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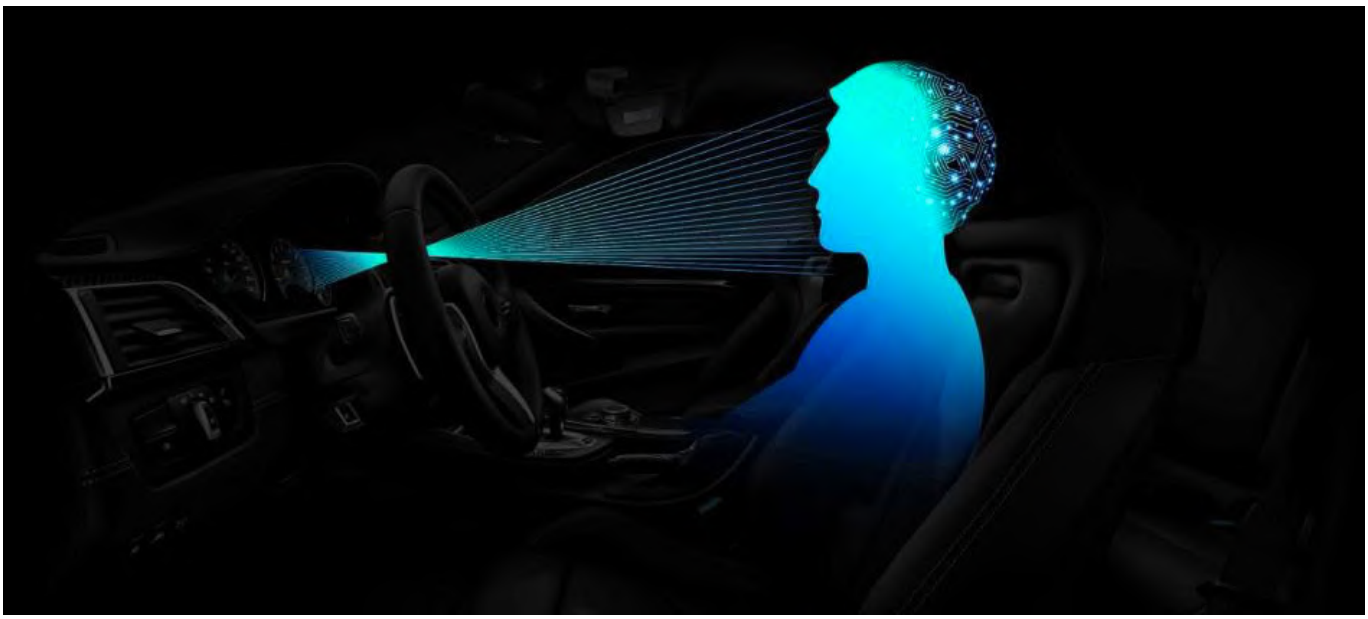
Weekly Newsletter

DVN-I
Automotive Interior

NEWSLETTER #157

Editorial

Seeing Machines CEO Interview, DMS For A Safer World



SEEING MACHINES IMAGE

Driver Monitoring Systems (DMS) are a key pillar of tomorrow's automotive safety, and they're becoming progressively mandatory all around the globe. Seeing Machines, based in Canberra, Australia, is a major DMS technology provider. This week's DVN-I interview is with their CEO, Paul McGlone. His company has been working since their beginning on human-machine interface, with a focus on transport safety, particularly, and we had a wide-ranging interview we're happy to bring you now. HMI and DMS are the main sessions of the DVN Interior Workshop, which is happening next Tuesday-Wednesday, the 25-26 April, at the Pullman Hotel in Köln. You've still got a few hours to rush and **register**!

Looking forward to meeting you in Köln next week, I am.

Sincerely yours,

Philippe Aumont
General Editor, DVN-Interior

In Depth Interior Technology

DVN-Interior Interview: Paul McGlone, Seeing Machines CEO

SEEING MACHINES CEO PAUL MCGLONE

DVN-I: How did Seeing Machines come to be?

Paul McGlone: We are 23 years old. Seeing Machines' beginnings are pretty amazing. It started with four students, two of whom are still with us, who focused their expertise on robotics, within a broad definition of it, applicable in various domains. Their belief was that cars would be the world's first robots. So they looked into which domain this technology could be applied, and they decided to work on human understanding or human-machine interface (HMI), with a focus on transport. Robotics and transport directed us to sensors, and sensors to eye tracking. And eye tracking led us, eventually, to driver monitoring system technology, which has expanded to include deeper human understanding through body position, movements, size, and overall cognitive state.

DVN-I: What is your company's mission?

PM: Our mission is to improve safety in transportation, and that has been our clear focus for 10 years. Transport injuries and fatalities represent a very high burden on society, in term of ethics, and in term of costs. The issue continues to grow in importance for a range of reasons, including the prevalence of smartphones and even features in the car (for example larger touchscreens) which can result in greater driver distraction, while fatigue also remains a big problem. Our purpose is to get everyone home safely and support the global agenda of Vision Zero, aiming for a world with no transport-related accidents. Our proven technology is on roads today, in over 700,000 cars and almost 50,000 trucks and buses, so we are making a real impact on safety and that impact increases with every new vehicle connection.

SEEING MACHINES' FOVIO DMS DEBUTED IN 2018 IN GENERAL MOTORS' CADILLAC CT6 SUPER CRUISE SYSTEM.

DVN-I: What can you tell us about your activities and products?

PM: Seeing Machines is primarily a software company, and that is reflected in our differentiated business model and diversified go-to-market approach, involving trusted partnerships with tier-1 automotive suppliers and manufacturers.

Our software can be integrated into any system or processor, as defined by our automaker and tier-1 customers. We can provide our software as an embedded system on silicon platform, for example our Fovio Chip or Qualcomm's Snapdragon Ride Platform. We license our software to customers—for example, silicon vendors—who then embed it onto their platforms to optimize it for DMS algorithms and performance for the automotive industry.

The business model is simple; for automotive it is mostly based on royalties and supplemented by non-recurring engineering (NRE) revenue when bespoke development is required.

DVN-I: How do you quantify the efficiency of a DMS?

PM: When we talk about DMS efficiency, we usually mean *processing* efficiency, which must consider three key elements: how many features can we include (processing); how much power that requires, and how much it will all cost.

We need many different metrics to fully understand processing efficiency and performance, but one especially useful metric is TOPS (trillions of operations per second) versus Watts (how much heat) versus Dollars (cost).

When we develop algorithms, we consider the amount of processing required (e.g., TOPS) to achieve a certain signal performance (e.g., classification accuracy). Less is better here, as carmakers are always searching for a low-cost, high-performance option.

DVN-I: Where and how is regulation driving the DMS market?

PM: Momentum on the regulatory front is being led from Europe; EuroNCAP is the leading consumer organization, and their 5-star requirements, which includes a range of technologies including DMS, are now the benchmark. Seeing Machines has worked very closely with Euro NCAP to solely represent tier-2 suppliers and assist with development of DMS protocols as they initiate the requirements. The EU General Safety Regulation (GSR) has also set out a requirement for all cars, vans, trucks and buses to have DMS as mandatory from 2024 for all new models and 2026 for all new vehicles.

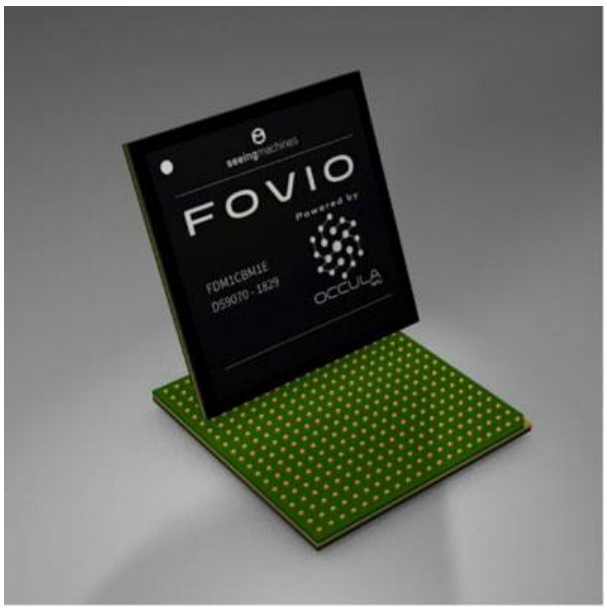
China is following Europe closely. The US is a different story; DMS has been a focus there, but this has been less about general safety and more about supporting the emerging levels of automation, specifically L^{2+}, where hands-off-the-wheel is allowed for periods of time. This focus is changing to general road safety and we expect it to be mandated in the next 3 to 4 years.

So, Europe is the leader, frankly, where regulations are locked in. China and now the US are following closely and we expect this to become global.

DMS performance will have to adapt to the regulatory environment. Safety is like an onion; every removed ring is revealing new and more stringent constraints (or opportunities!). The next ring of the onion will move to convenience features.

DVN-I: Are there other reasons why the DMS market is booming?

PM: There's a clear inflection point right now. Automation in cars has definitely underpinned a lot of the demand to date, but regulation is a clear tailwind for growth. We expect that by 2028 at least 75% of cars produced globally will be fitted with DMS. So, if you take a look at a round number for global light vehicle production at 100 million, in 5 years' time, 75 million of those cars will have some kind of DMS installed. By the end of this year, we estimate that there will be around 12 million cars fitted. That's significant growth over the next 5 years. For Seeing Machines alone, if we look at the business we have been awarded to date, the stage is set for significant percentage year on year growth over the next three years.



FOVIO CHIP: "A HIGHLY OPTIMIZED SINGLE PACKAGING OPTION FOR ANY VEHICLE, ON ANY PLATFORM"

DVN-I: What are your main technologies and unique offerings?

PM: Accurate observation of the eye and the pupil is the base principle. We use advanced machine vision technology to precisely measure and analyze head pose, eyelid movements and eye gaze under a full spectrum of demanding in-vehicle lighting conditions. This data is processed to interpret driver attention state, drowsiness, and impairment levels to trigger in real-time to vehicle cockpit, comfort and convenience systems, as well as to ADAS.

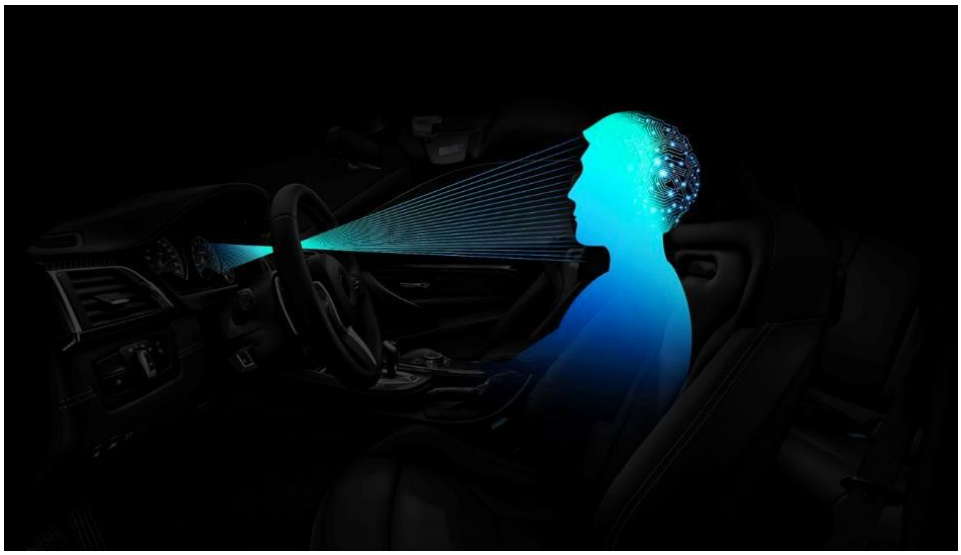
DVN-I: What's coming next; what's in the pipeline?

PM: From a sensing perspective, it could be overlaying our measures with additional data like heartbeat and/or temperature that we'll get from other existing or new sensors, and then merging the data together: we call this 'sensor fusion'. And we're also collaborating with voice partners. I'll give you one example, I call it voice, but they're actually looking at lip movement and essentially lip-reading, so this also happens through a vision system.

Another important next step is moving from 2D to 3D. That would be the biggest bang for the buck. We can do much more from observing and interpreting the human. You need a sensor and you need software to bundle all this information together, and make a relevant conclusion out of it. And we are constantly exploring things like radar, and the application for radar in the vehicle. The challenge comes when you try fusion of hardware and software, that's what is complex, and adding more is also creating a cost barrier for automakers.

DVN-I: As you're tracking occupants in the car, what else can you do besides DMS?

PM: The market will require different levels of capability in monitoring. You'll have full screens, voice interaction, gesture controlling features. The job of understanding if the driver is in control or can't be brought back to control will be even more important. The DMS market will progress for quite a long time and we believe safety will remain forever core and central.



DMS DEMAND IS BEING DRIVEN BY SIGNIFICANT GLOBAL REGULATORY MOMENTUM

DVN-I: What additional convenience and comfort features can be delivered through the camera?

PM: There is already demand to provide color videos for streaming or zoom calls. Through the rear-view mirror or camera, you can understand a person's age, body mass, gender. With this information, you could monitor airbag trajectory, understand who is in the back seat and whether an occupant or driver is impaired or approaching impairment. If you're feeling unhappy, should we change the lighting in the vehicle?

If you're looking into the footwell of the car, the camera is able to detect that you're looking in that direction and turn the light on in the footwell, making sure visibility is clear and the distraction is short. And at the end of the day, perhaps everything could be integrated with a head-up display?

DVN-I: What are the automakers' expectations like?

PM: Let's see what automakers will actually budget for these features. With $25, for instance, having a radar sensor and a dual camera driver and occupant monitoring capability is a challenge! If the budget is $200, it might go into one early-adopting, super-premium vehicle, one time. As we mentioned, automakers are expecting more with less!

Sensor fusion should help to bring the cost down. Right now, there is the appetite for automakers to continually ask us for new features, some of which are sensible and safety related and others that have to do with comfort and convenience, and ultimately, differentiation.

DVN-I: Does that make challenges on the software side?

PM: The more features, the more software, the more processing power and time. Seeing Machines is deeply specialized in software acceleration so we can overcome those challenges to a large degree, but you will then be faced with the cost challenge to address accordingly.

DVN-I: So how do you face onion-layer challenges like that?

PM: With our scientific background, our focus is on constant innovation, for example with eyelid perception, especially through pupil, with additional data, coming from other sensors, mostly already existing in interior, or lip reading through a vision system.

Our Human Factors team illustrates our scientific endeavors, open for collaboration in term of R&D, tools, and non-strategic features. The challenge for the future is about processing, quantity of information processed, software acceleration.

DVN-I: Are you looking to markets beyond automotive?

PM: We remain very focused on transport, starting with passenger vehicles, but also commercial vehicles like trucks and buses and including heavy mining vehicles. For aviation, our technology is already in pilot training simulators, and we are targeting cockpit solutions to mitigate the risks of pilot fatigue.

Beyond today's focus, which remains our core business, we do potentially see application for our technology in Healthcare (optometry, ophthalmology, patient monitoring and telesurgery); Entertainment (gaming, metaverse), Consumer (smart appliances, 3D and touchless displays, digital mirrors) and Retail (smart stores, billboards, taxis).

DVN-I: Do you collaborate with academics? With others?

PM: Yes, we work with a raft of universities around the globe, including Leeds; Washington State; MIT, and Monash Universities.

We also collaborate with partners on development tools. From time to time, we outsource development for non-core features (eg. machine learning. synthetic imaging), to develop basic algorithms that we can then integrate and apply to our feature set.

A SEEING MACHINES TEST CAR.
"ACADEMIC PARTNERSHIPS ARE FUNDAMENTAL TO SEEING MACHINES' R&D"

DVN-I: What's it like to drive a global company from Australia?

PM: The answer is we're used to it. There are obvious challenges, and these are mostly related to time zones, but we are adept at managing that and our team are dedicated to our customers and that requires flexibility. All Australian businesses that sell anything overseas are used to it. But you know, the key is to have things set up here to ensure that our people are very flexible in terms of working hours, and the way we work. We certainly also have people overseas that manage customer relationships in the same time zone. It works. In this hemisphere, there are many Australian software success stories these days that that have successfully managed the problem.

DVN-I: What else would you have the DVN-I community know?

PM: We remain focused on transport—automotive, commercial transport and logistics, and aviation.

As an industry pioneer and leading driver monitoring technology specialist Tier 2 automotive company, I think we have reached scale now with 15 ongoing programs and more than 700,000 cars on the road today with our technology installed.

Over the next year or two, we will continue to grow. We are very productive because we have a lot of very highly skilled people here. The next step may be to extend our presence in Europe, probably Germany, and possibly grow out our presence in the US which is now predominantly in Detroit.

From a software perspective, we're building Seeing Machines 2.0!

Interior News

Ford BlueCruise is UK's First Legal Hands-Free Driving

INTERIOR NEWS

FORD IMAGE

DVN recently published that Ford Blue Cruise is using Seeing Machines software for the driver-monitoring functions. Hands-free driving has been legal in the UK since 2021, and Ford has won the race to be the first manufacturer to offer the technology to customers.

Ford's newest BlueCruise allows drivers to remove their hands from the steering wheel on certain pre-mapped motorways in the UK. The UK's Department for Transport has approved BlueCruise for 2,300 miles of motorway in England; Scotland, and Wales. The system works at speeds up to 114 km/h, with radars and cameras monitoring road markings; signs, and changing traffic conditions. It also checks on the driver to ensure they're paying attention to the road—there's that DMS at work.

BlueCruise is already enabled on certain Ford models in the US and Canada, where the automaker says they have racked over 100 million kilometers using the technology. The system will be available on new Ford Mustang Mach-E models in the UK.

There's a new business model, too, as Ford is selling BlueCruise technology on a subscription basis. The first 90 days are included with the car, and then it'll be a £17.99 monthly fee.

Fifth ISELED Conference

INTERIOR NEWS

INOVA IMAGE

At the 5th ISELED Conference in Munich, again as a hybrid live and online event, members of the ISELED Alliance will present their latest products and advances—many in the form of please-touch product show-and-tells at the exhibition running parallel to the Conference. Experts from automakers; suppliers, and other sectors will give keynotes and presentations on the latest developments in the field of vehicle lighting.

With the trend to more driver assistance systems on the way to the self-driving car, interior lighting has to cover an increasingly large field of comfort, functional and warning tasks.

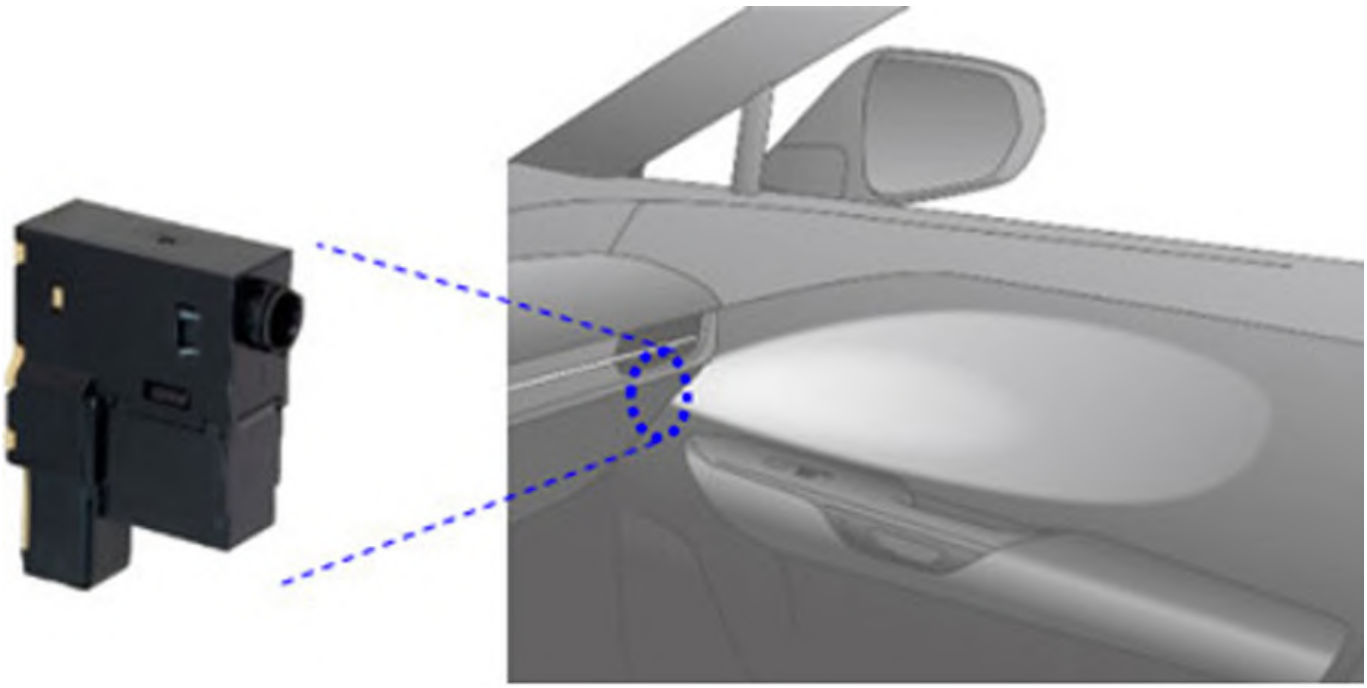
ISELED, the 'Digital LED', and ILaS, the complementary light and sensor network, together are capable of supporting all of these exciting new lighting applications and the latest corresponding domain- and zonal architecture.

The conference will be packed with high-value information and networking opportunities in and around the ecosystem, and the ISELED Alliance, now with 52 members (and counting!), warmly welcomes you.

Find information and register **online**.

Toyoda Gosei's New LED Shadow Interior Lighting

INTERIOR NEWS

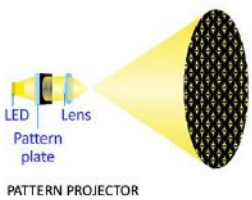


LED SHADOW ILLUMINATION

Toyoda Gosei have developed an LED lamp unit that projects patterns in vehicle interiors using shadow. It will first be used on the new Lexus RZ battery electric vehicle.
A plate with decorative patterns is built into the LED lamp unit, projecting an attractive ornamental design on the door interior to present a fresh impression at night, as if the vehicle interior had been given a makeover. Toyoda Gosei's optical technology prevents passenger shadows by projecting light diagonally from the front, while at the same time the pattern is vividly projected even at large distancesfrom the light source.

The new system can provide a variety of light colours and patterns, and they're customisable to cater for diverse interior materials.

PATTERN PROJECTED ON DOOR PANEL



PATTERN PROJECTOR

The newly-developed illumination product can provide different light colors and pattern variations. Different appearances are also expressed depending on the interior materials, which will contribute to diversity of interior design suitable to vehicle grade.

Joyson's Steering Wheels Get Sleeker

INTERIOR NEWS

JOYSON IMAGE

Drivers are putting up with touchscreens to replace knobs, switches, and buttons, though not without **justified resentment**. But steering wheels often still contain buttons. Auto designers who think every last mechanical button must be eliminated are looking to integrate higher tech surfaces that perform like a smartphone, to offer increased functionality.

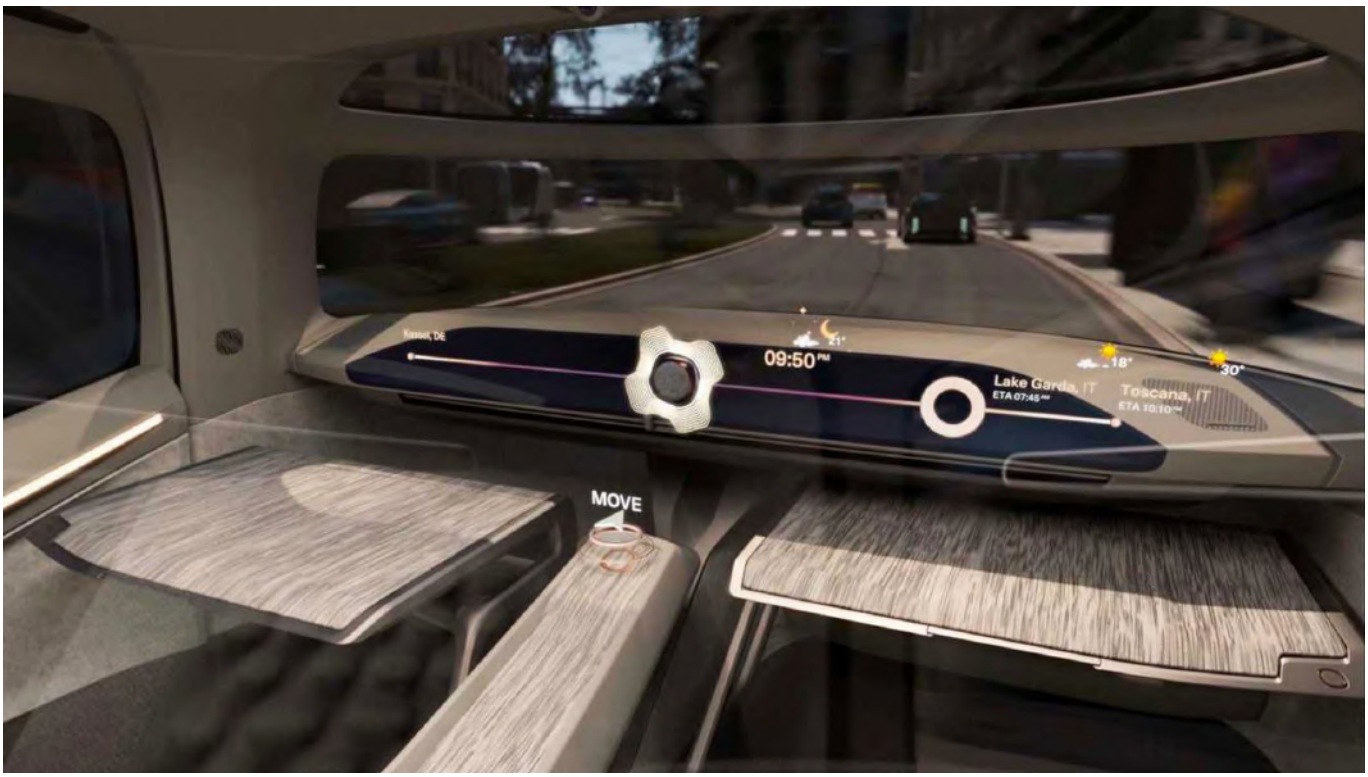
Joyson's latest concept is a single-piece, gapless steering wheel cover that will allow automakers to add touch-based multifunction controls while eliminating buttons, stalks and other levers they regard as clutter in the area in front of the driver. Joyson says by integrating controls into the steering wheels as they are manufactured, future development could be flatter, therefore a less obtrusive presence in the interior design.

Joyson Safety Systems, formerly known as Key Safety Systems, is an American company which develops and manufactures automotive safety systems. The company is a result of KSS purchasing scandal-wrecked Japanese airbag-and-seatbelt maker Takata.

The Joyson Group, founded by Jeff Wang in 2004 and based in Ningbo, China, is among the 30 largest global automotive suppliers. Their divisions include Joysonquin (automotive components); Preh Group (automotive electronics), and Joyson Safety Systems.

Argodesign Proposes UX/HMI Concepts

INTERIOR NEWS



VW IMAGE

While road safety researchers are **calling** for a return to switches and buttons, automakers are moving in the opposite direction with their design studies.

“Will this trend prevail? Will drivers and passengers be flooded with more and more information? And how can distractions be avoided?” asks David Cleaves, head of Creative at the Argodesign Agency in Munich. “Full-width displays, whether HUD or conventional, should be integrated into the architecture of the vehicle and should have a silent or deco mode and be able to retract when the person behind the wheel wants to have a conversation or use their own devices".

Continental has provided such a function: Only those control panels actually needed at a given moment appear in the 3D display. In addition, says Cleaves, HUDs are more difficult to see in certain lighting conditions and viewing angles and provide poorer image quality than a screen. A supplementary display therefore makes sense.

VW GEN.TRAVEL DESIGN STUDY (VW IMAGE)

“Concepts like the VW Gen.Travel have an extreme effect,” Cleaves says. "They prepare us for new experiences in autonomous driving. In this future, we might live far from work and commute there and back once or twice while we sleep. Or we might work while driving or being driven to an appointment."

Volkswagen has realized this concept, for long-distance mobility in autonomous driving mode. The four seats can be grouped vis-à-vis around a table. Or two seats can be converted into a bed.

“In the development of new studies, there is always the question of what the drivers and passengers of future vehicles want: their peace and quiet or pure infotainment? Cinema or concert hall, working space or bedroom?” says Cleaves. "That's another reason BYOD (bring your own device), will take on a central function, and car displays and sound systems will augment users' digital devices." With the BYOD concept, the design expert sees new possibilities and end devices in the medium term: "For example, in the case of display hardware, elegant solutions for smart glasses will make their way onto the market in about ten years".

Part of the future of interior design is that there will be separate concepts for the growing number of ride-hailing vehicles. "This requires a lot of stowable, flexible furniture, as well as displays and sound systems that can be converted from solo to group use," Cleaves says.

Will GM Use ChatGPT in Vehicles?

INTERIOR NEWS

GM IMAGE

GM and other automakers are increasingly turning to artificial intelligence for customer service and to develop high-profit digital services. General Motors' CEO Mary Barra envisions AI making voice-command navigation and choosing of songs look trivial. Barra says onboard bot software will interact more completely with drivers by, for example, allowing the driver to ask why a check-engine light has come on and if they should keep driving until a service station is reached; ask about hotels with rooms available, and otherwise like that.

GM has been increasingly talking about plans to use AI products such as ChatGPT as part of an ongoing partnership with Microsoft and Open AI. ChatGPT purports to allow users to interact with machines in a natural and personalized way, using artificial intelligence and natural language processing. ChatGPT can provide real-time support to customers, answer their queries, and resolve their issues quickly as a personal assistant. But will that support be any good; will the answers be correct and the resolutions be satisfactory? Probably not soon, as anyone might see who has interacted with ChatGPT on the web and taken half a look at the authoritatively-toned but factually-deficient output.

AI also allows to track and gather information about car users and target-advertise products and services to them. GM and other automakers see digital services as a multibillion-dollar area of growth over the next decade; Ford has been using a chatbot as part of their FordPass customer app, and recently deployed a chatbot to communicate with drivers through their cars' infotainment systems and provide real-time support. Toyota has been using a chatbot to interact with customers, and Mercedes-Benz uses a chatbot as well.

The Design Lounge

Lithium Versus Hydrogen

By Athanassios Tubidis

THE DESIGN LOUNGE

COFFEE CORNER
DVN
Interior

HOPIUM MACHINA AT PARIS MOTOR SHOW 2022 (WIKIMEDIA COMMONS IMAGE)

The rooster is posing next to a huge ostrich egg, causing havoc to the entire chicken house: "I did not want to scare you, just wanted to let you know what the competition does!"

One may wonder if with all the alternate eco impacts of building batteries for electric vehicles, their low range, the cost of deploying new infrastructures, long charging times, and our capacity to generate enough green electrons to charge them, are EVs going to end the same way as cassette players? Indeed, competition now may come from many different sectors. An upgrade to the previous version, with some weaknesses, but then quite rapidly replaced by an even better, more easily consumed media. Will hydrogen actually be the winner in the future and quite rapidly replace battery-powered vehicles?

Toyota in partnership with Yamaha, two companies with a strong passion and commitment to internal combustion engines, presented a hydrogen powered ICE. No fuel cells, the engine operates just like a normal one but the fuel is hydrogen.

To the opposite end, hydrogen automaker Hopium has announced that the development of its vehicle is put on hold. The company has been marketing its high-performance hydrogen-powered car since 2020, which is available for pre-order at a cost of €120,000 and is said to have a range of 1,000km. After its share price tumbled from a high of €37.80 in June 2021 to €3 in early April 2023, the loss-making company announced that it would switch focus to developing its fuel cell system and selling it to third parties. The competition with established multi-billion-dollar conglomerates, that can afford to invest significantly in product development with much lower risk, is unfair. In addition, studies have found that hydrogen cars are unlikely to move beyond a small niche due to the higher purchase, running and maintenance costs compared to more-established battery electric vehicles (BEV), which makes it even harder.

Hydrogen cars can be refueled faster than BEVs, but that gap is expected to narrow as battery and recharging technology improves. Hydrogen vehicle advocates point to their greater range compared to BEVs. Besides the frequent charging-interface issues or user friendliness deficit, there are already several

BEVs on sale that have theoretically a longer range than any H2 car on the market, and it will be far harder for the latter to find a hydrogen fueling station than for a BEV to reach a public charge point.

Investments being faster than product development times can create mayhem to anything that is not instantly up to date, producing in addition strong bias on any failed attempt. It is all about delivering the right car at the right time at the right place. Definitely more than one to handle. Unlike Lithium versus Hydrogen competing technologies, there is a wider financial ecosystem equally harsh and unforgiving.

The bank robber points the gun yelling: "Give me all the money! Initial investment is needed to cover the overheads until my cash flow is established!". The bank manager said to the clerk, "You'd better do what he says, I think he means business."

Genesis Crossover Coupé Concept Revealed…To a Few

THE DESIGN LOUNGE

GENESIS IMAGES IN THIS ARTICLE

Genesis, the luxury brand from Hyundai-Kia, showed a concept 'crossover coupé', the GV80, at an exclusive event held at Genesis House in New York, just ahead of the New York Motor Show, held from 7 to 16 April.

Highlighting the design philosophy of 'Athletic Elegance' and a driver-centric execution, the car has detailed reminiscent of a sports car and sophisticated material finish.

Hyundai-Kia Group Chief Creative Officer Luc Donckerwolke says the car "emphasizes the duality of the Genesis brand by showcasing the antagonistic character that lives within the Athletic and Elegance parameters of Genesis' design philosophy".

The design is amplified by the 'Magma' exterior color, which symbolizes a confident and passionate Korean attitude. Continuing the themes of the exterior, the interior is a contrast between Genesis' elegant Beauty of White Space philosophy and racing-inspired attributes.

In that respect, this interior is less production-realistic with four real bucket seats and a treatment that is more reminiscent of the world of motor racing than that of luxury premium SUVs. The GV80 SUV was a six-seater with three rows; this car has two. These four bucket seats provide increased body support during cornering, contributing to passenger safety and comfort, while the body-colored carbon fiber backrest further accentuates the extroverted character of the car overall.

A G-Matrix strut brace behind the bucket chairs offers structural stiffness, thereby reducing body roll. Interior trim has orange to accent the gray ultrasuede.

News Mobility

China Continues to Expand Robotaxi Fleets

NEWS MOBILITY

PONY IMAGE

Commercial cab services without a driver could be allowed in Beijing within the rapidly-dwindling first half of this year. Since the turn of the year, two new licenses have been issued to Baidu's "Apollo Go" and the Toyota-backed start-up Pony in preparation for this.

The two rivals for operating autonomous robotaxi fleets have each been allowed to operate ten cabs completely driverless in the Chinese capital since the beginning of this year. A safety officer, who previously had to sit in the car with the driver, now need only observe the test drives remotely, on a screen at the company's headquarters. From there, they can control the vehicles.

With an expansion of almost-autonomous robot cab fleet to Beijing, China's authorities are signalling that they want to take the lead worldwide in the development of autonomous driving. Beijing apparently senses an opportunity to dominate a future technology on a global scale, as it has already succeeded with wind and solar energy.

China is gradually allowing more and more road tests and its domestic startups to gain experience before unleashing the full regulation of its administration. The government is saying "Go ahead!" instead of applying stringent regulations from the start. Crashes, injuries, fatalities? Well…perhaps in China, that's just the cost of clawing the way to the top.

Baidu has said they want to establish the largest driverless-cab area in the world. There have been predictions that the cost of commercial trips in a Chinese robotaxi could soon be half the cost of a normal cab ride with a human driver.

Most likely, more announcements will come in parallel with the Shanghai Auto Show happening this week until April 27. DVN-Interior will be listening; watch this space!

Autonomous Cars Confused by San Francisco's Fog

NEWS MOBILITY

UBER SELF-DRIVING TEST IN SAN FRANCISCO WITH VOLVO (CITTI IMAGE)

Overwhelmed by dense fog in San Francisco early on a recent Tuesday morning, five of Waymo's fully driverless vehicles suddenly parked by the side of a residential street in what appeared to be a precautionary measure, the San Francisco Chronicle reported, and another Waymo car stopped in the middle of the street. Other vehicles were unable to pass as "baffled motorists flashed headlights and tried to maneuver around the jam," the Chronicle said.

The traffic problems persisted until the fog cleared and the autonomous cars resumed their journeys.

Waymo confirmed the incident in a statement last week, saying that at around 6 a.m., "multiple Waymo vehicles in San Francisco encountered very dense fog and determined they should pull over temporarily." They said after a "brief" stop, the cars continued on their way, adding: "We have software updates planned to improve our fog and parking performance to address such situations in the future."

San Francisco is famous for its fog, and a couple of years ago Waymo addressed the issue in a blog post: "low-hanging clouds are iconic to the city, but they also pose several challenges for drivers, both human and autonomous. Fog is finicky—it comes in a range of densities, it can be patchy, and can affect a vehicle's sensors differently. Sometimes, we see fog thick enough that it deposits tiny droplets on surfaces, like our optical sensors, while other times its microdroplets just form on our sensors, impacting how far one can see. Fog can also trap other particles, such as smoke from wildfires or pollution from gasoline, creating an opaquer fog or smog that's hard to see through". (*DVN comment: that is not the case. Although the word 'smog' is a portmanteau of smoke and fog, smog is not such a mix; it is the product of a photochemical reaction between sunlight and hydrocarbons or nitrogen oxides.*)

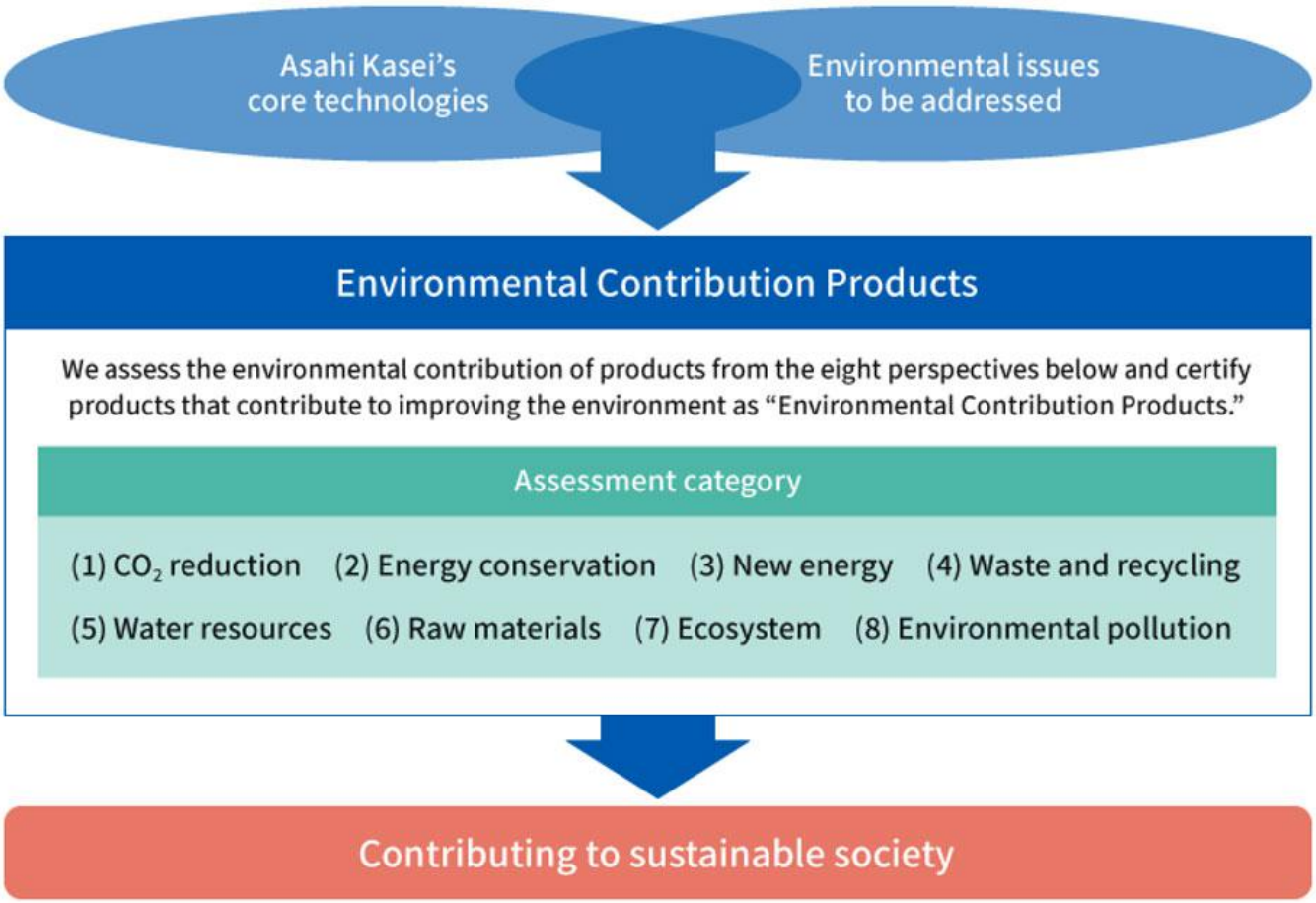
Waymo say their fifth-generation imaging radar uses microwaves instead of light and therefore can see through things like fog and mist, and a new cleaning system has been designed for the cars' sensors.

Add this to the stack of evidence that autonomous mobility has still hurdles to pass before it's fully ready! (*DVN comment: do they have fog in China…?*)

General News

Asahi Kasei's Startup Framework for Carbon Neutrality

GENERAL NEWS



ASAHI KASEI INFOGRAPHIC

Since their foundation in 1922 with ammonia and cellulose fiber businesses, Asahi Kasei has been developing their three business sectors of materials; homes, and healthcare. Their material sector, comprising environmental solutions; mobility and industrial, and life innovation, includes a wide array of products—battery separators and biodegradable textiles; engineering plastics and sound solutions.

Asahi Kasei has established a 'Care for Earth' investment framework as a new initiative for carbon neutrality by investing USD $100m worldwide in early-stage startups that aim to solve issues in environmental fields such as hydrogen, energy storage, carbon management, and bio-based chemicals over the five-year period up to fiscal year 2027.

Since 2008, Asahi Kasei has advanced corporate venture capital (CVC) activities to create new businesses by investing in startups and performing joint developments with them. Based in Silicon Valley since 2011, this activity has facilitated investments in over 50 startups in the US; Europe; China, and Japan, resulting in numerous collaborations and the two acquisitions of Crysal IS, a US-based provider of UVC LEDs for air, water and surface disinfection, and Senseair, a Swedish manufacturer of CO_2 and alcohol sensing solutions.

Until now, Asahi Kasei has focused their CVC investments in the area of care for people—healthcare; IoT, and homes, which have relatively short timeframes to commercialization. Their Care for Earth activities tend to have longer-term commercial prospects, while fields such as hydrogen and energy storage lack established value chains, making it difficult to invest under a conventional framework. The new investment framework is also expected to help Asahi Kasei advance the transformation of their Material sector portfolio through participation in business ecosystems for carbon neutrality.

German Auto Sector Pours Money Into R&D

GENERAL NEWS

AUDI IMAGE

Automakers and suppliers in the German automotive industry will invest more than €250bn in research and development worldwide between 2023 and 2027. That's a finding of the European Commission's report "The 2022 EU Industrial R&D Investment Scoreboard," which was evaluated by the German Association of the Automotive Industry (VDA). Investments by German manufacturers and suppliers accounted for 76 per cent of R&D investments made by European automotive companies worldwide in 2021.

According to the report, the focus of investment is on transformation, especially electromobility—including battery technology, autonomous driving and digitalization. Added to this is a further €130bn for the construction of factories and the conversion of plants, among other things.

According to the VDA, global research and development investments by German automotive companies amounted to €45.2bn in 2021, which is 6 per cent more than in the previous year. According to the association, Germany "remains the international leader in global investment in automotive research and development, ahead of Japan, the U.S. and China." Within the German economy, the automotive industry is also in the lead with R&D investments; the VDA says nearly half the global investments made by German companies in R&D came from the automotive industry in 2021.

Worldwide, there are four key sectors with highest investments for R&D:

- ICT manufacturers: 22.6 per cent (ICT, information and communications technology)
- ICT services: 19.8 per cent
- Healthcare industry: 21.5 per cent
- Automotive Industry: 13.9 per cent

Growth in these four key sectors was higher in U.S. and Chinese companies than in listed EU companies. The full report, "The 2022 EU Industrial R&D Investment Scoreboard," is **available** from the European Commission.