The Driver Alcohol Detection System for Safety (DADSS) Program is a research partnership between the National Highway Traffic Safety Administration (NHTSA) and the Automotive Coalition for Traffic Safety (ACTS) to explore the feasibility, the potential benefits of, and the public policy challenges associated with a more widespread use of non-invasive technology to prevent alcohol-impaired driving. For in-vehicle alcohol detection technologies to be acceptable for use among drivers, many of whom do not drink and drive, they must be seamless with the driving task; they must be non-intrusive, that is, accurate, fast, reliable, durable, and require little or no maintenance. Sober drivers who are under the legal limit should not even know they are there. The DADSS program is developing technologies that could prevent the vehicle from being driven when the device registers that the driver's blood alcohol concentration (BAC) exceeds the legal limit (currently 0.08 g/dL throughout the United States). The goal of this 5-year, $10 million initiative, funded jointly by NHTSA and many of the major automakers (BMW, Chrysler, Ford, General Motors, Honda, Hyundai/Kia, Jaguar Land Rover, Mazda, Mercedes Benz, Mitsubishi, Nissan, Porsche, Toyota, Volkswagen, and Volvo) is to have a research vehicle available, by the first half of 2013, that will demonstrate these technologies.

Two approaches have been identified that have considerable promise in measuring driver BAC non-invasively: 1) Tissue Spectrometry, a touch-based approach allowing estimation of alcohol in human tissue, and 2) Distant Spectrometry that will allow assessment of alcohol concentration in the subject's exhaled breath. In the touch-based approach, measurement begins by shining an infrared light on the user’s skin (similar to a low power flashlight). A portion of the light scatters several millimeters through the user’s skin before returning back to the skin’s surface where it is collected by the optical touch pad. This light contains information on the tissue’s unique chemical properties which can be analyzed to determine the tissue alcohol concentration. The breath-based approach makes it possible to perform a contact free, unobtrusive measurement of the driver’s breath alcohol by using the concentrations of carbon dioxide as a measure of dilution of the exhaled breath of the driver. Multiple sensors placed in the vehicle cabin will allow the system to determine that the breath sample is from the driver and not other passengers.

Prototype devices have been developed and tested at the laboratories of QinetiQ North America. The testing program was designed to provide an understanding of whether the devices ultimately can meet the performance specifications needed for non-invasive alcohol testing. Bench testing was undertaken to determine the prototypes’ accuracy, precision, and speed of measurement and to establish what additional development might be needed. To validate the performance of the prototypes, unique standard calibration devices have been developed for both...
the breath- and touch-based systems that go well beyond current alcohol-testing specifications. Limited human subject testing also permitted an understanding of the relationship among the various measures of blood alcohol provided through blood and breath samples and the breath-based and touch-based prototype devices.

Based on the results of prototype testing, sensors demonstrating both the touch-based approach and breath-based approach are judged to have the potential in Phase II development to measure BAC quickly, and with high levels of accuracy and precision. Significant additional development is needed, but the developers have identified potential technological modifications to the devices that will enable them to meet the DADSS specifications at the end of the Phase II development. Two technology providers have been identified for the Phase II effort: Autoliv Development AB of Vårgårda, Sweden; and TK Holdings who are working with TruTouch Technologies, Inc. of Albuquerque, New Mexico. Phase II development will begin in the first half of 2011.

While the challenges are substantial, the potential benefits to society are compelling. DADSS has the potential to save up to 8,000 lives per year, according to a study conducted by the Insurance Institute for Highway Safety (IIHS). Another study by the IIHS shows that the public may be ready for in-vehicle devices to combat drunk driving. The IIHS research shows that two-thirds of those surveyed considered the use of advanced technology to keep drunk drivers off the roads to be a “good” or “very good” idea.

For more information, visit www.dadss.org.

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