

VOLVO SAFETY



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The Human Factor

Tackling the Root Cause of Accidents

Statistically, the overwhelming majority of transportation accidents are caused by human error either at the controls or elsewhere. In cars, an even bigger percentage of those accidents are caused by none other than the driver himself.

In a bid to accomplish its goal of zero casualties by 2020, Volvo cars, which invests heavily in developing and applying on-board passive and active safety features, has focused its research a little more on the preemptive side to further understand driver behavior and condition prior to the situation that leads to the accident. In short, Volvo has been studying how to protect us from us.

In addition to the many active/preventive safety features Volvo cars has developed and put in its cars to aid drivers in some challenging situations, it has developed an ultra advanced feature that borders on the unbelievable.



The Driver Alert Control (DAC) is a feature that analyzes the driving behavior of the driver to discover signs of emerging sleepiness or loss of concentration. If such signs are discovered, the driver is urged to take a break and recover via audible tones and text messages on the dashboard.

Driver fatigue is a major traffic safety problem the world over. According to the U.S. NHTSA, drivers who fall asleep at the wheel cause about 100,000 accidents annually in the United States alone, resulting in 1,500 fatalities and more than 70,000 injured drivers and passengers.

The situation is similar in Europe. The German Insurance Association GDV estimates that about 25% of all fatal accidents on the German Autobahn are caused by driver fatigue. No precise numbers are given for the Middle East, but a great deal of accidents in our area is most definitely caused by driver fatigue and distraction.

Volvo has developed Driver Alert Control as a result of extensive studies on how drivers operate behind the wheel, a world-first innovation that registers the car's progress on the road and alerts unconcentrated drivers.

DAC is primarily intended for situations where the risk of losing concentration is the greatest and where an accident would have severe consequences - for example a straight, smooth road that lulls the driver into a sense of relaxation and where the risk of distracting activities or falling asleep is higher. The system steps in at 65 kph and stays active as long as the speed exceeds 60 kph.

DAC monitors the car's movements and assesses whether the vehicle is being driven in a controlled or uncontrolled fashion. This method is unique among vehicle manufacturers and is very reliable.

*We do not monitor human behavior - which varies from

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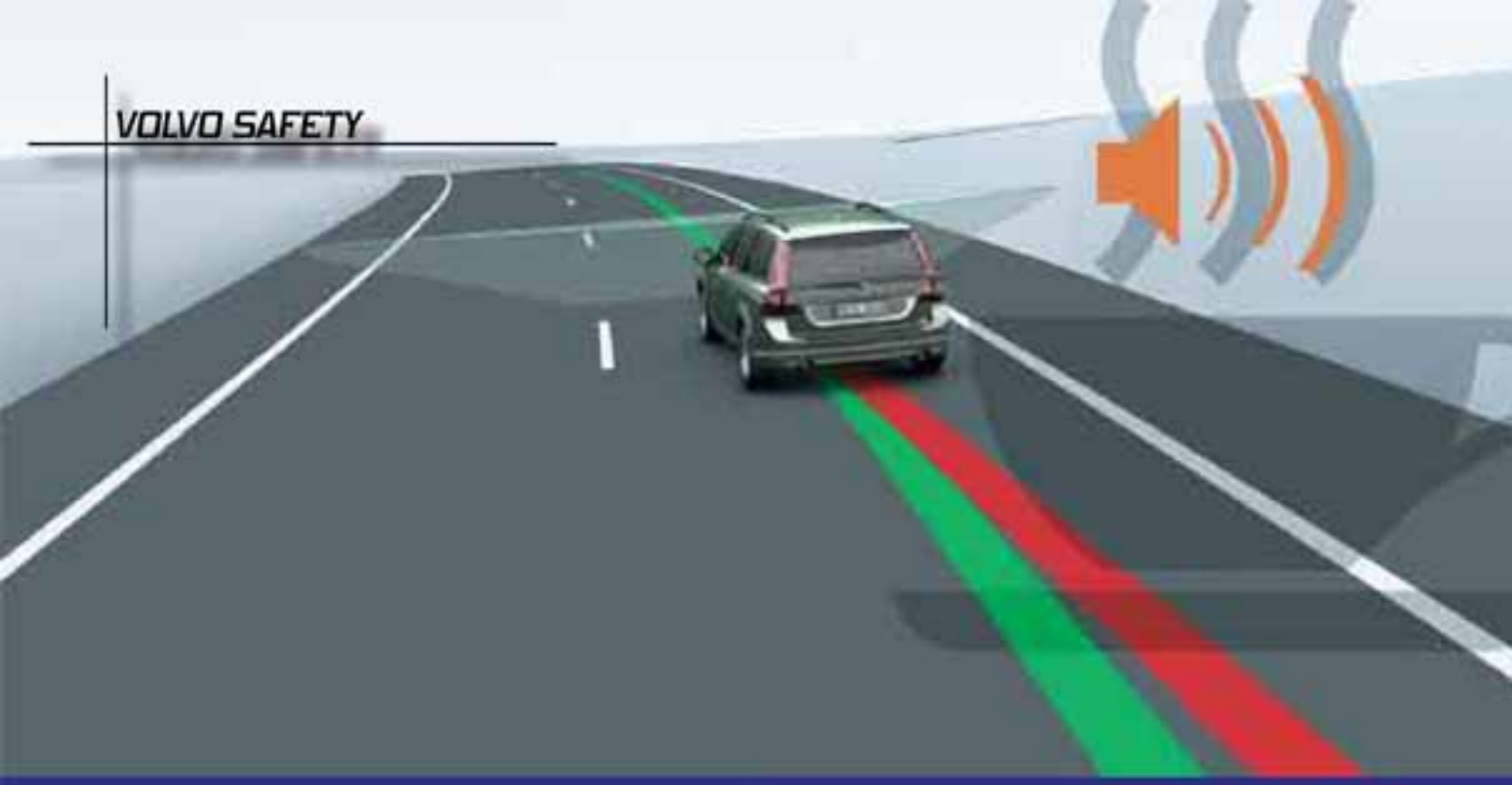
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one person to another - but instead the effect that fatigue or decreased concentration has on driving behavior. Our system is based on the car's progress on the road. It gives a reliable indication if something is likely to go wrong and alerts the driver before it is too late," explains Daniel Levin, Project Manager for Driver Alert Control at Volvo Cars.

He adds, "We often get questions about why we have chosen this concept instead of monitoring the driver's eyes (as other manufacturers have done). The answer is that we don't think that the technology of monitoring the driver's eyes is mature enough yet."

DAC can also cover situations where the driver is focusing too much on his/her cell phone or children in the car, thereby not having full control of the vehicle.

"This is a positive side-effect of our concept, and this is possible since the system evaluates driving behavior rather than human behavior," says Daniel Levin.

From a technical viewpoint, Driver Alert Control consists of a camera, a number of sensors and a control unit. The camera, which is installed between the windscreen and the interior rear-view mirror, continuously measures the distance between the car and the road lane markings. The sensors register the car's movements. The control unit stores the information and calculates whether the driver risks losing control of the vehicle.

If the risk is assessed as high, the driver is alerted via an audible signal. In addition, a text message appears on the car's information display, alerting him or her with a coffee cup symbol to take a break.

What is more, the driver can continuously retrieve driving information from the car's trip computer. The starting-point is five bars. The less consistent the driving, the fewer bars remain.

"It is, of course, always the driver's responsibility to take a break when necessary, but sometimes you might not realize that you're not alert enough to drive. In such situations, Driver Alert Control can help the driver make the right decision, like taking a refreshing break or a nap, before the concentration level becomes too low," Daniel Levin concludes.

DAC comes coupled with the Lane Departure Warning system in one safety package called the driver alert system. LDW uses the same camera mounted to the rear view mirror and monitors the road markings. If the system senses the car is approaching the lane markings without an obvious reason such as turn signal on, it will sound a light tone to remind the driver that he is drifting, also helpful if the driver is distracted by someone or something in the cabin.

The tone in both systems will mute the radio as it sounds so as to not be covered. LDW on a Volvo does not activate under 60kph, so it is not to be relied upon in conditions and at speeds where the driver should be in full control and awareness.

In addition to the Driver Alert System package, Volvo is pushing forward with human driving behavior studies in order to develop an integrated traffic and vehicular system that will, hopefully, dramatically cut out crashes all together. The research project is part of the EU project called EuroFOT (Field Operational Tests) where Volvo Cars, other actors from the automotive industry and SAFER at Chalmers University of Technology all are engaged.

Volvo Cars has studied and learned from real-life traffic accidents since the early seventies, in order to continuously improve the car's ability to protect its occupants in the event of an accident. The new vision of designing cars that don't crash requires new and entirely different research methods.



This project will collect all types of driver behavior, also including how a driver can avoid a traffic accident from happening and what in the driver's behavior made that possible. A fleet of a hundred Volvo cars will be equipped with cameras that record the driver's head and eye movements, together with a data logger that records the information from the safety features in the car. Other cameras will film the driver's view of the road and behind the car. The information and the videos will be saved on a hard disk for researchers to analyze the driver's head and eye movement patterns.

The field test project will last for three years. The overall ambition is to develop a safer, cleaner and more efficient road transportation system in Europe. The system will be an integral part of Volvo's 2020 zero casualty vision.

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