DVN-I
Automotive Interior

Thu, 9 April 2020 Weekly Newsletter **NEWSLETTER #25**

Editorial

DVN-Interior First Workshop New Date: 24 September

The 1st DVN Interior workshop will take place this Autumn in Darmstadt, Germany, on 24 September at the Maritim Hotel, with a dinner on the evening before—let us all hope the pandemic will have passed by then.

For this very special premiere event of DVN-Interior we're planning an exceptional Workshop with the rubric **new technologies for car interiors and mobility**.

Within the ACES revolution of **a**utonomous, **c**onnected, **e**lectric, and **s**hared vehicles, mobility use cases are changing drastically. Car interiors are becoming a new nexus of product differentiation, allowing drivers and occupants a complete new set of activities—relaxing, working, phoning, reading, watching movies…the car becomes a mobile lounge. These new usages are exerting strong technology pulls to become real.

The Workshop will be structured accordingly with a sequence of sessions:
• Interior as a System
• Any Surface Becomes Functional
• Interior Lighting, Color & Materials
• Design/Electronics/Simulation.
Exhibitors will present their products and services at expo booths. We look forward to meeting you there! Find registration information **here**.

This is a time that calls for cooperation, for sharing, for coming together to lead through this Coronavirus crisis. And that's what we are doing at DVN, opening exceptionally the total content of our DVN website to all our registered members, whether they have subscribed as DVN-Interior or as DVN members. Starting today, and for a period of 4 weeks, you will have access to the full contents on our DVN website at : www.drivingvisionnews.com

For the time being our topmost thoughts are with all those affected by the pandemic and with all the businesses who are going through this crisis. We wish you health and safety!

Philippe Aumont
General Editor, DVN-Interior

In Depth Interior Technology

Self-Cleaning Interior to Prevent Virus Spread

In a global pandemic like the current coronavirus situation, our cars are a bit like microbial prisons. All the worst stuff from everywhere in the outside world gets dragged in and stays. The last edition of DVN-I looked at IAQ (interior air quality), and today we're picking up from there.

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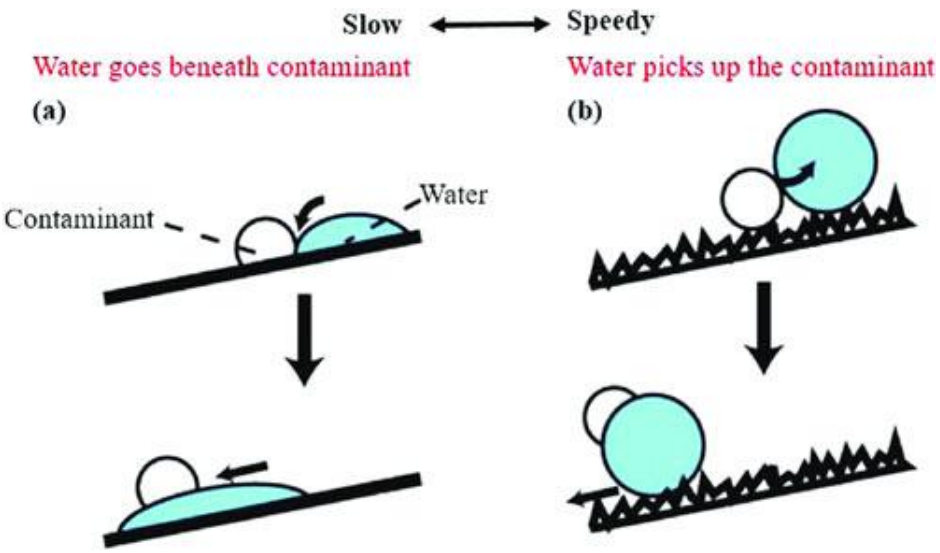
Health, wellness, and hygiene in shared and confined interior spaces involves much more than just air quality. All surfaces around the occupants need attention on this front, especially as they become more functional and interactive, drawing more contact with occupant fingers. More voice activated system will most likely generate more spit spray—a classic virus transmission vector. And of course, there's perceived quality; occupants feel better and more comfortable in a clean vehicle.

The fast development of new types of mobility based on car sharing, with frequent change of drivers and occupants of the vehicle, reinforces the need for the development of innovative automotive interior materials surfaces with anti-fouling and self-cleaning properties, especially against bacteria, dust, and oily deposits.

Automotive interior cleanliness will take more than just proper "housekeeping", too. According to a 2019 survey of 1,000 drivers in the U.S. asked how often they sanitize and clean their car's interior, many drivers rarely do so—like, only once a year or so. And according to the U.S. National Center for Biotechnology Information, steering wheels (630 colony-forming units) are four times dirtier than toilet seats (180 CFU)—a very unpleasant and inconvenient truth, considering that it's the part of the car that we constantly have contact with—and six time more than the average smart phone (100 CFU). The CFU is the average amount of bacteria per square centimeter.



Schematic representation of self-cleaning processes on (a) a hydrophilic and (b) a hydrophobic surface – source ResearchGate

The ability of a surface to self-clean commonly depends on the hydrophobicity or hydrophilicity of the surface. Whether cleaning aqueous or organic matter from a surface, water plays an important role in the self-cleaning process. The balance of capillary and adhesion force between the drop and the contamination on the substrate determines the friction force of drops during self-cleaning. Surface definition is also very influential, if it is hydrophobic or hydrophilic, creating wettability or "stickiness"; both can be used for self-cleanability.

The first instance of a self-cleaning surface was created in 1995 as car glass coated with transparent titanium dioxide - TiO_2), providing the ability for the glass to self-clean. This product implements a two-stage cleaning process. The first stage consists of photocatalysis of any fouling matter on the glass. This stage is followed by the glass becoming hydrophilic and allowing water to wash away the catalyzed debris on the surface of the glass. Since the creation of self-cleaning glass, titanium dioxide has also been used to create self-cleaning nanoparticles that can be incorporated into other material surfaces to allow them to self-clean.

In 2014 Nissan's Note was the first car with a self-cleaning body technology called Ultra-Ever Dry®. By creating a protective layer of air between the paint and environment, it effectively stops standing water and road spray from creating dirty marks on the car's surface.

The automotive industry has long used a surface treatment to ease plastic surface bonding or printing. It's called Corona, and it's a surface modification technique, ensuring that surface energy of the plastic is higher than that of the liquid by increasing the adhesion of the plastic surface. Corona comes from a ionization of a fluid such as air surrounding a conductor that is electrically charged. Nothing to do with current virus.

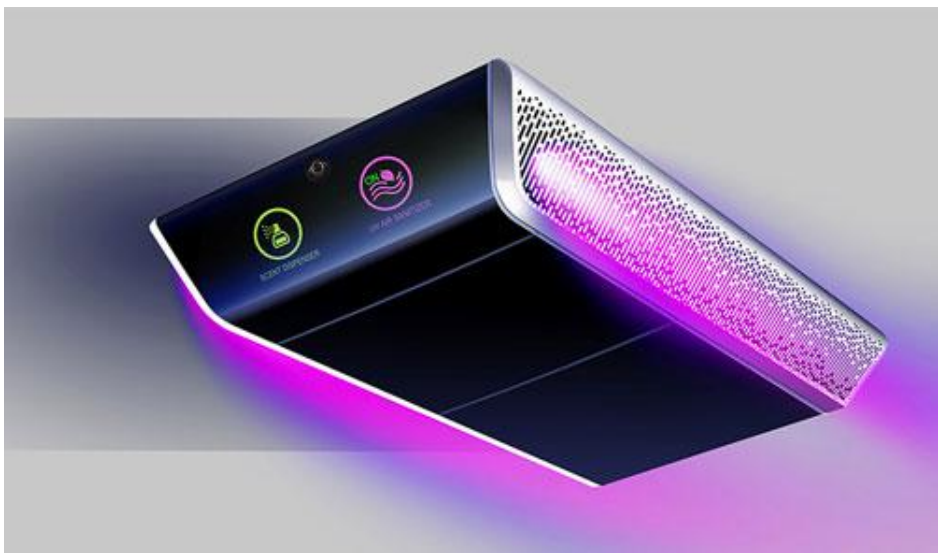
Researchers have used nano-scale hydrophobicity structures like those found on a lotus leaf to produce a non-wetting plastic for the automotive industry. It can be created in a number of different ways including plasma or ion etching, crystal growth on a material surface, and nanolithography; all of these processes create nano-topographical pattern which imbue the surface material with contaminant-shedding properties.

Early last decade Nanoclean, an EU-funded research project, concluded that micro- and nanotextures can be applied to 3D curved surfaces and that these textures are durable. From the industrial side, the project demonstrated that injection molding represents a promising technology to develop a nano/micro-structured surface with high performance and potentially low costs.

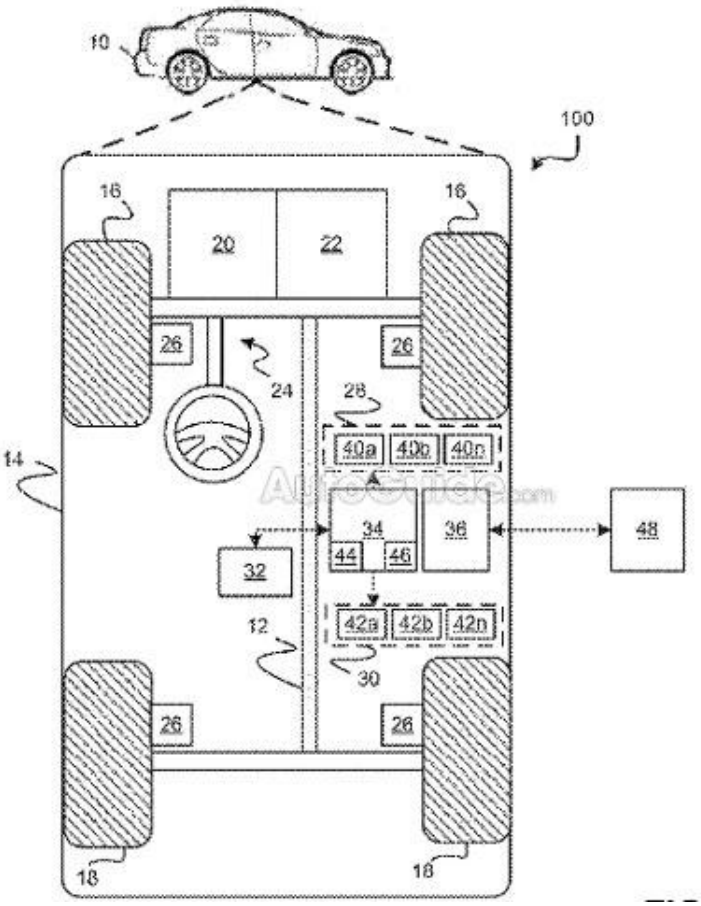
- **BIOSCA**
  Bio-Inspired Oleophobic Self-Cleaning surfaces for Automotive Interior Environment

The BIOSCA project gathers two French research laboratories (UNS Nice, IPREM) specialized in bio-inspired surface functionalization, an automaker (Renault) and a supplier (Faurecia). These team members worked together on preparation and structuration at the nano and micro levels of polymer surfaces, their chemical functionalization to achieve low surface energy, and the evaluation of performance on automotive interior materials samples and process industrialization. The technology they developed uses deposition of polymers and nano structural and chemical surface functionalization using electrochemical and plasma-assisted treatments.

Many research efforts are poised to emulate nature strategies developed over billions of years. Self-cleaning surface occurs naturally with leaves and wings of certain insects. An ablative 'peeling-off' effect is another search field researcher are working on.

- 

The Yanfeng UV Sanitizer technology is an antimicrobial device that claims to sanitize interior surfaces and air with UV-C light, destroying both bacteria and viruses to ensure a clean environment for all passengers. It is using the same UV light source as the Air Sanitizer we presented in our last DVN Interior edition.



General Motors is working on technology that would allow a self-driving car to also be a self-cleaning car, using internal sensors to determine just how clean the interior is. Two patent applications from GM have been published in the U.S. When necessary, the self-cleaning system can activate various cleaning devices, such as vacuums integrated into the floor mats, steam cleaners that use engine heat and recovered water, and even waste baskets that automatically replace garbage bags.

The patent also mentions the use of incentive-like coupons that would encourage passengers to remove garbage bags when they leave, mainly for shared vehicles.

In this pandemic time, it's possible to clean touched surfaces more frequently, including the steering wheel, door handles, shift lever, any buttons or touch screens, wiper and door armrests, grab handles, and seat adjusters.

Mercedes, through update of their MBUX vocal multimedia system, includes as part of the car's "Welcome Scenario" key messages and actions for coronavirus disease prevention—stay at home when sick, cover mouth and nose with flexed elbow or tissue when coughing or sneezing, wash hands often, and clean frequently touched surfaces and objects.

With users more demanding because of virus fear, any automotive interior surface faces challenges on dust, dirt, antimicrobial, ventilation, and more. Many surface treatment technologies will pop up around coating, nano enabled plastic or textiles. It will generate as well parallel benefits in term of weight reduction, acoustic absorption, recycling, aesthetics, and visual impression.

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In the meantime, soap and water are safe to clean most car interiors, with special attention to textile and leather and to surfaces you touch. Don't forget that steering wheel!

Interior News

Porsche to 3D-Print Seat Customizations

Porsche just launched a pilot program that uses 3D printing to create a customized "comfort layer" in a bucket seat that allows the user to select from several levels of support based on personal preference. The automaker says this alternative to conventional bucket seat upholstery was inspired by the custom seat-fitting for drivers that is common in motorsports.

The seat's central comfort layer is partly produced by a 3D-printer. The design is based on a sandwich-type construction with a base structure made from expanded polypropylene (EPP). This is bonded to the breathable comfort layer that consists of a mixture of polyurethane-based materials made via additive manufacturing (3D printing). It is proposed with three comfort hardness options (soft, medium, hard).

The outer layer of what is being called a concept seat for now—is made from "Racetex", a microfiber material partially consisting of recycled polyester fibers. Its production has 80 percent less CO_2 than traditional materials material with a unique perforation pattern for climate control. Open panels in the outer layer provide a view of exposed, brightly-colored portion of the 3D-printed lattice structure.

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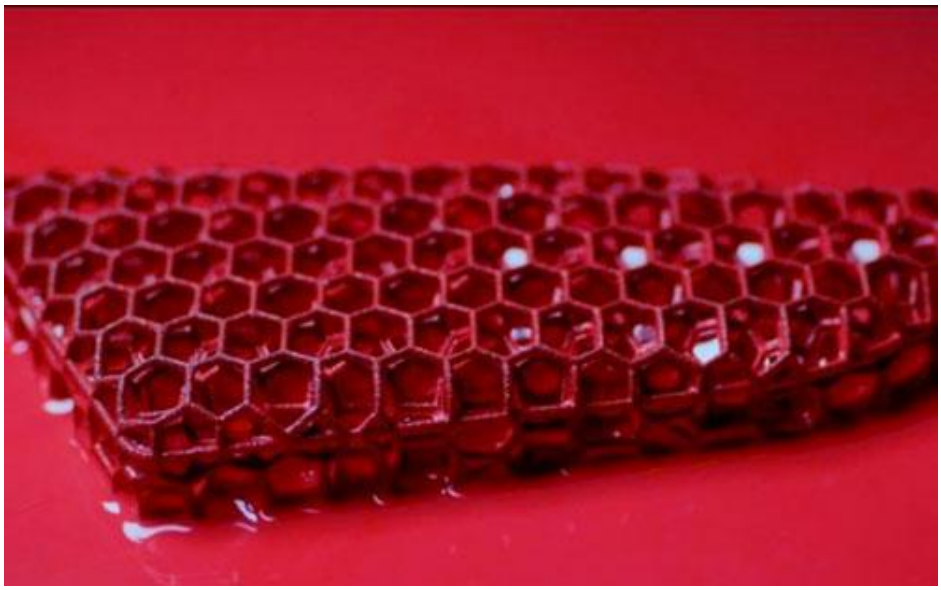
Comfort layer



Outer layer with exposed, colored 3D-printed

The special bucket seat will be available initially from Porsche Tequipment as a driver's seat for the 911 and 718 ranges from as early as this May.

This technology can enable fully personalized seats if sufficient customers express an interest. The personalization could extend beyond the current comfort layer choices to seats adapted to the individual customer's specific body contour. In addition to an ergonomic fit similar to professional racing seats, Porsche hope 3D-printed seat design will also offer lower weight, improved comfort, and passive climate control.

ZF Gains Room for Small Car Console Zone

There's a new front electric parking brake (EPB) from ZF, 20 years after the supplier introduced their first electric rear-axle parking brake. The front-axle EPB saves vehicle weight by eliminating the components needed for manual park brake operation within rear drum and disc brakes, and it requires only small modifications to the front calipers. The necessary electronic components and software are integrated into an existing ESC control unit, ZF says.

The new tech allows automakers to equip smaller vehicles with an advanced braking system and design cockpits without the common parking brake lever or pedal—which can now be replaced by a compact electrical switch, increasing design freedom and and leaving central space free for other features.

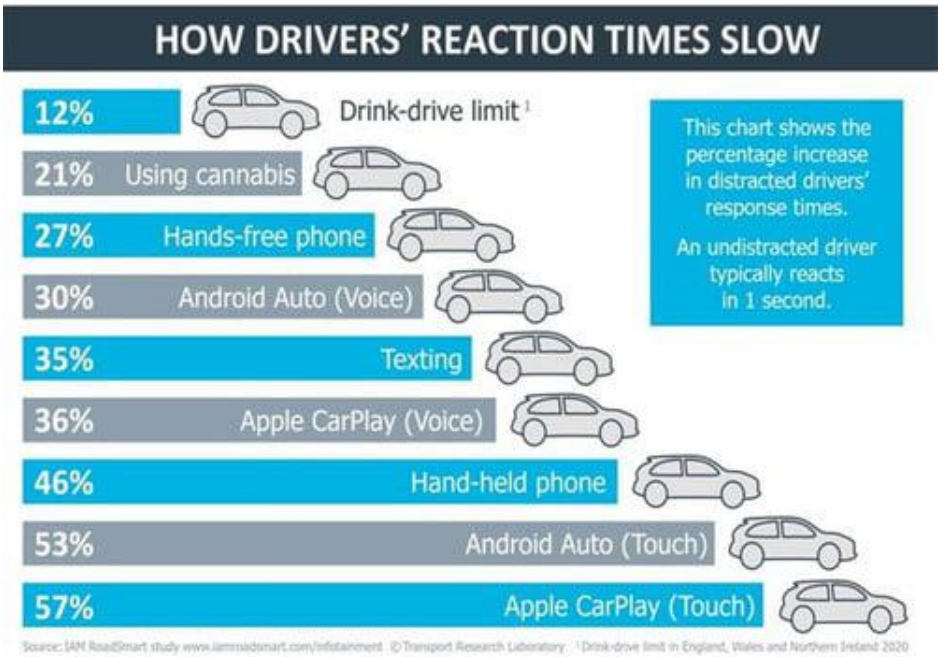
Series production of the EPB technology is taking place in Korea and China. Worldwide, ZF has supplied more than 75 million vehicles with rear-wheel EPB.

Infotainment Worse Than Alcohol for Driver Performance

Drivers' reaction times are worsened vastly more by using in-car infotainment systems than by being at the legal alcohol limit or being high on cannabis, according to a new study.

Experts at the U.K. Transport Research Laboratory, in conjunction with U.K.-based road safety charity IAM RoadSmart, found the world's two major infotainment platforms place enormous demands on driver attention, leading to a variety of negative behaviours on the road.

The study, which is **available online**, comprised two experimental trials with 20 participants using the Android Auto system, with another 20 using Apple CarPlay. Both groups were tasked with completing three simulated drives on the same test route: a control drive without infotainment usage, a run using the infotainment system with voice commands, and a run while controlling the infotainment by touchscreen.



The test run, divided into three sections, involved following another vehicle while accessing music on Spotify and BBC radio, navigating through erratic motorway traffic to a railway station, restaurant and petrol station; and performing a figure-8 loop while reading texts or making a call via the infotainment system.

Subjects were measured on four aspects of driving performance: maintaining a speed, lane position holding, eye gaze behavior and self-reported performance, as well as their reaction time to external non-driving stimuli, which tasked drivers with flashing their high beams when a red bar appeared on the screen.

Results show driver performance on all measures deteriorated significantly when using the touch screens. Reaction times in particular were about 50+% worse than control times, where driving at the blood alcohol limit only increased this metric by 12% and smoking cannabis saw a 21% increase in reaction times. The result would be 4-5 extra car lengths of stopping

distance at highway speeds. Using voice commands didn't make things that much better, increasing reaction times by 30-36 %, where texting while driving resulted in a 35% increase. It appears talking to Siri is about as bad as texting.

The clear implication: driver monitoring, including tactile, audio, and visual alerts, is essential to traffic safety.

Hyundai Mobis In-Cabin Safety Systems

Hyundai Mobis has developed a system for detecting rear-seat passengers with radar to prevent them being left unattended. Rather than weight or ultrasonic sensors, the Rear Occupant Alert uses a radar sensor. It is expected to prevent heatstroke tragedies when children are left unattended in vehicles. If a passenger is left in the rear seat, the driver is alerted by sound when the door is closed, or through the instrument panel or smartphone.

A Mobis representative said, "As the radar can penetrate clothes and measure various bio-signals, e.g. micromovements of passengers' chests and blood flow, it can detect the presence of passengers in rear seats more accurately. It overcame the weakness of the camera sensor, which cannot recognize babies covered in blankets"

The system has secured electromagnetic reliability so that it works normally near high-voltage lines and railroad tracks, and can discern adults, infants, and pets.

Ongoing development of the system is aimed at having radar capable of measuring heartbeats and expand the biometric function this year.

Eyesight & SEAT Keep Drivers Awake and Vigilant

Israel-based Eyesight Technologies is working with SEAT, the Spanish arm of VW Group, to monitor driver drowsiness and distraction.

This technology studies driver eye and head movement to detect if they are falling asleep or distracted. It is developed through XPLORA, and Eyesight.

XPLORA is a transversal team of specialists focused on technological innovation aimed at connected car and smart mobility services. Created in Israel by SEAT and Champion Motors, the initiative is to encourage relations with local mobility-related startups and players and identify innovative projects that could lead to future solutions and business models for the brand.

Eyesight Technologies is developing and producing computer vision AI for driver and cabin sensing. Their intelligent sensing solutions for the in-car environment include Driver Sense, an advanced driver monitoring system (DMS) which tracks the drivers and their real-time state;

Cabin Sense, an occupancy and interior monitoring system (OMS) which tracks the entire in-car environment.

DMS can detect drowsiness, distraction, seatbelt (non-)usage, phone-holding, and smoking. It can recognize enrolled drivers. Algorithms analyze eye openness, angle of vision, blink rate and head position of the driver, along with other visual attributes, with alerts being triggered if the driver is drowsy or distracted.

The technology can also identify the driver from previous trips and adjust the seats, mirrors, heating, and other cabin features according to personal preference.

What's Jeep's Pickup Gladiator Like Inside?

Pickup interior news is very seldom here. How does it look? Let's use the revamped 2020 Jeep Gladiator as a model.

First impression is that front compartment looks very similar to a nice looking "city" SUV pickup. Most of the main equipment is shared with Jeep Wrangler, the upright dash, instrument cluster, infotainment screen, buttons, seats, in fact everything from the front sets forward.

Unique features are behind that line. It includes segment-best rear seat legroom, rear HVAC vents, and power ports to keep devices charged.

Rear seats fold forward and flat, functioning as a shelf of sorts for more cargo-holding ability, while also revealing a rechargeable portable Bluetooth speaker. The rear seat bottoms also flip up, revealing lockable storage for odds and ends like ratchet straps or tow hitches. For extra security—especially important for this convertible pickup—the rear seat backs can also be locked to the wall of the cabin so they can't fold down, ensuring the cabin stays secure.

The pickup bed includes features to help line up motorcycles properly for loading, LED lighting, and a house current electrical outlet.

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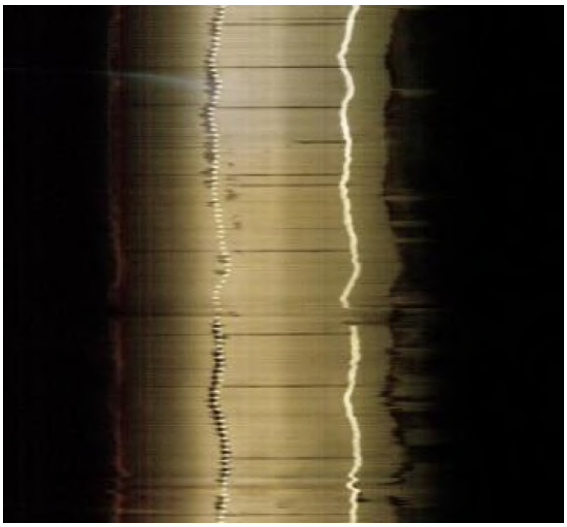
News Mobility

Ford Tech to Stay on Track on Country Roads



Ford says they have created technology to ease driving on dark, wet, snowy, no lane-markers country roads.

According to Ford, the system can detect where a paved road becomes a soft verge, gravel hard shoulder, or grass—and it can even provide steering support on marked roads where the lane markings are hidden by snow, leaves or rain. And the system is said to work in the dark, too, with the headlamps providing enough light for the camera to operate as effectively as during the day.

U.S.-based Road Edge Detection created a system using a camera positioned beneath the rear-view mirror to scan the road ahead. Covering an area 50 m ahead of the car and 7 m to either side, the system can spot the structural differences between the road and road edge.

Ford admits the system is not foolproof; the algorithm may struggle with roadside features that have similar structures to the road. Nevertheless, this new system is a very much needed feature to help drivers on rural roads. According to the European Commission, such roads are a significant causal factor of road-related casualties in Europe.

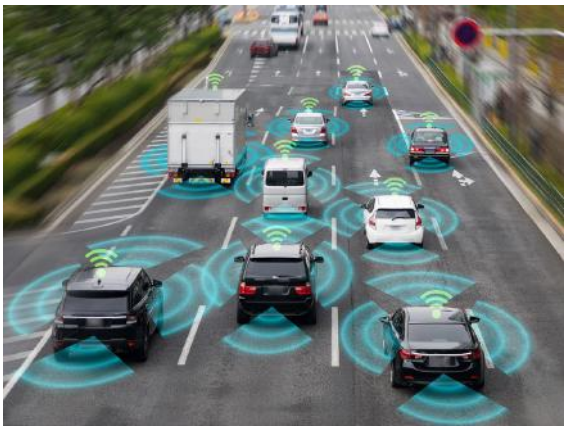
The Road Edge Detection system is a standard feature on the new Focus, Kuga, and Puma models

AI Autonomous Traffic Surveillance near 100% Accuracy

Computer vision systems developer Currux Vision has released test results for their Smart City AI traffic video analytics and management solution trialed by the City of Grapevine, Texas, and independently by camera and video surveillance systems manufacturer Costar Technologies.

Corrux and Costar are creating a new AI-based traffic analytics and management system they hope will enable autonomous traffic camera monitoring.

This Smart City AI solution removes the need for constant human oversight, outdated reporting systems, and limits on observation time by autonomously monitoring traffic cameras and systems and generating real-time alerts when certain events of interest occur.



AI traffic detection systems includes counting and identifying vehicle types, slow traffic, wrong-way traffic, speeding, parking violations, pedestrians (detection and counting), and has other features as well.

The test with the City of Grapevine, and independent testing by Costar Technologies, confirmed that Currux's Smart City AI system can operate with 95-98% or higher accuracy under various conditions including day and night, rain, (snow?) camera vibrations, and even partial camera view obstruction.

Traffic management cost and ease of installation will be a key driver to get better surveillance coverage for autonomous traffic monitoring.

The Design Lounge

Sorry, not present in this edition, because of technical reasons. We'll be back in next edition

General News

Veoneer, Volvo to Split Zenuity Software JV

Volvo Cars and auto tech supplier Veoneer will split their jointly-owned software venture Zenuity as the Swedish carmaker focuses on developing autonomous driving software, the two companies have announced. In parallel, Veoneer will integrate the current Zenuity business focused on ADAS software, while Volvo Cars will set up a new standalone company to take over Zenuity's development and commercialization of unsupervised autonomous drive software.

"This means we will buy today's ADAS from a more traditional supplier relationship, but development-wise we now want to put our focus on the next generation of products," Volvo Chief Technology Officer Henrik Green told Reuters, adding that Volvo's part of Zenuity will focus on software that will be introduced in the next generation of cars based on Volvo's SPA2 vehicle architecture platform starting from around 2022.

Veoneer, which also makes radars and vision systems and expects 90% of their available market to be for ADAS in the next decade, said the move will help them drive their business strategy more effectively.

General Motors, Honda to Jointly Develop New EVs

General Motors and Honda say they will jointly develop two new electric vehicles and are exploring more ways to expand their alliance.

The new vehicles will use GM batteries and be assembled in GM plants in North America, the companies said. Honda plans to begin selling the vehicles in the United States and Canada in 2024.

"We are in discussions with one another regarding the possibility of further extending our partnership," Rick Schostek, executive vice president of American Honda said in a statement.

The relationship between GM and Honda reflects industry pressures to share technology and development costs to meet fuel economy regulations. Those pressures were significant before the COVID-19 pandemic hit global vehicle demand, and promise to intensify as the crisis drains cash from automakers all over the world.

GM and Honda already collaborate on autonomous vehicles and fuel cell vehicle technology. The companies worked together on the design of an autonomous vehicle called Cruise Origin for GM's majority-owned Cruise Automation unit.

As part of the latest agreement, Honda will use GM's hands-free driver assistance technology, marketed by GM as Super Cruise. Honda also will incorporate GM's Onstar telematics services into the electric vehicles developed with GM.