

Development of a VR-based Drone-mediated Building Inspection Training Environment

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ABSTRACT

As drone-mediated building inspection gains interest among the inspection disciplines and becomes more standardized in the industry, current Construction, Engineering, and Management (CEM) students are encouraged to develop and enhance their drone flight operational skills. While integrating hands-on building inspection training using drones in the CEM education curriculum seems favorable, the high costs of the UAS hardware components, together with the liability and safety concerns associated with flying in proximity to buildings and people, hinder such opportunities. One potential alternative to real-world drone flights is the use of virtual reality (VR) simulation technologies. This study aims at exploring the technical development and effectiveness of utilizing a VR training environment – DroneSim – specifically designed to enhance students' drone piloting skills while accomplishing building inspection tasks. Using a head-mounted display (HMD), construction students were required to navigate their aerial platform using typical control commands (e.g., takeoff, landing) and perform building inspection tasks. Participants were asked to complete post-experiment questionnaires with the aim of evaluating their feedback on the usability and sense of presence of DroneSim. Post-experiment questionnaire results (N = 18) revealed that students' perception on using DroneSim was positive, finding the overall experience stimulating. The contribution of this research is to: (1) understand the steps involved in the technical development of a VR-based drone-mediated building inspection training environment; and (2) provide students with the opportunity to improve their drone piloting and building inspection skills in a safe and controlled environment.