Editorial

Rear Occupants Need Also Attention

REAR SEAT ENTERTAINMENT IN A PORSCHE

Automakers have long focused on getting drivers to sit tight and pay attention to the road. Now, as the industry moves to more automated vehicles, there's a new challenge: how to tackle passengers' boredom!

Since CASE is in the air, the whole industry is investigating new modes of automotive travel, starting with what happens when the driver is not actually driving. But what about the other occupants, especially the ones in the rear seat? They were already available for activities, and now even more so.

The paradigm shift is that attention to the road is not the focus anymore, and occupant time availability becomes center of attention. That's where rear seat entertainment will play an important role, and that's we explore in this week's in-depth article.

With screens, and with new user experience they offer, automakers are using new levers to boost the attractivity and identity of their brands. This week's missive from Industrious___ describes the UX as 'intellectual control of the object'—a kind of media management connecting the product with its user.

We do hope you enjoy this DVN-I Newsletter. We're glad to have you with us. If you haven't yet subscribed, come **join in**!

Sincerely yours,

Philippe Aumont
General Editor, DVN-Interior

In Depth Interior Technology

Rear Seat Entertainment's Day Has Arrived

RSE—rear seat entertainment—first started to develop along with the expansion of the minivan market in the mid-late '90s.

VAUXHALL ZAFIRA TOURER PROTOTYPE, 2011

Vehicles like the Chrysler Voyager, Opel/Vauxhall Zafira, and Renault Espace/Scenic were emblematic in that sense.

RENAULT ESPACE (IMAGE: TETEV.DE)

The first video setups used CD/DVD readers packaged in the vehicle: complex, bulky, expensive, and cumbersome. Then wearable devices took over until tablets came along in the 2010s to be the solution at that time. And now, progressive automation of vehicles and advancing display and connectivity technologies are refining rear-seat entertainment again. All the major automakers and their suppliers are working toward providing screens and media to entertain and to facilitate work and leisure activities. Passengers' road focus is decreasing, in parallel with reduced human-driver accountability. People have more time and thinkspace available for more than just looking out the windows. And for the matter of that, as front seats and their head restraints have grown taller and taller, it's grown essentially impossible for the rear passengers to have any kind of front view through the windshield.

The whole industry is focusing on new activities for the driver while they're not driving. Most of this work, especially with pillar-to-pillar screens, is also taking care of the other front occupant. That still leaves rear occupants to think of, beyond just attention to their safety (e.g., rear presence detection systems for kids left unattended in a hot car).

In parallel with what's happening up front, in the back seats the passengers are well placed to be catered for by rear seat entertainment systems. Screen size and resolution improvements are obvious enablers, and the gradual move towards advanced levels of autonomous functionality is set to herald tectonic shifts in the way the technology is integrated and used. Future cars may have screens in the rear, or even projections on any flat surfaces, if not in the air with a holographic environment (the Star Trek holodeck in real life?). As an example, Nio's ET7 has a second-row multifunction rear seat control with HDR touchscreen—so they say, but their commercial focus is not yet there, as it seems; they've shown no pictures.

VNC Automotive, based in Cambridge, England, is a technology spinoff working in the world of vehicle connectivity and telematics software. Their infotainment and telematics software is deployed in over 35 million vehicles, across 20 of the world's largest automakers including VW Group, Toyota, Honda, and PSA. It is also supplied across the automotive ecosystem to equipment suppliers such as Bosch, Panasonic, Clarion, and Pioneer, as well as device vendors like Sony, HTC, LG, and Huawei. VNC's efforts go toward helping automakers and suppliers to enable time spent in a vehicle to be more entertaining and more productive than ever, while—of course—respecting all safety and security needs and protocols. In a recent published report, VNC predicted explosive growth of RSE, from its origins as the preserve of passengers lounging in high-end, premium vehicles.

(IMAGE: VNC AUTOMOTIVE)

VNC Product Engineering Director Peter Galek explains that RSE has already become less of a premium-only product and is a key factor influencing the decision of car buyers of the most popular models. The company's Cobalt Share solution, which targets RSE and BYOD (bring your own device) users by sharing multimedia content from multiple mobile sources to vehicle screens, which hints at the evolving requirements of today's car passengers.

There are parallel enablers to this RSE development:

• Digital TV, streaming, and gaming have changed the way we use media at home, and even in public transport. It's logical, then, for these same trends to expand to personal transport. Ofcom, the UK communication regulator, have data showing 12 million new signups occurred during Covid-19, and that viewing times on these services have risen by 71 per cent over 2019's figures, confirming a kind of revolution in in-vehicle content consumption. See DVN Interior (in-depth, 20 May 2021) on infotainment's future through media content.

• One-click is driving new generations; it means that everything should be done with just one click (or tap), even when travelling: emails, texts, social media, videos—we have been spoiled by immediate availability of everything, so now we demand it. The pandemic has further accelerated this shift to remote working and reduced the reliance on physical communal office space. An ability to swiftly connect to a vehicle's screens, as widespread travel resumes, means that this work doesn't have to be completed at home or an office, but remotely from the back of a taxi or a mobility shuttle.

• The pandemic also has shown that working location is not terribly important; work can happen at the office, at home, at a summer house, at the beach, and when traveling. Work-from-car is the missing link, and permanent connectivity, RSE, and a table-like hub are the key ingredients of this recipe.

• Automakers, suppliers, MaaS providers, ride-hire providers, and the whole rest of the industry are all looking for new revenue streams, and RSE opens up potential for advertisements, targeted campaigns, and public service announcements.

Here are some examples of RSE integration in recent-model vehicles, starting with:

Audi

Named Audi Entertainment Mobile, it includes a 10.1" touch display in 16:10 format with excellent picture quality even in poor lighting conditions. It features a host of interfaces for connecting modern storage media and can also be used outside the vehicle. The players can be used separately. Using the function "Mirror screen" it is possible to display the same contents on both screens at the same time. They meet all global crash regulations.

BMW

In the new 7 Series, BMW's RSE has a screen on the back of each front seat, and an iDrive-style controller on the central armrest—just like up front, only with a different mix of functions (rear-seat riders don't need to select transmission gears).
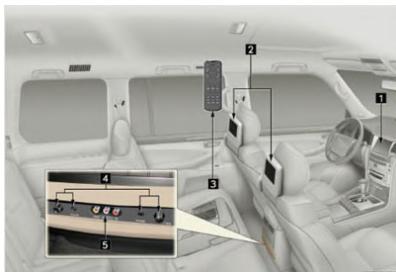
Lexus

The rear seat entertainment system is designed for the rear passengers to enjoy audio and DVD video separately from the front audio system. When audio-video equipment is connected to the A/V input port, rear passengers can enjoy different audio sources on each display.

Porsche

Porsche's system is built with dual 10.1" color touchscreen displays integrated into the front seat backrest. It includes USB and HDMI ports. Video telephony is possible thanks to a built-in camera, while video can be displayed to both screens through the WiFi Crosslink Streaming function, with sound sent via Bluetooth to a couple of wireless headphones.

Mercedes

The Mercedes RSE system provides passengers in the 1st row of rear seats a wide range of entertainment and information options. It consists of 2 high-resolution 10" touchscreens, attached to the head restraint mounts of the front seats. Mobile devices can be connected via USB, AUX and HDMI, and an internet browser is included.

Faraday Future

Faraday Future's FF91 EV has a 27″ rear seat screen with a video conferencing feature. See DVN Interior 27 May 2021 for more detail.

Aftermarket Products

Many aftermarket products are available. Security (hacking?) and safety performance (crashing?) can't be guaranteed to OE levels; it's strictly *caveat emptor* in China's flooded market of car interior gadgetry.

CHINESE AFTERMARKET ANDROID-BASED SYSTEM

Less dodgy examples can be had, as well, such as this one with headliner integration and one screen for all rear passengers:

ALPINE 10.2" OVERHEAD RSE FOR VOLKSWAGEN T5 MULTIVAN

RSE can't work without supporting technology, starting with connectivity, so 5G should be the boon of communication. Screen size and resolution is the second major need, where OLED technology is pushing past the threshold of attractivity. Zonal audio and directional sound are becoming available from many audio companies; obviously these are necessary to provide RSE without annoying or distracting other vehicle occupants.

Integration into the rear seat environment remains the stumbling block. It includes design, hardware certification, crash safety validation; fit and finish—all the parameters automakers and suppliers have large and growing expertise in.

Augmented reality, surface projection, and holography would be the next technology steps to truly make the vehicle an extension of one's living or work space.

Interior News

IM Motors Airo Cleans Air As It Drives

IMAGE: HEATHERWICK STUDIO

London-based Heatherwick Studio has unveiled their concept for the Airo electric car for IM Motors that will "vacuum up pollutants from other cars".

IM Motors (IM for Intelligence in Motion), within Chinese Zhiji Motors, is an EV JV founded by SAIC Motor, Zhangjiang Hi-Tech, and Alibaba. The Airo is an EV that boasts both autonomous and driver-controlled modes. But what's most interesting with this concept is that it is taking a further step beyond zero emission, cleaning polluted air around it as it drives.

Airo cleans the air using its HEPA filtering system that actively sucks up the pollutants from other cars around it, leaving the surrounding air cleaner than before. It's a new approach to an idea commercialised over 20 years ago by Volvo, who installed radiators with Engelhard's catalytic "PremAir" technology—ozone in the air passing over the radiator was converted to oxygen.

The interior of the Airo car can be customized and configured into a number of different styles, and for different functional spaces: from regular car to dining room to bedroom. The seats rotate from the regular driving position to fully face each other so that four people can sit facing each other for a chat or to enjoy a meal with the foldable four-leaf table in the middle.

A foldaway screen instantly turns the space into a four-wheeled cinema or gaming space, and to assure privacy or to simply stop any glare, the fully-glazed roof can be tinted. And the seats can fully recline to provide a double bed of sorts. If the IM implementation works, it would obviously allow only clean air induction into the vehicle.

Continental Could Accelerate Self-Driving with Unsupervised AI

AUTONOMOUS BMW ON THE TEST TRACK. (IMAGE: DPA)

Continental presented plans recently to investors at Bank of America in New York: the supplier wants to work with Autobrains (formerly known as Cartica AI), a startup from Israel applying a new version of artificial intelligence called "unsupervised AI". This new approach, they say, could give artificial intelligence for self-driving cars the decisive impetus.

In autonomous cars, AI derives and executes the correct driving maneuvers from the data from sensors such as cameras, radar, ultrasound, and lidar. The biggest challenge so far has been the enormous effort that is required to train the AI. For example, image recognition algorithms, of central importance in autonomous driving, have to be trained with billions of images in countless repetitive loops until they clearly identify certain objects or living beings. Pictures of children playing and of stop signs, for instance, are shown to the AI system until the system recognizes them with 99.9999 per cent (6 Sigma) reliably. In difficult borderline cases, such as pictures with graffiti, in bad weather conditions, at dusk, and in chaotic environments, enormous amounts of data are needed—which costs a lot and takes time.

The new approach has been researched for a long time and works under the generic name "non-guided AI". In contrast to the conventional approach, the AI programs should develop reliable criteria for object recognition themselves and refine their own algorithms. According to the Continental presentation, development of the new AI systems gets by with a tenth of the previous amount of data and computing power. This would significantly reduce development times and costs.

Former Continental boss Karl Thomas Neumann sits on the Israeli company's supervisory board. "Unsupervised AI is extremely exciting because it calls into question the entire mainstream of current AI developments relating to autonomous driving," he says. If the concept catches on, self-driving cars will be more quickly deployable because they'll be better able to cope with new situations for which they are not yet explicitly trained.

EV Concept Puts Vertical Battery Between Seats
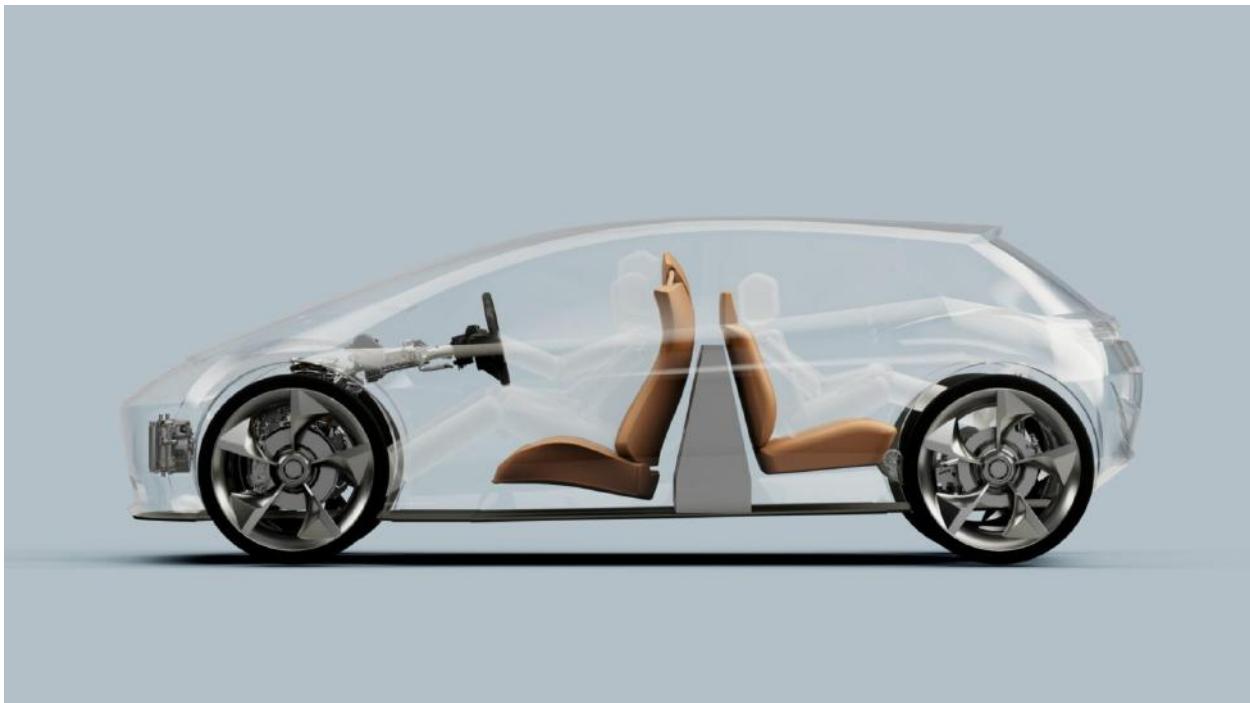
(IMAGE: PAGE-ROBERTS)

Launched in 2019, Page-Roberts is an innovation startup aiming to dramatically upscale EV efficiencies with engineering solutions that deliver design elegance. And now they've revealed a patented design concept for an EV with world beating efficiency, releasing the potential for 30 per cent greater range for any given battery size.

The innovation positions the battery between the front row seats and a second row of rear-facing seats. This concept puts a vertical battery stack in a torsion box arrangement at the center of a small hatchback, splitting the two rows of seating. The battery looks to be roughly half the height of the vehicle, and to prevent it interfering with rear-passenger legroom, the rear seats face rearward. The battery pack is angled to better fit between reclined seats.

This arrangement is far more compact than standard EV battery configurations, and offers the exciting potential for a lower, more aerodynamic vehicle with a standard wheelbase. The resulting vehicle will be relatively light and roomy, more streamlined, and up to 30 per cent more efficient, according to Page-Roberts. This offers the potential for either an extended range or a smaller battery. The reduced scale also means manufacturing costs are up to 36 per cent lower.

The absence of batteries under the floor also offers great design freedom, with the potential to produce lower height designs, giving a unique solution for sleek and sporty 4-seat vehicles.

Page-Roberts CEO Freddy Page-Roberts says: "the skateboard arrangement has become the mainstay of most EVs. But this results in taller vehicles with increased aerodynamic losses and energy consumption especially at motorway speeds, extra structure required to protect against impact, and a longer wheelbase to account for the battery. The increased size and weight dramatically inhibit range. By simply moving the location of the battery pack, we have come up with a much more efficient solution".

This simple architecture could make EV easier to adopt, within constant interior roominess for a given car length and height.

Toyota & Co in Automated Mapping Deployment Talks

TOYOTA INVESTED IN NURO, A DEVELOPER AND MANUFACTURER OF AUTONOMOUS VEHICLES

Woven Alpha, a subsidiary of Toyota's Woven Planet Holdings, together with Isuzu and Hino, have agreed to proceed with talks to put into use the Automated Mapping Platform (AMP) developed by Woven Alpha.

The Woven Planet team, alongside the team of researchers at the Toyota Research Institute, have already established a center of excellence for software development and technology in the Toyota Group. Bringing together world-class engineers and experts, as well as additional technology resource, this organization targets to weave together the people, resources, and infrastructure

AMP is a connected crowdsourced software platform that supports the creation, development and distribution of high definition (HD) maps, a key enabler for smart and safe automated mobility. AMP provides high-precision data-driven maps by using vehicle fleet data and advanced satellite imagery. It's already being used to benefit even today's non-autonomous mobility.

The AMP map includes several layers of data-rich information comprising road characteristics such as lanes, curves, topography, road signs, traffic lights, and other objects. It creates an accurate representation of the road while also keeping it updated. The Woven Alpha team plans to develop AMP to become the most globally comprehensive HD road network mapping platform, enabling high-precision localization support for automated driving vehicles. Isuzu and Hino will examine the potential use of AMP in combination with AD and ADAS, initially for local light delivery truck applications. The companies aim to contribute to the deployment of safer automated driving and ADAS with the collaboration of Commercial Japan Partnership Technologies Corporation, to help accelerate CASE responses.

eSync Alliance To Secure OTA Welcomes Aptiv
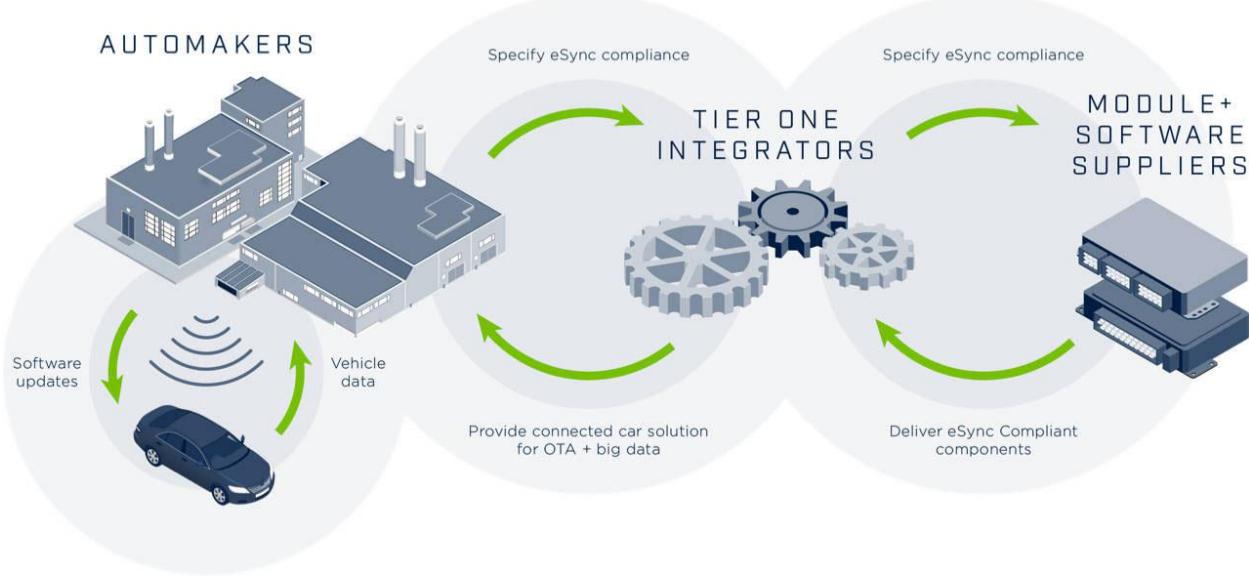
The eSync Alliance announces that Aptiv, formerly Delphi, has become its latest member, joining existing Alliance members to build an industry-wide bi-directional pipeline to electronic devices in the automotive market.

The eSync Alliance is an industry initiative established to build a high-confidence, multi-vendor path for end-to-end secure over-the-air (OTA) and data services for the connected car, through a global network of co-operating suppliers. Members of the eSync Alliance include AlpsAlpine, Excelfore, Faurecia Clarion Electronics, Hella, Molex and ZF, among others.

OTA updates enable a vehicle's software to be remotely updated, without requiring the vehicle to be physically present at the dealer.

eSync can deliver and update software and firmware over-the-air, and can collect real-time diagnostics and telematics data from end devices in the vehicle. The standardization it offered should enable eSync to become widely-adopted, serving the entire automotive industry. It provides new opportunities for carmakers to enhance vehicle software and features on vehicles in the field.

The need for standardization is undoubted, as there are now more than 30 different solutions for OTA updates and remote data gathering among the top 50 tier-1 suppliers and 30 major automakers. Not surprisingly, this has caused severe headaches for designers trying to ensure compatibility as they integrate their devices and software into a working whole. Issue is key to tier-1s, selling their products to multiple automakers, and forced to re-engineer their products for different OTA technologies.

Aptiv technology portfolio includes Advanced Safety, User Experience, Signal and Power Solutions, Autonomous Mobility and Connected Services. Software and vehicle architecture expertise enable advanced safety, automated driving, user experience, and connected services that are making the future of mobility work.

Toyota Corolla Cross Interior

(IMAGE: TOYOTA)

Toyota will become the latest brand to double up in the growing, competitive subcompact-crossover segment with their 2022 Corolla Cross, which aims to give consumers a midpoint between the subcompact C-HR hatchback and compact RAV4. The Corolla Cross is being built—at least for the American markets—at a new joint-venture factory with Mazda, in Huntsville, Alabama, USA.

In the cabin, both a 7" digital instrument cluster and an 8" infotainment touch screen are optional, as is wireless mobile-device charging, which comes standard on the upper two trim levels. Also optional is an Audio Plus multimedia with Remote Connect and an upgraded nine-speaker JBL sound system. The Corolla Cross is compatible with Amazon Alexa, and Apple CarPlay and Android Auto are standard. Other connected features include a standard three-month SiriusXM All Access trial subscription to more than 300 channels accessible throughout the USA.

The all-new model can be outfitted with a power moonroof, as well as either single- or dual-zone automatic climate control, with all grades featuring standard heating and air conditioning ducts for rear seat passengers. SofTex-trimmed seating is also available, as is a 10-way, power-adjustable driver's seat with lumbar support, and heated front seats. In back, storage space can be maxed out thanks to the 60/40-split folding rear seats that come standard on all grades, while XLE models also include a center armrest with two cupholders. And to make access to the roomy cargo area even more convenient, the Corolla Cross has an available power liftgate with height adjustability.

(IMAGE: TOYOTA)

All models come standard with the Toyota Safety Suite, while blind-spot monitoring and rear cross-traffic warnings are standard on the upper two trim levels. Nine airbags are mounted throughout the cabin to help protect occupants. The top-end XLE trim also comes standard with front and rear parking assist and automatic braking.

The Corolla Cross has an advantage no other new SUV can boast: name equity. More than 46 million Corollas have been built since the 1966 original, and several tentative new names failed in the past—such as "Auris" in Europe; now it's called the Corolla again.

The Design Lounge

BMW's BEVs: iX and i4, Premium Design Detailing
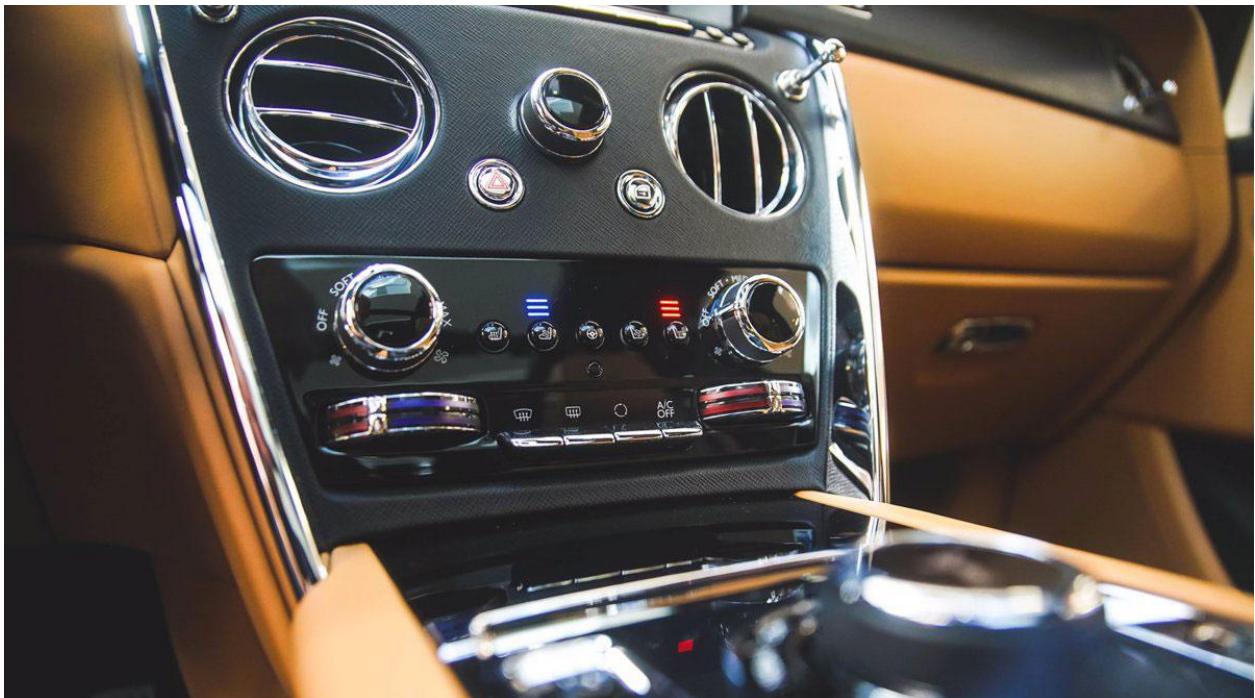
The design 'basics' of shape, material and spatial harmony and homogeny are required within every interior design but most critically within premium vehicles.

Perceived quality, even in entry level vehicles as an integral part of today's interior vehicle design, has risen to a such a high standard that the differentiation between entry level and premium vehicles interiors has been only achieved through higher cost materials.

But what really gives a 'premium' design feel when these higher cost materials can be also 'optioned' in lower segment vehicles and design and perceived quality has risen to such a level?

Depth.

The best descriptor for quality and premium design, perceived quality and materials would be the use of depth. Visually, think of the most expensive/quality paint finish. The lacquer has the 'deepest' visual appearance with many coats of clear covering the color below it. Haptically, a 'deep soft' surface feel is the 'plushest. Finally, acoustically. The satisfying 'deep thump' of closing a door give the best sense of solidity.

With the latest execution of design detailing within premium vehicles we can see the use of 'depth' to further define premium interiors form Volvo, Mercedes, BMW, etc.

Looking at BMW, we can see this impact and progression with their UX/HMI center console and door panel controls.

The BMW 4 Series UX/HMI interface show us the 'old version of premium with precision fit and finish and material usage. Unfortunately, this can be achieved within virtually all OEM interiors and segments and not exclusive to the premium OEMs.

BMW 4 Series door panel controls have a very 'tight' fit and finish along with the use of authentic materials but are missing the crucial 'depth' the best describes premium.

With the latest BMW iX UX/HMI interface you see the simple inclusion of a transparent UX/MMI controller along with a flush capacitive switched background create a visual 'depth' that wasn't possible with BMW previous execution.

BMW iX seat controls also use this capacitive switch technology but now in a three-dimensional form factor. The controls are 'pushed' into the soft leather surface while also using a metal protruding surface for the seating controls for the feeling of added 'depth'. Also, the door lock switches are flush mounted so this 'depth' is localized to create a focal point for the door panel.

For their most upmarket and premium versions, the BMW iX UX/HMI interface adds a natural matt-finished wood panel lower to further contrast the 'crystal like' control touch points. This finish replaces the previously used metal touch points.

Using this 'crystal finish' adds further depth and separation to the BMW iX seat controls bringing an even higher quality feeling.

In contrast, although of a very high resolution, display technology is lagging regarding depth as seen in the Porsche Taycan UX/MMI interface.

With the Mach-E UX/MMI interface, Ford has added a protruding physical dial along with graphic effects that simulate 3D buttons to add this 'depth' and increase its perceived quality.

Including 'depth' into displays and interfaces are the next challenges for design and we can start to see some movement in this direction.

Genesis and Mercedes are now using real 3D displays, not simulated graphic effects, within their latest generation of clusters and …

… with HUD/Augmented Reality, the information presented at various depths increase the premium and perceived quality impact.

I am excited to see how the addition of 'depth' also impacts the UX/HMI design of the next generation of vehicle interiors.

News Mobility

_Car interiors Unplugged
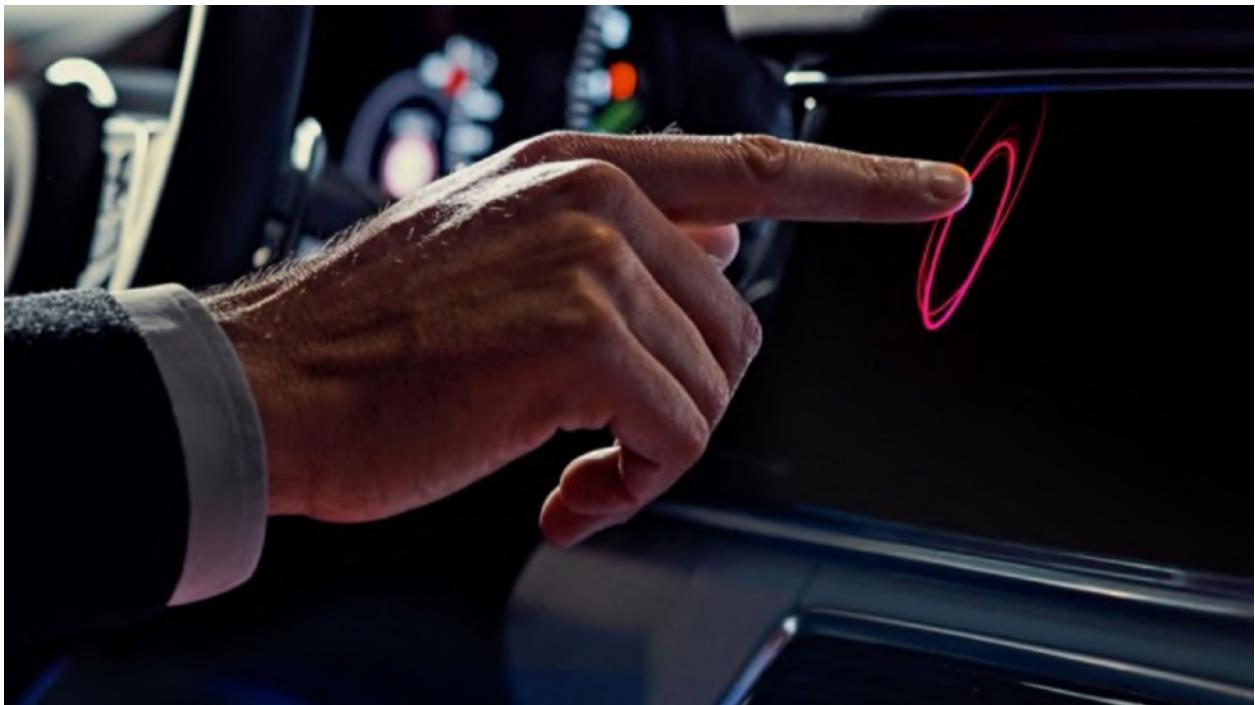
(IMAGE: PORSCHE)

23. UX, broadcasting motion

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

The imagination age is a theoretical period, beyond information age, where creativity is the primary maker of economic value. While the ongoing Industry 4.0 and remote automation (AI, Cloud.) lead to an ever-increasing number of screen interphases, car interiors lose their essential materiality and redeem, just like anything physical, into a factual finality.

The mid-90s shifted space age to computer age where friction and speed acquired a different meaning. Instead of cosmic limits, we run into the limits of our own sociocultural hub. Through an aesthetic yet applied language, car design has always tested and proved locally-built vehicles into global scale, empowering our mobile self with influential narratives that fed human imagination. Digital interface is the writing of our mobile biographies and mobility 'transactions' across borders, all into a global virtual setting. While instant gratification competes with the physical effort to 'make the machine work', the challenge remains unchanged: empowering emotions.

Let's consider a few examples:

• Tesla, way ahead of its times to the point of being overwhelming with its bigger than life touchscreen as the central piece of the interior lounge.

• Polestar's pure minimalism, connectivity and infotainment are priorities rendered through cutting edge eco technologies; a breath of fresh air to the heavy industrial heritage.

• Porsche, recognizable, emotional, yet simple and responsive, just like the real one; infotainment here is not a priority.

The first computers were designed for a very specific group of people, an elite of scientists. One of the major leaps of linguistic transformation is the fact that they became, not just affordable but accessible in terms of comprehension to a wider spectrum of populations. Thus, they amplified communication networks changing our relationship to anything semantic.

UX is referring to digital interface and web related practices. Unlike any language rules, the web is a cruel place, the potential of misunderstanding is limitless. Reading from the beginning to the end or in any specific order, is completely arbitrary. Everything depends on speed, layout and the mood of the reader. Here, 30 seconds is eternity and language becomes an experience. Fancy new terms come up as ephemeral trends to the deficit of older worn, yet valid terminology, leading into a short of a vocabulary inflation. Words and meanings seem to be interchangeable. It is like designing something while it constantly changes to its new version, an ongoing sense of obsolesce to the premise of the next upgrade. Hence, our communicative skills with the machine are separated from the emotional aspect of any type of 'driving' or being in control.

Merging text to illustration (e.g., emoji), a new sort of language, is a way to transmit what lays beyond writing, cut through the web polyphony and label an instant feeling. With computers, besides the language simplification, we have accomplished something amazingly great: we have reunited symbols and letters and as frivolous as it sounds - indeed more primitive than we think – we entered an era of interactive language, to communicate, enable, activate, affect. A new practice assigned to extract and augment values of everything previously acquired. Thus, UX constitutes an 'intellectual control of the object' a kind of media management connecting the product with its reason to exist. Usage interface is coupling digital economy.

Harvesting car interiors is an idea not an illustration. From cave paintings, pictographs and printed press to computer-mediated communications, we have always said a story. It might be that UX is the language to tell 'the story of the most complex object ever made'. Unlike computer screens, automotive interiors are carriers of emotions and an everlasting muscle-memory of mobility. Can we still remain in touch through a digital interface? We don't know. However, set aside speculations, some OEMs such as Tesla, Polestar and Porsche, already portray an identity on their approach, inspired each through own legacy and vision to a new 'emerging' usage of mobility. Between bespoke interiors, screens and emojis, OEMs are already laying the ground and character of their future augmented brand experience.

_to be continued…

_____INDUSTRIOUS__

Evaluating AV/Public Transport Competition

TRAFFIC AT A BUSY INTERSECTION IN SINGAPORE. (IMAGE: JEREMY LONG)

The rapid advancement of autonomous vehicles technology in recent years is changing transport systems and consumer habits globally. Use of autonomous vehicles is rising, with tests here and there showing that shared autonomous mobility on demand (AMoD) service is likely to be the next hit.

The big question is how public transport will be impacted, or whether AMoD would coexist with it. Researchers at the Future Urban Mobility (FM) interdisciplinary research group at the Singapore–MIT Alliance for Research and Technology (SMART), MIT's research enterprise in Singapore, and MIT conducted a case study titled "Competition between Shared Autonomous Vehicles and Public Transit: A Case Study in Singapore". Using an agent-based simulation, the competition process and system performance were evaluated from the standpoints of four stakeholders — the AMoD operator, the public transit operator, passengers, and the transport authority.

The research found that the competition between AMoD and public transit would push bus operators to reduce the frequency of inefficient routes and allow AMoDs to fill in the gaps in the service coverage.

"We found that public transit services will be spatially concentrated to shorter routes that feed directly to the subway station, and temporally concentrated to peak hours. On average, this reduces travel time of passengers but increases travel costs. However, the generalized travel cost is reduced when incorporating the value of time." said a SMART speaker.

The study also found that providing subsidies to public transit services would result in a relatively higher supply, profit, and market share for public transit as compared to AMoD, and increased passenger travel cost and total system passenger car equivalent, which is measured by the average vehicle load and the total vehicle kilometer traveled.

Finally, the study is showing that this competition will benefit both AMoD and Public Transport in term of system efficiency and profit, but impact on passengers is not positive with higher travel costs or longer travel times. It suggests to Policymakers to support vulnerable groups with discounts and other incentives.

General News

Faurecia Buys DesignLED
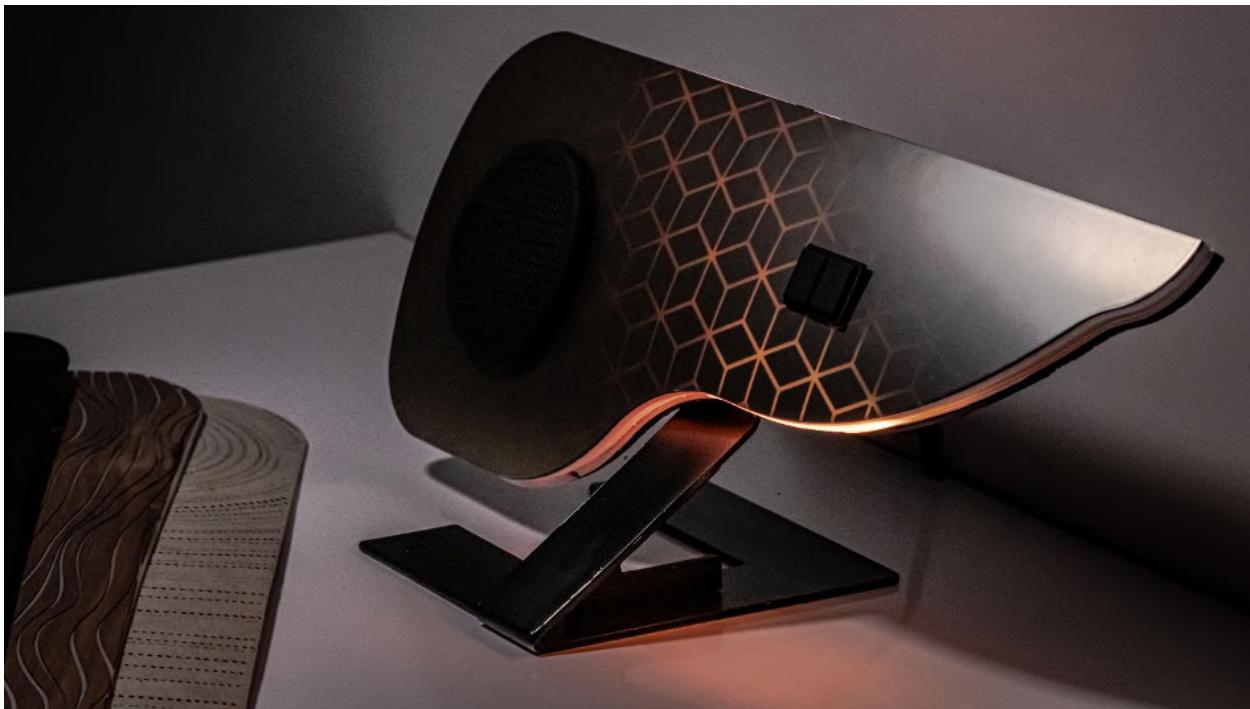
(IMAGE: DESIGNLED)

Longtime DVN Gold Member DesignLED has been acquired by French automotive tier-1 supplier Faurecia—specifically, by Faurecia Clarion Electronics, as announced last week by the two companies.

DesignLED, based in Livingston, Scotland, was formed in 2004. They're an innovative LED lighting technology company with expertise in designing, developing, prototyping, and scaling thin and flexible LED lighting and HMI products for the automotive industry, and supported by over 68 patents worldwide.

Scotland's economic development agency, Scottish Enterprise, has provided support to the company since it was established. Jan Robertson, Interim Director of Growth Investments at Scottish Enterprise, says "The outstanding designLED team has created an impressive portfolio of lighting technology which will be a real asset to Faurecia and its Clarion Electronics activity. Having supported designLED's growth we are excited to see how it develops under the global stewardship of Faurecia".

DesignLED CEO Stuart Bain, for his part, says "This is a hugely important and exciting milestone in the evolution of designLED. In recent years we have established the company as a leader in automotive lighting and HMI innovation, building a reputation based not only on an extensive technology and intellectual property portfolio, but also the highly skilled and energetic team, which is already delivering ground-breaking lighting solutions to international [automaker] and tier-1 customers. Looking to the future, the designLED team will be able to utilise Faurecia's global reach, international customer base and world-class engineering and manufacturing skills to accelerate adoption of our differentiated display

and back-lighting technology. The management team and employees are excited to move forward at pace under this new ownership".

The entire designLED team will transfer to Faurecia and will continue to develop technology from Livingston.

Edag's Perspective: Interior of the Future

(IMAGE: EDAG GROUP)

Edag Engineering Group is an international corporate group active in the engineering services sector. Since 2015, it has been based in Arbon, Canton Thurgau, Switzerland. It is one of the world's largest independent development partners to the automotive industry and aviation industry.

Recently, Edag shared their perspective on the future of automotive interiors. As an engineering company experienced with many automakers and suppliers, their broad view is of interest, and here are a few highlights:

Nothing will change as much in the next few years as the interior of cars. The main challenge for automakers is to find the right balance between innovation and cost. Thanks to connectivity, our car has already become a mobile office and a multimedia home cinema for our children in the back seats. Stylish design concepts and the use of new, high-quality materials are coining terms like "cocooning". The car is becoming a living space with the driver as passenger in their own car.

The networking of the vehicles with the outside world makes it necessary to provide vehicle conditions and driving situations to the driver and passengers at any time. Optical, olfactory, haptic, and thermoreceptor stimuli are used for this purpose. Infotainment systems provide good sound and guide the passengers precisely through foreign cities; they are radio, navigation system, telephone, and messenger all in one and transform the vehicle into a mobile office. Vehicle occupants are also supported by features such as a concierge service for hotel bookings or a parking service. The monitoring of bodily functions ensures that they are well during the journey.

(IMAGE: EDAG GROUP)

Edag's interior teams are responsible for design concepts around the cockpit, door panels, seats or equipment implement true living-space concepts and use new materials, illuminated surfaces, develop new seating concepts such as reclining seats and swivel seats to create a modularly designable interior. However, the interior must not only be modern, visually appealing and comfortable, but also functional. What functions can be integrated where in the interior, what can the surfaces be like—both visually and haptically, but also for user-friendliness, what possibilities are there for individualization to make the interior an experience for the passengers, to appeal to all the senses, to give them a feeling of safety and comfort? Appearance and quality play an essential role in this.

The balance of look, feel, usability, function and cost is the guiding principle for the interior development in the future.