DVN-I
Automotive Interior

Thu, 1 April 2021 Weekly Newsletter **NEWSLETTER #54**

Editorial

Electronics, Software Advance Interior Features

IMAGE: ELECTRONIC DESIGN TODAY

This week we're starting something new: we're profiling companies to give the community an opportunity to get to know them and their technologies, techniques, expertise, and specialties to support safety, comfort, and convenience in car interiors. Melexis, for example, is focused on sensing technology and its interior applications including thermal control, networked lighting, seat adjustment, gesture control, and interior monitoring. Sensing technology means more than just sensors; it extends to how the sensed information is processed and applied—the entire chain of electronics and software to trigger a feature or function. In-cabin monitoring, HUDs, acoustic monitoring, and sound systems, for example, not to mention maximized efficiency of the whole system for best usage of scarce resources, such as chips (which are in short supply these days). All these are yet more illustration of how the car continues its transition from a hardware-driven machine to a software-driven device with electronics everywhere—especially in the interior.

Don't forget, the Shanghai DVN Workshop takes place on 19-20 April, with full online access and specific sessions on cockpit and interior lighting. To register, either for the whole event or if you have interest only in the interior-light sessions, please **contact me** or **Salomon Berner.**

We're glad you're here and proud to present this latest edition of DVN-I. If you're not a member yet, **come and join us**!

Sincerely yours,

Philippe Aumont

Philippe Aumont
General Editor, DVN-Interior

In Depth Interior Technology

Melexis Company Profile

IMAGE: MELEXIS

Melexis is an engineering company designing, developing, and delivering microelectronic components and systems. They're specialists in mixed-signal semiconductor sensor and actuator solutions like pressure, speed, and temperature sensing, embedded motor drivers, fan and pump drivers, LED drivers, and transceivers. They integrate sensing, driving, and communication to improve safety, comfort, and sustainability.

Melexis was founded in 1989. They're headquartered in Belgium, employ over 1,500 people across 18 locations in Europe, Asia-Pacific, and the Americas, and boast revenue of €507.5m in 2020. The majority of Melexis' customers are automotive manufacturers.

And all those people at all those locations are hard at work to expand their portfolio of sensors and driver ICs to meet the needs of not only automotive applications but also appliances, home automation, industrial, and medical applications.

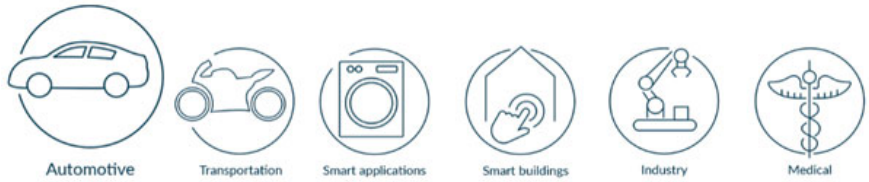
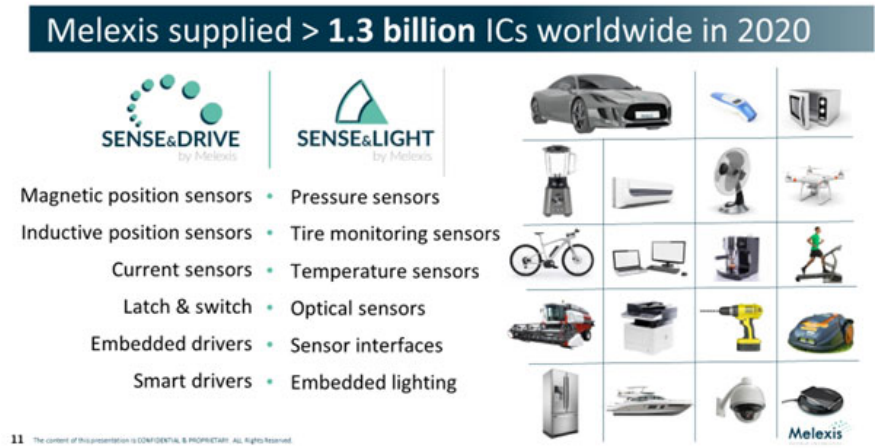
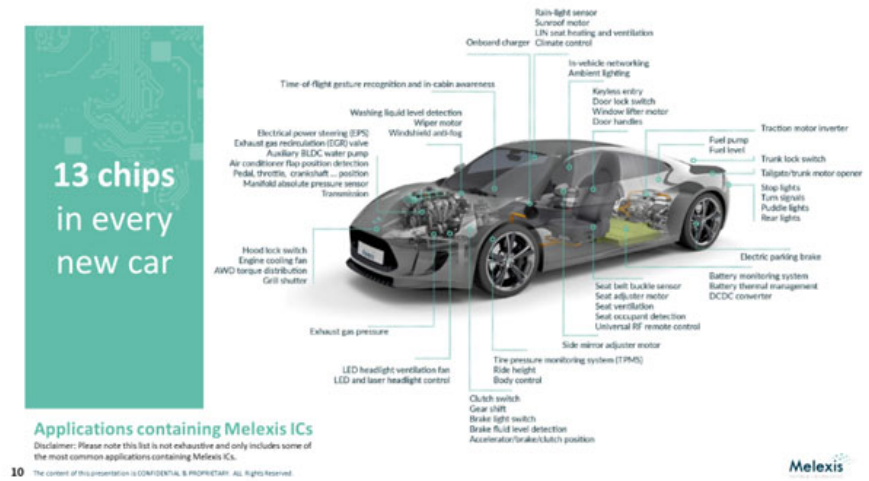


IMAGE: MELEXIS

Melexis is a pioneer in 3D magnetic Hall sensors with their unique Triaxis® solutions, in the use of MEMS in mid-range pressure sensing applications, in latching and switching, and in ambient lighting. Especially with the arrival of autonomous driving, there is an increasing internal focus on ambient interior lighting with multicolor, complex, animated, and smart lighting functions for safety and communication and to personalize the human-machine interaction.



IMAGES: MELEXIS



MELEXIS AUTOMOTIVE TECHNOLOGIES INCLUDE:

• Technologies aimed at improving engine management, transmissions, and thermal management in vehicles with combustion engines;

• Camshaft and crankshaft sensors;

• Position sensors for the likes of throttle valves, water valves, and exhaust gas recirculation valves;

• Manifold absolute pressure and temperature sensors;

• Fuel pressure, vapor pressure, and crankcase pressure sensors;

• Oxygen sensor signal conditioning chips;

• Exhaust gas temperature sensors;

• Diesel and gasoline particulate filter pressure sensors;

• Sensor ICs and motor driver ICs for engine management, including air intake, ignition timing, fuel, exhaust gas, and temperature;

• Engine-specific motor drivers for water pumps, water valves, cooling fans, fuel and oil pumps;

• Technologies for hybridization, electrification, and autonomous vehicles—electric traction and auxiliary motors; smart valves and flaps; complex thermal systems (positive temperature coefficient pTC heaters, HVAC compressors); battery packs; smart fuses and contactors;

• Networked lighting with the Melexis Light Bus (MeLiBu™) which integrates LED systems from different suppliers;

• Gesture control and interior monitoring, and

• Time-of-flight sensors for infotainment, HVAC systems, and safety applications including driver monitoring, head pose monitoring, body pose monitoring, hand-on-wheel detection, and advanced seatbelt detection.

Temperature monitoring

Applications including medical body thermometers, smart wearable devices, and smart buildings.

Motion control

Sensors and motor drivers for robotic applications

Online

ICs for fans used in cooling applications in processing units, computing servers, data centers, and base-stations

Here's an overview of Melexis embedded solutions:

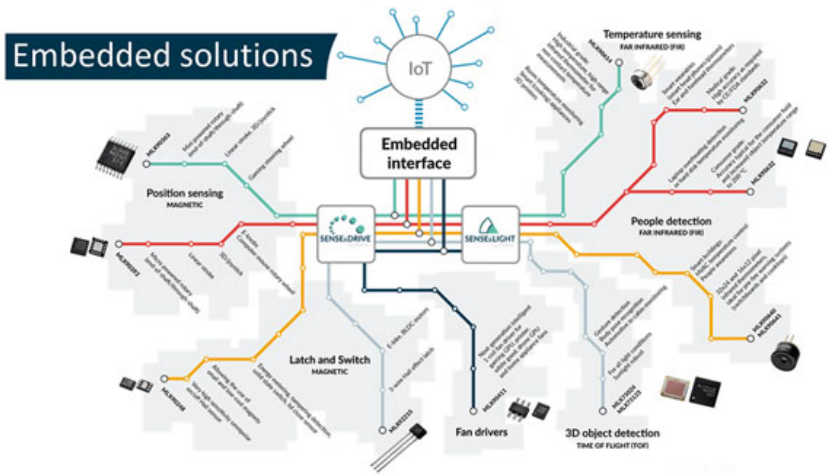


IMAGE: MELEXIS

For embedded lighting, Melexis offers LIN RGB drivers for ambient lighting and solutions for dynamic RGB lighting with automotive bus architectures.

Melexis contributes to the current automotive trends like electrification for zero emissions, ADAS and AD for zero traffic fatalities, and user experience customization and personalization with powertrain, chassis, body, and safety systems.

Melexis electronics also are implemented in 'Smart Life' solutions:

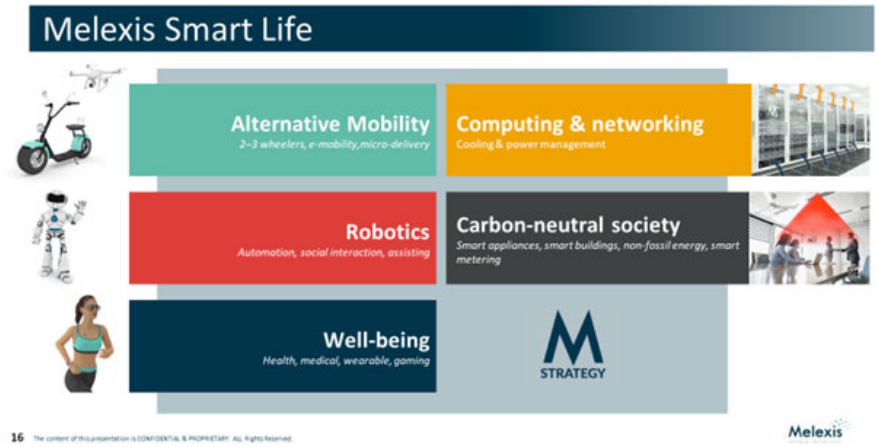
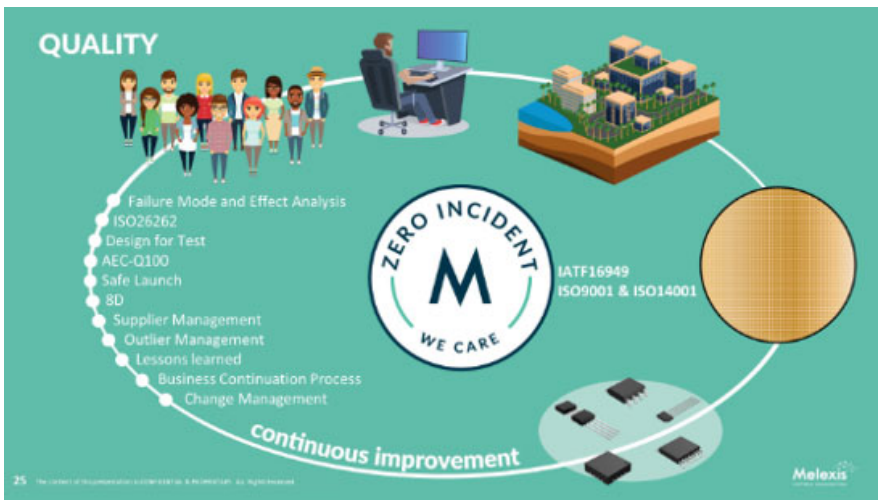
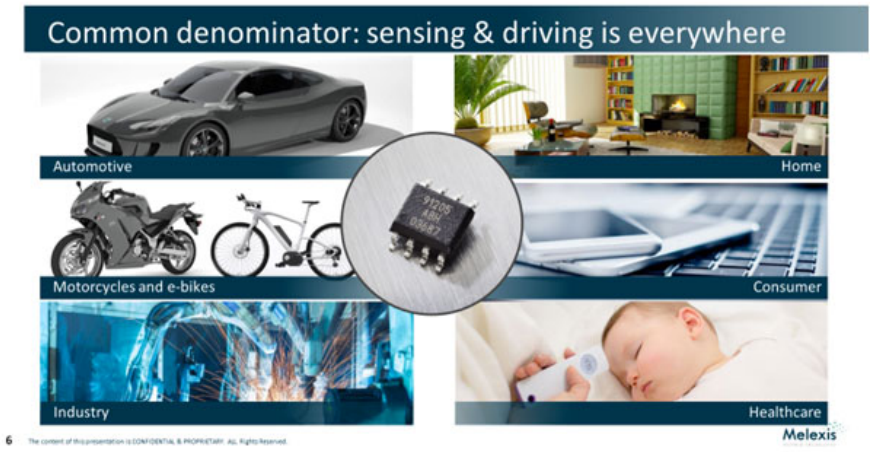


IMAGE: MELEXIS

Melexis strives for zero-incident quality in a continuous improvement process.





Melexis tackles electronic challenges by talking to customers, understanding their needs and concerns, and meeting them with responsive products. This is the customer-centered approach that has been fundamental to the success of Melexis.

Interior News

Hyundai Mobis HUD with DiSTI GL Studio

INTERIOR NEWS

Hyundai Mobis adopts DiSTI's User Interface software, called GL Studio, to develop HUDs (Head-Up Displays) for vehicles made by Hyundai-Kia.

Hyundai Mobis, founded in 1977 and headquartered in Seoul, has more than 30,000 employees with manufacturing operations across 10 countries. Their products include chassis, cockpit, and front core modules; brakes; suspension; airbags; lighting and automotive electronics, and ADAS based on state-of-the-art technologies.

DiSTI Corporation is the world's leading provider of graphical user interface software. Their flagship product, GL Studio® delivers high fidelity, feature-rich 2D and 3D graphical user interfaces for digital automotive cockpit instruments, HUD displays, controls and clusters, and fully immersive HMI cockpit environments.

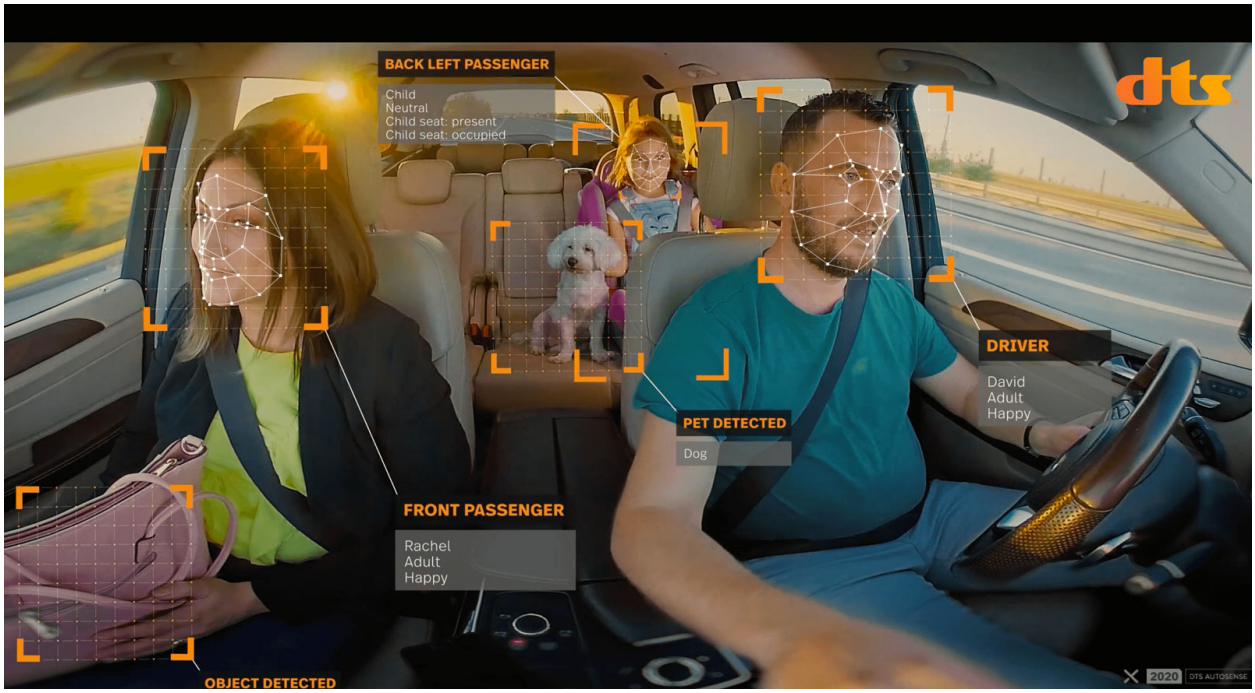
Mobis' newest 12" HUD, built with GL Studio HMI software tools, leverages GPS data to provide information like driving routes, driving assistance, and traffic signs, as well as traffic data about cars sharing roadspace with the equipped vehicle.

The reason for HUDs is to improve safety, giving the driver scan efficiency of the environment, while reducing cognitive load and the need to shift and refocus gaze between the road outside and the instrument panel inside. HUDs help the driver avoid distractions such as controlling GPS and making phone calls too urgently important to wait until after the driver is done with the driving task and its attentional demands.

GL Studio includes support for ISO 26262, offering the highest standard for functional safety development.

DTS Autosense In Cabin Monitoring

INTERIOR NEWS



DTS®, based in Calabasas, California, build and supply what they call next-generation audio with imaging and sensing technology. They say their AutoSense™ is the world's first OMS (occupancy monitoring solution) to be designed into passenger vehicles to be on the road this year. AutoSense was named the 'Overall AutoTech Solution of the Year' in the 2020 AutoTech Breakthrough Awards and a top safety pick in the 2020 CLEPA Innovation Awards.

AutoSense is a suite of computer vision solutions designed for in-cabin monitoring applications with high accuracy detection, classification, and analysis of all the passengers inside the vehicle, enabling a safer and more personalized journey experience.

The system uses a single camera, and leverages the company's extensive experience—over 20 years' worth—with image processing and artificial intelligence. Its advanced computer vision and machine learning techniques enable vehicles to sense, in real time, the presence of occupants and objects (for example, a laptop accidentally left in the vehicle). The technology can also enable personalization of infotainment recommendations, such as playlists, content, volume of music, choice of radio stations, in-cabin temperature, and any other setting that can be adapted to a user's specific taste. Powered by AI, each feature relies on proprietary neural networks designed, trained, and tested by the company's team of over 100 AI/ML engineers, artists, scientists and problem solvers.

It is effective even if vehicle passengers/occupants are masked, and includes child seat detection, child presence detection, occupant detection, emotion detection, and passenger authentication. The AutoSense solutions are deployed using edge computing, without a need for cloud connectivity, meaning all data can remain within the vehicle.

In addition to AutoSense, DTS automotive technologies include connected and HD radio for a robust, rich, personalized in-cabin infotainment experience.

Altia: More Efficient HMI to Compensate Chip Shortage

INTERIOR NEWS

IMAGE: ALTIA

The semiconductor chip shortage has impacted all facets of the industry, including HMI (human-machine interface) development teams and those companies who are part of the embedded user interface supply chain. Since HMIs' requisite animation and graphics are computer-intensive, they require the microprocessors and memory devices currently in such short supply.

Altia World, based in Colorado Springs, Colorado, enables innovative, intuitive, especially efficient graphical user interfaces for digital displays such as instrument clusters, HVAC, infotainment, and HUDs.

The chip shortage has many odious short-term consequences, such as plant stoppages, but long-term effects might include some desirable ones, like boosting local chip production and push creativity further with greater hardware flexibility, smarter design, more integration, and frugal use of critical components.

Altia's development tools are keys to designing and developing GUIs for embedded devices. Their workflow engages all stakeholders in the UI development process for clear communication and optimal results.

Even if chip supplies catch up with demand in the short term, automakers need a better plan because onboard technology is proliferating, and autonomous vehicles will require even more computing power. Smart product design is the way forward, with more efficient usage, flexibility to rapidly pivot to other chips, and more standard components. By working with HMI design and development partners that separate out the hardware-independent part of the design process and automate hardware code generation, automakers and tier-1s can swap out chips in weeks rather than years, generating significant cost savings on hardware without compromising the look, feel and performance of the HMI.

This strategy helps also to expand features like HUDs from premium models to popular-price cars.

SIA How to Evaluate Acoustic Comfort

INTERIOR NEWS

RENAULT ACOUSTIC TESTING CENTER AT AUBEVOYE

SIA (the French Society of Automotive Engineers) has been looking at how to evaluate automotive acoustic comfort.

Acoustic comfort is one dimension of overall comfort in a car. It includes having no long-term annoyances or short-term disturbances. Noise in a car can be dysfunctional (It shouldn't exist) or functional (cannot be avoided, only reduced and ameliorated). It also covers sound quality, more related to premium level of the interior and the brand signature. Acoustics as a field has its specific metrics (sound pressure level, frequency, and suchlike); acoustic comfort evaluation includes also perception, where psychoacoustics is used within a complete interior comfort evaluation.

Electrification and more automated vehicles create a new interior environment, where the need for acoustic quality and comfort drastically increases. Occupants' perception around the globe is pretty similar, but driving conditions are different. EVs amplify the road issue as it's not masked by a combustion engine's sounds. Multiple in-car activities and new technology such as voice recognition increase the need for a quieter interior atmosphere.

In hot places (or cold ones, for the matter of that), the HVAC blower is frequently at high speed, or maybe the windows are more often open. That means a completely different occupant perception, and therefore, different expectations. Bad roads create high level of vibrations, which drive buzzes, squeaks, and rattles within the car. All of which calls for solutions like more acoustic insulation, advanced acoustic management (such as active noise cancellation), and even artificial engine sounds for EVs.

Lucid Air's Immersive Audio: Surreal Sound, Even for Alerts

INTERIOR NEWS

DVN Interior already covered the exceptional interior of the Lucid Air. Its sound system is worth a deeper dive. It has 21 precisely positioned speakers—front, rear, side, and overhead—and is the world's first car to offer Dolby Atmos capability. This custom-designed immersive audio system is called **Surreal Sound** (note in the video the executive rear seating planned for future models).

According to Senior VP of Design Derek Jenkins, "The Lucid immersive system is really about this further evolution of dimension and depth. It's not only about front to rear or left to right. It's also up and down. That's what makes it truly unique".

Lucid collaborated closely with Dolby Labs and their Atmos technology. "It was very obvious to us that Lucid was trying to do something different and trying to do something that was unique to the automotive experience", says Tim Pryde, Dolby's Director of Music. "The way that Lucid has approached the automobile very much resonates with Dolby's approach to experiences. We are creators creating things for other creators. With Atmos we're giving creatives a whole new way of thinking about audio to where they now just think about audio in space".

The crystal-clear, studio-quality immersive sound gives the impression of being in a recording studio. It can handle hundreds of sounds and sources simultaneously. It goes beyond the music and more into the sounds that the car makes, such as signals, warnings, indicators, and how the car communicates with its occupants, especially safety cues. Lane departure alerts are delivered directionally; the rear seat belt alarm coming from the back, and turn signal tick-tock sounds come from the indicated side of the vehicle. Blind spot warnings come from where the hazard is located.

Left, right, up, down—it's immersive; the Lucid Air interior is a captive sound chamber with everything hidden, no visible hardware like speaker grilles.

Genesis GV 80: Superbly Luxurious Interior

INTERIOR NEWS

Genesis is Hyundai's luxury brand. The Genesis name first appeared on a Hyundai sedan in 2009. After that, it morphed into the South Korean automaker's luxury division beginning in 2017 with two models, the G80 and G90 sedans. The 2021 GV80 (video **here**) is the first Genesis SUV, and its interior is superbly luxurious. The overall impression is gorgeous with soft-close doors, quiet and deep comfort, high end materials and superior fit and finish. It can even be a zen machine when the "Sounds of Nature" app is activated, supported by an active noise control system.

There are 16-way nappa leather seats with adjustable side bolsters that tighten in Sport mode, and a powered cushion length extender and circular lumbar support to maximize comfort. It has a "smart posture care" system that will automatically adjust the seat and steering wheel position based on height and weight entered into each driver profile. There's an adjustable easy seat access feature that retracts the steering wheel and moves the seat back when you get out, then resets it to the last setting when you get back in. Rear seats are heated and cooled, and fold automatically down under their own power to form a tall and deep cargo area. The rear cabin is roomy, with 99 cm leg room and power rear window shades.

The 14.5" stretched display can be divided into one main section for navigation and a smaller section for audio, for example. The split is managed with a central dial, and several operations, like radio, can be controlled by voice, steering wheel controls, touchscreen, or dial.

The Design Lounge

BEV vs ICE 5-Doors, Part I

THE DESIGN LOUNGE

An interesting development has been occurring lately regarding segment classifications and body styles with the success of: the 5-door CUV segment, the introduction of new 5-door BEVs and the upmarket positioning of the traditional ICE 5-door C-Segment vehicles. The 5-door vehicle has an expanded imprint on the market, as it seems. More than an entry level option, it has become the luxury and utility solution for buyers around the world.

So let's now compare two of the most recent entries, the Kia EV-6 BEV and Citroën DS 4.

KIA'S EV 6 IS 465 CM LONG, 190 CM WIDE, 160 CM HIGH, AND HAS A 300-CM WHEELBASE.

THE CITROËN DS 4 IS 440 CM LONG, 183 CM WIDE, 147 CM HIGH, AND HAS A 270-CM WHEELBASE.

Although very different in their technical layouts and market positions—the Kia is longer, wider, and taller; the Citroën is a luxury vehicle—they share similar overall exterior proportions. Their interior designs represent the latest from each brand, but also include some clear similarities.

The Kia EV 6 shares the platform just introduced with the recently-launched Hyundai Ioniq 5, but with a more sport-oriented, traditionally-configured environment. The strong tunnel/floor console and full width concave instrument panel surface create a more encompassing feeling than the Ioniq 5's open, airy, spacious effect.

Citroën has also put in a dominant tunnel/floor console and full-width concave instrument panel base theme with luxury materials and detailing.

The cluster/UX/HMI display on the Kia EV 6 is carried over from the Ioniq 5 along with many of its switch gear and base technical architecture. The use of a black panel display near the instrument panel without a traditional brow give it a modern, sporty feeling.

The Citroën DS 4 puts forth a strong driver-oriented theme with a small, focused traditional brow over the cluster area; this display is also extended horizontally as a center display/UX/HMI.

KIA EV 6

CITROËN DS 4

The use of this strong, wide horizontal theme is achieved by both vehicles that exaggerates the vehicles interior width. This is created by the concave instrument panel upper section uninterrupted by any HVAC ducts, and a wraparound execution from the door panels to the base of the windshield.

Citroën achieves this by incorporating the HVAC ducts into the door panels, an execution that hasn't been seen in quite some time. Both rely on a tunnel/floor console element to give the driver's area priority, which Citroën has further emphasized with their material choices.

In future instalments of this analysis, we will compare these two cars' design, layout, and materials execution.

News Mobility

_Car interiors Unplugged

NEWS MOBILITY

LAMBORGHINI EGOISTA COCKPIT, 2013

12. Lost and Found In Transportation

(this story is part of an ongoing series introducing automotive interiors as an evolution of our habitat)

While eliminating drivers from modern day vehicles (AVs), there is one particular scenario of removing passengers as well. This is the case of robocars. Letting aside utility pods and delivery vehicles, strictly devoted to logistics and supply chain tasks, in the particular example of race-bots, autonomy is 'remoteness'. The ambition is to maximize both exterior vehicle performance and equally interior piloting skills by detaching gravity or at least its consequences. In order to attempt such ambition, we separated the two; the only link between vehicle/exterior and interior/cockpit, is data.

Unlike passenger AVs, there is not much debate on the looks, since all are stunningly beautiful. Getting rid of all ergonomic constraints, proportions are now stretched to the extremes, following an optimized geometry and weight distribution that suggest the prime racecar. We are about to invent the perfect driving machine…but without a driver! All previsions referring to 'the future of driving experience' are equally valid but, with a different flair. How does the pilot rely to any sensation of speed, acceleration, torque,

cornering and braking, has to do with how much of the immediate cockpit-like environment is carried out of the vehicle along with the driver into a new type of inhabited space. Whether this is a smartphone screen, a joystick platform or an entire drive simulator, in-house surroundings seem to be decorated by somewhat familiar objects; a bit like an instrument panel, a driver seat, maybe even a bucket seat, pedals, a gearshift of some sort.

With technology far more performing than policies and data being always ahead of anything regulatory, it seems itinerant and static inhabited spaces are merging into one new type of interior setup. At the very moment that public space is challenged on the purpose to redefine mobility on a new multimodal vision, boosted by industry 4.0 and a pandemic change of our social protocol, humans tend to be configuring a new type of interior living space. Transitioning from car interiors to open working spaces, now within a living/working habitat we will soon be able to even drive remotely. After successful gamification of any professional and domestic task, our in-house practices require evermore real-estate that comes closer to the automotive industry (gamer seats, armrests, joysticks, steering, pedals, cup holders) already familiar with motion fabricated for many decades. Interiors, whether static or itinerant have now more in common. Shifting hard parts into smart parts, automotive suppliers are maybe about to gain space in our houses.

_to be continued…

_____INDUSTRIOUS__

Inrix Cloud-Based Smart Alerts

NEWS MOBILITY

Inrix, based in Kirkland, Washington (not far from Microsoft in Redmond) specializes in mobility insights for making data-driven decisions. They support the use of big data to identify and solve transportation problems. They work with automakers and suppliers, governments, retailers, insurance agencies, advertisers, and dozens of other industries that can benefit from understanding how people and vehicles move.

Last week, they announced a new standard for streamlined and personalized traffic safety, incident, and parking notifications that doesn't require additional software or an in-car navigation system. Inrix Smart Alerts is a new automotive-grade, cloud-based system Inrix says provides helpful notifications and eliminates unnecessary ones, even when drivers are not using navigation.

The system uses artificial intelligence and a vehicle's probable route along intercept paths to notify only the vehicles that could be affected. With the world's largest collection of mobility data, Inrix can immediately detect congestion, dangerous slowdowns, and road closures through anomalies in traffic flow. It provides notifications even when drivers are not using navigation.

Some scenario examples:

Dangerous slowdowns: an algorithm continually monitors traffic data from real-time sources to identify significant speed deltas on the road network. Drivers on the path of a sudden speed decrease are provided a notification to reduce their speed, decreasing risk of rear-end collisions.

Incidents: when a road closure, construction project, collision, roadway debris or other incidents occur—planned or not—the system quickly notifies relevant drivers to make the best route decisions and avoid delays.

Parking rules: Smart Alerts leverages Inrix's parking awareness to inform drivers of parking restrictions that will affect them. When a connected car is shifted into Park, it will immediately inform the driver of specific parking restrictions for that particular spot, helping avoid a potential parking fine or towing.

General News

Volvo, Ecarx in Infotainment JV

GENERAL NEWS

VOLVO | ECARX

Volvo Cars will set up a joint venture to accelerate the development of a new, scalable infotainment platform that can be shared with mother/sister brands such as Geely Auto and Polestar, as well as with third parties.

Ecarx is a Chinese tech company co-founded in 2016 by Geely owner Li Shufu to develop Android-based systems for Geely's various car brands.

The formation of the new joint-venture company, not yet named, is still subject to final negotiations between Volvo who will hold a 60 per cent stake, and Ecarx (40 per cent). When established, the joint venture will be led by Jan-Erik Larsson, currently the head of R&D in China for Volvo Cars. It will be headquartered in Gothenburg, Sweden, with a staff of about 100 people, including about 70 Android, Linux and UNX software developers who will transfer from Volvo.

Since 2017, Volvo Cars has worked with Google on the development of the Android automotive operating system, which was first commercialized in Volvo and Polestar cars with Google apps and services built-in.

Volvo Cars CTO Henrik Green says "The infotainment system in Volvo's latest cars is one of the best on the market, rivaling mobile phones in user experience. Through this joint venture, we can speed up development of the system, bring high quality infotainment to more cars and maximize incentives for companies and developers to create great services and apps for the users of the platform". This will be Volvo's answer to Volkswagen Group's Car.Software organization, which employs about 5,000 and develops the VW.OS operating system.

Recticel is Now Ascorium

GENERAL NEWS

ASCORIUM SUPPLIES THE UPPER DASHBOARD IN THE AUDI A6

Recticel Automotive has changed their name to Ascorium Industries. The supplier, based in Königswinter, Germany, make premium polyurethane surfaces. Their product range of polyurethane spray skins will be unchanged in terms of its performance, design unlimited opportunity, haptics, durability. They will also continue to focus on lightweight, ecologically responsible products to help customers meet environmental challenges.

Ascorium Industries, abbreviated as "AI", suggests they will work on new innovative smart surfaces, as well. Their Colo-Fast® material is prized for its high performance in terms of color, grain, function, and dimensional stability. Continuous refinement of the base material guarantee that the high requirements of the automotive industry are fulfilled. The results of these developments are the materials Colo-Sense® and Colo-Sense Lite, in response to increased quality requirements and the option for effective weight reduction in the automotive world.

Ascorium Colo-Sense Lite skins the upper part of the dashboard in the new Audi A6. Since mid-2018, out of their newest production site in Shenyang, China, they supply the dashboard and glove box for the BMW X3 to Dräxlmaier Automotive China, in charge of this BMW cockpit module.