CIVIL & ENVIRONMENTAL ENGINEERING GRAD STUDENT SEMINAR ANNOUNCEMENT

Quantum Computing:
An Emerging Approach to Sustainability and Decarbonization in Buildings and Cities

Dr. Zhipeng Deng
Department of Mechanical and Aerospace Engineering
University of Central Florida

Friday, Apr. 10
12:30 p.m.
COE B134

Dr. Zhipeng Deng
Department of Mechanical and Aerospace Engineering
University of Central Florida

Zhipeng Deng is an assistant professor in the Department of Mechanical and Aerospace Engineering at University of Central Florida (UCF). He completed his doctoral degree at Purdue University. Then he served as postdoctoral researcher at Syracuse University. His research interests include decarbonization in buildings and cities; smart control; quantum computing; building and urban energy simulation; sustainable built environment; data mining; CFD; airflow and infectious disease transmission in enclosed space. Dr Deng's expertise in utilizing cutting-edge technologies of big data and quantum computing has significantly advanced the understanding of built environment and optimization of energy systems. He is also professional member of ASHRAE, ISIAQ, ACM, and ASME.

FAMU-FSU College of Engineering

This event is sponsored by
FAMU-FSU College of Engineering
Department of Civil & Environmental Engineering

Buildings contribute to more than 70% of overall U.S. electricity usage and greenhouse gas emissions. The future building control optimizes more connected devices and renewable energy equipment, which requires a rapid and accurate response. It also poses the challenge of solving non-linear problems with discrete variables in real time. In one study, we developed a novel optimization using quantum annealing for MPC of rooftop units in buildings. Our approach demonstrated significant improvements in computational speed from hours to seconds by considering day-ahead demand response signals. Our findings highlight the potential of quantum computing in solving large-scale non-linear discrete optimization problems for building energy systems. The other research presented a new framework for building-to-grid integration. We developed MPC for a commercial distribution grid for cost reduction. We proved its potential to solve large-scale discrete optimization problems for urban energy systems. In the latest study, we successfully managed charging activities of over 200 EVs within a community. Utilizing quantum computing, we effectively addressed demand response and boosted the overall grid profitability by shifting peak load and reducing stress on the grid with time-of-use pricing.