DVN-I
Automotive Interior

Thu, 25 March 2021 Weekly Newsletter NEWSLETTER #53

Editorial

Air Pollution Exists Inside, Too!

IMAGE: MANN+HUMMEL

For many people, their biggest exposure to daily air pollution comes while they are driving their car. The present pandemic, driven by an airborne virus, is making people more aware and sensitive on the topic of IAQ (interior air quality), and it's getting even more critical with the S-for-Shared part of the CASE mobility shift. Sharing an enclosed compartment with present and past strangers, in a post pandemic world, calls for vigilance and work—that's why this week's in-depth report looks at recent developments in automotive IAQ.

The Design Lounge continues the interior architecture and design comparison between premium ICEs and BEVs, between a traditional display integration and a new floating-panels approach, both being separated and highlighted with surrounding ambient lighting.

We remind you again: don't miss the DVN Workshop on 20 April, with specific sessions on cockpit and interior lighting. To register, please contact **Salomon Berner**. If you have interest only in the interior-light sessions, please **contact me**.

We're glad you're here and proud to present this latest edition of DVN-I. Not a subscriber yet? **Register here**! Sincerely yours,

Philippe Aumont

Philippe Aumont
General Editor, DVN-Interior

In Depth Interior Technology

Interior Air Quality: New Tech Pulls Old Tech

IMAGE: MANN+HUMMEL

DVN Interior published an in-depth look at IAQ (interior air quality) a year ago, back at the beginning of the pandemic. Already IAQ was a hot topic, not only because of polluted city air, but also because researchers had identified it as an ascendent issue. We talked about Volvo's Advanced Air Cleaner system, Jaguar Land Rover's cabin air ionization system, Geely's unusual pronouncement that they would use antibacterial air filters (which don't filter out viruses), Valeo's ionizer purification system, Yanfeng's Wellness pod with a UV-based air sanitizer—a broad palette of new technologies, mixed of course with a marketing flavor (viz Tesla's typically sensational name for their "Bioweapon Defense Mode").

Since then, and even if SARS-CoV-2 is just the latest of an unbroken line of viruses stretching back through human history, it raises awareness and attention to risk mitigation while travelling in public, especially in motor vehicles shared with past and present strangers.

Electrostatic and ionizing car air purifiers come in different shapes and size. The ones that work all use the same principle: charged electrical surfaces or needles generate electrically charged air or gas ions. These ions then attach to airborne particles which are then electrostatically attracted to a charged collector plate or simply fall and settle on surfaces around the car.

PCO (photocatalytic oxidation) air purifiers work by putting intense ultraviolet light on a surface of titanium dioxide or another material which oxidizes air pollutants. PCO purifiers convert harmful particulates and toxic gases into safer compounds such as carbon dioxide and water.

While UV light and ionization are promising technologies, they have driven filtration suppliers to apply their ingenuity towards improving filtration-based systems.

A functional cabin air filter is essential in keeping the inside of a vehicle free of pollutants. A cabin air filter that's dirty or clogged won't filter those contaminants, causing problems for those who suffer from allergies or have breathing difficulties. Which means first of all that cabin air filter must be changed frequently, at least as often as recommended.

Honda's Freudenberg Covid Cabin Air Filter

Honda has a new cabin air filter they say is highly effective at capturing a wide range of harmful germs, allergens and even viruses. It's been developed with Freudenberg, a filtration technology company in Weinheim, Germany. Their MicronAir cabin air filter, they say, offers reliable and long-lasting protection for vehicle occupants as well as system processes.

Honda's new cabin air filter reliably captures viral aerosols with its progressive four-layer design, and prevents the shedding of viable viruses. The filter can trap more than 90 per cent of viral aerosols and an innovative second step inactivates almost 100 per cent of the captured viral load via a bio-functional layer impregnated with a fruit extract.

It's called the Kurumask, a portmanteau of "kuruma" (Japanese for "car") and mask. A "car mask" would be an accurate description, because the Kurumask is actually a thin cap that goes over the existing cabin filter.

It shields occupants with a specially developed surface comprising millions of thorn-like protrusions at the nanometer level. Honda says it was created by a zinc-phosphate chemical treatment that is similar to one used for rust prevention on cars.

The first two microfiber layers capture most ultrafine aerosols, dust, and pollen while the third layer, made of activated carbon, is responsible for the adsorption of harmful pollution such as particulates and acid gases. An innovative fourth biofunctional layer coated with the active substance of fruit extract then effectively inactivates captured viral aerosols and prevents them from being released back into the cabin air. This has been conclusively proved by a comprehensive series of tests conducted in collaboration with the Austrian Research Institute OFI.

Developed in conjunction with the Kitasato Research Center for Environmental Science, the Kurumask can remove 99.8 per cent of airborne virus droplets in a car in 15 minutes. The mask is good for 15,000 km before it needs to be replaced. It may also help filter out other types of viruses, not just the currently-problematic coronavirus.

According to Honda, it would normally have taken several years to develop such a product, but because of the urgency of the COVID-19 pandemic, the company released it on an accelerated schedule. Since the outbreak, Honda has been working with local governments in Japan on vehicles for transporting coronavirus patients. This was one of the technologies resulting from that program. It started on one model, the N-Box (closely related to the Honda N-One) kei car, only sold in Japan. It is now announced in Europe for all recent Honda models, through dealers to supply and fit this new filter.

Mann+Hummel Cabin Air Filtration

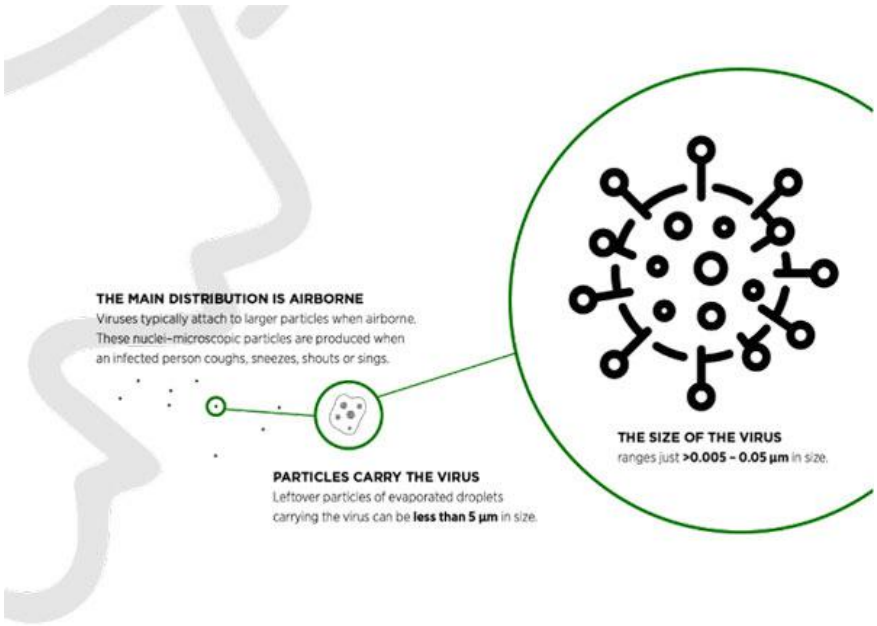


IMAGE: MANN+HUMMEL

At Mann+Hummel, a major filter supplier based in Ludwigsburg, Germany, they're testing the effectiveness of their products for contamination control. As viruses can generally also be found in vehicle interiors, Mann+Hummel specialists have compiled information on protection inside the car by means of cabin filters. They've developed a cabin filter which also adsorbs allergens and at the same time prevents bacteria entering the interior of the vehicle through the ventilation or air conditioning system.

Common cabin filters include a particulate filter and frequently also an activated carbon layer. This is also true for the cabin filters from Mann+Hummel. The particulate filter layer stops most all coarse particles such as dust, pollen, and tire debris as well as the smallest respirable particles such as soot, smoke, and other particulate matter. The activated carbon layer adsorbs harmful gases, unpleasant odors, and ozone almost completely from the air flowing through the system. But M+H's newest cabin filters also have a third layer with a special biofunctional coating containing polyphenols. Polyphenols are natural products with an anti-inflammatory effect and are perceived to promote good health. They are present in plants such as green tea and pomegranates, and can adsorb allergens and make them harmless.

Panasonic Nanoe™ X Inhibits Interior Surfaces

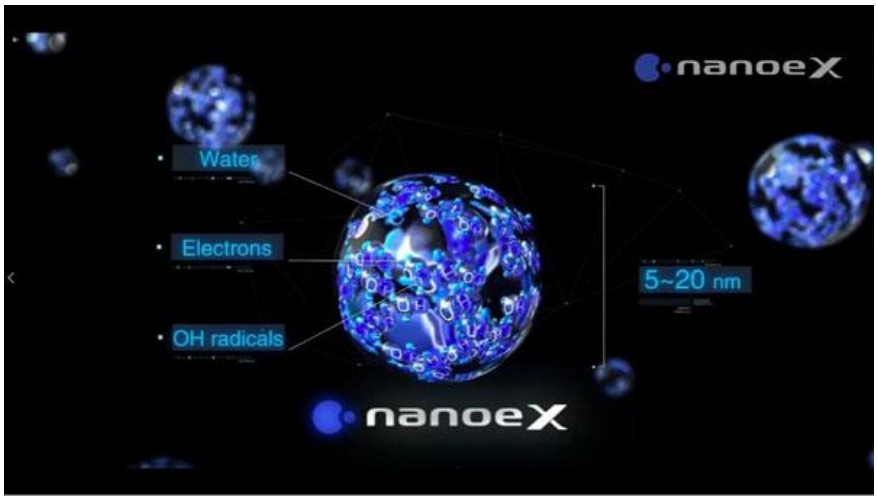


IMAGE: PANASONIC

New technology keeps developing, as shown by a fine example from Panasonic. A person could get COVID-19 indirectly by touching a contaminated surface or object before touching their own mouth, nose, or eyes. In a car interior, we frequently touch surfaces—the steering wheel, door handles, shift lever, any buttons or touch screens, wiper and turn signal stalks, door armrests, door handles, grab handles, and seat adjusters. It is not certain how long the virus survives on surfaces, but a recent review of the survival of human coronaviruses on surfaces found large variability, ranging from 2 hours to 9 days.

Panasonic air conditioners can generate millions of Nanoe X particles, which constantly clean the air. Nanoe X collects moisture in the air and applies high voltage to it, generating a huge volume of hydroxyl radicals. The output: tiny, nano-sized electrostatic water particles that contain ions and hydroxyl radicals. These hydroxyl radicals react to hydrogen contained in pollen, bacteria, viruses, and odor compounds, altering their molecules and inhibiting them. The hydroxyl radicals then return to air as water.

Tests have demonstrated the system inhibited 99.99 per cent of adhered novel coronavirus activity on gauze in a 45-liter box in 2 hours. Then Panasonic engineers continued testing in an actual air conditioner in a larger space—almost 7 m^3, similar to a station wagon's interior volume. Here, inhibition was 91 per cent in 8 hours' time.

Even if airborne droplets can be exhausted by opening the window, adhering virus remains in the car, even after passengers leave. This is a potentially critical transmission vector, especially for public transport with unknown passengers. As shown in an **online video**, The active Nanoe X particles are released in large quantities by a generator put inside the HVAC system.

Interior News

Apple Patents for Augmented Navigation & Interior Lighting

INTERIOR NEWS

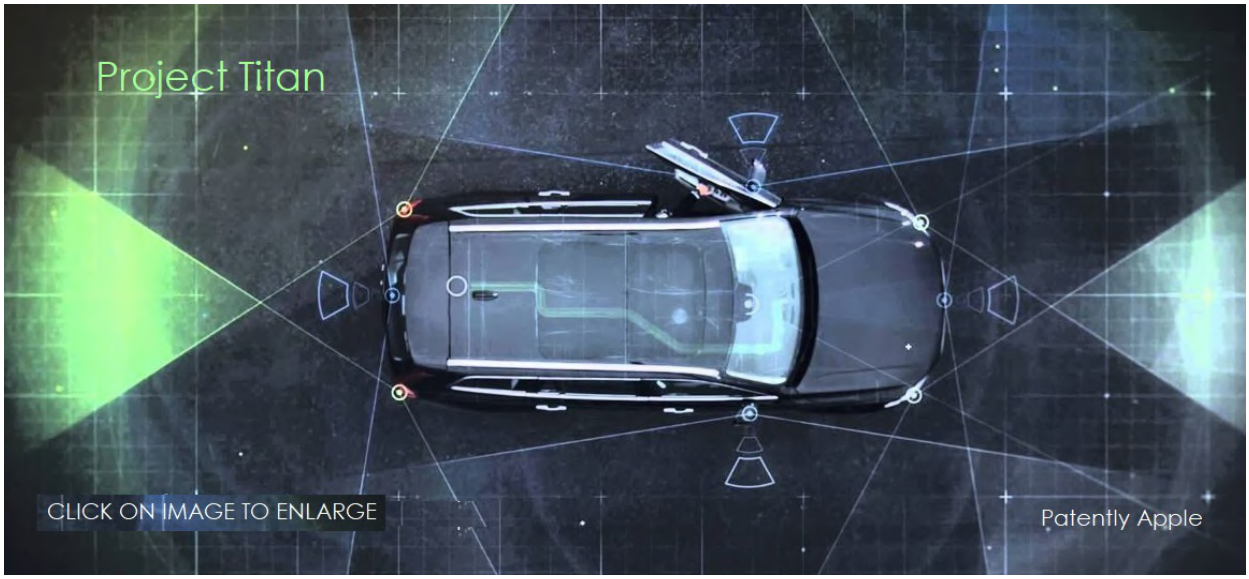


IMAGE: APPLE

In 2014, Apple began working on an electric vehicle called Project Titan. Since then, the project has stopped and resumed numerous times. The most recent information indicates Apple has overcome development problems and still plans to develop an autonomous vehicle. As evidence, Apple is still registering apposite patents, including automotive interiors. One of them relates to sensors embedded in light assemblies in a vehicle, for example, and another relates to adjustable and dynamic lighting within a lighting environment. Let's look at these two a little closer:

The embedded sensors patent covers a vehicle which includes one or more element assemblies which can provide concurrent light emission and environment monitoring via a common window element in the vehicle. The vehicle includes sensors which monitor one or more portions of an environment in which the vehicle is located. The sensors generate data which can be utilized to augment the navigation. The sensor data are configured to monitor the environment proximate to the vehicle and to provide the driver with a graphical representation of the environment via a user interface for an augmented situational awareness of the environment when manually navigating the vehicle. The generated sensor data are also crucial for the navigation systems of autonomous driving vehicles.

The element assembly includes a housing which is configured to support at least one light emitter and one sensor device. A window element, coupled to the housing, establishes a transparent barrier between the interior space and an external environment, such that the light emitter and sensor device are configured to interact with the external environment via a common window element.

The second patent relates to a system and method for an adjustable and dynamic interior lighting based on occupant and object identification in a vehicle.

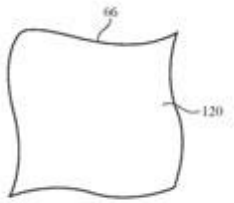


FIG. 12

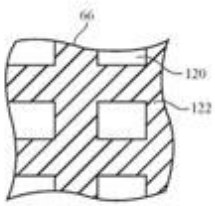


FIG. 13

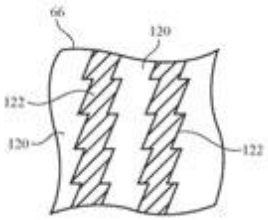


FIG. 14

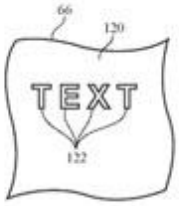
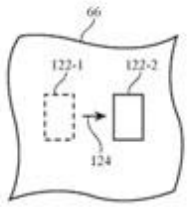
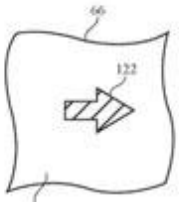


FIG. 15





Conventional vehicle interior lights are static or dynamic and the vehicle occupants control the lights by physical switches, buttons or touchscreens. A conventional interior light often illuminates only limited areas inside the vehicle and the objects within the vehicle are difficult to view, because the occupants create shadows or the light does not illuminate the correct location.

Apple's granted patent covers an interior lighting system that determines objects, locations, and zones within the vehicle to illuminate while minimizing disturbance to vehicle occupants. The lighting system recognizes the objects, locations, and zones within the vehicle to be illuminated and reacts to explicit requests or commands for illumination, or anticipates implicit requests or commands for illumination. The lighting system automatically and dynamically adds or subtracts lighting to a location associated with an occupant, object, or zone.

In one embodiment, the lighting system provides adjustable spotlights that receive signals from sensors and imaging devices of the vehicle to intelligently illuminate a particular object, location, or zone within a vehicle interior. In another embodiment, the lighting system that provides the adjustable spotlights, includes mechanisms to respond to commands via voice, gesture or touchscreen. Here are some examples of system functionality:

• An object is dropped on the floor of the vehicle; the lighting system automatically illuminates the dropped object and tracks the hand of the occupant to grasp it.

• An occupant is located in the rear zone of a vehicle and is illuminated by an adjustable spotlight. When the sensors detect that the occupant is sleeping, the lighting system automatically and gradually turns off the adjustable spotlight.

• An occupant is located in the front zone of a vehicle while the vehicle is autonomously driving at night. When the vehicle is approaching the destination, the adjustable spotlight is turned on automatically and softly to wake the occupants of the vehicle.

Ford Reductive Design: The Changing View from the Driver's Seat

INTERIOR NEWS

Car interiors have changed a lot from when drivers really did store gloves in the glovebox to cope with metal-and-wood steering wheels of that time, which got freezing cold in winter. To show the changes, Ford created **a video** with the driver's view from a dozen vehicles, from the Model T to the Mustang Mach-E, and beyond.

Some of the developments shown in the video include:

• Plain plate glass—the kind that breaks into jagged, dangerous shards—was used in cars initially, and it was an extra-cost option, at that.

• Curved windshields, which could no longer be opened, pushed for the development of car air conditioning, first broadly commercialized in the early mid-1950s.

• The first car radios amounted to 20 per cent of the vehicle's value.

• Postwar dashboards were influenced by the space race, with more dials, switches, and gauges, as technology became increasingly an omnipresent part of daily life.

• The advent of video games and the use of handheld gaming controls influenced steering wheel design, with buttons placed within easy reach of the driver's thumbs.
• Today's interiors are increasingly made of more durable materials, able to better withstand contact with products such as hand sanitizer, sun lotion, and insect repellent.

It clearly shows that the trend was towards *more*: more buttons, more features, more elements. Now it's going the other way, using human-centric design to declutter the interior and create a holistic space.

To step inside the Ford Mustang Mach-E is to experience an interior unlike any Ford vehicle that came before. The all-new design is the culmination of refining the things that customers want—spaciousness, technology, and a perception of warmth; and a large, central touchscreen that consolidates many of the in-car controls in one place. That's what is Reductive Ford Design, intended to provide occupants with a more comfortable and simpler environment.

Amko Leenarts, Ford of Europe's Design Director, says "When we think about how cars have changed, we think of what they look like from the outside, but it is from the inside that drivers and passengers see them most of the time. It's been an incredible journey to the dynamic, holistic interior of the Mustang Mach-E, which does more with less while putting all the important controls within easy reach."

EV6 is Kia's First Dedicated BEV

INTERIOR NEWS

Although the EV6 is not the first battery-electric vehicle from the Korean automaker, it is the first model to strictly rely on electricity for power. Based on the same E-GMP platform and powertrain architecture as Hyundai's Ioniq 5, it offers more space than the company's previous EVs, which were based on existing IC-engine model architecture.

HYUNDAI IONIQ 5 (IMAGE: HYUNDAI)

The Hyundai employs a retro-futuristic and simple design, while the Kia's styling takes a more dramatic and sporting approach with a seamless, curved, driver-oriented infotainment display and center console. Extending from the steering wheel across to the center of the car, it displays an instrument cluster in front of the driver, with infotainment and navigation above the center console. The width of the screen is said to create an immersive experience for the driver, with a minimal number of physical buttons to offer an uncluttered and soothing driving experience.

Underneath the central nav screen, HVAC settings are controlled with haptic 'buttons'. Below this panel, the dashboard slopes away toward the front of the car, creating a sense of space and openness for the driver and front passenger. A handsome mix of light and dark materials adds an upscale feel.

Evergrande Hengchi 1's Fully Loaded Interior

INTERIOR NEWS

HENGCHI 1 WITH ULTRA-VISION GLASS DOME AND SCREENS FOR REAR PASSENGERS

Evergrande New Energy Vehicle Group was founded in 2019. They're located in China and Sweden (with NEVS, formerly Saab). They specialize in developing EVs, and their car brand is Hengchi.

Evergrande revealed last month three new fully-electric luxury models: the Hengchi 7, 8, and 9. The 7 is a sedan; the 8 is a cross between a sport wagon and a sedan, and the 9 is a midsized SUV. These complete the company's already broad portfolio of sedans, SUVs, and a minivan—those being the Hengchi 1, 2, 3, 4, 5 and 6.

HENGCHI 1'S REAR SEATS, WITH TABLET-SHAPED CONTROL UNIT IN FRONT OF THE ARMREST

The Hengchi 1, in its ultra-luxury version, has a very traditional setting reminiscent of a large Jaguar or Mercedes. Three monitors form the dashboard; two others are available to rear passengers. The control as a three- or five-way display is expected to be

patented and be a world first, which provides users with a special driving or multimedia experience. The car is fully networked with dual 5G via Baidu and the Tencent cloud.

The seats are richly covered in fine leather, electrically adjustable in 18 directions, and equipped with a massage function. An "ultra-vision" glass dome lets the sun shine in. There's a premium Bowers & Wilkins UK-made audio system, but headroom in the rear seats seems a bit cramped.

The Design Lounge

BEV vs ICE: Premium Brands, Part 2

THE DESIGN LOUNGE

Display screens and UX/HMI for premium vehicles directly reflect the maker's philosophy regarding the interfaces and integration within their interior. This can be clearly seen as Audi has integrated their displays into the instrument panel in a traditional way with localized ambient lighting, for example, while Mercedes has chosen to create a 'floating panels' approach with ambient lighting acting as an element to separate and highlight these panels.

The Mercedes C-Class uses thin lighting strips to outline key visual elements. The air ducts, control surround on the doors, and flowing lines from the tunnel console into the instrument panel are used to visually integrate the key aesthetic elements, creating a sophisticated experience for the occupants.

Audi's Q4 E-Tron uses a more localized integration approach as the cluster and center displays are part of a larger monolithic design. Notice how the ambient lighting is also

localized as the IP lighting and door lighting are different, to create a segmented feel.

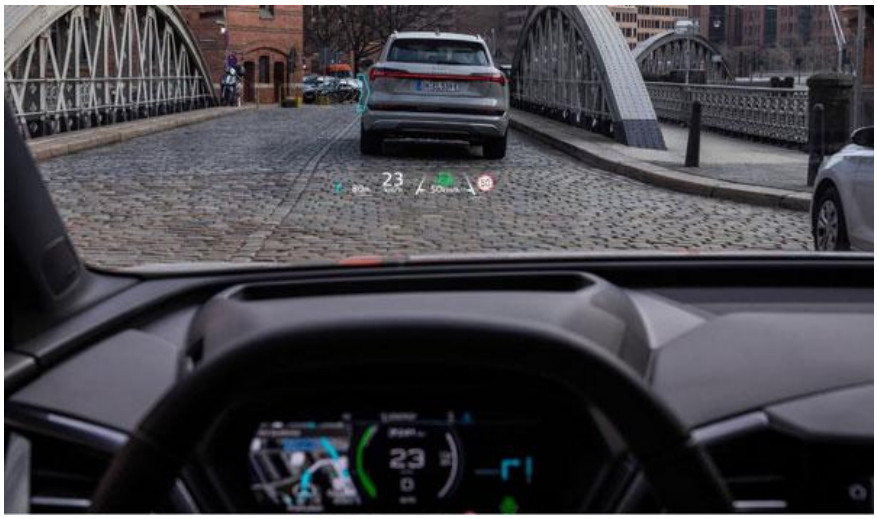
Mercedes uses materials such as leather with contrasting stitching, bright metal edge detailing, and hidden ambient lighting to provide depth effects. Added depth creates a greater perceived luxury environment.

Contrastingly, Audi uses lighting as a repetitive enhancement for the brightwork in the passenger area with the IP trim and door pulls.

This compartmental design approach can best be seen with the drivers' interface that includes a HUD, configurable cockpit displays, and capacitive switching.

Touch controls on the Audi Q4 steering wheel are hidden when not in use by the driver.

As your fingers pass over the controls, they become active and light up to show their functionalities



The HUD has incorporated two depths of fields for the driver for indicating vehicle information and navigation assistance…

…while also incorporating VW's latest UX/HMI interface into the cluster.

Mercedes' latest approach, as seen in the new S-Class, is much more thematically

oriented; all the displays and lighting configurations are integrated with the entire interior environment, not each individual display/interface.

NAVIGATION ORIENTED THEME

SPORT DRIVERS ORIENTED THEME

THE CLASSIC DRIVER THEME

Further use of this segmented design approach by Audi can be seen in their center displays, switches, and tunnel-console integration.

The main central display is integrated within the upper/main portion of the instrument panel while the HVAC switches are located underneath as a separate element. This is a bit surprising as the latest A5, A6, A7, and A8 all use a touch screen interface, not traditional switching, for the HVAC while also bridging the IP to floor console.

The floor console itself contains the traditional driving interfaces such as the (pushbutton) prindle, electric parking brake switch, hazard flasher, switch and start/stop button—all on a horizontal plane.

Audi Q4 E-Tron tunnel console

This creates a 'floating' upper portion for the tunnel console that contrasts with an open plastic storage area with exposed cup holders. Although very functional, this does not impart a luxury or sophisticated environment that is typical from Audi.

The contrast with Mercedes is quite extreme; they have chosen to eschew the use of separated interface areas for the HVAC, prindle, and center display to the point where the cup holders and storage areas are also under flowing hidden compartments.

The center display is visually integrated into the tunnel console, but then 'floats' away from the instrument panel in the display area. They have also tidied up this region by locating the prindle as a steering wheel stalk.

What seems the most surprising is that Audi's placement of the prindle in the tunnel console makes the interior feel more like a traditional ICE vehicle—which it is not! Mercedes' very clean tunnel/center console, without any of the traditional driving interfaces (no prindle here) feels more like a BEV…which it is not. Strange days indeed!

News Mobility

_Car interiors Unplugged

NEWS MOBILITY

IMAGE: THE 2009 STREETSIE AWARDS, PART 1 – STREETBLOG.ORG

11. In search of an epic V

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

Desirability and attractiveness are the key to anything new and equally the missing link to the AV business. Autonomous vehicle developments suffer from an identity disorder when presented on screen or show-floor. In addition, their visual appearance has become the symbol of continuous polarizing debates. Besides consumer adoption and regulatory issues, AVs are not just about technical solutions but major cultural changes. Shifting auto-manufacturers into mobility-providers, the new type of practice brings to surface diverging beliefs for any aspect of mobility, technology, energy management and governance overall. Socioeconomic institutions are being reexamined through a new lens prospecting a key change however, all possible scenarios seem to be more clearly pronounced on the long term, than they are for the near future.

Having 'the right to' is today equal to 'having the right to be able to' (to go to) hence, mobility gains its aspect of a public act and civic expression. Unlike the origins of the automobile where the social model was successfully revised to enable the upcoming disruption, AVs today face a much greater challenge: restructuring our entire

fundamental belief system. Disruptive events, erratic trends and behaviors reveal the invisible aspects of social policy.

Concerning specifically car interiors, the pain is on the driver seat. Driver 'is gone' and its place is conjured by a 'virtual active god': the amount of information generated and managed through, in, out and around the moving-habitat. Between the fundamental right to privacy of the EU citizens and the expectations of the US citizens, the prospect outcome could turn states into surveillance mechanisms; the fundamental right of personal data privacy versus life as the pursuit of happiness. In the absence of harmonization, any innovation is delayed. It took a globalized industrial saga in order to put on the table 'the right to be forgotten'. US suddenly looks towards European policies with more sympathy.

Equally, the existential disruption of any shared mobility app amplified inequalities among operators bringing about major debates, legal proceedings and prosecutions. What is employment on the front seat whether is an Uber or a delivery van? Using humans for utility functions implies taxation, wages, life and health insurance, and maybe after all we have been compromising a human into an automated role. …and how does the whole package compare to the lifetime mortgage of a traditional cab driver.

Digital dexterity should not be confused with progress; any good scientist is conscientiously experimenting with policy. Shared mobility means shared economy, which means, shared benefits. This is a direct expression of societal issues and that is why 'the epic' of an era has to always have a collective perceived understanding.

For the time being, a block on wheels is posed on the chess-board of public space. It comes the time we have to define if it is a Knight, a Queen or a Pawn. What happened to the driver though?

To be continued…

_____*INDUSTRIOUS*__

Parkopedia: Indoor Mapping for Parkades

NEWS MOBILITY

IMAGE: PARKOPEDIA

Most parkades, being sturdy buildings with minimal window area, have weak or nonexistent GPS coverage. Parkopedia, the world's leading parking services provider since 2007, helps drivers (and future AVs) find parking quickly, easily and conveniently, without the need to drive around looking for a space.

Indoor parking facilities present many challenges, including navigation system blackouts, finding a vehicle within large parking facilities, and locating services such as EV charging stations. Parkopedia can be used in a variety of ways to mitigate these issues, including indoor navigation where GPS is not available, location of vehicles in parking garages and the development of automated valet systems.

They have developed their own 3D mobile mapping rig to calibrate sensors, capture data and generate highly accurate colorized point clouds. Their proprietary SLAM system integrates lidar, IMU, GNSS, and high-resolution imagery using a state-of-the-art technique. As a result, their scalable indoor mapping technology helps them to produce maps quickly and update them frequently. These high-definition maps give drivers a clear vision of the entirety of the parking-related part of their journey, from reaching and entering a parkade to finding a parking space, with the shortest walking distance based on their intended destination. Parkopedia supports 70 million off-street and on-street parking spaces across 89 countries.

This **online** **video** shows how parking data is integrated into the Audi Q3 to show parking locations in Ann Arbor, Michigan (home of the University of Michigan Transportation Research Institute and its MCity simulated town used for AV and ADAS research).

Cruise to Buy Voyage

NEWS MOBILITY

IMAGE: ELECTREK

Cruise, a majority-owned subsidiary of GM, will acquire self-driving startup Voyage—a spinoff of the Udacity online learning service—in another major autonomous vehicle merger. The announcement came less than a week after news first surfaced that the two companies were in talks about an acquisition.

It's a new merger step in the world of autonomous vehicles over the past few years: Amazon acquired Zoox; Aurora absorbed Uber's autonomous vehicle division; Apple bought distressed startup Drive.ai and was considering a tie-up with Hyundai; Intel bought Mobileye; and Delphi acquired nuTonomy and became Aptiv, which then joined with Hyundai to become Motional. "The self-driving industry is consolidating, and the leaders of a trillion-dollar market are fast emerging," Voyage CEO Oliver Cameron said in a statement. "After being intimately involved with the AV industry for the last five years, I can say with certainty that Cruise—with its advanced self-driving technology, unique auto-maker partnerships, and all-electric purpose-built vehicle with no human controls—is poised to be the clear leader."

Cruise mainly operates its autonomous vehicles in dense, urban settings like downtown San Francisco, while Voyage oversees a fleet of low-speed autonomous vehicles providing trips to residents of several retirement communities. Both companies have tested their vehicles without a safety driver and aspire to launch full-fledged commercial robot taxi services.

Voyage operates a fleet of self-driving cars in two retirement communities, one near San Jose, California, and the other north of Orlando, Florida, both called The Villages. Last year, Cruise unveiled the Cruise Origin, a fully driverless prototype vehicle without a steering wheel, pedals, or any controls typically associated with human driving. The vehicle will go into production at GM's Detroit-Hamtramck plant.

General News

Tencent IoV to Form Smart EV JV with Evergrande

GENERAL NEWS

HENGCHI 1 (IMAGE: HENGCHI)

Tinnove, a Tencent-backed IoV (Internet of Vehicles) technology developer, will build a joint venture with China Evergrande Auto, to develop an in-car smart operating system with independent intellectual property rights

The joint venture will be 60/40 controlled by Evergrande Auto and Tinnove, with both parties expected to make full use of their respective capabilities in new energy vehicle R&D, manufacturing, artificial intelligence, big data, cloud computation, and other fields, aiming to jointly create a world-leading smart vehicle ecosystem.

Founded in 2018, Tinnove is an IoV solution provider jointly owned by Tencent and Changan Automobile. Tinnove provides industry-wide IoV-based OS solutions with open, adaptive, and custom-made characteristics based on Tencent's professional capabilities in AI, big data, cloud computing, and mobility ecosystem. It also covers onboard operating systems to realize the two-way HMI data exchange between the enterprise and each car and user. The OpenOS can help automakers and suppliers build their own flexible infotainment systems and smart cockpits faster.

Hisense to Buy Sanden

GENERAL NEWS

China's Hisense Home Appliances Group plans to acquire troubled Japanese auto air conditioner supplier Sanden Holdings as the major Chinese home appliances maker expands into the global auto industry. Hisense, listed in Shenzhen and Hong Kong, is a household brand in the Chinese home-electronics market, with products such as air conditioners, refrigerators, and TVs. They have a marginal stake in the auto sector with their Hisense Mould division, producing bumpers and small plastic parts.

Sanden is a long-established, leading Japanese manufacturer of automotive air conditioning compressors, heat exchangers, and systems—the second-largest auto air conditioner compressor maker in the world as of 2019—mainly supplying to Japanese and European car brands, including Volkswagen Group.

Sanden started with a textile mill, then began manufacturing components of communication devices and mica-condensers in 1943, during World War II, then changed to develop dynamo lighting sets for bicycles, in 1963. They developed a clean forced ventilation type heater that did not foul the air in the room for the first time in the world, and consistently accumulated and developed technologies both in cooling and heating.

Hisense chairman Tang Yeguo said in a statement that he views Sanden "as the core company to expand into the automotive air-conditioning compressor and automotive air-conditioning industries".