Augmented Tectonics: Teaching Construction Through Extended Realities

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Abstract:
Architecture has recently begun to fully embrace advances in Extended Reality (XR) technologies. These readily available platforms are beginning to integrate themselves within the architecture and construction industries as a way to aid in project design, delivery and execution. They are also being integrated to new pedagogical approaches for teaching and learning. Using XR as a learning environment provides a significant step forward, where students are able to move beyond their screens and embody designs through an immersive virtual environments (IVE). This allows for a greater understanding of the designed space as well as provides an alternative to visualize the complex array of layers that are included in the assemblage of a building. Within a pedagogical framework, the teaching of construction relies heavily on the presentation of assembly systems through precedent. Through this process, students are trained in interpreting and synthesizing two-dimensional representations for the production of three-dimensional constructs. Within this process the understanding of scale and in some cases physical constraints are easily overlooked by an untrained individual. The physical engagement with this content in many cases only occurs after a student has left the classroom and begins to work in the profession. Due to liability and available opportunity, the integration of an on-site immersive construction experience within the classroom is more often than not unattainable. The work undertaken through
Augmented Tectonics leverages XR technologies as a way to simulate these experiences and through an embodied version of the course content. This paper discusses the initial deployment and testing of Augmented Tectonic as case study developed by the authors. Augmented Tectonics is a teaching tool that leverages extended realities for a building construction course in architecture. The platform is a collaboration between Taubman College of Architecture and Urban Planning and the Center for Academic Innovation through the XR initiative at the University of Michigan.

• Author(s) Biography:

Jonathan Rule, is a cofounder of MPR Architects and Assistant Professor of Practice at Taubman College of Architecture and Urban Planning where he teaches in the areas of design, construction, and digital technologies. Jonathan’s research focuses on material experimentation, innovation in construction systems and in building design and technology. Complementing the tactile explorations of materials and their implementation, his work leverages virtual and augmented reality for understanding spatial and constructive assemblies. His work and research have received awards from the International Union of Architects (UIA), the Association of Collegiate Schools of Architecture (ACSA) and the XIV Spanish Architecture and Urbanism Biennial. Rule received a Bachelor of Science in Architecture from the State University of New York at Buffalo and a Master in Architecture from the Harvard Graduate School of Design. He is a registered architect in Spain.

Shalaunda Reeves is a Learning Experience Designer at the University of Michigan Center for Academic Innovation, where she designs online learning and extended reality enabled education experiences. From a design-based perspective, Shalaunda’s research explores the various ways students experience and learn in online and extended reality environments, to understand for whom and under what conditions such experiences promote educational processes and outcomes.