

8th International Symposium on Advanced Vehicle Control, 國立清華大學, 2006 年
08 月 20-24 日

Construction of Input Equipment and Firmware of Virtual Reality and Vehicle Dynamics Based Driving Simulator

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Abstract

The purpose of this research is to develop the input equipment of a virtual reality (VR) and vehicle dynamics based driving simulator. The VR environment and vehicle object are constructed by Superscape VRT. The vehicle dynamics equations are derived and programmed by MATLAB, transferred into C++ code by Visual MATCOM, compiled into dynamic-link library (DLL) format and embedded in the VR system to be called by Superscape control language (SCL) to produce vehicle dynamic behaviors of the vehicle object in the VR environment. A Logitech WingMan Formula racing-car joystick is adopted as the input device. The joystick includes a steering wheel, pedals and gear-shifting buttons. The signals produced by the joystick are detected by a device driver built by Superscape developers' kit with the integrated development environment of Microsoft Visual C++. The device driver is also compiled into the DLL format to be called by SCL to input the kinematics parameters into the VR environment and maneuver the vehicle object. The constructed system can achieve the designed simulation functionality and will be further integrated with fuzzy control algorithm to form an automatic vehicle control system proposed in another submitted paper.

Key words: Vehicle dynamics and control;
Modeling and simulation technology;
Virtual reality