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Working Party on Road Traffic Safety
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Information on activities of interest to the Working Party

DEVELOPMENT OF ADVANCED IN-VEHICLE ALCOHOL DETECTION TECHNOLOGY

Transmitted by Government of the United Sates of America

In February, 2008, the National Highway Traffic Safety Administration (NHTSA) initiated a 5 year project with the Automotive Coalition for Traffic Safety (ACTS) to develop in-vehicle alcohol detection technologies that could have widespread deployment and are non-invasive, reliable, accurate, and precise. The project is titled Driver Alcohol Detection System for Safety (DADSS).

The goal of the initiative is to develop alcohol detection technologies that are non-invasive, that will quickly and accurately measure blood alcohol concentration (BAC) and determine whether it exceeds the legal limit. To achieve this goal the project will:

1) assess the current state of alcohol detection devices, and
2) support the development and testing of prototypes and subsequent hardware that may be installed in vehicles.

Prototypes would then undergo extensive laboratory and field testing. The end goal would be voluntary acceptance and integration of these technologies into all vehicles. The agency believes that widespread use of vehicle-based, alcohol detection technologies could help to significantly reduce the number of alcohol-impaired driving crashes, deaths and injuries by preventing drivers from driving while impaired by alcohol.

As indicated in the attached press release, three technology providers received proof-of-concept research awards to develop a working prototype of their technology. The focus of this phase of the research is on speed and accuracy of the device in measuring blood alcohol content (BAC). Depending on the results of this proof-of-concept phase of the project, one or two technologies will be selected for development and demonstration in vehicles.

For Immediate Release
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Major Advancement for Efforts to Eliminating Drunk Driving: Research Awards Granted to Three Companies

Washington, DC – The Driver Alcohol Detection System for Safety (DADSS) Research Program announces the awarding of Phase 1 proof – of – concept research awards to three technology providers: Autoliv Development AB of Vårgårda, Sweden; Alcohol Countermeasure Systems, Inc. of Toronto, Canada; and TruTouch Technologies, Inc. of Albuquerque, New Mexico.

"These three firms were selected following a rigorous, year – long competitive vetting process," said Susan A. Ferguson, DADSS program manager. Seventeen technology providers from around the world submitted proposals for developing a working prototype of their DADSS technology concepts.

Phase 1 awards are for $400,000 each. Awardees that successfully complete Phase 1 will be eligible to compete for Phase 2 funding totaling $2.5 million each. The technology concepts range from passively analyzing drivers' breath to using spectroscopy to estimate BACs by measuring the skin's absorption of light. Full descriptions of each awardees' DADSS concept are attached.

The DADSS Program, a partnership between the National Highway Traffic Safety Administration and the Automotive Coalition for Traffic Safety, is exploring new advanced alcohol detection technologies that one day could be developed for widespread use.

"These awards move the nation significantly closer to, one day, eliminating drunk driving," said Laura Dean – Mooney, national president of Mothers Against Drunk Driving. "The DADSS Program is an essential component to MADD's *Campaign to Eliminate Drunk Driving*." MADD was joined by others in November 2006 to launch the campaign, which relies on the high-visibility enforcement of strong laws, public education and awareness, and technology to ultimately eliminate drunk driving.

"An alcohol detector that's suitable for all drivers would have to be all but invisible – it shouldn't hassle sober drivers – and would require virtually no upkeep," said Ferguson. "It would have to be quick and easy to use and provide accurate readings. No such device exists yet."

A recent study shows that the public is ready for such a device. The Insurance Institute for Highway Safety (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.

"The results are clear, and may be surprising to some," said IIHS President Adrian Lund. "We didn't expect to find such broad support for this. However, our study shows that, as long as the technology is reliable, the public is ready to put technology to work keeping drunk drivers off the road."

"In the big picture, MADD is excited about advancing technology like DADSS in a way that can eliminate drunk driving," said Dean – Mooney.

Although most impaired drivers are never arrested, alcohol – impaired driving is a major contributor to fatal crashes. In 2008, 11,773 people – or a full 32 percent of all traffic-related deaths – died in crashes involving drivers with blood alcohol concentrations (BAC) at or above the legal limit of 0.08 percent.

IIHS analysis has shown that if driver BACs can be limited to no more than 0.08 – the legal limit in all 50 states – more than 8,000 lives could have been saved in 2008.

"What DADSS will do is prevent anyone from operating a motor vehicle if their BAC exceeds the legal limit of 0.08 percent," explained Ferguson.

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DADSS SUBSYSTEM PHASE I PROOF-OF-PRINCIPLE PROTOTYPE DEVELOPMENT

TECHNOLOGIES DESCRIPTION

AUTOLIV DEVELOPMENT AB – VÅRGÅRDA, SWEDEN

The Autoliv in-vehicle alcohol detection system will measure alcohol from the exhaled breath of the driver. The measurement technique which has been under development for several years uses non-dispersive Infra-Red technology. By using the concentrations of carbon dioxide (CO_2) as a measure of dilution of the exhaled breath of the driver it is possible to perform a contact free, unobtrusive measurement of the driver's breath alcohol (i.e. without a mouthpiece).

The challenge is to identify and quantify small variations in the vehicle cabin air within an arm-length distance to the driver's mouth and nose. 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. Infrared spectroscopy, which will be used to sense both alcohol and CO_2, has the ability to provide high sensitivity, specificity and system reliability.

ALCOHOL COUNTERMEASURE SYSTEMS INC. – TORONTO, CANADA

A second prototype is also adopting a breath-based approach. ACS is working with Daylight Solutions (DLS), a company with expertise in the mid IR (MIR) technology for molecular detection. Specifically, sensors based upon DLS patented external cavity quantum cascade laser (ECqcL™) technology will be employed to enable identification and analysis of ethanol. The ACS approach is to use the ECqcL sensor to measure ethanol emanating from the driver by simultaneously measuring the concentration of alcohol and CO_2 in the cabin air of the vehicle in the near proximity of the driver. This method allows for rapid, accurate measurements to be taken while simultaneously providing the necessary specificity to allow the system to be immune from common interferants such as gasoline, exhaust fumes and perfume.

TRUTOUCH TECHNOLOGIES – ALBUQUERQUE, NM - USA

The TruTouch technology employs near-infrared (NIR) absorption spectroscopy to measure alcohol in skin tissue. NIR spectroscopy is the science that characterizes the transfer of electromagnetic energy to vibrational energy in molecular bonds, referred to as absorption, which occurs when NIR light interacts with matter. The specific structure of a molecule dictates the wavelengths at which the electromagnetic energy will be transferred. Thus, the absorbance spectrum of each molecular species is unique.

The touch-based DADSS prototype will be based on current TruTouch products which are comprised of a light source, optical touch pad, and spectrometer engine. The measurement begins by shining NIR 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 unique chemical information and tissue structure of the user which can be used to determine the driver's identity. This light is analyzed to determine the tissue alcohol concentration and, when applicable, confirm the identity of the user.