Title:

Abstract:
Early detection of actual or potential performance deviations in Architecture/Engineering/Construction and Facility Management activities is critical to project management as it provides an opportunity to initiate proactive actions to avoid them or minimize their impacts. Despite the importance, current monitoring practice includes manual data collection and extensive data extraction, non-systematic and generic reporting, and visually/spatially complex representations. This talk addresses these challenges by introducing the underlying hypotheses and algorithms for automated generation of D4AR – 4D augmented reality – models for automating and visualizing monitoring of sustainable built environments. These models assembled through superimposition of 4D point clouds generated from unordered daily construction photo collections and 4D Building Information Models, visualize performance deviations and allow Architecture/Engineering/Construction professionals to intuitively observe problems, conduct various decision-making tasks, and minimize detrimental impacts of performance deviations in an augmented-reality environment rather than the real world which is time-consuming and costly. Moreover, application of D4AR models, developed with several challenging building construction photo collections captured under different lighting conditions and server occlusions, demonstrates that component-based tracking of progress at schedule-activity level could be automated. These models generate a new research paradigm by allowing researchers develop visual and spatial sensing techniques to automatically track productivity, safety, quality, and carbon footprint of operations.