The Studying of Driving Posture and Driver Fatigue

Through Virtual Reality Car Driving Simulation Based on

Motion Capture System

Wen-Chun Hsu*, Yu-Jen Hsu and Ju-Ling Shih
Department of Information and Learning Technology, National University of Tainan, Shu-Lin Street, Tainan, Taiwan
*kenny.hsu0118@gmail.com

ABSTRACT
Road traffic safety is mainly affected by such factors as people, cars, roads, environment, and intelligent transportation system (ITS) services. Among those factors, driving actions and habits play the most important roles. Rumar (1985) believed that 90-95% of traffic accidents are caused by human factors and 25-30% of car collisions are due to driver fatigue. When driver fatigue is analyzed and studied, the experiment subject's safety factors must be considered, in addition to the cost of cars. Therefore, virtual reality has become an ideal alternative, for it can mimic real-world driving scenarios, such as road or weather conditions, enabling the subject to have real-time interactions with the virtual reality (VR) objects. Besides, it frees the subject from any security concerns. For the above reasons, this study employed a motion capture system to construct a real-time car-driving simulator, which synchronically captured and analyzed various angles between the limb parts and joints of the subject, who was sitting in a most comfortable driving posture. Moreover, an electromyography was used to detect muscular motion and fatigue. Thus, the correlation between a comfortable driving posture and muscle fatigue was discovered. This Research expected to study whether it is feasible to substitute a VR car-driving simulator for a physical simulator; in addition, it was hoped that this study will help to improve road traffic safety.

Keyword: Driving Posture, Driver Fatigue, Virtual Reality, Car Driving Simulation, Motion Capture System

1. Introduction
Driver fatigue may affect the driver's alertness and capability of safe driving; so many countries are actively exploring the solution. To reduce traffic accidents, analysis of