Development of a Student-centric Cyber-Physical System (SCPS): An Android App for Interactive Learning of Structural Analysis and Dynamics

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ABSTRACT

Although there have been many attempts to increase student engagement and interaction in class through virtual reality and augmented reality (VR/AR), structural engineering has remained as one of the disciplines that lacks interactive learning. There was an earlier attempt by the authors to improve student learning in structural analysis and dynamics through a student-centric cyber-physical system (SCPS) that reacts to student movement and outcomes structural behavior. This system used mobile devices as sensors and sent data to be processed by a server. As a result, it suffered from the inherent limitation of Transmission Control Protocol/Internet Protocol (TCP/IP) – lags and instability. Therefore, this paper presents the development of a new SCPS tool with a new system architecture that is much more stable and provide better user experience. This SCPS captures and uses student movement (i.e., walking, turning, and jumping) as point loads on a virtual bridge. As students move around, structural behavior (i.e., deflection) is simulated and visualized in real time.