MOBILITY INDUSTRY INSIDER

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April 2020 Bulletin

Human Machine Interface

Image credit : Jaguar Land Rover

FutureBridge

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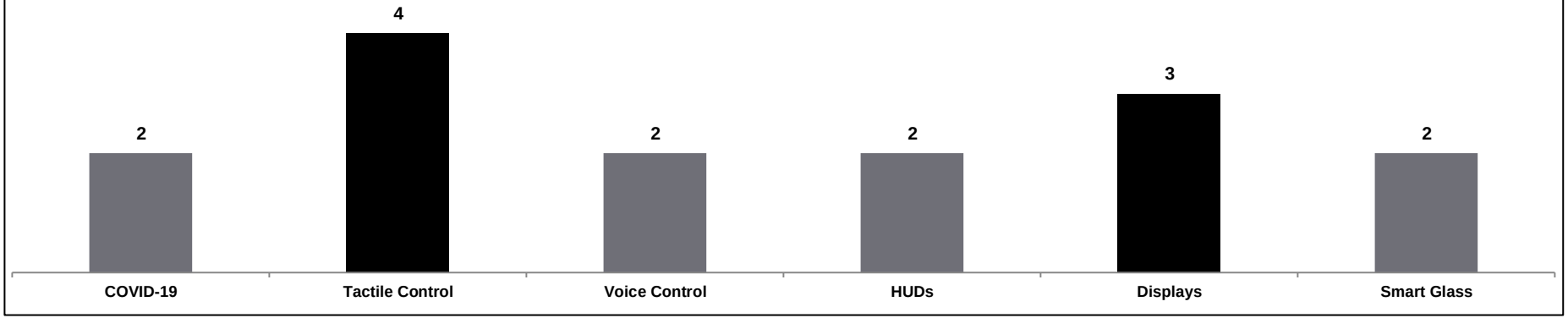
Image credit : Jaguar Land Rover

Industry Development Summary in April'20

There were increased developments in the segments of Tactile Control and Displays. Tactile control developments constituted developments related to product launches and collaboration. Health monitoring was also an area of interest amongst players considering the situation of COVID-19

Industry Development Summary in April 2020



Key players involved

UVEYE, TACTOTEK, RIGHTWARE, siili_auto, CANATU, vayyar, ALPSALPINE, Henkel, immersion, cerence, CARMEN, DIGILENS, HYUNDAI MOBIS, MAGNETI MARELLI, faurecia, 旭阳集团 XUYANG GROUP, Bentley, Apple, Gauzy

Impact on vehicle cockpit due to COVID-19

COVID-19 seems to be bringing opportunities for players in the sector of health monitoring

Health Monitoring is becoming an area of interest in this pandemic considering the need of passengers and drivers to be screened while driving. Players are using different sensor technologies to deploy contactless health monitoring in vehicles

- **UVeye** has developed contact-free inspection systems equipped with **infrared thermal sensors** that can detect passengers and drivers with potential coronavirus fever through the windshield. Infrared thermal sensors can read the body temperature of occupants, helping to flag possible COVID-19 carriers
- **Vayyar** announced that its **4D imaging sensors** will be used by Israeli government to fight the spread of COVID-19. Vayyar's intelligent sensors provide touch less, remote and confidential monitoring to detect and monitor vital signs that can indicate early-stage COVID-19 symptoms

These systems may be essential in ride hailing services, public transport wherein contactless health monitoring of different people is important. In passenger cars this domain was always of an interest so having high acceptability is expected

- In early March, the Federal Motor Carrier Safety Administration loosened restrictions on drivers hauling emergency loads such as medical and sanitary supplies, lifting an 11-hour-a-day cap on drive time
- While drivers are still entitled a minimum of 10 hours off, the rule change could lead to more fatigued drivers on the road. Also during the current pandemic period, extra hours are spent on the road by essential workers which means drowsiness is likely to become more common, therefore identifying and preventing driver distraction and drowsiness is especially very important
- Eyesight announced that its driver monitoring software can now detect whether drivers are distracted or feeling drowsy, even if they are wearing a face mask. The system uses infrared sensors and cameras to detect facial expressions in situations where minimal light is available.

While COVID-19 seems to be creating disruptions, there is a possibility that wearing a medical mask may be a reality for short span of time. This update seems to be create a demand for short span of time as we don't expect drivers to wear mask all the time

Players have developed a solutions focusing on improvement of cockpit environment

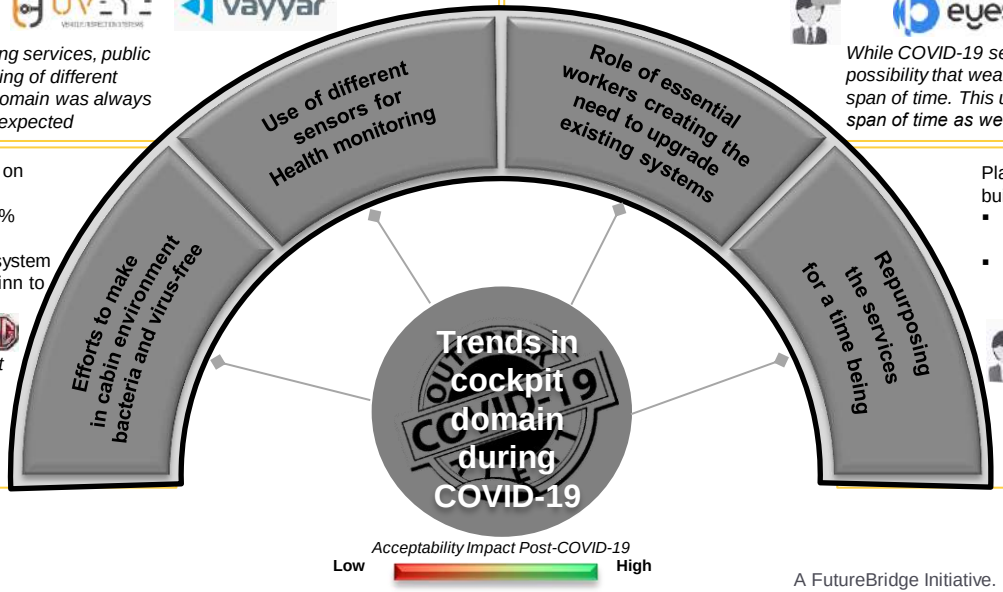
- Seoul and SETi claims of achieving 99.9% sterilization of coronavirus
- Geely has come up with an air filtration system
- MG Motor India joined hands with Medklinn to explore its cabin sterilization

These solutions seems to be already present and deployed in the market. Considering the situation, players are trying to increase the sales for their existing products considering the outbreak which can serve a purpose of safety and well being at the same time

Players are seen repurposing the car parts and building ventilators and emergency respirators

- Ford repurposed seat ventilation systems and build emergency respirators
- Tesla making ventilator with HVAC parts

Players are seen deploying these solutions in the epidemic so as to help and it will not be a universally accepted solution for players to be used after this situation



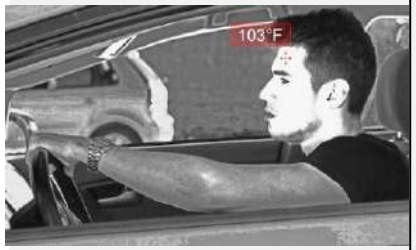
COVID's impact on Cockpit

Cockpit

Thermal sensors for health monitoring

4D imaging sensors for health monitoring

UVEYE



Vehicle inspection system upgraded with passenger health monitoring system

UVeye's thermal sensor to detect passengers and drivers with Covid-19 fever ≫

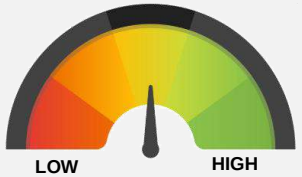
Detects vehicle **occupant's temperature** (potential **COVID** symptom) along with mechanical flaws in vehicles

Uses **infrared thermal sensors** that work by measuring the infrared energy emitted from the body that is equal to the **temperature**

Accurate within **0.3 degrees Celsius**

The stations equipped with infrared thermal imaging sensors can be used by **rental car agencies, fleet, etc.**

Technology Impact Post-COVID



- **Contactless health monitoring** is a viable segment with many players working for the development of systems that are capable of monitoring various vital parameters
- For the time COVID is around, this seems to be a **good move** from the company, adapting according to the whole situation
- The system can speed up the process of identifying infected people in other domains but considering the competition in mobility industry wherein players like Philips, SMK-Caaresys are already seen innovating in terms of contactless health monitoring inside the cabin, this system which claims to detect the fever from outside the vehicle and can be operated from a dedicated station seems to lag in the competition post-outbreak

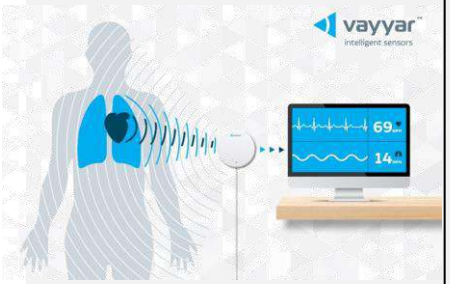
COVID's impact on Cockpit

Cockpit

Thermal sensors for health monitoring

4D imaging sensors for health monitoring

vayyar™



- Vayyar announced that its 4D radar imaging technology will be used by Israeli government to fight the spread of COVID-19
- Vayyar's intelligent sensors provide touchless, remote and confidential monitoring to detect and monitor vital signs that can indicate early-stage COVID-19 symptoms

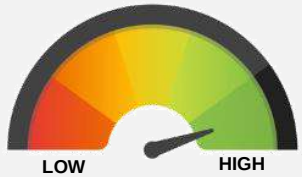
Israeli Government partners with Vayyar to combat COVID-19 symptoms using touch-less sensors ≫

Vayyar's intelligent sensors provide **touchless**, remote and confidential **monitoring** to detect and monitor vital signs including **pulse**, **heart rate** variability and **respiratory rate**, are all measured remotely, without the need for touch

Vayyar uses **4D radar imaging sensors** that are used to recreate 4D images in real time and sense the vital signs of the person without making any contact

The sensors are unaffected by **line-of-sight**, **lighting** or **weather conditions** and since they do not use cameras, personal privacy is always protected.

Technology Impact Post-COVID



- This system is expected to have a high impact and maybe potentially adopted post-COVID with the increased deployment of health monitoring systems in vehicles
- Valeo has already partnered with Vayyar to implement its technology in automotive vehicles
- Such contactless sensors that provide information may be essential in ride-hailing services, public transport wherein contactless health monitoring of different people is important
- In passenger cars this domain was always of interest so having high acceptability is expected and thus we can expect this system to have a high impact during and post COVID outbreak to monitor the health of people

Product launches in smart surfaces domain

Henkel's focus seems to be printed electronics whereas the Finnish ecosystem consisting is directed mainly on driver distraction reduction using smart surfaces in vehicles

1-April-2020

Henkel's new product for smart surfaces in vehicles

- Henkel developed stretchable Loctite ECI 7007 conductive carbon-ink which can be processed into the surface of an automotive interior
- It makes the integration of motion sensors, heating or charging devices directly via the smart surface
- The stretchable Loctite conductive inks can be thermoformed matching the requirements of in-molded electronics, which are processed in automotive interiors
- With this technology, automotive dashboards without buttons are possible with the integration of functionalities like controlling temperature or infotainment via the smart surface

Analyst Comment

- Printed electronics seems to create an impact on the mobility sector which is rapidly innovating to become more digital and intuitive
- The printed electronics for smart surface use will gain prominence as electronic components become more cost-efficient and processable in huge quantities
- With functional ink being an integral part for printed electronics, Henkel may benefit from this development

7-April-2020

Finnish automotive ecosystem launches Origo steering wheel concept

- The Origo Steering Wheel concept is developed by Canatu, Siili Auto, Rightware and TactoTek, where each player is bringing its technological expertise
- The concept is designed to improve safety by reducing the driver distraction with touch-based intuitive controls adapted from mobile device user experiences

Analyst Comment

- The Origo smart steering wheel concept brings mobile device user experience to driving, enhancing safety, design and usability. Further it aims to provide an integrated steering wheel which will be fully transparent and will have 3-dimensional thumb controls to avoid driver distraction with various user interaction models for enhancing safety on the road
- After regulatory mandates, many players are mostly seen developing systems that detect the signs of distraction in vehicles. But concepts like this that mitigate distraction from happening is what is needed in the growing era of advanced HMI in cabins rather than just monitoring its occurrence
- Many other players have been active in integrating touch interface to steering wheels like Tesla, Hyundai and JLR
- It will be crucial for players to think if these integrated functionalities in steering wheel disappear for L4 and L5 scenarios where vehicles will come without steering wheel

Collaborations in smart surfaces domain

Alps Alpine is collaborating with different players working in smart surface arena. The company is seen progressing towards providing enhanced user experience by collaborations

28-April-2020

Alps Alpine, TactoTek deliver in-mould electronics HMI solution >>

ALPSALPINE ⟷ TACTOTEK

- TactoTek and Alps Alpine collaborated to develop an IMSE HMI solution which includes printed electronics for circuitry, seven digital touch buttons, one slider as well as seven LEDs for backlighting controls, all of which are encapsulated within the 3D injection-molded structure

Analyst Comment

- The collaborative technology could provide light-weighting and space-saving in a single-piece design which will be used by the German OEM to meet its HMI requirements
- Companies involved in this collaboration aims to deliver a solution that has the potential to attract larger OEMs and will be used in many application areas in the future
- One of the companies in this collaboration, Tactotek is seen advancing in this area, by collaborating with other players like Kyocera, Lightworks and Canatu-Sili Auto-Rightware for bringing combined expertise of its IMSE technology and building a solution for different use cases for automotive interiors
- Read in-depth profiling and technology description of Tactotek in our H2 2019 Deep Dive

23-April-2020

Alps Alpine to use Immersion's 'Active Sensing' technology >>

ALPSALPINE ⟷ immersion

- Immersion has signed a licensing agreement with Japanese supplier Alps Alpine for the use of Immersion's Active Sensing technology in Alpine's touch feedback devices
- Alps Alpine will leverage Immersion's advanced technology to provide realistic touch feedback solutions to automotive HMI applications for buttons, dials, switches, and textures in suspended touch displays and surfaces

Analyst Comment

- Through a closer relationship with Immersion, Alps Alpine seeks crucial progress on improving the user experience of next-generation automobiles and new types of services characterized by the CASE domains – connected cars, autonomous driving, sharing and services, and electric vehicles – and Mobility-as-a-Service (MaaS). The move will also spur further expansion of a product line-up born from synergies generated by business integration
- Under the new joint collaboration agreement on product creation relating to HAPTIC™ technology, the two companies will work together to innovate products delivering enhanced operability and diversity by fusing Alps Alpine's HMI technology in areas including touch input, illumination, graphics and sound with Immersion's advanced software and control algorithms and other expertise

Investments activities in April 2020

This months investment was focused on HUDs and Smart Glass domain. Gauzy used the investment to expand its product reach whereas Digilens increased investment to enable head worn XR products at consumer price points

23-April-2020

Gauzy gets funds from Hyundai Motor to expand product reach ≫

- Gauzy has raised a Series C financing round of $10 million from Hyundai Motor Company, Blue Red partners VC, and Avery Dennison
- This investment allows Gauzy to develop and lead the active light control technology market
- With continued advancement in product development and of resources for high volume production, LCG® technology and active glazing is more accessible for serial implementation by industrial players

Analyst Comment

- Gauzy has been collaborating with companies to integrate Gauzy's LCG (light control glass) technologies, including SPD (suspended particle device) and LC (Liquid Crystal), into the serial production of various type of products which allowed for dynamic and user-controlled light control
- SPD provides the light control solution whereas LC technologies are used for privacy, solar reflection, and displays that turn transparent for smart mobility solutions
- In February 2019, Gauzy announced a strategic investment in Research Frontiers and its plans to develop and manufacture SPD

20-April-2020

Digilens receives increased investment from Samsung ≫

- DigiLens announced that Samsung Venture has increased its investment
- Samsung Ventures first invested in DigiLens' Series C round and has again invested through a convertible debt instrument
- DigiLens develops waveguide displays and laser waveguide-based light engines that provide a cost effective and scalable solution for mass production of high-quality XR waveguide displays
- This added investment will help to solidify DigiLens' position as an industry leader whose technology will enable head worn XR products at a consumer price point

Analyst Comment

- The company states that optics are by far the hardest element when it comes to packaging them at an affordable price point and sleek form factor that will attract mass adoption
- In May 2019 Digilens received $50M to expand holographic wavelength displays
- DigiLens has competition in TruLife Optics, WaveOptics, and Colorado-based Akonia Holographics
- For its part, WaveOptics raised $26 million last December to gear up for the launch of its low-cost AR hardware product lineup

Technology Development activities in April 2020

Players are converging on technologies that would assist for convenient driving along with safety for vehicle cabin and thus developing in the field of voice control and smart glass

1-April-2020

Carmen developed personal AI vehicle assistant >>

- Carmen is an Artificial Intelligence (AI) cloud software platform, designed to revolutionize automotive aftersales
- Carmen highlight includes Online AI Scheduler and in-store scheduler for service advisors and BDC enhanced with recalls, declined service, loaners, rideshare, pick-up & delivery, and OEM recommended services
- It is also fully integrated with CDK and DealerTrack, more DMS integrations

Analyst Comment

- Alexa, Google Assistant, Carplay and others are rapidly integrating into new vehicles and adding new features like the ability to pay for gas,etc. by voice as demonstrated in our H1 2019 Deep Dive - HMI
- We have seen many advancements in the voice control technology as a growing trend wherein players were seen incorporating monitoring features and increasing the reliability of speech recognition. Read more in our Q4 2019 Pulse-HMI
- In the future different voice assistants will serve as a specialist for different tasks
- Carmen product seems to be designed to replace the processes in the automobile industry with touchless digital alternatives which will be an area of interest in the upcoming autonomous future

27-April-2020

Apple patents adjustable tinted windows for future cars >>

- Apple has got a patent grant titled "adjustable window systems" that controls its their darkness and opacity based on the requirements. The company is studying the composition of windows that could be adjusted to help protect passenger privacy or change the shade of protection in bright environments

Analyst Comment

- Vehicles are fitted with tinted glass for use as windows or rear shields to reduce the amount of light inside the cabin, to improve passenger comfort. These glasses utilize switchable films made from Electrochromic, SPD (tints for shade), and PDLC (privacy, solar control)
- According to Apple, the system could work on its own as the system collects data, and sensors adjust tint, haze, and other elements automatically
- It is using cholesteric liquid crystal technology that could help to provide a clear outward view as well as an opaque inward view to enhance passenger privacy
- Players are continuously researching on vehicle window tinting technology. Honda has patented a technology that could change the window glass clarity using electric current, which applies touch-sensitive models to darken or brighten it.
- 3M has developed a patented technology for producing window film
- Research Frontiers is specializing in SPD-SmartGlass, electronically tintable window technology for vehicles. Gauzy is also providing LCG® (light control glass), switchable glass or privacy glass for automotive applications

Product Development activities in April 2020

Hyundai Mobis has secured the mass-production of core infotainment technologies that include the head-up display (HUD) and Faurecia seems to be building a strong footprint in the Chinese market

6-April-2020

Hyundai Mobis is developing 24-inch or larger Head-up Display

- Hyundai Mobis is developing a 24-inch or larger head-up display (HUD), which is more than twice the size of a 12-inch one that was first applied to the Genesis brand's first SUV GV80
- The largest HUD that Hyundai Mobis is currently mass-producing is a 12-inch product, which was used for the GV80 released in January 2020
- When linked to an advanced driver assistance system (ADAS), it allows drivers to see the driving flow of nearby vehicles at a glance
- The wide-screen windshield HUD under development will be more than twice as large as the HUD for the GV80. If mass production starts after development, Hyundai Mobis's HUD lineup will range from a sub-10-inch product to a 24-inch or larger one

Analyst Comment

- The global HUD market has been dominated by multinational auto parts companies such as Continental, Denso, and Nippon Seiki
- In 2015, Hyundai Mobis became one of the few Korean companies to develop windshield-HUD technology. Then after performing precise quality validation processes covering performance demonstration and actual car testing, the company finally announced its mass-production to develop solutions that allow drivers to enjoy a differentiated experience in the vehicle. The company further has an opportunity to sell its HUD products to other carmakers

27-April-2020

Faurecia forms JV with Changchun Xuyang to develop display products

- Faurecia has formed a new JV with Changchun Xuyang for production, assembly, and sales of automotive display products to OEMs in China
- The French supplier will have controlling stake in the JV
- Faurecia and Xuyang will be engaged in the production, assembly and sales of automotive display products

Analyst Comment

- Faurecia has already collaborated with Xuyang Group on Seating and Interiors as well as in R&D along with the University of Jilin
- This JV will broaden and regroup company's expertise for its Cockpit of the Future strategy and accelerate its deployment for the Chinese market
- In recent years, Faurecia has accelerated its strategic transformation through the creation of its fourth Business Group, Faurecia Clarion Electronics
- This latest partnership will strengthen its position in the automotive market in China

Other Development in April 2020

Magneti Marelli was recognized by an award for its technology in 3D displays domain whereas Bentley was seen providing occupants in the vehicle to operate convenience functionalities

28-April-2020

Magneti Marelli named 2020 PACEpilot Award honoree ≫

- Magneti Marelli was recognized as a 2020 PACEpilot award honoree for its “Glasses-Free” 3D display technology
- Marelli developed an “auto-stereoscopic” 3D screen technology (AS3D) that can be utilized in vehicle dashboard displays to simulate a 3D view of important driver information without the use of 3D glasses

Analyst Comment

- As vehicles become more complex and loaded with technology, automakers are working to develop displays and vehicle control systems that are simpler and more intuitive to use, thereby reducing driver distraction
- Marelli's 3D display technology uses a specially designed lenticular lens that's laminated over a conventional instrumental panel display. The thin lenticular lens overlay, which consists of an array of tiny magnifying lenses, produces the 3D effect
- Marelli developed its AS3D technology in partnership with Alioscopy. AS3D enables a 3D effect without the use of glasses and allows to "perceive" depth through the naked eye using a special overlay
- In the past we have seen players like Bosch working on technology that provides 3D effect without the need of wearing any glasses

27-April-2020

Bentley to gives increased control to rear seat occupants ≫

- The Bentley Flying Spur’s multi-functional Touch Screen Remote (TSR) lets rear seat occupants increased control over the car’s range of features
- The remote, which sits atop the rear centre console, held in place by integrated magnets, deploys at the touch of a button
- The TSR lets passengers configure their 14-way adjustable backrest and cushion, control six-setting seat heating and ventilation, five massage functions and armrest heating from a single screen
- It grants passengers full control of air conditioning functions individually for both sides of the rear passenger compartment, including fan speed, temperature, air distribution and ionisers
- Cabin lighting can be controlled either by day or by night. It also lets the rear passengers see current speed, journey information, and outside temperature among others.

Analyst Comment

- As we progress towards the autonomous future wherein drivers will also become a passenger giving the control to functionalities to the occupants is what we see coming shortly

SPOTLIGHT cerence

Cerence proceeding to be most sought out players in voice control technology

Cerence's recently announced offerings

11-Dec-19
Cerence introduces 'Cerence Drive' voice assistant platform with active voice recognition and assistant activation

30-Dec-19
Cerence introduced My Car, My Voice, which lets people create custom voices for their in-car assistants

18-Feb-20
Cerence introduced Cognitive Arbitrator that can enable the use of multiple voice assistants

10-Mar-20
Cerence introduced Cerence UX service to provide deep analysis of in-car user experience and driver satisfaction to automakers

OEMs deploying Cerence's products

12-Mar-20
Geely to use Cerence ARK platform to build AI voice assistants for Geely motor vehicles

18-Mar-20
Fiat Chrysler announced that it will use Cerence Voice Recognition technology in all vehicles

8-Apr-20
Cerence announced that Bean Tech will deploy Cerence ARK to build AI-powered assistants

Cerence's collaboration with other players

14-Jan-20
LG collaborated with Cerence to develop a software solution with Cerence's AI Reference Kit

24-Feb-20
Cerence partnered with HERE to bring AI-powered voice access to maps & navigation

- Alexa, Google Assistant, Carplay and others are rapidly integrating into new vehicles and adding new features like the ability to pay for gas,etc. by voice as demonstrated in our H1 2019 Deep Dive - HMI. We have seen many advancements in the voice control technology as a growing trend wherein players were seen incorporating monitoring features and increasing the reliability of speech recognition. Read more in our Q4 2019 Pulse-HMI
- Cerence is developing new technologies and has recently introduced many offerings which shows that it want to create its footprint in voice control technology. By developing different offerings like, the company is trying to get edge over its competitors. It s also constantly upgrading its products by collaborating with different suppliers and thus OEMs were seen taking an interest towards deploying Cerence's technology in their vehicle

North America
55 Madison Ave, Suite 400
Morristown, NJ 07960
USA
T: +1 212 835 1590

Europe
328-334 Graadt van Roggenweg
4th Floor, Utrecht, 3531 AH
Netherlands
T: +31 30 298 2108

United Kingdom
5 Chancery Lane
London EC4A 1BL
United Kingdom
T: +44 207 406 7548

Asia Pacific
Millennium Business Park
Sector 3, Building # 4, Mahape
Navi Mumbai 400 710
India
T: +91 22 6772 5700