DVN-I
Automotive Interior

Thu, 8 July 2021 Weekly Newsletter NEWSLETTER #68

Editorial

HMI Software To Control Vehicle Experience

TESLA MODEL S

HMI, human-machine interface, refers to the interaction between a human and a machine of any kind, whether it be hardware, software, or a mix of both. As a car is an entire ecosystem of interconnected systems and parts—machines—HMI is crucial for the automotive interior industry. It's where the rubber of design and engineering meets the road of customer experience. People expect seamless, permanent connectivity and interaction with their world during any boring commute.

This week's in-depth introduces HMI and infotainement novelties announced recently. Everything starts with software, then moves on to hardware and mechanical components. Naturally, it includes the ability to make hardware decisions that reduce software complexity and make it easier to scale functionality in the future, which ultimately has a cost-benefit over the long term. Software programs are at the heart of even today's most basic cars.

As with species in the planetary ecosystem, so too with makers, suppliers, and providers in the automotive ecosystem: adapt—get onside with the software-centered reality—or die. Many companies who have been going concerns for years and have built up extensive corporate culture and tradition are finding themselves fundamentally challenged in ways never before experienced. It is enticing to take the quick path and go with Android or Alexa or whatever other popular thing exists. But popularity of today's software platforms is about as durable as the here-today/gone-tomorrow tailfin designs of the 1950s, and this strategy means relinquishing control of the vehicle experience. It's great to be with you in the DVN Interior community, and we eagerly welcome your feedback and suggestions. Not a member yet? **Join in**!

Sincerely yours,

Philippe Aumont
General Editor, DVN-Interior

In Depth Interior Technology

HMI, Infotainement Spring From Software, Connectivity

IMAGE: AUTONOMOUS VEHICLE INTERNATIONAL

HMI and infotainment are at the center of today's auto interior consciousness. Most automakers are using their every new-model introduction, communication event, social-media channel…really, every opportunity to release new features, more powerful software, bigger screens, faster systems, augmented solutions. The high-tech systems are a primary main differentiation lever, and are also being applied to develop recurring revenue sources from subscription services.

Premium makers like Mercedes-Benz, BMW, and Audi are investing significant capital in developing bespoke infotainment systems that run on sweeping dashboard displays. Others, such as Volvo, are building off Google's Android Automotive system, which essentially transforms the vehicle dashboard into an Android smartphone.

Here are some of the most recent announcements:

Porche

The newest sixth-generation PCM (Porsche Communication Management) system learns user behavior and is said to operate faster and more intuitively, with an attractive design.

The system will debut next year in the 911, and will also update Taycan, Panamera, and Cayenne.

The behavior-learning feature allows it to deliver information and content faster and more intuitively. The interface is cleaner and features updated icons, new typefaces, and larger touch points for easier operation.

An updated voice assistant now understands natural language, avoiding the need to use awkward pre-determined commands. For example, "Hey Porsche, I need gas" will trigger the navigation app to search for nearby gasoline stations.

Porsche has deepened the system's integration with the Apple Music and Apple Podcasts streaming services, which are built into the head unit and don't require an iPhone to operate. This way, drivers can add a song they hear on the radio to their Apple Music library, or switch to a custom Apple Music station that will play the artist's music.

The route calculation feature can tell whether the Porsche is towing a trailer, and factor that into its calculated destination arrival times.

WIth PCM 6.0, Porsche expands digital applications previously exclusive to the BEV Taycan to combustion-engine models. An interactive operating manual is integrated into the system, and smartphone calendar entries are displayed on the system's touchscreen via the Porsche Connect app.

PCM also ties into vehicle controls, allowing occupants to adjust air conditioning, ambient lighting, or seat settings with their voice. With "Hey Porsche, I am cold," the cabin temperature will increase by two degrees.

Lexus RX

Here the focus is on ease of use. the 12.3" central display now incorporates a touchscreen function, as an alternative to using a touchpad. It also minimizes distraction by making switches and controls easy to use. The screen has been moved further forward on the center console, giving a wider viewing angle and within easy reach of the driver and front seat passenger. The multimedia functions can also be operated using a trackpad or with voice control.

Beneath the touchscreen is the climate control panel that has been rationalized with multiple buttons replaced by a series of toggle switches.

Driving-related switches and controls are arranged in a control zone concentrated immediately around the steering wheel. These include the shift paddles and drive mode selector switches, each located for easy reach and operation.

The six USB ports around the cabin now provide higher amperage so devices can be charged more quickly. Smartphones can be wirelessly integrated with the car's multimedia system via Apple CarPlay or Android Auto, and connected services can be accessed using Lexus Link, which also offers the option of in-car WiFi.

A 360-degree bird's eye view of the car's position gives the driver an all-round view when making low-speed maneuvers or when driving slowly off-road. The monitor also works in conjunction with the RX's parking assist system and rear cross-traffic alert.

Jeep

Hands-Free Active Driving Assist is Jeep's L^{2+} system with multiple ADAS and features to monitor the driver.

Using a capacitive-touch steering wheel allows the system to much more accurately detect when the driver physically has a hand on the wheel and not, for example, just a sock full of coins draped over one spoke to simulate a thumb. For now, Active Driving Assist is simply adaptive cruise with vastly better lane centering, and it works on most roads with robust lane markings.

If the driver lets go the wheel for longer than allowed, the green instrument cluster surround glow will turn yellow, then red, then the system will spike the brakes sharply to try to jolt the driver into paying attention. Still no hands on the wheel? The system will pull the vehicle over and park it.

In 2022, when the driver-monitor cameras of equipped Grand Cherokees become active and allow for Hands-Free Active Driving Assist to come online, the Stellantis system will likely work very much like GM's Super Cruise and Ford's BlueCruise. Extended hands-free cruising will be permitted as long as the driver keeps their attention focused on the road ahead.

The Advanced Protech package also includes the likes of an integrated off-road camera, surround-view camera system, head-up display, rear backup camera washer, map-in-cluster display, intersection collision assist system, highway assist system, interior rear-facing camera, and night vision with pedestrian and animal detection.

Tesla's new user interface

Tesla's new Model S Plaid has a new user interface, aimed at being more intuitive and customizable. Tesla is improving the UI first, then plans to stack in new features and apps (and, if history is any guide, perhaps delete some) via OTA updates.

Tesla has now fully transitioned to a horizontal screen for the main display, like in Model 3 and Model Y, but the UI has to be different since the whole passenger side is dedicated to the instrument cluster in the two less-expensive Tesla models.

In this new Model S, Tesla has retained a separate screen for the instrument cluster, which gives them a lot more freedom for the UI of the main display. The new control panel features large icons to access some of the most used features.

With this UI update, it makes better use of the screen, which is readily visible through the steering yoke, though the jury is still out on whether the yoke is an improvement over a wheel. The new model also comes with Tesla's new invisible A/C system integrated into the dash.

Ford

Ford's efforts in HMI and infotainement are supported by the expansion of the in-vehicle Alexa capability and OTA updates.

Ford plans to put in-vehicle Amazon Alexa voice capability into roughly 700,000 vehicles in the U.S. and Canada this year through over-the-air updates as part of a new six-year deal. It follows a separate six-year deal with Google earlier this year, billed as the industry's "broadest rollout of the embedded Alexa hands-free experience to date." This update will allow the use of voice commands to place a phone call or find parking, and control things like lighting and temperature in drivers' homes from within their cars.

Ford says Mustang Mach-E customers will soon get a new sketch feature that allows them to draw on the vehicle's touch screen and save their work. Future updates will include the activation of Ford's BlueCruise hands-free driver-assist system.

So from a wide range of automakers, we see more and more new UI features and enhancements. The OTA upgrde trend will push makers to equip their vehicles with processors with excess capacity at point of sale, with a view to monetizing these models over their lifecycle through periodic updates.

Interior News

In Volvo's Future EV Design, Interior is Extended to the Max

INTERIOR NEWS

Volvo's recently-revealed Concept Recharge is a forecast of their next-generation electric SUVs, purpose-built for electrification without accommodations for internal combustion engines. Volvo expects a 50 per cent EV sales mix by 2025. From 2030, it should be 100 per cent EV.

Based on a dedicated electric platform, its architecture offers an optimized cabin with completely flat floor, a larger wheelbase, a large space between the front seats, and shorter front and rear overhangs. This gives more freedom to add interior space and storage. The hood and roof can be lower for better aerodynamics while maintaining the driver's high road viewpoint and headroom in the cabin.

Volvo's head of design Robin Page says the concept brings "a truly Scandinavian living room feeling. The interior integrates our latest user experience technology with beautiful, sustainable and natural materials. Each part of the interior is like a piece of art and could stand alone as individual furniture in a room. We use the latest technologies but not for their own sake. We always focus on the benefits that technologies can bring".

There's a large 15" tabletlike touchscreen to operate a new infotainment system running Android Automotive OS and integrating Google Assistant, Google Maps and Google Play. It connects with mobile devices: phones will act as a key, and the Volvo Cars app will connect to everything that comes with modern living and EV ownership. Various functions will be integrated, such as finding and paying for recharging the vehicle, connecting to home devices, or even popular remote functions such as preheating and pre-cooling the vehicle.

The black element at the top of the windshield is a lidar sensor provided by US-based Luminar. Developed in close collaboration between Volvo engineers in California and their counterparts at Luminar, it's a step towards even more autonomous driving.

EV Cabin Nano Heating

INTERIOR NEWS

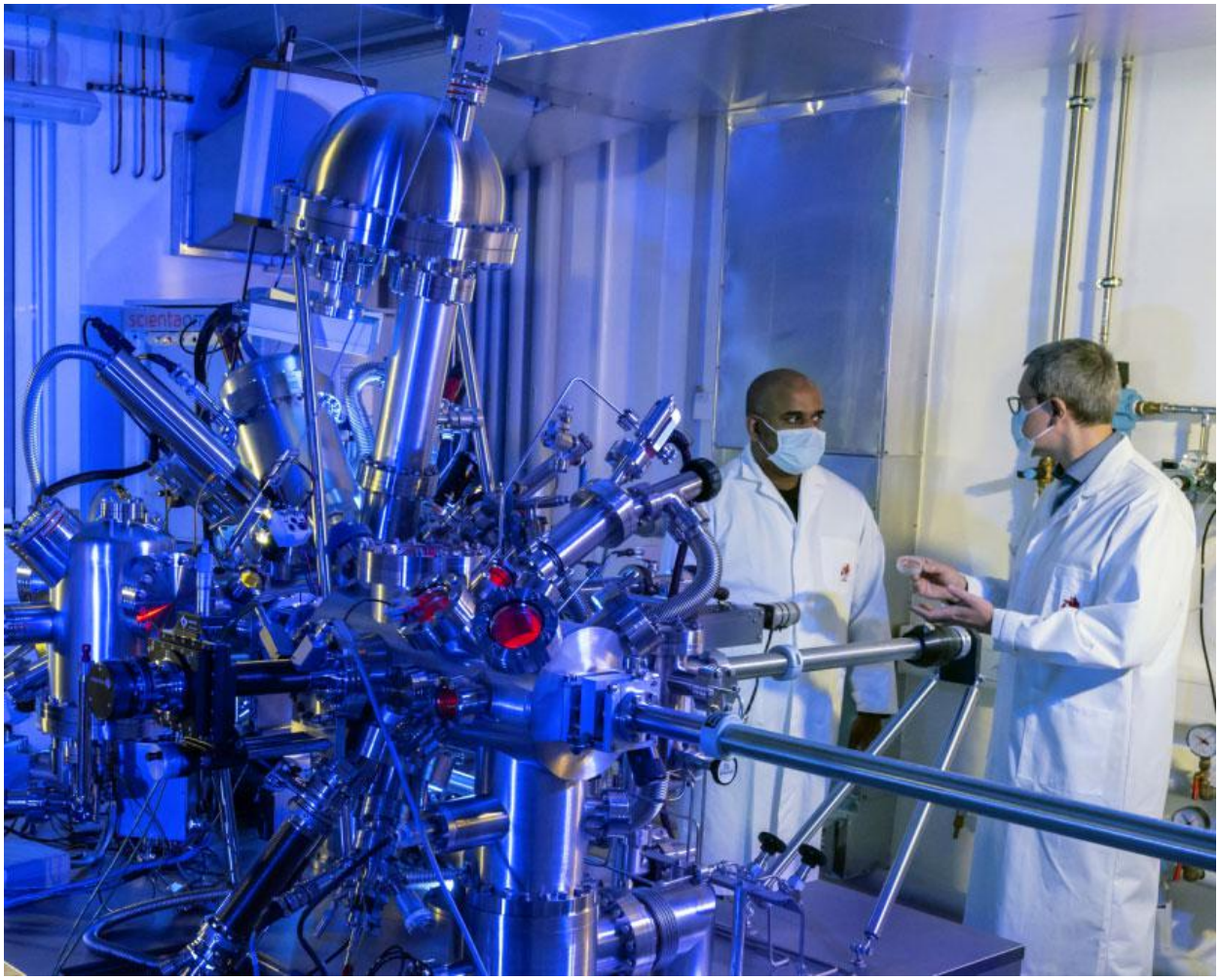


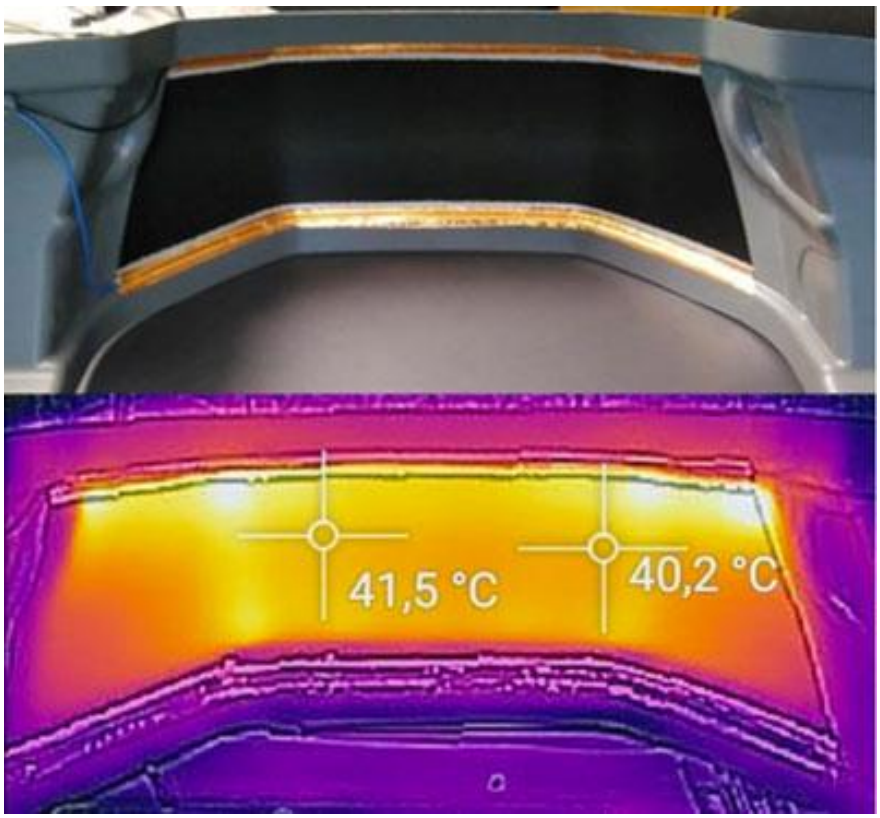
IMAGE: JENS MEYER/ UNI JENA: LABORATORY FOR THE PRODUCTION OF 2D MATERIALS

Space heating in electric cars costs electricity—and therefore range. Researchers are working hard to find energy-efficient heating methods, and they have found a possible solution in nanomaterials.

Up to now, the waste heat of the combustion engine has been used to heat the vehicle interior. There's no such waste heat with electric cars, so electric heating is used. But this consumes electricity from the battery, and that costs range. In order to conserve the battery, drivers are tempted to turn off the HVAC and radio in favor of driving range.

So there's quite a need for improved HVAC technology for electric cars. In the future, two-dimensional materials such as Graphene and Carbon nanotubes (CNTs) may play an important role. Chemists from the University of Jena now want to explore their immense potential in the recently launched innovation forum 2D-Mat-Net. Uni Jena professor Andrey Turchanin says "There are many layered three-dimensional substances whose individual layers can exist as an independent two-dimensional material. These very thin materials have, for example, special optical, electrical or catalytic properties that are needed in future technologies". Turchanin is the coordinator of 2D-Mat-Net, and emphasizes that conductive coatings made of graphene can now even be printed on surfaces like ink. And he names one of the possible future applications: "Carbon-based two-dimensional coatings could be an alternative heat source for electric cars and, among other things, prevent window panes from fogging up".

In Bissendorf near Osnabrück, a company called Osnatech has been developing electrical heating systems based on carbon nanotubes for some time. In cooperation with Osnabrück University of Applied Sciences, the development of an energy-efficient, fanless infrared surface heating system for vehicle interiors began this past March. The Federal Ministry of Economics and Technology is funding the project for two years with around €200k.



OSNATECH: CNT HEATING LAYER APPLIED ON A DASHBOARD

CNT technology is a "quantum leap in heating technology", according to a company statement, because the carbon particles of 4 to 6 nanometers in diameter conduct electricity about a thousand times better than copper. Osnatech uses the material to produce very thin resistors that act as heat conductors. These convert electricity into heat with almost 100 per cent efficiency, as well as generating infrared radiation of 97 per cent density.

Osnatech is already on the market with the process in building technology. For series production in electric vehicles, further development of the application and contacting technology is required, as well as a process for applying it to complex vehicle parts. This is where development partner Osnabrück University of Applied Sciences comes into play. Osnatech has applied for a corresponding process patent.

Adient-Autoneum-Dow CO2 PU Foam

INTERIOR NEWS

IMAGE: ADIENT©

Adient, based in Plymouth, Michigan, is a top-three seating systems supplier. They've made a major sustainability achievement by integrating recycled carbon from mobility waste into seating systems.

Seat pad foaming chemistry typically uses polyurethane made of isocyanates and polyols. With polyol from development partner Dow MobilityScience, as an intermediate product partly based on recycled chemicals, the new solution proposes reintegration of waste products into polyurethane foams. Named Specflex C and Voranol C, these products are certified by an independent mass-balance agency who will validate that the quantity of polyurethane intermediates produced from recycled materials corresponds to the appropriate quantity of end-product, thereby confirming the reporting is accurate and auditable.

Specflex C will enable a wide range of flexible foam systems commonly used for comfort and acoustic purposes in automotive interior applications. Voranol C will enable the production of a wide range of low- to high-density foams with low viscosity that provides easier handling and the flexibility to choose the optimum loading level for any application.

An automaker has already placed an order for a seating system made with this first-in-the-market solution, thus reducing the CO_2 footprint for vehicle production. The first seats with this sustainable solution are scheduled for production this coming October.

Autoneum, a global supplier of acoustic and thermal management for vehicles, is also part of the agreement. They develop and produce multifunctional, lightweight components and systems for interior floor and engine bay as well as the underbody.

Infineon Radar To Monitor Occupants

INTERIOR NEWS

Infineon Technologies now has radar technology to monitor people in automated vehicles. Infineon is a semiconductor group spun off of Siemens in 1999 and listed on the stock exchange in early 2000. They are a market leader in smart car components.

Their new radar can detect subtle movements from people in a car, including children who may have been inadvertently left behind, drivers getting drowsy or losing vigilance, and passenger misbehavior. With this data, a smart car can send out emergency alerts or make adjustments, such tightening seat belts and preparing air bags.

Infineon considers 60-GHz radar sensors particularly promising for these applications. The company is unveiling their Xensiv 60-GHz radar sensors and Aurix microcontrollers for ultra-short-range automotive applications. These are new additions to the wide variety of products Infineon offers for an ultra-wideband, ultra-low power, scalable DMS architecture.

Infineon has partnerships with Bitsensing, a South Korean imaging radar technology startup (previously described in DVN-I 4 March 2021) and Caaresys, a startup in Israel that develops vehicle passenger monitoring systems based on contactless, low-emission radio frequency radar. Their system has two main sensors: a vehicle occupancy sensor counts the number of passengers and keeps track of their position, while a vital sign sensor analyzes heart rate, breath rate, and driver health condition.

Bentley's Bespoke Beats

INTERIOR NEWS

With the new use cases and human/car relationships, audio has a new importance. It can even strengthen the link between a car owner and the car.

Through a partnership with LifeScore, a UK sound startup, a Bentley demonstrator car now can compose a soundtrack based on a driver's inputs and driving style, using artificial intelligence. LifeScore uses world-class musicians, contemporary and classical instruments, and cutting-edge technology for recording at the world-famous Abbey Road Studios. All of the audio elements are recorded in fully ambisonic (full sphere surround sound) audio using more than 50 microphones to provide for all possible future formats.

LifeScore composes building blocks. Notes and beats are real recordings, not computer-generated simulations. That musical raw material is then processed by their proprietary AI Cellular Composition™ platform to generate soundtracks that adapt to the listener's environment and inputs, creating an authentic and interactive musical experience, unique every time. Vehicle inputs such as engine RPM and acceleration influence the composition in real time, providing true driver-vehicle-music synchronization.

"The vehicle generates a live, composition of instrumental music in real-time enhancing the emotional experience of every journey," is how Bentley puts it. "The goal is to have music that adapts to the ever-changing driving conditions and the driver's style—from relaxed grand touring to energetic, spirited driving on dynamic roads".

This demonstration Bentley will provide the baseline data needed to develop the system for their first BEV. Sound and audio in EVs will probably generates a lot of innovation as the lack of engine and transmission noise vacates a large audio space within the vehicle experience.

The Design Lounge

Thirty Years of Ford's Explorer ‘Family Truckster’

THE DESIGN LOUNGE

Ford's Explorer has been near the center of the SUV trend in North America since its inception. As you can see in the image above, there have been six generations of the Explorer since the first 1991 model. As is typical, the Explorer has grown to its current 7-seat configuration.

1991

2021

In the beginning, the Explorer was a closed-roof variant of the popular and cheap Ranger body-on-frame compact pickup truck, considerably longer than the Bronco II compact SUV also based on the Ranger. The Explorer was first offered as a 5-passenger unit with two or four doors, and was one of the first road- and family-oriented SUV, along with the Jeep Cherokee. In parallel, Chrysler's minivan quickly came to dominate the 7-passenger market; minivans from Ford, GM, and other makers couldn't topple the Chrysler offerings.

The Explorer was positioned as a 'lifestyle' family vehicle with all-terrain capability that showed throughout the interior, although features were lacking. It was the 1990s, so materials were PVC plastics, velour, and some bold color combinations. Also …

… notice the pass-through front seating area and lack of a center console. Not much in the way of standard equipment, by today's standards.

Its body-on-frame truck origins are also clear with the shifter's placement on the floor. No console necessary here, as…

…minimal cost was the goal. Notice the low-cost integrated head restraints on the front seats and the complete lack of head restraints in the rear—under U.S. regulations, the Explorer was a "truck", which meant many passenger car safety requirements were optional, even though the Explorer was obviously designed, configured, and intended primarily to carry people.

The cargo area was also simple and straightforward. It needed to be large and accommodating, with the only functional elements being pull-down hooks on the floor and the vinyl roll cover.

Today's 2021 Explorer stands in stark contrast to the original from 30 years ago.

2021 FORD EXPLORER

Now with a full 7 seat capacity, the luxury features and materials that are available make the latest Explorer a benchmark in the midsize SUV field.

A polar opposite to the 1991 original Explorer, the center/tunnel console is now overflowing with features.

The Explorer's rear seats and interior in general are now very family-focused as Ford stopped trying to make minivans long ago, leaving the Explorer as Ford's primary family vehicle offering.

Storage, usability, luxury and all-round capability are the key attributes.

With a large variety of materials, features, and finishes, Ford's Explorer has created an appeal for the broadest audience—hence its longevity and market success.

News Mobility

_Car interiors Unplugged

NEWS MOBILITY

PEUGEOT 2008 BLACK DIAMOND ROOF (IMAGE: PEUGEOT)

26. Framing mobility

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

If we were to talk about consoles, seats and door panels, they would all have their unshakable place in the story of car interiors, but if we were to talk about 'glass' we might be a little more hesitant. Yet, all the clear surfaces of a car interior define pretty much the so-called 'bubble', the real interior volume. Astonishingly, only few millimeters of thickness constitute an invisible shield from the outside world, setting the physical boundaries of our traveling habitat.

There is a precise moment in 'Space Cowboys', the movie, when during the construction of a vessel, astronauts exhaustively negotiate with the state committee a glass window on the space ship, previously rejected as pointless. Whether it really happened so or not, spaceships do have windows. The subject is complex. It has to do with perception of space and surroundings, motion and sense of belonging and with who we are within this partial and temporary residence of spaces we have crossed. It is another definition of mobility.

Unlike architecture, where the use of glass is mostly vertical, transparency in automotive has taken any possible angle, moving away from flat sliding surfaces very long ago. Concave or convex forms, tangent surfaces and their overall development, expand beyond visible into multifaceted tridimensional envelops. For instance, a sliding driver's window cylindrical surface, is just a tiny fragment of a major surface development that virtually occupies an area of several football fields with intricate twisted mathematical shapes. Way greater than the vehicle itself, the huge rolling envelopes define its position into the larger engineering protocol. These are virtual factors that urbanists and architects do not have to take in consideration. The automotive transparent surfaces, so

called 'windows' or 'greenhouses', are carriers of the manufacturing history and identity of mobility.

Outlining the visual frame, transparent surfaces define interior with respect to its exterior surroundings. It is not only about the living interior experience but also about being able to move safely and see what's coming. Every time we sit in a car interior, we talk about what we see.

Mobile observation occurs on the verge of railways, looking through a framed glass towards the previously invasive landscape, making it an almost artistic image. Whether traveling by train, car or airplane, landscape experienced through a glass window has become our perception of surroundings, until all of a sudden, an unpredictable event stands to claim anything transparent as an invisible protective screen. Through the unexpected pandemic experience, a bit at the time and by practice, transparent shields took over almost every aspect of our everyday lives, from shop windows to counters and from taxis to offices, framing people, places, operators and just about everything. It is almost as if a derivate of a sort of an Instagram culture wants to take revenge on transparency by framing everything before even observing it. Perhaps transparency is about to redefine our perception of habitat and mobility.

_to be continued…

_____INDUSTRIOUS__

AV Safety and Architecture: Unity Is Strength!

NEWS MOBILITY

IMAGE: AUDI

Developing systems for autonomous driving is complex and expensive, so several companies have joined forces for this purpose.

A safe system architecture for self-driving vehicles: this is what leading technology and automotive companies want to develop together. They are working together under the name "The Autonomous". After the kick-off in 2019 and events in 2020, the association has now established the first "Safety & Architecture" working group. It aims to define a concrete reference solution for complex safety issues within the system architecture of self-driving vehicles. This includes subsystems that interface with sensors and systems for fault mitigation. The partners involved are:

- Arm (processor technology)
- Audi (with VW Group software subsidiary Cariad)
- Baselabs (software for the development of sensor fusion)
- Core AVI (safety-critical hardware and software)
- Denso (automotive electronics)
- Five (software components and development platforms for autonomous driving)
- the German Fraunhofer Institute for Experimental Software Engineering IESE
- NXP (semiconductors)
- Swedish Royal Institute of Technology
- TTTech Auto (software and hardware platforms for automated driving)

The cooperation has the advantage that the companies are experts in different fields. Questions of product liability, newly developing technical procedures and the increasing complexity of new technologies require cross-divisional know-how.

The working group intends to publish the consolidated results in a technical report. It is intended to provide the automotive industry with guidance for the series production of safe autonomous vehicles. To ensure that the results can reflect industry-relevant standards, the working group is coordinating with standardization societies such as ISO and IEEE.

The Autonomous positions itself as an open platform and invites industry partners to contribute further topics. In addition, further working groups should be founded for the topics artificial intelligence, cybersecurity and for the approval of autonomous systems.

General News

Aunde, TB Kawashima Expand Cooperation

GENERAL NEWS

IMAGE: TOYOTA

Last year, interior specialists Aunde and TB Kawashima, a Toyota Boshoku company, founded a joint venture in India. Now the cooperation is being rolled out to other markets.

The two automotive suppliers Aunde and TB Kawashima have agreed an alliance to strengthen competitiveness in the global market for interior materials, mutual use of production sites and facilities, joint development, and the reciprocal supply of interior materials. TB Kawashima is a consolidated subsidiary of Toyota Boshoku Corporation, headquartered in Aichi, Japan.

The automotive industry is in a transformation phase, which is dominated in particular by the topics of CASE and MaaS. In connection with the growing awareness of sustainability, it is therefore also essential for interior suppliers to react to these changes.

Continental: New CTO for Automotive Technologies

GENERAL NEWS

GILLES MABIRE (IMAGE: CONTINENTAL)

Gilles Mabire will be the new Chief Technology Officer of the Automotive Technologies division at Continental.

Mabire will start in this position by the first of next year, succeeding Dirk Abendroth, who last month left Continental by his own request. Until Mabire's transfer, Michael Hülsewies, Head of Architecture and Software, will serve as acting CTO.

Mabire has 25 years' experience in the automotive industry. He joined Continental in 2007 with the acquisition of Siemens VDO. In addition to his work as a key account and project manager, the electrical engineer and mechatronics engineer led the infotainment and connectivity business for European vehicle manufacturers in 2013 before assuming responsibility for Continental's entire automotive business in France in 2017. Since 2019, he has been responsible for the supplier's global commercial vehicle business.

In his new position, Mabire will act as a central point of contact for customers and business partners on technology and innovation issues related to the automotive business and will also be a member of the Automotive Technologies Board. In this role, he will report to Nikolai Setzer, in his role as Chairman of the Automotive Technologies Board.