

Title : Comparative Analysis of User Experience in Photorealistic and Low-Poly Driving Simulations

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ABSTRACT

This research aims to compare user experiences in simulated car driving environments featuring photorealistic and low-poly scenes. The objective is to develop a virtual driving simulation program for realistic driving and parking practice in various scenarios, study virtual reality technology in driving training, and collect data for evaluation.

The system was developed using Unity with Oculus Quest 3 virtual reality headset and Logitech G923 steering wheel to create a realistic driving experience. The system's realism is divided into two main components: vehicle driving behavior simulation and game graphics, utilizing both low-poly and realistic approaches with 3D Gaussian Splatting technique from 360-degree video footage of actual locations at Chiang Mai University.

System evaluation was conducted through preliminary surveys from 82 participants. Research results show that 53.9% of participants gave the highest score (level 5) for their interest in playing traffic rule games in the future, and 57.2% believed it would help with real-life driving. 38.5% of participants were

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satisfied with pedestrian simulation, and 33% were satisfied with traffic aspects, giving good scores (level 4).

Of all participants, 46 were capable drivers (56%) and 36 were learners or non-drivers (44%). Among capable drivers, 19.8% and 20.9% gave moderate scores (level 3) for vehicle control and good scores (level 4) for realistic driving feel, respectively. Participants showed high interest in traffic rule games and their practical applications. Views, pedestrian interaction simulation, and traffic realism received good to excellent ratings, especially from regular drivers. However, control evaluation revealed areas for improvement, with participants suggesting that the brake system was too rigid, turn signals were difficult to operate, and gear shifting felt unnatural, which are important aspects for future development. The findings from this research can be applied to develop more effective and safer driving training systems in the future, particularly in improving controls for greater realism and ease of use.

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