

Department of Civil Engineering
The University of Hong Kong

Centre for Innovation in Construction
and Infrastructure Development

Modular Integrated Construction
Laboratory

SEMINAR

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Human-Machine Intelligence Integration for Resilience Civil Infrastructure and Construction Production Systems

Dr Pingbo Tang

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Date: July 5, 2024 (Friday)

Time: 2:30 p.m. – 3:30 p.m.

Venue: Room 612B, 6/F Haking Wong Building, The University of Hong Kong

Abstract

Resilience Civil Infrastructure and Production Systems (CIPS) benefit from the collaboration between human operators and artificial intelligence (AI) in managing uncertainties and mitigating risks. In real-world scenarios, human operators coordinate complex systems including civil infrastructures, manufacturing lines, and fleets of heavy-duty equipment. Meanwhile, advanced AI techniques require human intervention to analyze multiple anomalies and reconstruct operational contexts and failure patterns, which aids in explaining issues and forming response strategies. However, human operators face challenges from varying demands, human conditions, equipment wear, and environmental changes. This seminar will explore challenges in resilient CIPS that necessitate integrated human-AI solutions, examine issues like production disruptions, water quality in treatment systems under cyber threats, air traffic control mishaps, abnormal events in energy production, and safety incidents in construction equipment usage, and address three main research questions centered on modeling contexts that affect CIPS operations, capturing human-machine operational strategies, and adapting these strategies to different conditions to proactively manage and resolve events. The research outcomes are expected to enhance the safety and efficiency of future infrastructures, such as bridges and modular manufacturing facilities, leading to reductions in accidents, downtimes, and material waste.

About the Speaker

Dr Pingbo Tang is an Associate Professor in Civil and Environmental Engineering at Carnegie Mellon University and an expert on civil infrastructure operations and human systems engineering for civil infrastructure operational safety. His research explores remote sensing, human systems engineering, and information modeling technology in support of the spatiotemporal analyses needed to effectively manage production systems, construction sites, constructed facilities, and civil infrastructure systems. His ongoing studies have examined sensing and modeling methods for comprehending the Human-Cyber-Physical-Systems (H-CPS) in accelerated construction and infrastructure operations (e.g., airport operations, nuclear plant outage control). He has received several research awards, including several best paper awards at multiple conferences, the 2013 Recent Alumnus Achievement Award of the Civil and Environmental Engineering Department at Carnegie Mellon University, the National Science Foundation CAREER Award in 2015, and the Daniel W. Halpin Award for Scholarship in Construction from the American Society of Civil Engineers in 2020.