

Advanced Computing to Reduce Construction Failures

Abstract

Computer aided design and engineering tools have transformed practices of architecture, engineering, and construction (AEC) professionals. Emerging advanced computing technologies, i.e., artificial intelligence (AI) and extended realities (i.e., virtual reality, augmented reality, and mixed reality) have been reported to boost AEC professionals' decision-making capacities. However, construction is a complex process especially for large and mega scale projects. Uses of advanced computing technologies may be tempered by new types of failures. During this interactive workshop, participants will examine how AI-driven systems can rapidly analyze large data sets, detect hidden patterns, and streamline repetitive tasks in engineering and failure investigations. We'll also revisit past cases—like the Tacoma Narrows Bridge and Hartford Civic Center collapses—where emergent technologies or flawed assumptions contributed to catastrophic outcomes. Attendees are encouraged to share experiences and strategies for ensuring that advanced tools complement AEC professional's core engineering judgment.

The two-hour workshop is composed of three parts:

1. Forensic engineering and advanced computing
2. Advanced computing to reduce failures.
3. Future practices to reduce construction failures

Learning Outcomes

- Fundamentals of engineering principles in forensic investigations
- Learning potential applications of advanced computing to reduce construction failures
- Integrating emergent technologies into established construction practices

Instructors: Rui Liu, Ph.D., P.E., M. ASCE; Mike Drerup, P.E. M. ASCE.

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