

Session 1-C: Exploring Automation in Construction

Room 204

Track: Technology

Facilitator: Zhouqian (Jason) Jiang

Chair: John Messner

Questions:

- What is state-of-the-art for implementing automation in the Construction Industry?
- What is needed to increase the use of automation in construction?
- What are the challenges that impede automation implementation?
- In what areas / trades do you think automated machinery may replace or supplement field workers?
- How do you envision our work practices changing based upon automation in design, construction, and maintenance over the next five years? Or the next 20 years?
- How has your company started to explore or implement automation on projects?
- How should construction firms establish their efforts to implement automation?

Notes:

- Automation throughout Design:
 - A model is the prerequisite for automation. The model not only need to reach the level of development, but also the level of implement.
 - Potential use cases: 3D coordination, parametric design, prefab, 3D printing, etc.
 - Prefab is critical. Automation can be used in factory to preassemble. E.g. steel, and mechanical systems.
 - From material perspective: new material could lend themselves to automated assembly.
- Autonomous machinery can be classified into different levels (like different levels of autonomous driving)
 - From fully autonomous to semi or teleoperated, like teleoperated cranes.
- Influence of automation in construction from social perspective:
 - The activities / roles of field workers will change. Will they be taken over or supplemented by robots / automated machinery? (Employment challenges).
 - How do you capture “craft knowledge” from experts in field, and integrate into robots?
 - Challenge with robots trying to replicate human postures and activities. But it is not always the best approach (People tend to think robots are similar to humans, but it does not have to be).
 - Challenge with workforce retraining and education, to leverage technology, or to potentially collaborate with robots/automated machinery on jobsite.

- Challenge with unions, workforce health, and safety.
- How will the automation gain traction in construction industry:
 - Small evolution, stepwise change. Gradually implement new automations on construction sites.
 - Industry consortium: new regulations, change delivery methods.
 - External forces: A technology giant company jump in and totally change the rules of the industry.
- Possible research topics regarding this area:
 - Case studies of automation implementation in projects: factory prefabs, construction robotics, autonomous machinery, etc.
 - Framework development for classifying different types of automation in construction.
 - The ways to fund the research and development (R&D) of automation in construction.