAM structures lab at Penn State. She is currently the Global Engineering program coordinator at SEDTAPP for study abroad courses to Germany, Singapore, and Spain. Dr. Gutierrez Soto holds a M.S. and Ph.D. in Civil Engineering from the Ohio State University. She was the recipient of the "Teacher Who Made a Difference" award in 2020 and the "Faculty Research Mentor of the Week" award in 2019 from the University of Kentucky. She was recipient of the Presidential Fellowship in 2016. Her current research interests include structural control for vibration mitigation of civil infrastructure, and post-extreme event reconnaissance missions.