In-Vehicle Alcohol Detection

Résumé

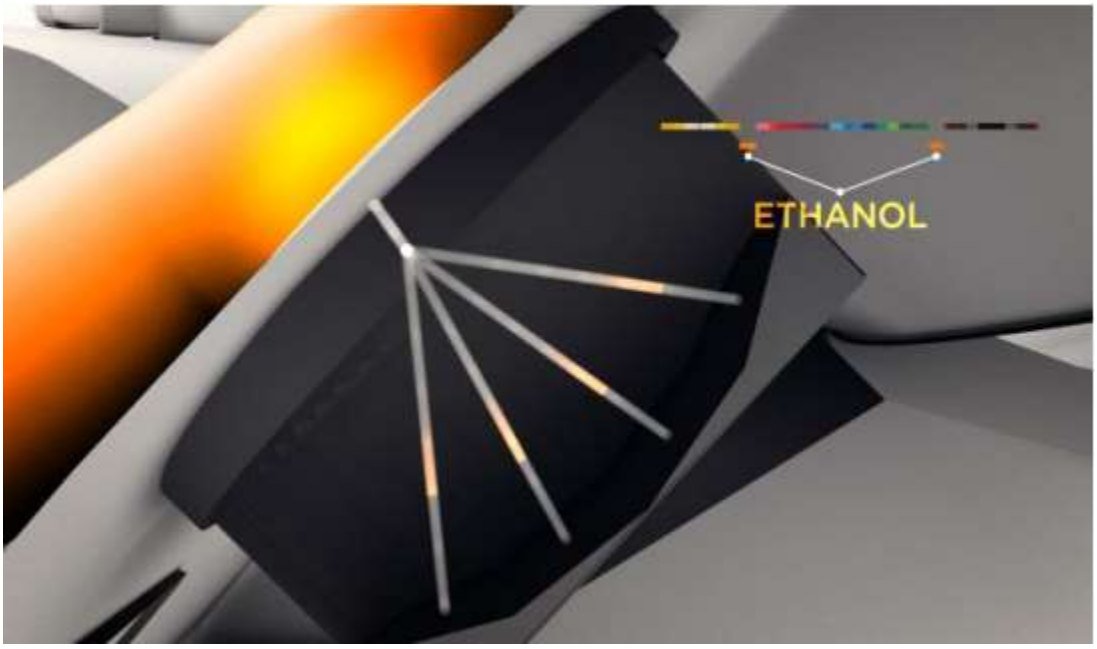
Les systèmes passifs embarqués dans les véhicules pour détecter l'alcool au volant sont en cours de développement depuis de nombreuses années. Entres autres, un programme de recherche aux États-Unis rassemble le gouvernement et l'industrie pour explorer la faisabilité, les avantages et les défis associés à l'utilisation de telles technologies embarquées.

Research on the Driver Alcohol Detection System for Safety (DADSS) is being undertaken collaboratively by the Automotive Coalition for Traffic Safety (ACTS), representing 17 automobile manufacturers, and the U.S. National Highway Traffic Safety Administration (NHTSA). The goal of the research is to assess and develop alcohol-detection technologies to prevent vehicles from being driven when a driver's blood alcohol concentration (BAC) exceeds the legal limit.

The research programme began in 2008 with the goal of assessing the feasibility and effectiveness of in-vehicle alcohol-detection technologies. Two methods of measuring absolute driver alcohol levels are under active consideration.

One system samples and analyzes breath exhaled by the driver. The driver simply enters the vehicle and breathes normally. The in-vehicle device draws some of the exhaled breath into a sensor that directs infrared light onto the sample and analyzes the responses at specific wavelengths. The system can detect both carbon dioxide and alcohol and uses their relative concentrations to determine the driver's BAC.

The second system uses a touch sensor and near-infrared spectroscopy to measure alcohol present in the driver's blood. The sensor shines infrared light onto the driver's skin, so penetrating the adjacent subcutaneous capillaries. A spectroscope is used to probe the specific wavelengths in the reflected light at which alcohol can be detected and provides a measure of the driver's BAC.



Takata-TruTouch non-invasive alcohol sensing system using near-infrared spectroscopy on the driver's finger

Canadian Research on Driver Alcohol Detection Technology

An Auto-21 project, headed by Dr. Eihab Abdel-Rahman at the University of Waterloo aimed to produce an in-vehicle alcohol detection and interlock system. The project included the development of novel micro-electromechanical gas sensors, new detector polymers, transmission interlocks for gas powered, hybrid and electric vehicles, a vehicle decision module, and looked at integrating these system components into a product as original vehicle equipment or for after-market installation.

https://www.plant.ca/features/alcohol-sensors/

ACTS developed stringent performance requirements for DADSS, stipulating high levels of accuracy and precision, as well as a fast measurement time, in order to ensure that the technologies would be unobtrusive and not pose any potential inconvenience to sober drivers. The initial phase of the research, completed in 2011, focused on the speed, accuracy and precision of the methodologies. A subsequent phase of the programme has been aimed at improving measurement performance while decreasing measurement time. Additional, laboratory-based, human-subject testing has been conducted to understand human interaction with the sensors, both physiologically and ergonomically, in order to assess how these technologies might operate in a vehicle environment.

In the next phase of the research programme, a number of prototype vehicles, equipped with the latest generation of sensing technologies, will be road tested in jurisdictions across the United States. The vehicles will be operated over a wide range of geographic and climatic conditions, and the tests will utilize drivers who are unfamiliar with the sensing systems. It is anticipated that this testing will identify the acceptability of the normally unobtrusive nature of the sensing technologies, allow evaluation of driver reactions to the mode of operation of the DADSS system should this be activated, and indicate any unforeseen problems that may arise in real-world operation.

The ultimate goal of the research is to prove DADSS to be a viable countermeasure to the problem of alcohol-impaired driving. The system must be shown to be capable of accurately detecting drivers who have a BAC at or above the legal limit, and prevent the vehicle from moving by means of an engine interlock, without inconveniencing sober drivers. The intention is that such a system will be made available as a safety option in new vehicles, in the same manner as automatic braking, lane-departure warning, and other advanced driver assistance technologies.

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References:

dadss
http://www.dadss.org/

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https://www.youtube.com/watch?v=fwuIAQY7xq4