Independent Study Title	A Study of the Effectiveness of a Forklift Driving Simulation: A Comparison Between Virtual Reality Controllers and Mobile-based Controllers
Author	Natkitta Kongkaewvorasit
Degree	Master of Science Program (Digital Transformation Technology)
Advisor	Assistant Professor Suppakarn Chansareewittaya, Ph. D.
Co-Advisor	Kemachart Kemavuthanon, Ph. D.

ABSTRACT

Forklift operation training carries inherent safety risks and high costs. To address this, this study developed a simulation system integrating a miniature forklift with IoT and Virtual Reality (VR) within a Digital Twin framework. The research compared operational effectiveness and user satisfaction between VR controllers and mobile-based controllers. Drawing from a continuous research framework (Protocol Number: EC 25067-13), participants performed navigation and pallet handling tasks using a learning-by-doing approach. The findings indicate that while both modalities facilitate conceptual understanding, the VR-based interaction demonstrated notably higher engagement and situational awareness due to its immersive nature. The study concludes that VR-based simulation effectively enhances procedural skills and provides a safe, engaging platform for technical and vocational education.

Keywords: Forklift Simulation, Virtual Reality (VR), Internet of Things (IoT), Digital Twin, Vocational Education