SMALL‑SCALE TRAFFIC DEMONSTRATOR WITH DRIVING SIMULATOR

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Abstract - Driving simulators and traffic simulations have a lot of potential in research and development, training and assessment, which provides many advantages. First of all, it is safe and the experiments are cheaper. Secondly, the setup is very flexible and many subject actions can be studied. Moreover, many parameters and factors can easily be recorded.

Since the early 2000's, the Institute of Dynamic and Vibrations of the Technical University of Braunschweig has developed alternative paradigms for a microscopic simulation, which are clearly rooted in the drive activities.

This poster describes some points regarding the development and construction of the miniature traffic demonstrator with car driving simulator components. Some components can be used as part of hardware-in-the-loop simulation.

The car driving simulator can be driven/operated by human drivers (Fig. 1, right) and parallel by virtual drives. These virtual drivers are characterized by the ability to directly drive moveable cars in the same way as human driver in the laboratory. In both cases, it gives you the opportunity to observe and study the behavior of drivers in the implementation of certain difficult driving situations.

The driver simulator includes the front part of a real car with all factory components inside the cabin, a projector for video transmission from the controlled vehicle inside the laboratory for microscopic traffic simulation, as well as special hardware (sensors, actuators) for communication processing and output of information. Special factor in this scheme is the integration of a real driver in the simulation environments.

After analyzing a number of factors that affect the human perception of information and the existing equipment in the laboratory have been done significant improvements, both in the driver simulator and laboratory for microscopic traffic simulation.

As a result of the creation and implementation the driver simulator includes acoustic modules, enhanced visual systems and haptic force feedback systems, so that the running conditions of the car simulators are close to the condition in realer car, as similar as possible.

Study driver behavior under different conditions will allow reducing a minimum the impact of errors due to lack of visual, acoustic or tactile.

The simulator provides a good tool for developers to build driver information and assistance systems that help the driver to control the vehicle and has recently become an integral part of modern cars. Such systems help to increase the level of safety in the vehicle and reduce the number of accidents and their consequences.

Car sensors and other electronic devices enable you to record full measured data for statistic deals. In conjunction with the subjective opinion of the drivers it gives an opportunity to find a correlation to improve driver assistance systems and their functionality.

The car driving simulator and miniature traffic demonstrator seems to be a good tool to study behavior at intersections. The main goal is the development of hypothesis, whether typical accidents in micro traffic situation (2-5 cars) are modulated by self organizational effects.

Keywords: driver's behavior, driving simulator, traffic laboratory, driver model.

Fig. 1. Snapshot of small-scale traffic laboratory.

Fig. 2. Driving simulator.