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Integration of virtual reality (VR) and eye-tracking device to enhance construction students' safety knowledge of hazard-identification

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Abstract

The construction industry is hazardous due to the congested working environment and complexity. Hazard identification is the most frequently employed approach to preventing and reducing accidents on construction sites. However, it often fails due to insufficient knowledge because of the complex work environment on job sites. Risk recognition training is an important training in construction companies to avoid work-related accidents. Because eye tracking exhibits the immense potential of providing deeper insights into construction workers' hazard-identification patterns, researchers have also recently begun to examine potential applications of this technology in studying the knowledge and hazard-identification skills of construction workers.

Eye tracking also provides a more objective and reliable approach to reflect workers' real reactions to hazards on construction sites. However, most of the relevant researches used static images in the laboratory that might not capture all of the characteristics of a real-world construction site. What's more, it is not easy to use eye-tracking device to achieve on-site or in-plant safety training as there are uncontrollable and unpredictable hazards. Visualization is a better tool that solves the problem of understanding and analyzing hazards on sites. So this proposed project will use virtual reality (VR) application and eye-tracking device together for risk recognition training. VR provides different realistic and interactive scenarios to simulate dynamic real-world construction sites rather than images. The eye-tracking device will be used to track students' eye movements to assess students' safety knowledge toward hazard-identification and then provide personal training to improve their abilities. Through this system, the quality of teaching can also be assessed.