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CONGRESSIONAL TESTIMONY

# **ENHANCING VEHICLE TECHNOLOGY TO PREVENT DRUNK DRIVING**

**Testimony before  
The Consumer Protection and Commerce Subcommittee**

**Energy and Commerce Committee**

**U.S. House of Representatives**

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# Enhancing Vehicle Technology to Prevent Drunk Driving

## Introduction

Good Morning Madam Chairwoman Schakowsky, Ranking Member Rodgers, and distinguished members of this subcommittee. Thank you for the opportunity to appear before you today to update you on the important technology research to prevent drunk driving that is being performed by the **Automotive Coalition for Traffic Safety, Inc. (“ACTS”)**. I am Robert Strassburger, President & CEO of ACTS.

ACTS is a 33-year-old nonprofit based in the Commonwealth of Virginia that is funded by all of the world’s leading light car and truck makers.<sup>1</sup> The mission of ACTS is to research, educate and promote highway and motor vehicle safety.

Since 2008, ACTS has been working with the U.S. Department of Transportation's **National Highway Traffic Safety Administration (“NHTSA”)** as part of a public-private partnership to develop vehicle-integrated technologies to prevent drunk driving – what has become known as the **Driver Alcohol Detection System for Safety (“DADSS”) Program**. Public-private partnerships like DADSS have led to innovations that enhance our everyday lives, such as the internet, GPS and the microchip.

Recognizing the potential of the DADSS technology to save lives by preventing drunk driving, Virginia became the first state to join the **Driven to Protect Initiative** in late 2016 through its Department of Motor Vehicles' Highway Safety Office.<sup>2</sup> Through this Initiative, Virginians are getting an early look at the progress being made and fleet drivers are providing input about their experience with vehicles fitted with prototype DADSS sensors that is helping to improve the technology before it becomes widely available to all consumers.

## DADSS Program

Despite progress over the past three decades, drunk driving in the U.S. claims approximately 10,000 lives and costs the U.S. \$194 billion every year. To address this problem, the DADSS cooperative research partnership, was established. The Program is dedicated to advancing the state of alcohol detection systems for motor vehicles. Its explicit mission is 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.”* To accomplish

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<sup>1</sup> ACTS' is wholly funded by a diverse membership which includes companies headquartered in the U.S., Europe and Asia – BMW, Fiat Chrysler Automobiles, Ford, General Motors, Honda, Hyundai, Jaguar Land Rover, Kia, Mazda, Mercedes-Benz, Mitsubishi, Nissan, Porsche, Subaru, Toyota, Volkswagen and Volvo.

<sup>2</sup> With NHTSA approval, state highway safety offices may use 23 U.S.C. §154, §164, §402, or §405 grant funds to sponsor DADSS deployment projects, subject to the existing conditions for such grants.

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this, ACTS is working to demonstrate the **commercial feasibility** and assure the **commercial viability** of DADSS technologies, hasten deployment, while managing and mitigating technical and financial risk.

The Program is developing a first-of-its-kind alcohol detection technology that can detect when a driver is impaired by alcohol and prevent the car from moving. Once the DADSS technology has met rigorous performance standards, it will be voluntarily offered to vehicle owners as a safety option, similar to other driver assist systems like automatic braking or lane departure warning.

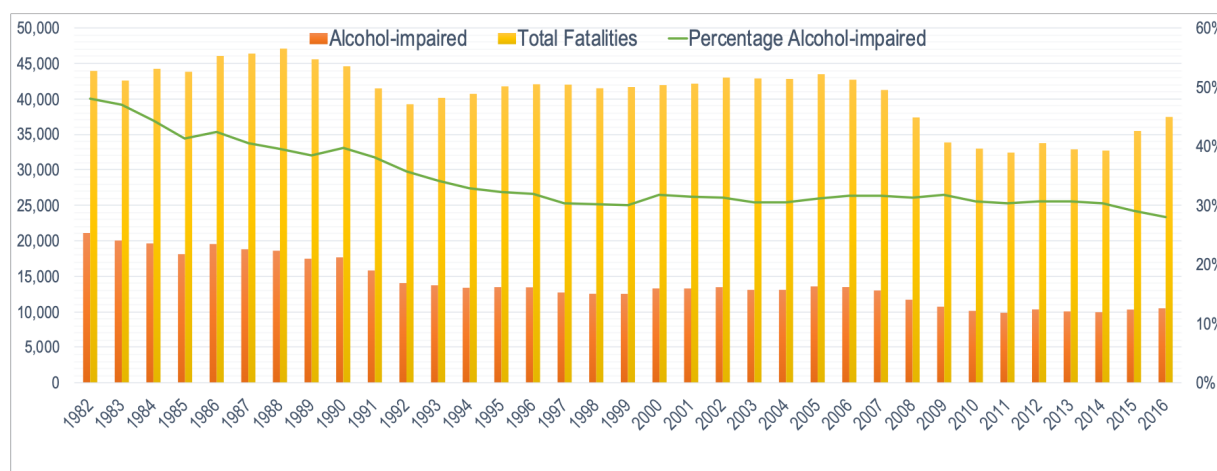


Figure 1 Impaired driving fatality trend in the U.S. Source: NHTSA.

### Potential Safety Benefits of DADSS Technologies

DADSS technologies hold the greatest, and likely the most expeditious, promise to reverse impaired driving fatalities trends in the U.S. and globally. The estimated safety benefits of various drunk driving countermeasures are compared in the table below.

Countermeasure	Deaths Avoided Annually
All offender ignition interlock requirements	552 <sup>3</sup>
50-state 0.05 <i>per se</i> BAC Limit <sup>4</sup>	1,790 <sup>5</sup>
All driver BACs limited to 0.08 or less	6,904 <sup>2</sup>

<sup>3</sup> Lund, Adrian K.; McCartt, Anne T.; Farmer, Charles M. (2012). Contribution of alcohol-impaired driving to motor vehicle crash deaths in 2010. *Insurance Institute for Highway Safety*.

<sup>4</sup> Utah began enforcing a 0.05 BAC limit effective December 30, 2018. In 1983, Utah was the first state to lower its BAC limit to 0.08 from 0.10. In 2000, President Clinton signed legislation compelling states to adopt 0.08 BAC effective no later than 2004.

<sup>5</sup> [Alcohol Clin Exp Res](#). 2017 Dec;41(12):2128-2139. doi: 10.1111/acer.13501. Epub 2017 Oct 24.

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The projected estimates above indicate that the inclusion of more widespread deployment of vehicle-integrated technology as part of a multi-faceted, comprehensive commitment to reduce and eliminate drunk driving would likely significantly enhance the safety benefits attributable to that commitment.

An analysis by the University of Michigan's Transportation Research Institute ("UMTRI") estimated the injury prevention impact and cost savings associated with vehicle-integrated technology that limits driver BACs to less than 0.08 percent (0.08%).<sup>6</sup> The UMTRI study concluded that over 15 years:

- 85 percent (85%) of crash fatalities (>59,000) and 84 to 88 percent (84% ~ 88%) of nonfatal injuries (>1.25 million) attributable to drinking drivers would be prevented; thereby
- saving an estimated \$342 billion in injury-related costs, with the greatest injury and cost benefit realized among recently legal drinking drivers.

### **DADSS Program Authorization**

The DADSS Program is authorized and funded through 2020 under strict performance specifications based on a blood alcohol concentration (BAC) level of 0.08 percent (0.08%) – the legal limit in every state except Utah. See 23 U.S.C. §403(h). Funding is capped at \$21.248 million which will result in a 10 percent (10%) reduction in federal funding in Fiscal Year 2020. See 23 U.S.C. §403(h)(2).

The DADSS authorization prohibits the development of, *"requirements for any device or means of technology to be installed in an automobile intended for retail sale that records a driver's blood alcohol concentration."*

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<sup>6</sup> Carter, P. M., Flannagan, C. A., Bingham, C. R., Cunningham, R. M., & Rupp, J. D. (2015). Modeling the Injury Prevention Impact of Mandatory Alcohol Ignition Interlock Installation in All New US Vehicles. *American Journal of Public Health*, (0), e1-e8.

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### DADSS Technologies

Two technologies are being researched: a touch-based and a breath-based system.

The **breath-based system** measures alcohol as a driver breathes normally, when in the driver's seat. It is being designed to take instantaneous readings to accurately and reliably distinguish between the driver's breath and that of any passengers.



Figure 3 Breath-based DADSS System Illustration



Figure 2 Touch-based DADSS System Illustration

The **touch-based system** measures blood alcohol levels by shining an infrared-light through the fingertip of the driver. It is being designed to be integrable into current vehicle controls, such as the starter button or steering wheel, and take multiple, accurate readings.

A significant part of the Program's efforts has been aimed at the research needed to achieve the **DADSS Performance Specifications** related to speed, accuracy, precision and reliability of the BAC measurement. These rigorous standards continue automaker's long-standing best practice to use six-sigma quality requirements, which demand that every piece of safety equipment installed in passenger vehicles as original equipment performs correctly 99.9997 percent (99.9997%) of the time. These stringent performance specifications are necessary to:

- Ensure that no driver at or above 0.08% BAC is allowed to drive; while also
- Ensuring that sober drivers are not hassled.

The DADSS technology must be accurate, precise, repeatable and reproducible over the 20-year life of a vehicle for the variety of people (ethnicity, gender, medical condition, etc.) from which the measurement is to be made who will use that vehicle over its lifetime.

The DADSS Performance Specifications set accuracy and precision requirements for a BAC range from 0.01 percent to greater than 0.09 percent (0.01% ~ 0.09%).

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### Current Efforts

#### *Component, System and Vehicle Level Testing of the DADSS Technology*

Following good scientific and engineering practice, testing of the DADSS technologies, i.e., at the component level at the DADSS Lab, at the system level involving human subjects at Harvard's McLean Hospital, and at the vehicle level through on-road evaluations (currently in Virginia and Massachusetts) is currently being conducted over a broad range of BAC from 0.00% through 0.12%, over a broad range of operational and environmental conditions and alcohol consumption and elimination protocols.



*Figure 4 Component level testing in an environmental chamber at the DADSS Lab in Marlborough, MA*



*Figure 5 System level testing involving human subjects at McLean Hospital, a Harvard Medical School affiliate*

## Enhancing Vehicle Technology to Prevent Drunk Driving

Two on-road evaluations of the DADSS technologies are being initiated: a naturalistic evaluation and a controlled evaluation. These evaluations supplement the component level testing being conducted at the DADSS Lab in Marlborough, MA and the system level testing being conducted at McLean Hospital, an affiliate of the Harvard Medical School.

The **naturalistic evaluation** involving livery vehicles fitted with the breath-based technology derivative suitable for use in fleets, began in August 2016 in partnership with the Commonwealth of Virginia and James River Transportation. See <https://www.dadss.org/virginia/>. To date, over 41,000 miles have been accumulated and over 21,000 sensor readings made in over 4,000 hours of operation. Naturalistic testing will expand later this year in Virginia, and possibly in other states or sites.

The **controlled evaluation** is to begin once clearance for the information collection is approved by the Office of Management and Budget (“OMB”). That approval is currently pending which is delaying initiation of this testing. See 80 FR 24314 (2015) and 82 FR 37163 (2017). Once begun, this testing will stress the DADSS sensors operating under environmental and altitude extremes experienced in the U.S. involving dosed passengers. In anticipation of OMB approval, “shake down” testing, by staff, of the vehicles, data acquisition system, and evaluation protocol to be used in this evaluation began in Massachusetts in February 2019.

The information gathered in these evaluations will be used to narrow gaps between actual performance and the performance specifications that need to be met to allow widespread use of DADSS technologies, make improvements to the technology for long-term installation in cars and trucks bringing us one step closer to when the technology is ready to be offered to both automakers and consumers as an optional safety system.

This battery of stress testing ensures that we have a robust DADSS sensor and system, and is also generating a comprehensive data library of BAC data under all manner of conditions in which the DADSS system is to operate. This will ensure that the measurement algorithm adopted will be robust over a broad range of BAC and operating conditions.

### *Technology Roadmap*

While the DADSS Program remains in the invention phase, we estimate the testing now being conducted will conclude with the technology transfer, by the end of the current authorization in 2020 with the release of the first DADSS commercial derivative for fleet vehicles and accessory applications of the breath-based DADSS technology (GEN 3.3). Should the FAST Act authorization be extended to 2024, we are targeting the release of the derivative for privately owned and operated vehicles for the breath-based technology by 2023 to 2024 (GEN 4.0) and

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the touch-based technology by 2024 (GEN 5.0). Should the authorization be enhanced, we estimate that the release of the private vehicle derivative could be pulled ahead one to two years.



Figure 6 Automotive innovation and technology transfer in relation to product development process (Source: CAR).

- To accomplish technology transfer of the breath-based fleet derivative (GEN 3.3) by 2020, we are:
  - Taking advantage of SAE's expedited development process to ratify the DADSS Performance Specification for fleet vehicles as an SAE J-standard;
  - Planning the needed verification and validation and other recordkeeping testing needed to support a final release decision in 2020;
  - Raising awareness of the DADSS technology among fleet operators and service providers beginning in April 2019;
  - Working to qualify the supply chain needed to support the semi-automated, low-volume production of up to 100,000 to 200,000 units per year<sup>7</sup>;
  - Working to develop the business model and deployment strategy.<sup>8</sup>

<sup>7</sup> This work does not involve the expenditure of federal or state grant funds.

<sup>8</sup> Ibid.



## Enhancing Vehicle Technology to Prevent Drunk Driving



**Safety that's also good for the bottom line.**

The Driver Alcohol Detection System for Safety (DADSS) Program is developing a first-of-its-kind technology that can passively detect when a driver is under the influence of alcohol and prevent the vehicle from moving.

Our **Alcohol Detection System (ADS)** helps keep vehicle operators safe, which also protects your business. If you are a fleet manager or service provider **visit booth 979 to learn more.**

**dadss** 

Figure 7 NAFA Institute & Expo Program Ad (See <https://www.nafainstitute.org/Home.aspx>).

### *Driven to Protect Initiative*

In late 2016, Virginia became the first state to use NHTSA highway safety grant funds to partner with the DADSS Program, through the Virginia Department of Motor Vehicles' Highway Safety Office. This partnership resulted in an initiative called **Driven to Protect** which is a model program for raising awareness and acceptance of the DADSS technology to generate consumer demand for the technology in sync with the readiness of the technology. Initiative events have been held at NASCAR races, minor league baseball games, on military posts, and other venues. Under the Driven to Protect Initiative, Virginia is also helping to educate the next generation of drivers about responsible driving behavior, and is helping to prevent additional drunk driving crashes, injuries and deaths on its roads.

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Figure 8 Driven to Protect exhibit at the Washington Auto Show (2018).

### *Intellectual Property*

To promote commercialization, hasten deployment, and assure commercial viability, ACTS owns all of the intellectual property created by the DADSS Program. ACTS is prosecuting DADSS-related patents in the major regions of the world where motor vehicles are manufactured, namely, Canada, China, Europe, Japan, South Africa, South Korea<sup>9</sup>, Sweden, and the United States. ACTS is also prosecuting patents under the Patent Cooperation Treaty (“PCT”) which makes it possible to seek patent protection for an invention simultaneously in each of a large number of countries by filing an “international” patent application.<sup>10</sup> All costs associated with the prosecution and maintenance fees of the DADSS technology patent portfolio are borne exclusively by ACTS. The portfolio currently includes ten (10) patent families worldwide covering ten (10) patent areas. The total number of applications exceeds fifty (50). Nine (9) patents have issued to date.

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<sup>9</sup> Beginning in 2018.

<sup>10</sup> <https://www.wipo.int/treaties/en/registration/pct/>

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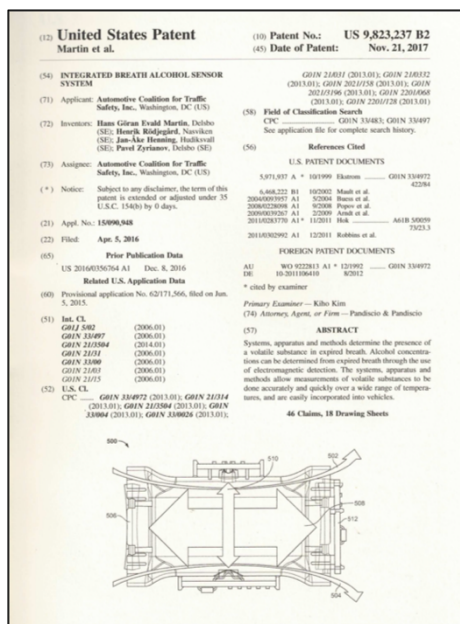


Figure 9 U.S. Patent No. 9,823,237, "Integrated Breath Alcohol Sensor System (2017)

ACTS will license the DADSS technology on the same terms as ACTS Members to any entity with the capability of manufacturing, deploying and supporting or servicing DADSS technologies.

## Summary

The DADSS Program began with a wild, audacious conceptual question: What if we had widely-deployable, vehicle-integrated technology that could limit driver BACs to less than 0.08? Our initial research taught us that we would need an alcohol detection system that, without hassling sober drivers, measured a driver's BAC within one-third of a second with exceptional accuracy and precision<sup>11</sup> that doesn't require any maintenance over the vehicle's life. The research performed subsequently has led to inventions that have turned that audacious concept into a technology suite that holds extraordinary promise for commercialization and deployment in just a few years. Once successfully deployed, DADSS is likely to produce safety benefits on par with electronic stability control and the safety belt.

## More Information

DADSS Program Publications: <https://www.dadss.org/our-publications/>  
DADSS Events: <https://www.dadss.org/events/>  
Driven to Protect Events: <https://www.dadss.org/driven-to-protect/>

<sup>11</sup> The DADSS Performance Specification states that the accuracy and precision of the BAC measurement should at least  $\pm 0.0003\%$  or "three-zeros, three". To conceptualize this, that's equivalent to being able to measure the weight of a 4-ounce filet mignon placed on the hood of a 66,000-pound cement mixer.

## ABOUT ACTS

ACTS was originally incorporated in the District of Columbia on June 27, 1986 as the American Coalition for Traffic Safety. On July 23, 1992, ACTS was incorporated in the Commonwealth of Virginia. On June 16, 1999, the Board of Directors adopted the organization's current name.

ACTS is classified as a 501(c)(4) nonprofit corporation by the U.S. Internal Revenue Service. It is funded by motor vehicle manufacturers.

In furtherance of its mission and objectives, ACTS works cooperatively with other safety organizations and government agencies. ACTS has brought together disparate groups to address difficult safety issues and has hosted numerous leadership conferences on increasing safety belt and child restraint use.

ACTS facilitated the U.S. DOT's **Blue Ribbon Panel on Child Restraints and Vehicle Compatibility**, which is credited with the introduction of LATCH (Lower Anchors and Tethers for Children). ACTS also facilitated a second **Blue Ribbon Panel: Protecting Our Older Child Passengers**, which encouraged states to enact booster seat laws.

ACTS has worked to keep tweens safely restrained in the back of vehicles and raised awareness about the very serious safety issue of unintended kids in and around cars.

In 2005, ACTS was asked to serve as the manager of state legislative activities, and later overall management services, for the **National Safety Council's Air Bag and Seat Belt Safety Campaign**. The Campaign was a coalition of automakers, insurance companies and traffic safety advocates who came together in response to a national crisis of children dying from first generation frontal airbags. In this role, ACTS was influential in helping states pass primary enforcement safety belt laws.

In 2008, the scope of ACTS' activities was further expanded when the organization established a public-private partnership with the U.S. federal government to research and develop vehicle-integrated technologies to prevent drunk driving known as the **Driver Alcohol Detection System for Safety Program**.

See [www.actsautosafety.com](http://www.actsautosafety.com) and [www.dadss.org](http://www.dadss.org).