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CEE Seminar Series
Fall 2024

Wildfire Engineering: Integrating Models with Data to Provide Active- and Pre-Fire Solutions

Presented by:
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Friday, Nov. 8, 3:00 PM - 4:20 PM PT
McDonnell Douglas Auditorium (MDEA)

Abstract: Wildland fires play a vital role in maintaining healthy ecosystems, but the growing wildland-urban interface, coupled with climate change and other human activities, has significantly increased wildfire hazards in recent decades. Wildfires are now among the most critical natural threats to our physical, environmental, social, economic, and health systems. This presentation highlights recent advancements in active-fire decision support and pre-fire risk assessment.

For active-fire management, we emphasize the need for low-latency, high-resolution data to enhance situational awareness, alongside accurate fire behavior modeling capable of predicting wildfire dynamics faster than real-time. Key advancements in wildland fire modeling will be presented, focusing on canopy fuel modeling, fire spotting, and fuel characterization. Given the difficulties of gathering observational data during wildfires, we introduce a deep learning method that enhances satellite observation resolution, enabling more precise fire monitoring.

Additionally, a probabilistic wildfire risk assessment framework will be discussed to quantify pre-fire risk as the probability of loss from wildfires. Finally, the presentation will address current technical challenges in wildfire monitoring, simulation and data assimilation while outlining a forward-looking vision for wildfire engineering research to encourage further contributions from the engineering community.

Bio: Dr. Hamed Ebrahimian is an Assistant Professor in the Department of Civil and Environmental Engineering at the University of Nevada, Reno (UNR). He is the recipient of the 2024 Nevada Jason Geddes Rising Researcher award and the NSF CAREER award. Dr. Ebrahimian joined UNR in 2019, following a senior engineering position in industry and a postdoctoral appointment at the California Institute of Technology (Caltech). He earned his Ph.D. in Structural Engineering in 2015 and a second master's degree in Mechanical Engineering in 2013, both from UC San Diego.

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