香港科技大學
THE HONG KONG UNIVERSITY OF SCIENCE AND TECHNOLOGY

土木及環境工程學系
DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING

SEMINAR

MULTIMODAL SENSING AND ADAPTIVE TRAINING FOR PERSONALIZED HEAT STRESS MANAGEMENT IN CONSTRUCTION

Speaker
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Arizona State University

Abstract

Heat stress represents an escalating occupational hazard for construction workers, with climate change intensifying extreme temperatures while urban heat island effects and machinery-generated radiant heat create additional thermal burdens. Modern technological solutions such as wearable physiological monitors, networked environmental sensors, and artificial intelligence analytics now enable real-time identification of heat exposure risks coupled with individualized protective measures. These integrated systems support proactive worksite safety through continuous tracking of core biometric indicators, hydration status, and localized thermal conditions, complemented by predictive algorithms that optimize work-rest regimens to prevent heat-related health incidents. Parallel investment in comprehensive worker education programs remains equally vital, ensuring proper recognition of heat illness symptoms and implementation of adaptive behavioral strategies. The development and deployment of such evidence-based countermeasures demand sustained collaboration across industry stakeholders, research institutions, and regulatory bodies to establish practical, scalable protections that preserve both workforce health and operational efficiency. This multidimensional approach demonstrates how concurrent advances in sensor technology, data science, and occupational training collectively contribute to building more thermally resilient construction workplaces.

Biography

Dr. Siyuan Song is an Associate Professor at Arizona State University (ASU), where she leads research in construction safety, human-centered AI, and smart sensing technologies. As the founder and principal investigator of the Safety Automation and Visualization for Environments (SAVE) Laboratory, she focuses on developing innovative solutions to mitigate occupational hazards, including heat stress, falls, and musculoskeletal risks. Her work integrates wearable biosensors, computer vision, and predictive analytics to enhance real-time safety monitoring and decision-making in high-risk environments. Through developing real-time safety monitoring systems, Dr. Song's research enables data-driven decision-making, particularly in extreme climates. Her solutions are field-tested with industry partners, ensuring real-world usability, equitable safety outcomes, and scalable adoption. Committed to bridging research and practice, Dr. Song collaborates with construction firms, tech developers, and policymakers to advance both cutting-edge safety technologies and workforce training strategies. Her work not only enhances worker well-being but also promotes sustainable and productive construction practices.

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Room 3584A (Lift 27/28), Academic Building, HKUST

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