

M. LIU, M. GOLPARVAR-FARD, F. PEÑA-MORA. **Online remote construction performance monitoring and control using a web-based 4D augmented reality modeling environment.** *Gerontechnology* 2012;11(2):79; doi:10.4017/gt.2012.11.02.674.00 **Purpose** Using existing sources of information we created and developed an online remote construction management system for monitoring and control of building construction projects. In many projects, the geographical distribution of the project team imposes great difficulty for project participants to physically travel to the construction site in order to have first-hand knowledge about the construction progress. Travel issues can affect the frequency of monitoring and this in turn reduces the chances of control decisions being taken in a timely manner. **Method** To address these limitations and improve project control efficiency, this paper builds upon earlier work¹, wherein unordered daily construction images were collected to automatically develop a 4D-point-cloud model of the actual performance of the project. The proposed D⁴AR – 4 dimensional augmented reality – model enables the reconstructed as-built models to compare with 4D-building information models (BIM) in order to highlight the performance deviations. We improved the D⁴AR models in three distinct directions: (i) implementing this system in a web-based platform to enable remote users to access these models in a ubiquitously; (ii) providing more efficient visualizations to enable the users to spatially and temporally navigate these models from several image perspectives; and (iii) enabling users to contact construction personnel on site and to add images to particular areas of interest. **Results & Discussion** This is a particularly challenging research task due to the size of the image collections, the sparseness in the distribution of the unordered images in the scene, and the clutter which can be generated from different viewing perspectives. We use Adobe Flash builder combined with Stage3D as a 3D-rendering engine to enable temporal navigation through BIM-models. The technical components of the system are presented along with results from the performance of the proposed system in several actual construction projects. We discuss the perceived and actual benefits of this system in reducing the time and cost associated with travelling to construction sites, decreasing the frequency of these site visits to resolve performance issues, faster reporting, and minimizing the response time to performance deviations.

References

1. Golparvar-Fard M, Peña-Mora F, Savarese S. Integrated Sequential As-Built and As-Planned Representation with D⁴AR Tool in Support of Decision Making Tasks in the AEC/FM Industry. *ASCE Journal of Construction Engineering and Management* 2011;137:1099; doi:10.1061/(ASCE)CO.1943-7862.0000371

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