Advancing Driver Safety through Simulator Research

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ABSTRACT

Over the last thirty years, there have been between 40,000 and 52,000 fatalities per year on our nation’s roadways. The National Advanced Driving Simulator (NADS) at the University of Iowa was designed and built to help researchers and regulators explore the root causes of motor vehicle crashes in order to help reduce roadway fatalities. To this end, staff and faculty at the University of Iowa in collaboration with researchers from around the country have been and continue to be involved in a number of cutting-edge research projects that positively impact road safety. Recent research into the effectiveness of electronic stability control (ESC) systems on behalf of the National Highway Traffic Safety Administration (NHTSA) provided valuable information to federal regulators who have subsequently mandated ESC on all light vehicles by model year 2012. NADS has continued this line of research and is now involved in assessing the effectiveness of stability control in heavy trucks. Other ongoing research efforts include the development of algorithms to detect alcohol-related impairment based on driving performance, the relationship between obstructive sleep apnea and crash risk, aging drivers, novice drivers, advanced vehicle safety system evaluation, and the impact of visual decrements on driving safety. NADS also continues to push the state of the art in driving simulation through such new technologies as the NADS MiniSim, which allows greater access of simulators to researchers through a low-cost portable simulation platform. Use of the MiniSim could allow for advances in roadway design through interactive visualization of various roadway designs and potential design optimization. Additionally, NADS researchers are in the process of developing a virtual Iowa City driving environment that will allow parallel simulator and on-road data collections using the same driving environments. This technique has applicability for easier visualization of existing road networks that could be used to evaluate current areas with unexplained high crash rates. An overview of these research and development programs will be provided.

Key words: electronic stability control—NADS—simulation