DVN-I
Automotive Interior

Thu, 30 July 2020 Weekly Newsletter **NEWSLETTER #33**

Editorial

Autonomous, But With A Driver

As ideas take shape as to what vehicle autonomy should look like, sound like, and work like, the United Nations vehicle regulations—recognized one way or another by most of the world's countries with the notable exception of the United States—have new specifications for how automated lane-keeping systems are to work. This is a new reference point for the industry to work from, demonstrating the magnitude of further development and regulation still necessary. For more, see the Mobility News section of this Newsletter.

Industry is increasingly focusing on how to support and assist drivers—rather than how to replace them—with technology. The in-depth article this week looks at augmented (vs. artificial) intelligence, with Toyota and Mobileye examples. The driver remains the central part of the system, and the car keeps an eye on them, rather than the duty-relieved human driver keeping an eye on the self-driving car. Natural language understanding—the machine adapting to the humans, rather than the other way around—is increasingly important, and we've got news on that front, too.

The inaugural DVN-I Smart Interior Conference and Expo will happen online on 24 September, providing an ideal opportunity to go deeper into these topics **Sign up here!**

Agenda available **here**, video teaser **here**

This Newsletter also brings you new chapters in our onrunning series: lighting integration, trajectories, mobile signature, and the VW group interior design review.

We hope you find this Newsletter interesting and informative. Have you not yet subscribed? **Register here**!

Sincerely yours,

Philippe Aumont
General Editor, DVN-Interior

In Depth Interior Technology

Augmented Intelligence Now, Articial Intelligence Later

The phrase "artificial intelligence" (AI) brings to mind robots, machines, and algorithms—not people. But as autonomous vehicle development progresses, we'll still have humans involved in driving up to Level 4, meaning probably for more than a decade, if not longer. And that, in turn, means the driver remains part of the solution rather than an obsolete element to be replaced by a "higher" artificial intelligence imposing constraints and costs.

Lower automation fits with Level 2 in the SAE L^0 to L^5 vehicular autonomy scale, meaning automation—and by extension, the application of artificial intelligence—is only partial. Driving experience remains the № 1 criterion of the human piloting the vehicle, although certain emergency and other specific functionalities can be taken over by the system when needed, such as automatic emergency braking (AEB) to name the most obvious.

TOYOTA RESEARCH INSTITUTE TOYOTA AI VENTURES

in 2015, the Toyota Research Institute (TRI) opened at Los Altos, California to develop automated driving, robotics, and other "human amplification" technology. Toyota views the relationship between driver and car as teammates working together to ensure a safe, comfortable, fulfilling journey. TRI is applying this philosophy to automated driving by pursuing technology to make vehicles safer and driving more fun and more convenient.

The three components of automated driving are perception, prediction, and planning; TRI is making significant developments in all three.

TRI is developing two different automated driving modes in parallel, called Guardian and Chauffeur, to give drivers a real choice between computer-aided driving and computer-driven transport. Guardian mode constantly monitors the driving task, giving the human driver alerts when warranted to avoid a potential crash. In Chauffeur mode, the technology takes all responsibility for driving and all vehicle occupants are passengers. The underlying technology for both modes is the same.

AI is deeply integrated in such systems, and at this stage it mostly aims to complement human drivers, not replace them. It helps in specific scenarios like on-ramps and off-ramps and overtaking. Many automakers and suppliers are working in this direction, because it's easier for consumers to trust—the computer is only watching, not taking over. It's simpler from a development standpoint, meaning it will be available sooner, and it costs less.

"When the field of AI was born in the 1950s, a few other scientists flipped the AI idea around," said TRI's mobility and advanced technology communications manager Nathan Kokes in a recent interview. "This other field was Intelligence Amplification, or IA. The idea of IA was human-centric, for people and machines to act in synergy; accomplishing together something better than either one could accomplish alone".

Toyota's goal is to have humans and machines interact as seamlessly as possible to improve the performance of the vehicle. The company frequently cites the examples of jet fighter airplanes, in which the pilot does not actually fly the plane directly, but a flight control system reads the pilot's actions, correcting them as necessary to ensure that the aircraft stays within reasonable safety parameters (and not the opposite, as in the unfortunate and illustrative case of the Boeing 737 Max).

For cars, this means the human is in control of the vehicle in nearly all situations within the driving experience. However, as TRI CEO Gill Pratt says, "as the driver begins to reach the edge of a dynamically-changing safety envelope, the machine begins to collaborate with the human driver, nudging the driver back into a safe corridor". Lane keeping assist, for example.

Toyota uses a lot of this kind of language of cooperation when describing Guardian's IA functionalities. They would like to create a system with no hard, defined borders between the artificial and organic intelligence operating the vehicle as a team.

TRI uses Toyota AI Ventures venture capital subsidiary, with investment in early-stage startups from around the world in the areas of artificial intelligence, autonomy, mobility, robotics, data, and cloud computing. The Toyota effort supports the following main areas of development: Improving accessibility and mobility for all, including autonomous and personal vehicles; Reducing congestion and pollution through electric and shared mobility services; Increasing efficiency through smarter home and building construction; and assisting people with everyday tasks and personal care.

We've seen a similar approach with Mobileye, once a startup and now part of Intel after the latter company bought the former for a record $15.3bn in 2017.

Mobileye CTO Shai Shalev-Shwartz said recently, "The idea of the system is, rather than intervening at the very last moment like AEB systems today are doing, to gently intervene with the driver's decisions in advance, in order to prevent entering a dangerous situation in the first place". There it is again, that same idea to help human drivers stay in the safe zone.

Mobileye designs eyes and brains for vehicles, not only by developing their own chips, but also their own software and services. The company has developed their expertise gradually, progressing from their first pedestrian detection system in 2010 for Volvo, to their first camera-driven automatic braking system for Audi in 2013, to the Autopilot system for Nissan in 2016.

Now Mobileye works with a wide array of automakers, suppliers, and mobility-involved companies: Volkswagen, BMW, Renault-Nissan, Denso, STMicro, Waymo, and many more. The overspanning strategy is to leverage computer vision, artificial intelligence, and data to significantly reduce crash rates and costs. That's why they aim to perform as many calculations as possible using only conventional CMOS image sensors—not radar, ToF (time of flight) sensors, or others. They consider that solutions with multiple sensors are expensive, but a platform with 12 CMOS sensors costs only $1,000, which makes the platform more accessible.

Mobileye shares the "Vision Zero" goal (zero fatal road crashes) with TRI, along with broadly similar goals for how to achieve it: by using vehicle autonomy to avoid crashes, but with the driver as part of the solution rather than an element passivated and replaced by artificial intelligence imposing certain behaviors.

Mobileye uses braking as an example, arguing that while a solution such as AEB is effective, it is only effective as an emergency measure rather than a preventive one. In

the company's view, good preventive solutions would reduce crashes without sacrificing the comfort of the driver and passengers and while keeping the general flow of traffic intact without undue delays. Driver monitoring systems and drowsiness detection care more good examples, wherein early warning could spur the driver to alertness before AEB becomes necessary.

The company's prevention-prioritized approach is to formalize a set of best driver practices in a model called "Responsibility Sensitive Safety" (RSS). In a 2019 white paper, Mobileye said "RSS formalizes an interpretation of reasonable human common sense. RSS is a rigorous mathematical model formalizing an interpretation of a set of principles of reason".

In other words, it's a model that imposes human preferences and habits on a machine-based solution, rather than the other way around. As with Toyota, the idea is to merge the two without showing any of the seams, an approach reflected in the idea of "gentle intervention" to describe how the pair should work together, rather than a "take control" or "override" paradigm.

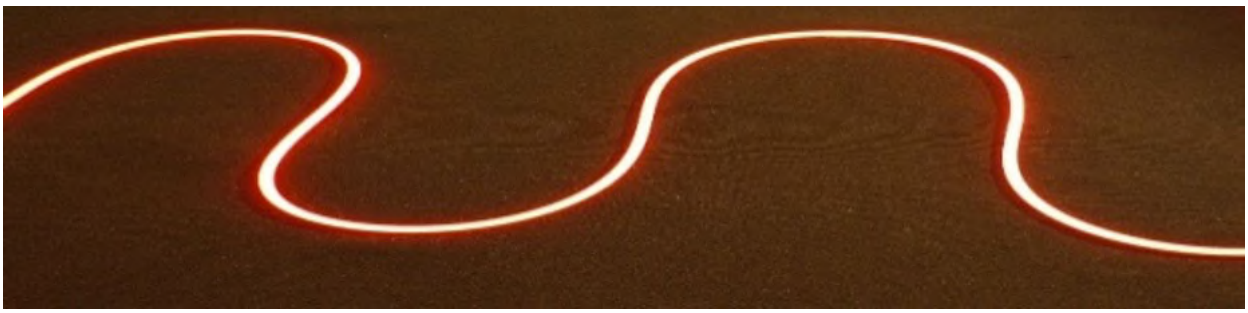
GM PICTURE

What TRI and Mobileye are describing are forthcoming new levels of driver assistance system functionality. It won't be full autonomy as soon as was being promised shortly ago, but it is surely closer to the horizon of full autonomy than our present position. Much more development and testing must be done to achieve these goals sooner than later.

Interior News

Lighting Integration in Automotive Interior Components, Part 2

INTERIOR NEWS



In this chapter of our interior lighting integration series, we'll cover contour lighting and indirect lighting.

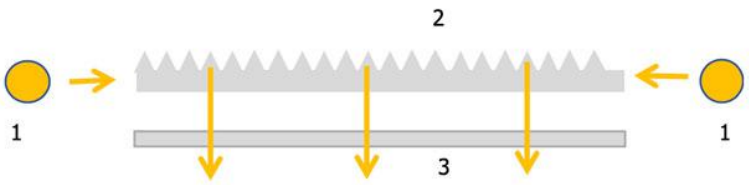
Contour Lighting

Light and Integration Aspects:

- The light guide is an optical line with a diameter between 2 and 5 mm
- The contour lighting is directly visible and therefore a subject of strict assessment
- Contour lighting amplifies the design, styling and geometry of the interior components
- It has to be placed perfectly to the contour of the recipient components
- When lit: totally homogeneous light distribution over the visible length
- When unlit: Nearly invisible, clear and transparent or slightly satinized surface
- Light color adjustable to the surrounding materials or per driver's own choice
- Depending on light guide position, the door panel must be a one- or two-part system
- Additional package for implementing the light and mounting system in the door trim
- For homogeneity, the light guide, lens, and mount has to be simulated and calculated
- Additional stray light outcoupling must be avoided by all means

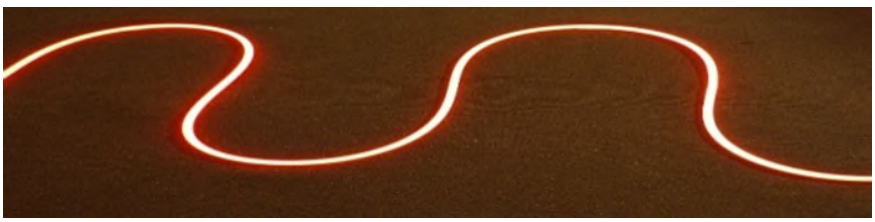
- For each position of the contour lighting, new integration concepts are necessary
- Only LEDs are used for incoupling light, on one or both ends of the light guide
- RGB-LEDs with electronic control for different light colors and adjustable brightness
- Smart LEDs with microprocessor for dynamic lighting and improved bin selection

Technical Principles:

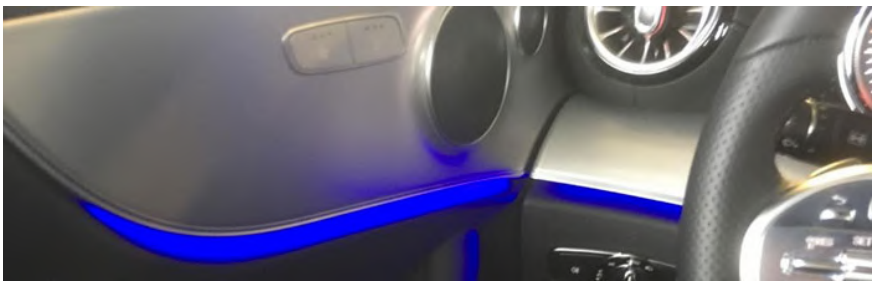


1 = LED-Modules on one or both ends of the light guide (2) for in coupling light
2 = Light guide with a prismatic profile to emit efficiently the in coupled light in the required direction
3 = Cover lens to homogenize the light distribution from light guide (2)

The "double system" of light guide and lenses is more complex to integrate in the door panel.
In future, the contour lighting can be realized with one light guide, which fulfills the homogeneity requirements over the whole visible length without an additional cover lens. This could be a light guide with an attractive transparent day-design coating with its own refractive index. Such a system doesn't emit light at the contact points with other materials, and can be mounted easily.



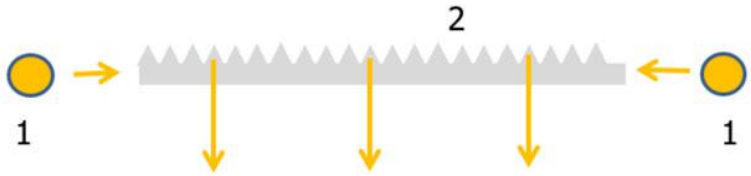
Indirect Lighting



Light and Integration Aspects:

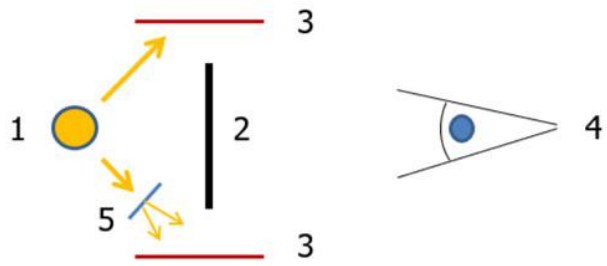
- Only light guides with a calculated light distribution are suitable (raytracing)
- Material: Mostly rigid plastics with molded connection points (tool needed: greater volumes)
- When lit: Indirect illumination of defined areas from a hidden light guide
- When unlit: Hidden light guides and LEDs with or without additional cover lensThe indirect lighting can also be realized by flexible light guides, to spare tools for the rigid version
- Light guide is fixed in a hidden position, so that light inhomogeneities are not seen
  Therefore, no need for additional cover lens for homogeneity aspects

Technical Principle 1:



1 = LED Modules on one or sometimes both ends of the light guide 2 for incoupling light
2 = Light guide with a prismatic profile to emit efficiently the incoupled light into the required direction

Technical Principle 2:



LED module (1) hidden by a "wall" (2) so the LED is not directly visible to the observer (4)
LED Module (1) illuminates the areas (3) directly or through an additional dispersion cover lens (5)

- Only one LED as light source for an indirect and direct light emission and illumination
- When lit: Direct ambient lighting on operational elements and areas
- When unlit: Hidden light source with or without additional cover lens

The direct and indirect lighting by a hidden LED is often used as a "cheap" solution for ambient lighting in door panels, pillars and overhead consoles in headliners, to illuminate door panel ornaments, armrests with switches, map pockets and side areas in headliners.

Disadvantage comparing to a light guide: Shadowing effects of the punctual light emission.

Ford Bronco: Retro Cues, Modern Technology

INTERIOR NEWS

Ford has unveiled their new Bronco and Bronco Sport SUVs. The Bronco is a model line manufactured and marketed by Ford from 1965 to 1996, then discontinued for 24 years, and now it's back in a 6th generation.

The new Broncos are built in 2- and 4-door versions on the new Ford's Global Midsize Truck Architecture, based on the Global C2 platform developed by Ford of Europe for unibody front- drive vehicles.

There are removable doors and roof panels; on 4-door models, the removable doors can be placed in protective bags and stored in the back.

The heritage-inspired interior has been conceived and developed as an outdoor product: rubberized flooring with drains and optional plugs, allowing users to simply hose it down to clean away dirt, mud or sand. Switches on the instrument panel are made with silicone rubber parts that can get wet, marine-grade vinyl seats are water-resistant and mold-resistant. It also includes a number of hand grips, marked with the Bronco name, to hold onto for stability while jostling around off-road; many storage cubbies for small items, a gridded seatback to stow things and know exactly where

they'll be when you go to reach for them in the same bumpy conditions, and otherwise like that.

The Bronco's dashboard looks sleek and modern, and its general shape is a nod to the original Bronco's simple design. The car shown here has the optional 12" infotainment screen. For connectivity, it will come standard with Ford's latest fourth-generation Sync infotainment system. The Bronco Sport will use the third-generation Sync system for now. There's an optional 360° camera to provide additional visibility in technical pursuits such as rock crawling. For off-road, off-internet conditions, navigation remains capable with no connection by dint of pre-loaded trail maps. The Bronco has a rail on the dash where you can mount all kinds of devices along the windshield, and it's got a charging port built in, obviating the need for iffy aftermarket attachment systems.

Audi Adjusts e-Tron Interiors

INTERIOR NEWS

In an effort to simplify the ordering process for the e-Tron, Audi has revised the capabilities of its Audi Virtual Cockpit and the touchscreen MMI Touch system. The MMI system can be controlled either manually or via voice control, and has been further enhanced with a more powerful, third generation MIB 3 modular infotainment platform.

Audi says the car can now access speech recognition software in the cloud during its formulation of responses to spoken commands, to increase the accuracy of comprehension and feedback. Phone book contacts can also be accessed vocally, as can a radio station or a track from the media library, and the system can now produce text messages via dictation. The climate control system also now responds to spoken words.

Thanks to the new processor, the navigation system has become more intelligent, with machine learning capabilities. During route planning it can make suggestions based on previously-driven routes, taking into account the time and traffic congestion, and can even now provide lane-by-lane information on traffic flow. Routes are calculated online on the servers of the service provider Here, which uses data from the overall traffic situation. In the interest of optimal route guidance accuracy, Audi has made free over-the-air map updates available to e-Tron drivers on a monthly basis. Drivers of all versions of the e-Tron also have the option to duplicate and control navigation and infotainment apps from a smartphone on the central MMI monitor using the standard smartphone interface, and this now takes place wirelessly as an additional benefit of the upgrade to MIB 3 connection.

BMW Signs On to Convenience-as-Service

INTERIOR NEWS

BMW has made a comprehensive update to their infotainment system, including updated navigation services, wireless Android Auto compatibility, electric-vehicle charging services, and subscription-based convenience features coming soon to cars—and it looks like the maker is going in the direction of a features-as-subscription model.

Cars built since 1 July feature the updated tech, using BMW's latest iDrive 7 operating system to get upgrades via an over-the-air software update.

Soon, BMW will offer new owners app-like, in-car purchases for features and driver-assistance systems that may not have been originally activated in the car. The list of available features will vary by model and region, but examples may include adaptive cruise control, traffic-jam assistance, adaptive headlights, or heated seats: build all cars with the hardware, and selectively activate it for whoever pays, for however long they keep paying. When the car is sold or traded in, the features can be zeroed out unless and until a new owner decides to pay for them. Some features might be offered for a free one-month trial, then with subscription terms for one to three years. Some BMWs already offer similar features, but those embedded systems required visiting a dealer for activation.

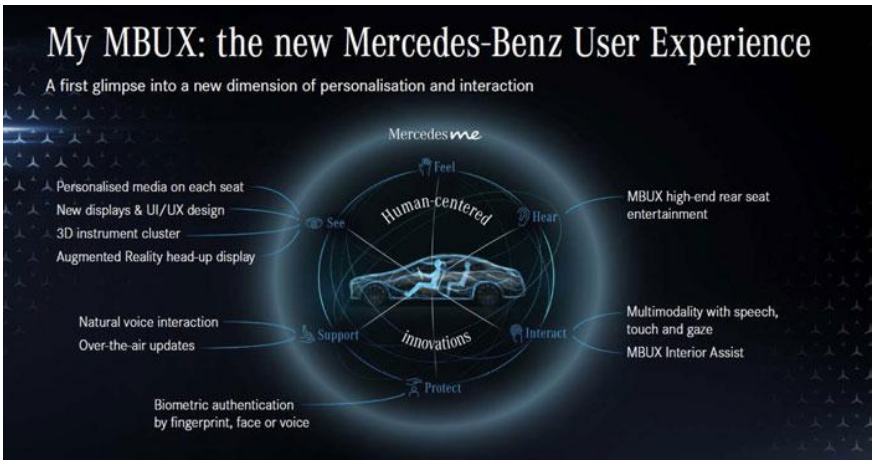
The upgrade also includes BMW's newest navigation system, which will use cloud-based route calculations and provide contextual services such as nearby restaurants and shops, including reviews, and in some places available parking. BMW has offered parking services on some cars for over a year now, with integral payment and available-spaces information. Nearby charging stations and their availability also will be displayed.

New Mercedes S Class: More Screens, Fewer Buttons

INTERIOR NEWS

Mercedes has launched their second-generation MBUX infotainment system, and it is loaded with new technology: touchscreens, augmented-reality head-up display, and improved voice and facial recognition. And many of the physical switches found in the older version of the S-Class have been deleted; Daimler says they removed 27 mechanical switches for the 2021 model.

It clearly confirms—not that any confirmation was necessary—that luxury is increasingly viewed as mandatorily supported by technology and realized with sleek simplicity. Button- and switch-crowded dashboards and consoles are over; the new MBUX version is centered around a tablet like console, with the following approach:



PIC CREDITS: MERCEDES-BENZ

The 2021 S Class will have up to five touchscreens, including displays for passengers, with OLED screens including haptic feedback.

Display control and feature access can be operated by touching or swiping the actual screen or by using voice control, natural hand gestures, and now gaze control. Mercedes did hold back on some functions, like lights and windshield wipers off of the touchscreen. The climate control panel is permanently at the lower edge of the display. Preferences can be stored in the vehicle's personal "Mercedes me" profile; up to seven different profiles are possible in the vehicle.

In the back seat, where up to three screens are optionally available, passengers can share, select, and amend navigation destinations.

Mercedes has adopted 3D technology for the driver display. Technology combines a conventional LCD display with a special pixel structure and a controllable LCD aperture grill, so the left and right eyes see different pixels, thus perceiving an illusion of depth.

The voice assistant, through "Hey Mercedes" activation, now understands commands and questions in 27 languages. It has also become far more natural and continues to learn, including some indirect language such as "I am cold" instead of the clear command "Set temperature in footwell to 24°." If the driver says "I'm tired," an activation program of energizing comfort control is started. The same sentence from the rear starts a wellbeing program. The vehicle will also listen for cues to gauge the alertness level of the driver.

Security with a new authentication method in the vehicle now combines fingerprint, face and voice recognition. This allows access to individual settings. The high security layer is not only to protect seating preferences, but especially to secure application such as digital payments from within the vehicle.

Small Steps in Interior Innovation for Energy Efficiency

INTERIOR NEWS

Industry reports show that electric vehicle efficiency increases by about 3% per year, in what could be named a learning curve. More efficient electric cars can use fewer batteries to achieve a desired range, or get more range with a given battery pack.

Little efficiency gains add up Tesla, for example, has learned to automatically close the passenger-side air ducts when no passenger is detected, lowering energy consumption in hot weather, thus boosting air directed to the driver without consuming more power with a higher fan speed that would be needed with all ducts opened. The ducts can be manually enabled by tapping the HVAC panel where you'd like the passenger face vent to direct air.

The new strategy even works with the Models 3 and Y, which have a very long duct that runs the width of the dash.

This strategy of using energy only where and when needed can probably be developed further to respond to varying numbers of occupants, weather, local culture, driving scenarios, and other factors.

Corning ColdForm™ for Curved Screens

INTERIOR NEWS

Corning is actively working on commercializing their ColdForm™ technology for curved automotive display systems. Driven by consumer demand for more and larger in-car infotainment and connectivity, ColdForm enables larger, curved, and more integrated display designs for digital clusters and integrated center stack applications.

In the past, curved glass has been achieved by heating glass in a mold, followed by sagging or pressing the glass into shape before cooling. For automotive applications, the curved glass must then go through coating and decoration processes for ease of readability and improved aesthetics, as well as chemical toughening. These steps are difficult, with less precision and more expense than when applied to flat glass.

Corning ColdForm allows to complete all the critical and precise parts of processing and finishing of the glass while the surface is flat, and then bend or shape it later during display module assembly to fit the design need. This helps eliminate process steps, while providing design freedom in an entirely new way.

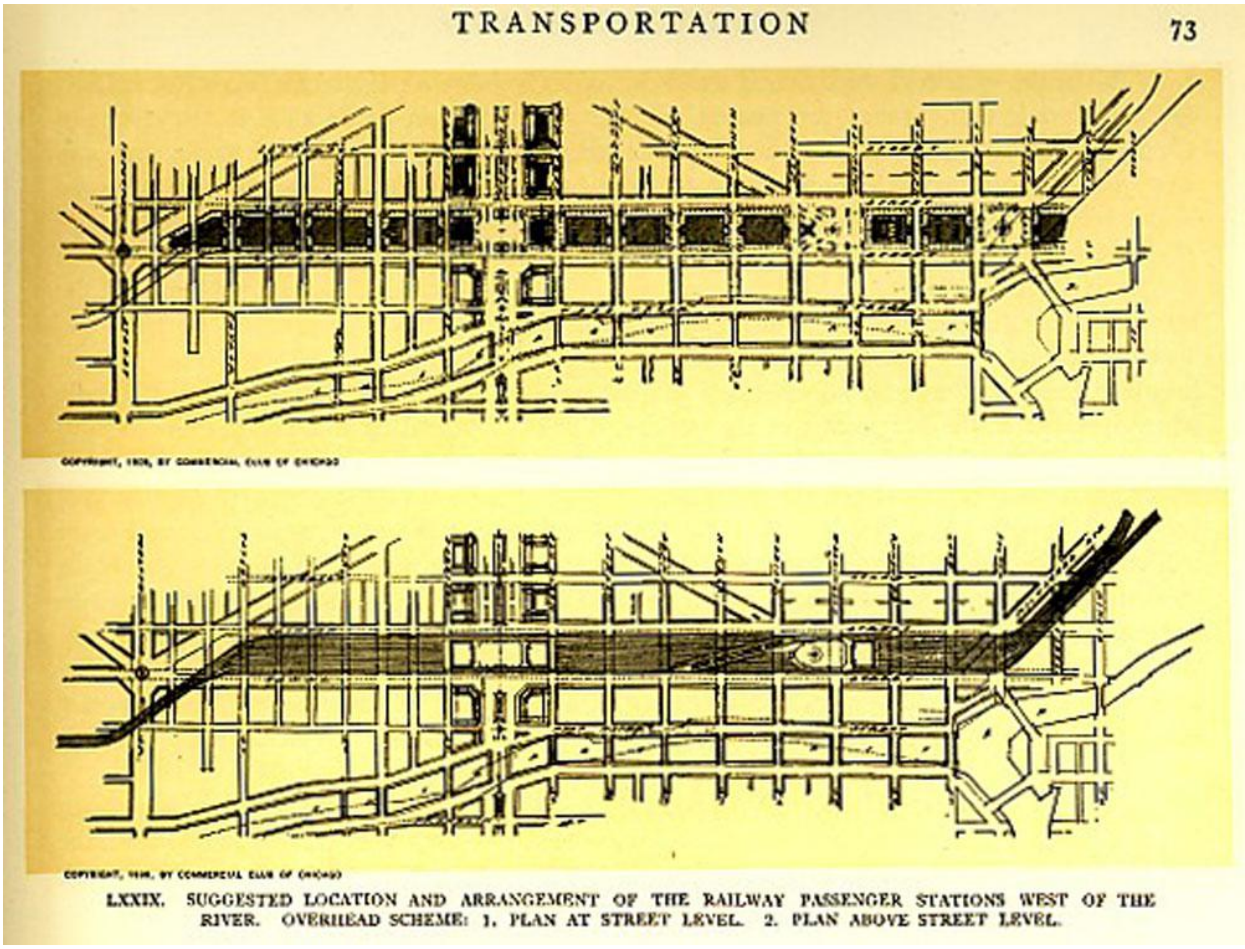
It helps as well to improve the main display attributes: optical clarity so the driver and passengers can quickly view driving information, even across angles, curves, and in different lighting conditions; durability and resistance to scratching, discoloration, and breakage; and high-tech performance (extreme touch sensitivity, high resolution, and design sophistication).

Curved displays could become even more complex in the future. What could come next? Foldable or roll-up displays? We'll have to wait and see!

News Mobility

_Trajectories, Our Mobile Signature

NEWS MOBILITY



LXXIX. SUGGESTED LOCATION AND ARRANGEMENT OF THE RAILWAY PASSENGER STATIONS WEST OF THE RIVER. OVERHEAD SCHEME: 1. PLAN AT STREET LEVEL. 2. PLAN ABOVE STREET LEVEL.

(a designer's look at our mobility-centric culture)

3. Urban planning & demographic influences

Exponential demographic changes in the industrial revolution rapidly increased rural exodus. Population and goods drew the main paths of flux and cities became the lands of progress.

Following Haussmann's ventures [as described in the last chapter], Berlin's urban planning commissioner James Hobrecht visited all known urban chefs-d'œuvre and by 1859 Berlin's new script was pronounced. Based on old existing paths within a brand-new framing infrastructure, the plan was divided in sectors of pre-existing traces, that —contrary to Paris—were not erased but reused at the service of the new bigger picture. Often compared to Paris due to wide metropolitan avenues, large urban parks and squares, Berlin in Hobrecht's plan was instead conceived on a footprint base, the master plan defined only the boundary lines for housing construction. A fire engine was used as the measurement unit to set building dimensions. With houses no taller

than 20 meters and a back yard of specific dimensions for the fire engine to turn, the first housing regulations were imposed.

Regardless of how the new looks of the late 19th urban territory appealed to the viewer, contemporary development status in urban planning was defined by sophisticated, invisible to the human eye, underground pathways and trajectories. Sewer systems constitute the rigid technical layout that codified cityscape measurements. A specific position of intakes defined street and sidewalk dimensions and engraved on urban land the proportions of every street, avenue and boulevard, passing-on the perceived character of the city for the years to come.

In a very diverse urban narrative, waterways and steel structures at the southeast tip of great Lakes edited Chicago's outline and mobile trajectories. In 1848 at the most strategic spot of the largest waterway network, the Windy City emerged once Illinois & Michigan Canal linked the Great Lakes and the Mississippi River waterways. Logistics imposed the first railroad tracks, and soon Chicago became the train hub of the nation resulting in a 500× population growth within the decade! An urban planning spree took over, focusing on big boulevards and roundabouts, when suddenly in 1871 a devastating fire destroyed a third of the city.

Water and steel, once again, would recompose Chicago's new urban alphabet and within a year, most of the city was restored. In 1889, one of the most ambitious projects of mankind kicked off; at its completion, the flow of the Chicago River would be reversed. In this unique example of man interfering and changing his environment, mobile trajectories shifted from east to west and the Windy City acquired a new mobile signature evermore. At the turn of the century, in 1897, the elevated Loop was constructed connecting several passenger rail lines and becoming Chicago's emblem of urban mobility.

All along the 19th century, accelerating urban growth gave birth to infinite paths, intersecting rails and roads, water passages and bridges, multiplying urban trajectories that withstood time. Pioneering urbanists at their best sharpened their pencils for the next big thing!

New UN Regulations for Autonomy

NEWS MOBILITY

The United Nations ECE has finalized and formalized three new UN Regulations for vehicles equipped with autonomous-driving capabilities at Level 3 or above.

All three standards were developed through the UN's World Forum for Harmonization of Vehicle Regulations (WP.29). The forum has around 60 signatory countries, and most of the world's other countries apply the UN Regulations to one or another degree —the most notable exception being the United States.

The new UN Regulations define performance requirements for automated lane-keeping systems (ALKS), which enable a vehicle to pilot itself within a marked lane. The reg describes all conditions for the system to operate: maximum speed of 60 km/h, a road with no pedestrians or cyclists and with a physical barrier separating opposite traffic, a seat belted driver available to resume control, and the system has passed an automatic functionality check.

The regulation also asks national regulators to define how the driver resumes control, what it does if the driver doesn't respond, and what actions the system takes if a collision is imminent.

The standard requires that ALKS-capable vehicles come equipped with an EDR—an event data recorder, or "black box", like the ones found on commercial airplanes, that logs information about system activations and deactivations, transition demands and driver responses, emergency maneuvers, collisions, and system failures.

The new regulations demonstrate the magnitude of further development, and the urgent need for appropriate, uniform regulation to reach high levels of autonomy as soon as can be.

Ford Tests C-V2X in China Ahead of 2021 Launch

NEWS MOBILITY

IMAGE: CHINA DAILY

Ford China has begun final testing of vehicle-to-infrastructure communications equipment in Changsha, in Hunan province, ahead of the launch of their first 'intelligent cars' in China next year. They first began testing C-V2X (Cellular Vehicle to Everything) technology functions in China late in 2017, in trials at the National Intelligent Vehicle Pilot Zone in Shanghai.

Ford China says they have begun final testing of C-V2X on a 100-km stretch of motorway and on public roads in a 100 km^2 area around Changsa. The target is to help Ford accelerate C-V2X technology implementation in China and verify how the applications could effectively support the city's intelligent transportation systems.

Ford thinks this technology can help make roads safer, as vehicles will be able to detect pedestrians, cyclists, and other road users by communicating with each other and with roadside infrastructure, leveraging China's fast 5G development. Ford also plans to deploy C-V2X technology in all new models in the United States beginning in 2022, though 5G development is relatively slow in that country.

Ford's SYNC+ in-vehicle infotainment system provides drivers with timely road information, including upcoming traffic lights, speed limits, and dangerous intersections. It can also recommend appropriate driving speeds to help drivers avoid waiting at traffic lights and also help prevent red light violations.

The Design Lounge

VW Group Interior Design: Luxury and Premium Vehicles

THE DESIGN LOUNGE

This final chapter of our series on the design and platform sharing of the VW Group focuses on their luxury and premium brands. That's Bentley, Porsche, Lamborghini, and Bugatti.

Overall, these brands and vehicles have come to define premium and quality benchmarks within the automotive industry and though they do not have cost constraints as tight as most other vehicle segments and brands, they are not without challenges of their own.

Platform or cross platform design, is also leveraged from the more mainstream and higher volume vehicles, such as UX/HMI interfaces.

Let's take a specific look at the SUVs within all of these brands.

The Bentley tradition has evolved from their luxury sedans. With the introduction of the latest Flying Spur, Bentley has integrated all the technology features required and expected in modern vehicles, along with the UX/HMI, into a concealed panel that highlights the high quality and hand craftsmanship that has defined this brand for years.

BENTLEY FLYING SPUR

GLOSSY INLAID WOOD TRIM WITH INLAID ALUMINUM ACCENTS AND PRECISION ALIGNMENT

A three position UX/HMI display is only activated when needed, with a clever transition from digital to analog displays.

Contrasting with the real leather and stitched instrument panel and wood trim, there's a platform cluster/display along with a HUD that incorporates all of the modern features of modern vehicles within a classic environment.

Porsche, for their platforms, also highlight their extensive history in the layouts of the newest 911, Panamera, and EV Taycan. Three large round digital 'gauges' within the cluster has been the classic, traditional Porsche layout for decades. By also incorporating the UX/HMI touch screens in a linear horizontal design, Porsche focuses on their heritage but with modern high-tech interfaces.

This can be best seen in the newest Taycan's curved OLED instrument cluster. A clear brand identity is created, even though a bit of sharing is still discernible—the steering wheel, for example.

PORSCHE 911

PORSCHE PANAMERA

PORSCHE TAYCAN

With VW groups' very exclusive and extremely low volume prestige vehicles, it is difficult to see how any of their platform sharing techniques are used with Lamborghini and Bugatti cars

LAMBORGHINI HURACAN

BUGATTI CHIRON

If we now look to the newest vehicle introductions within the luxury /premium segments, the premium SUV has made the greatest impact and has now permeated all of the VW Group's brands including Bentley, Lamborghini, Porsche (which produces over 50% of the group's overall global sales), Audi, and VW.

Bentley and Lamborghini are the latest introduction into this segment and when comparing these vehicles with those marques' cars, it is clearly perceptible how platform sharing comes into play, such as with the elimination of the rotating center display.

BENTLEY BENTAYGA

Focusing on form language as a differentiator, Lamborghini, Bentley and Audi share the same basic interior architecture. This can be seen in the ducts, the shifter, and the display placement. Even the steering wheels share an architecture.

LAMBORGHINI URUS

AUDI Q8

With Audi replacing a button/switch panel with a touchscreen for the lower floor console unit, a high-tech environment contrasts with Lamborghinis' and Bentleys' more traditional interface.

As one of the earliest entries into the premium SUV segment, Porsche's platform sharing with the VW Toureg is less obvious than more recent entries. Even though the traditional five-dial cluster is no longer used, they have gone to great lengths to successfully differentiate these vehicles.

As the importance of the UX/HMI interface grows and screen size and usage increase, it will be a challenge for Volkswagen—and all brands, really—to further differentiate their vehicles without only relying on the highest quality materials and craftsmanship.

PORSCHE CAYENNE

VOLKSWAGEN TOUAREG

General News

Sitech, Brose Plan Whole-Seat JV

GENERAL NEWS

Volkswagen's Sitech subsidiary and Brose are planning to create a joint venture devoted to complete seats, seat structures, and seat components. Sitech will become part of the joint venture. Brose and VW each will hold a 50% stake in the new company. Representatives of both companies signed a memorandum of understanding covering the joint venture last week in Coburg.

Sitech Sitztechnik has more than 5,000 employees, producing car seats and seat-structure components at six manufacturing plants in Germany, Poland, and China. With more than 200 engineers involved in the development of new products, they cover the entire development to prototype creation and support of mass production.

Brose is the world's fourth-largest family-owned automotive supplier. They develop and produce mechatronic systems for vehicle doors and seats as well as electric motors, drives, and electronics for steering, brakes, transmissions, and engine cooling. Around 25,000 employees at 65 locations in 24 countries generated turnover of €6.2bn in 2019. Around 8,000 employees at 24 locations in 12 countries develop, produce and market seat structures and components worldwide. The Interior business division employs 650 engineers and technicians in Europe, the US, and China, who work on seat systems and adjusters for the vehicle interior.

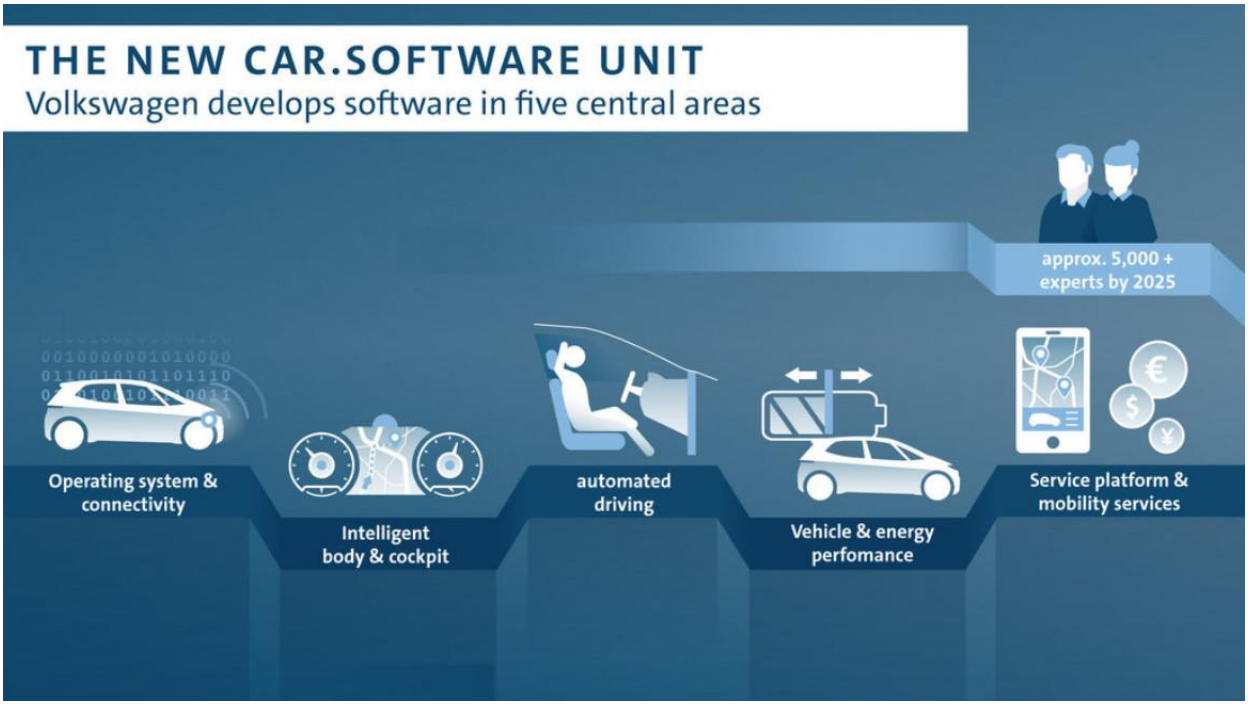
Volkswagen and Brose will review the transaction as part of a due-diligence process and finalize the agreement negotiations over the next few months. The agreement is

scheduled to be signed by the end of the year. An antitrust review will follow.

Brose already set up a complete-seats JV with Aunde in 2018 to serve automakers outside the VW group.

Volkswagen Consolidates Infotainment Development

GENERAL NEWS



Volkswagen Infotainment is planning a new development center at the Bochum technology campus Mark 51°7 (meaning lat long coordinates). The subsidiary of Volkswagen specializing in software development and vehicle connectivity intends to group its brands and company experts (more than 34 nationalities represented!) together at a central facility to work on software development in a unit VW call the Car.Software organization.

The subsidiary develops software solutions and digital components for VW Group vehicles with a focus on passenger cars, including integrated modem units (online connectivity unit, OCU) for connected car applications, such as weather maps, optimized traffic guidance and remote control of certain vehicle functions via a smart phone app. A key project is a dedicated vehicle operating system called VW.OS for all future model generations from the Volkswagen Group.

Currently, Volkswagen Infotainment works at three locations in the city of Bochum with a total of around 700 employees, including the Bochum University campus. The new complex is to include an engineering center, a vehicle test hall, an audio laboratory and agile working areas with space initially for 800 employees. There is also the possibility of a second stage with a significantly larger number of workplaces.