FIVIS: An Immersive Bicycle Simulator

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Objectives

An immersive bicycle simulator is developed to simulate potential dangerous traffic situations without exposing the rider to a risk.

Figure 1. The FIVIS simulator with its compact three-screen immersive visualization system.

Motivation

Realistic interactive simulators exist for most types of vehicles, however, bicycle simulators are rare. Such a simulator would be a valuable device allowing for systematic psychophysical experiments by manipulation of visual and auditory cues. Particularly, it could be used to train proper behaviour in urban traffic scenarios.

Methods

The simulator features three almost bezel-free flat screens providing up to 180° horizontal field of view. The rider interacts with the system using a mounted bicycle equipped with a steering sensor and an electric motor brake for simulating ascents. A Kinect sensor based markerless tracking system detects hand signs and head motion. These and the driving behaviour are interpreted by a reward system, which provides the rider with immediate feedback. It also allows for perspective corrected rendering based on head tracking, thus improving the immersion effect. Several scenarios have been implemented which model realistic but dangerous traffic situations.

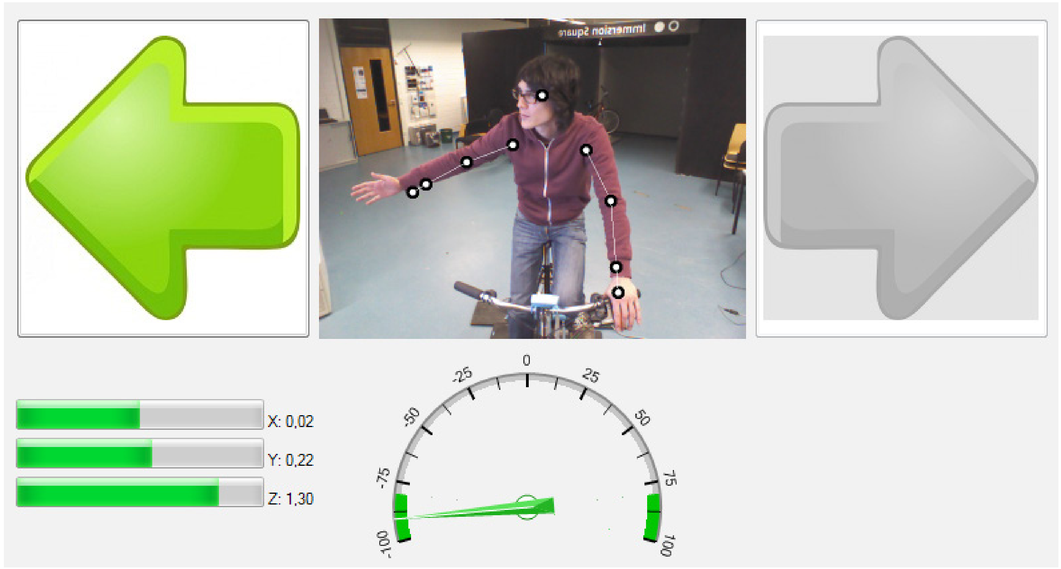

Figure 2. Result of the hand sign and head orientation recognition module.

Figure 3. Wide-angle high-resolution frame rendered by the simulator.

Results

The developed system has been applied in various psychophysical experiments investigating the cognitive constitution of test subjects while being exposed to physical stress. Furthermore, the implemented traffic scenarios have been successfully evaluated in elementary school traffic education.

More information at: www.fivis.eu

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