



## Frequently Asked Questions – 2021

### What is the Driver Alcohol Detection System for Safety (DADSS) Research Program?

The DADSS Research Program is a collaborative research effort to invent, test, commercialize and deploy new alcohol detection technologies for widespread use in commercial vehicles. The Program brings together the Automotive Coalition for Traffic Safety (ACTS), which represents the world's leading automakers, and the U.S. Department of Transportation's National Highway Traffic Safety Administration (NHTSA), in one of the most important government and private sector partnerships in transportation history. Public-private partnerships like DADSS have led to innovations that enhance our everyday lives, such as the Internet, GPS and the microchip.

### What is the overall goal of the Program?

The goal is to advance the state of alcohol detection systems by developing a first-of-its-kind technology that can passively detect when a driver is under the influence of alcohol and prevent a vehicle from operating. The technology is being designed to precisely detect and measure a driver's blood alcohol concentration (BAC) and if it is at or above the legal limit—0.08 in most states – prevent the vehicle from moving. The system is designed to be fast, accurate, reliable, and affordable – all without affecting normal driving behavior.

### How does the technology work?

Two technologies are being developed: a breath system and a touch system. The breath system will measure alcohol in a passive, non-invasive way as a driver breathes normally, when in the driver's seat. Unlike existing breathalyzers, a forced deep lung sample is not required into a mouthpiece, making the system seamless and tamperproof. The breath system is also being designed to accurately and reliably distinguish between the driver's breath and any passengers.

The touch system measures blood alcohol levels under the skin's surface by shining an infrared-light into the fingertip or palm of the driver. It will be integrated into current vehicle controls, such as the starter button or steering wheel, and take multiple, accurate readings in less than a second.

### What are the projected safety benefits of the DADSS technology?

Despite progress over the past three decades, drunk driving remains the #1 cause of fatalities on U.S. roadways, claiming more than 10,000 lives and costing the U.S. approximately \$194 billion every year. With support from safety advocates and the auto industry, Congress has recognized the Program's life-saving potential and made it part of a multi-faceted national commitment to reduce and eliminate drunk driving.

A 2020 study by the Insurance Institute for Highway Safety (IIHS) estimates that a quarter of U.S. road fatalities could be prevented and more than 9,400 lives can be saved annually if drivers with a blood alcohol concentration (BAC) above the legal limit—0.08 in most states – can be prevented from operating a vehicle.

A University of Michigan Transportation Research Institute (UMTRI) analysis concluded that over 15 years:

- Almost 59,000 deaths and approximately 1.25 million nonfatal injuries could be avoided; and an
- Estimated \$342 billion in injury-related costs avoided, with the greatest benefit realized among recently legal drinking drivers.



## **Who is involved in this Program?**

The Automotive Coalition for Traffic Safety (ACTS) and the National Highway Traffic Safety Administration (NHTSA) are working together in collaborative research to develop the DADSS technology. ACTS is a nonprofit organization wholly funded by the world's leading automakers, including the BMW, Ford, General Motors, Honda, Hyundai, Kia Motors, Mazda, Mercedes-Benz, Mitsubishi, Nissan, Porsche, Stellantis, Subaru, Toyota, Volkswagen and Volvo.

Two technology developers are currently refining the prototypes; Senseair AB, a Swedish-based sensor company, is working on a breath system, while program engineers are working with the German laser technology company Sensalight Technologies on a touch system.

## **When did this Program begin and how has it evolved?**

The DADSS Program began in 2008 and was focused on research and creation of proof-of-concept prototypes to determine which technological approaches were most promising for vehicle integration. After extensive research, it was determined that the breath system and touch system were most viable.

Since that time, the Program has focused on ensuring the technology meets strict performance specifications related to accuracy, precision and reliability, so sober drivers are not inconvenienced, and so drunk drivers are never allowed to operate the vehicle.

In 2018, the Commonwealth of Virginia announced the first trial deployment with James River Transportation (JRT) to conduct in-vehicle, on-road test trials of the technology with sober drivers in naturalistic settings. This initiative, called Driven to Protect, was expanded to Maryland in 2019. That same year, the Program expanded on-road testing to include controlled, in-vehicle tests with drinking passengers, to determine how the sensors respond to real-world conditions. Those tests continue today.

In 2021, the Program announced the first-generation system equipped with the breath technology will be made available for open-source commercial licensing in fleet vehicles for the first time ever. ACTS will begin licensing the technology to interested parties and a product equipped with the breath technology will be made available in late 2021 to any existing fleet or company that wants to outfit it into their vehicles – whether it be transportation vehicles, government fleets, rental cars, transportation vehicles, trucking companies, etc. This system is designed for fleet operators implementing a zero-tolerance alcohol policy for their drivers.

Today, teams of engineers, chemists and data scientists are working to reduce the size of the sensors so they are small enough to fit into passenger vehicles, can withstand harsh environmental conditions, do not require extensive calibration and can last the entire lifetime of a vehicle. Previous transportation safety innovations like airbags have taken a minimum of 20 years to be tested and approved for the public's use, and the DADSS Program is on track to be completed in less time.

## What has been accomplished to date?

Since the program began, the following milestones have been achieved:

- **Invented 2 cutting-edge viable technologies:** a breath system and a touch system
- **Evolved 5 new generations** of the touch system and **6 generations** of the breath system
- **Increased breath sensor sensitivity** to alcohol by **99.79%**
- **Reduced the size** of the breath technology by **85%** and the touch technology by **89%**
- **Integrated 40 vehicles** with test sensors, driving **65,866 miles** and clocking **9,783 sensor hours** over **1,600 days**, which is equal to almost **4.5 years**
- **Began testing** the technology with everyday people on the road in specially built vehicles and in controlled, dosed experiments in a hospital setting
- **Collected 136,678 breath, blood and touch** samples from **338 individuals** in **443 human subject and driving testing** with the Harvard-affiliated McLean Hospital
- **Filed or secured 63** global patents to ensure all intellectual property is open-sourced
- **Built relationships with Tier 1 automotive suppliers** to ensure the technology will be manufactured at a scale and cost that makes it a viable consumer option
- **Developed partnerships** with state motor vehicle departments to support testing and deployment
- **Began negotiations** with fleet providers and electric vehicle companies on additional deployment
- **Building consumer demand** by demonstrating the technology at 86 local, national and international events so that when available, the technology will have consumer demand

## What is the next step for the Program?

DADSS continues to form key partnerships to test the technology for commercial deployment. Beginning in Virginia, through the Driven to Protect Initiative, breath sensors have been integrated into vehicles for on-road tests, allowing engineers to collect data from sober drivers and observe driver behavior in natural settings. On-road testing has been expanded to include controlled, in-vehicle tests with drinking passengers to determine how the sensors respond to real-world conditions.

Today, teams of engineers, chemists and data scientists continue to evolve the technology to meet the strict performance specifications, ensuring the systems are fast, accurate and reliable before they are made available for widespread commercialization. These individuals are also working to reduce the size of the sensors, so they are small enough to fit into passenger vehicles. Previous transportation safety innovations like airbags have taken a minimum of 20 years to be tested and approved for the public's use. The DADSS Program is on track to be completed in less time and is currently on schedule with the following timeline for commercialization:

- **2021:** Zero-tolerance (.02 BAC) **directed breath sensors** available for purchase by **fleet operators**
- **2023:** Zero-tolerance (.02 BAC) **touch fleet sensors** available for purchase by **fleet operators**
- **2024:** Fully **passive breath sensors** that can be installed in consumer vehicles & set at the legal limit
- **2025:** Fully **passive touch sensors** that can be installed in consumer vehicles & set at the legal limit



## **When do you expect the technology to be in U.S. cars and trucks?**

The current timeline for commercialization for use in consumer vehicles is by 2024 for the breath system and 2025 for the touch system. Engineers are in the middle of comprehensive human subject and driving testing that are required to ensure the highest levels of accuracy, precision and reliability before being introduced to consumers. This includes testing the technology with real people in natural driving conditions. The Program will use the information gathered in these tests to make improvements to the technology for widespread deployment in consumer vehicles.

## **How is DADSS technology different from interlocks, breathalyzers and other alcohol detection technologies? How will it prevent tampering?**

The DADSS Program is developing much more sophisticated technology than anything on the market today and differs from existing ignition interlocks and breathalyzers in three main ways. First, there are no large pieces of hardware or equipment in the vehicle cabin, making the system seamless and tamperproof. Second, instead of requiring a forced deep lung sample from the driver, the system is being designed to take accurate, unobtrusive readings in less than a second while the driver breathes normally. Third, the system will meet performance standards related to speed, accuracy, precision and reliability that are higher than any other alcohol detection technology available today. The DADSS technology is not designed to be a punitive or corrective device, but rather a consumer safety option, much like lane departure warning or automatic braking.

## **What about existing technologies such as driver monitoring systems?**

Technologies that help drivers better perform their task – like warning of drowsiness or nearby vehicles – have come a long way, but they are prominently found in newer and luxury vehicles.

While these systems can, in some driving situations, *infer* certain behavior, no technology exists or is under research with the same level of sophistication as the systems being developed by DADSS to *measure* and *quantify* precise alcohol concentrations in drivers and render a vehicle inoperable. This is a key distinction, because if we are to reach the goal of saving 9,400 lives annually that the Insurance Institute for Highway Safety (IIHS) estimates is possible, we must put in place technology that stops drunk drivers from driving even one mile, which driver monitoring systems cannot do.

DADSS technology – measuring a driver's precise BAC in less than a second – is a much more sophisticated system. To date, no technology has been developed that can passively and unobtrusively measure breath alcohol concentrations with the necessary high levels of precision and accuracy while fitting into vehicles with a seamless operation. It is a true feat of biomedical engineering, and unlike anything designed for vehicles before.



## **What are the technical challenges associated with the DADSS technology?**

Developing a sensor that can positively, quickly, reliably, and accurately measure a driver's blood alcohol concentration – without inconveniencing the sober driver – has never been attempted before. Part of the research includes inventing completely new equipment that also never existed before to rigorously test the alcohol sensors. It also means inventing the test methods and protocols for making measurements in the part-per-billion range, the test devices for making those measurements, and the acceptance limits. As an added challenge, the sensor must be small enough to fit seamlessly into a motor vehicle; sensitive enough to measure ultra-low concentrations of alcohol; intelligent enough to distinguish between the driver and any passengers; and rugged enough to work every day of a vehicle's 20-year life span, in all types of environmental conditions, and with little to no maintenance. And finally, it must be mass producible in automotive quantities to automotive quality standards.

## **Will the technology be reliable?**

A significant part of the DADSS Research Program has been the establishment of DADSS Performance Specifications related to speed, accuracy, precision and reliability. These rigorous standards are based on the Department of Defense's technology and manufacturing readiness levels, and they are in addition to manufacturers' six-sigma quality requirements, which demand that every piece of safety equipment installed in passenger vehicles as original equipment performs correctly 99.9997% of the time.

With this combination, the DADSS technology will be held to unprecedented standards to ensure BAC levels are measured quickly and reliably. Not even medical instruments are engineered to have such strict specifications. The DADSS Program is being overseen by a team of engineers and scientists and will be further tested in real-world operating conditions and by independent third parties before being made available to consumers.

## **Will the technology be set at a limit other than 0.08%?**

The Program was authorized and funded under strict performance specifications based on a blood alcohol concentration (BAC) level of 0.08% – the legal limit in every state except Utah. While the DADSS Program is aware of the developments in Utah, they do not affect the research being conducted, and the Program will continue its direction based on the national standard of 0.08%. The exception is for underage drivers. Since no level of alcohol is legal for drivers under 21, parents could potentially have the system programmed for a zero-tolerance policy.

## **What happens when a driver is over the legal limit?**

With the alcohol detection technology, when a driver has a blood alcohol concentration (BAC) at or above the legal limit of 0.08%, the vehicle will start, but not move. This allows the driver to remain warm (or cool) and safe in the vehicle, make a call for help or charge a phone. The system will reset and be ready for another test less than a second after each reading and will move only when the driver's BAC is below the legal limit. The final implementation of the system will vary by automaker. That means the location of the sensors, the actions the sensors will take, and/or the driver's interaction with the sensors will differ greatly and depend on the individual automaker.



### **How will the technology be able to tell the difference between drivers and passengers?**

The system is being designed to accurately distinguish between the driver and other passengers, and this is a significant part of the required testing. The touch technology could, for example, be based on a touchpoint programmed by the driver, similar to today's smart phones, which could also serve as an anti-theft measure. The breath technology is being tested with sensors near the driver's seat to best isolate the driver's breath. Either system will require a retest if the person in the driver's seat gets out of the seat and another person sits down.

### **How is this going to stop people who are most likely to drink and drive?**

The DADSS technology is designed to take the guesswork out of BAC measurement and give drivers the certainty they will never put themselves or others in danger by driving over the legal limit. The system can also give parents an extra layer of protection and additional peace of mind knowing that if their children have been drinking, they won't be able to drive.

For the first time, all drivers will be able to take advantage of a system that is seamless and nonintrusive, representing a breakthrough in technology and vehicle safety. We believe that consumers will want to purchase the technology as a safety option once they learn more about its life-saving potential.

A key component of the Program is to develop consumer awareness, acceptance and demand, so that once a product is made available, there is sufficient demand. In focus groups, surveys, and through demonstrations at in-person events, we know that consumers – including those who have a history of drinking and driving – already have a very positive opinion of the technology.

### **Will DADSS technology be installed in every new car and truck?**

The Program was authorized and funded as a research program to advance the state of alcohol detection technology, and Congress did not mandate the use of any technology in the authorization. The Program's responsibility is to provide a working product, and when the technology is finalized, it will be made available to any vehicle manufacturer. Because each car is different, each manufacturer will decide how to integrate the technology into their vehicles in their own unique way.

### **Will DADSS technology add to the price of a new vehicle?**

Possibly. The technology may be an additional cost for those who choose to purchase it as a safety option for their vehicle. While the exact cost per vehicle has not yet been established, it will be in line with other voluntary safety systems like automatic braking or lane departure warning. As with any new technology, the more vehicles are equipped with the system, the lower the price will be.



### **Will data on tests be recorded or shared with law enforcement?**

No, the system is not set up for the data to be shared with law enforcement. Today, automakers have adopted privacy protection principles to protect customer data from being accessed by unauthorized parties, and DADSS technology will be no different. In the meantime, the leading automakers involved in the DADSS Program have joined with consumer advocacy groups to establish voluntary privacy principles and to provide standards and guidance on future in-vehicle technologies. For more about these principles, click [here](#).

### **Will the system test for drugs such as marijuana?**

Currently, the sole focus of the Program is developing a system that detects a driver's precise blood alcohol concentration. However, a similar system could be developed that might detect when drivers are under the influence of THC, but the development of such a system would present additional challenges beyond those faced by an alcohol detection technology. For example, drugs like marijuana linger in the system longer than alcohol, and researchers have not yet determined where the legal limit should be set. These challenges, and more, face researchers as they look at the different types of drugs that could affect safe driving behavior, whether over-the-counter, prescription or illegal.

With additional research, the spectroscopy technique we are using for alcohol could be adapted for THC, using information we have collected from the cutting-edge laser technology being used in the DADSS Program. For now, Program leaders are focused solely on developing a system that detects a driver's precise blood alcohol concentration.

### **Why would an alcohol detection technology be necessary if we are eventually going to have self-driving cars?**

Self-driving cars of the future could present interesting evolutions in vehicle technology and safety, but they are still in the early stages of development, while the DADSS technology is expected to become commercially available in the next few years. While it may be technically possible to have a self-driving vehicle in the next decade, early models are still likely to rely heavily on the ability of an unimpaired driver to take control of the wheel as a precaution.