Empowering Civil Engineering with Generative AI: Opportunities, Risks, and Future Directions

Organizers: Pingbo Tang, Associate Professor, Civil and Environmental Engineering, Carnegie Mellon University; Beibei Li, Professor, Heinz College, Carnegie Mellon University; Ruoxin Xiong, Ph.D. Candidate, Civil and Environmental Engineering, Carnegie Mellon University; Yael Netser, Ph.D. Student, School of Architecture & Civil and Environmental Engineering, Carnegie Mellon University; Joonsun Hwang, Mater Student, Civil and Environmental Engineering, Carnegie Mellon University

Objectives:

This workshop aims to:

1. Explore the transformative potential of Generative Artificial Intelligence (GAI) in revolutionizing Architecture, Engineering, and Construction (AEC) workflows.
2. Identify the challenges and risks of GAI deployment, including ethical concerns, job replacements, privacy, governance (policy and regulations), and cyber security.
3. Facilitate the development of a policy framework to guide responsible GAI integration, ensuring public welfare and accountable and safe applications.

Agenda (2 hours):

1. Introduction and motivation (10 mins)
   - *Overview of the workshop agenda and goals*
2. Industry Perspectives on GAI in AEC applications (20 mins)
   - *Industry members will provide their perspectives on GAI in AEC projects.*
3. Current State of GAI for AEC applications (20 mins)
   - *The organizing team will present the current state of GAI in AEC applications, including challenges, opportunities, and open research questions.*

Break (5 mins)

4. Breakouts on research opportunities (45 mins)
   - *Three discussion tables will be created with specific topics and open questions:*

   a. <u>GAI opportunities and challenges</u>: What AEC tasks can GAI assist? What are the potential risks?

   b. <u>GAI social and policy impacts:</u> What are the ethical and policy implications of integrating GAI into AEC projects?

   c. <u>Educational aspects</u>: How do we prepare AEC professionals and marginalized groups to navigate the GAI-driven technological transformation?
5. Consolidation as a roadmap of responsible adoption and research in AEC domains (20 mins)
   - *Attendees discuss breakout session insights and identify connections between topics to articulate a GAI research agenda in AEC projects.*

Brief Bios:

- Dr. Pingbo Tang: An established researcher in AEC with extensive experience leveraging AI for infrastructure projects. Leader of multiple collaborative efforts with ASCE.
- Dr. Beibei Li: Expert in data analytics and AI applications in public policy and management.
- Ruoxin Xiong: Focused on innovative technologies in civil engineering, particularly AI applications and data management.
- Yael Netser: A licensed architect and a PhD student in Architecture and Civil Engineering at CMU. Focused on integrating BIM, AI, and sustainability into the design process of architects and engineers.
- Joonsun Hwang: Studied architecture and worked for a real estate asset management company in Seoul, and is planning to study AI applications in civil engineering at CMU.