MOBILITY INDUSTRY INSIDER

Bulletin – JUNE 2020

Human Machine Interface

Major developments, Spotlight and Research Highlights

What's inside ?

- Major developments in Human Machine Interface in June 2020
- Spotlight on: Suppliers collaborate for GM Cadillac 2021's 38-inch curved OLED display
- Research highlight : User interface for in-vehicle systems

FutureBridge

THEMES AND KEY TAKEAWAYS IN Bulletin

01 **Major developments in Human Machine Interface**

02 **Spotlight: Suppliers collaborate for GM Cadillac 2021's 38-inch curved OLED display**

03 **Research highlight for the month: User interface for in-vehicle systems**

Contents covered in this Bulletin	Key Takeaways
Major developments in Human Machine Interface ▪ Collaborations for Voice Control Technology	▪ Renault-Nissan-Mitsubishi's Innovation Lab collaborated with Kardome to solve the issue of speech recognition in car and reduce the noise. Ford collaborated with Cerence for conversational and enhanced AI user experience
▪ Technology developments in information display units	▪ Samsung patents its wearable Augmented Reality (AR) glasses that can provide directions. Mercedes Benz introduced a new feature that allows occupant to find and navigate to nearest COVID-19 test center
▪ Cerence further strengthening its hold in Voice control technology	▪ Cerence announced its debt financing funding round and expects to realize significant interest savings as a result of the successful completion of its debt refinancing on the other hand it developed a web based platform facilitating OEMs to develop custom voice domain
▪ Technology Development in in-vehicle infotainment system	▪ Toshiba developed display interface IC to eliminate the challenge of incompatibilities between interface standards. Skoda Octavia deployed with third generation IVI system with interactive functionalities like voice, touch and gesture control for improved safety and convenience
▪ Technology Developments in compact hardware for smart materials and automotive navigation	▪ Bosch developed a MEMS sensor for navigation system and Microchip introduced a compact touch controller for smart surfaces in vehicles

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THEMES AND KEY TAKEAWAYS IN Bulletin

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02 **Spotlight: Suppliers collaborate for GM Cadillac 2021's 38-inch curved OLED display**

03 **Research highlight for the month: User interface for in-vehicle systems**

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Spotlight on: Suppliers collaborate for GM Cadillac 2021's 38-inch curved OLED display	▪ Spotlight on Rightware and LG's collaboration to supply their technologies in 2021 Cadillac's 38-inch curved display
Research highlight for the month ▪ User interface for in-vehicle systems with on-wheel finger spreading gestures and head-up displays	▪ Researchers studying the effect of IVI on distraction and propose the system to reduce driver distraction and increase the response time in hazardous situation

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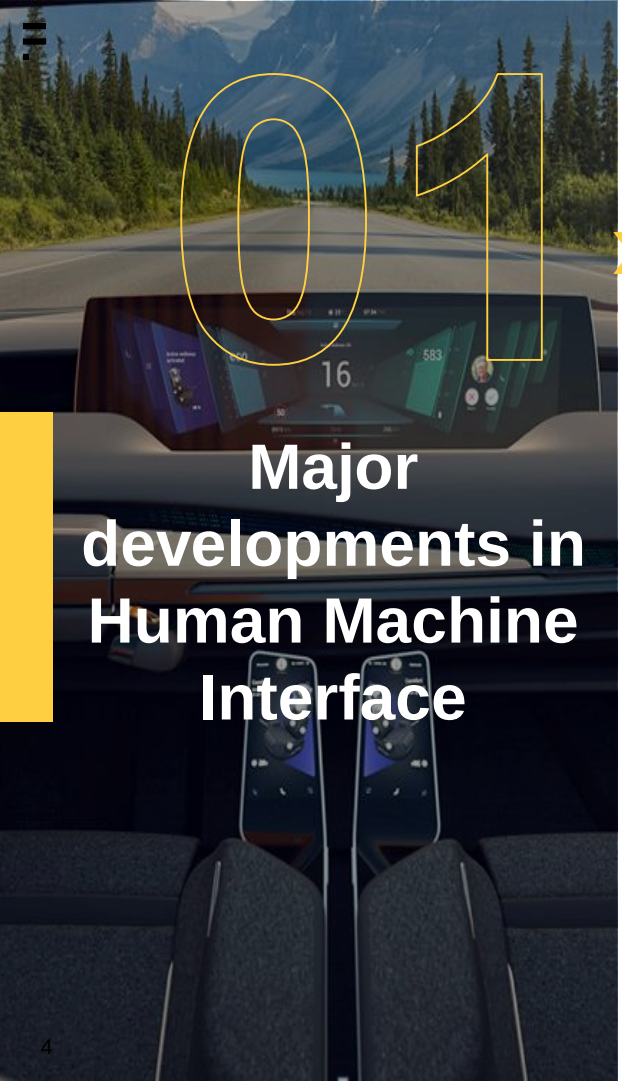

01

Major developments in Human Machine Interface

Major Developments

RENAULT NISSAN MITSUBISHI ⟷ Kardome

Ford ⟷ cerence

Mercedes-Benz

SAMSUNG

TOSHIBA

ŠKODA

MICROCHIP

BOSCH

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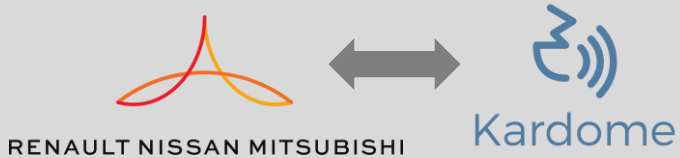
Collaborations for Voice Control Technology

Renault-Nissan-Mitsubishi's Innovation Lab collaborated with Kardome to solve the issue of speech recognition in car and reduce the noise. Ford collaborated with Cerence for conversational and enhanced AI user experience

2-June-2020

Israeli startup, Kardome partners with Renault-Nissan-Mitsubishi's Innovation Lab to test smart audio solution >>



- Kardome has entered an agreement with Renault-Nissan-Mitsubishi's Innovation Lab to evaluate Kardome's smart audio solutions for automotive applications
- The collaboration will leverage Kardome's generic speech recognition and noise reduction technology to solve the frequent issue of speech recognition in the car

Analyst Comment

- Kardome uses technology that focuses the microphone array on the location of the desired source rather than towards the direction of the source. By doing so, both the direct path and the multipath are captured by the microphone array
- The company focuses on the Signal to Interference plus Noise Ratio (SINR) improvement module comprising an acoustic echo canceler, beamformer, and post-filter thus increasing the performance of voice user interface
- A start-up, HiAuto has also developed an approach to mitigate the challenge of poor recognition rate in a noisy setting. Their solution uses a camera along with a microphone that tracks the speaker's lips

2-June-2020

Cerence to power Ford SYNC 4 infotainment system with conversational AI and voice recognition >>

- Ford has selected Cerence Drive to deliver advanced, conversational artificial intelligence (AI), and voice recognition to the Ford SYNC 4 system
- Leveraging Cerence Drive products, Ford's next-generation infotainment system will deliver enhanced AI-powered technologies, as well as embedded and connected services to create conversational and safer driving experience for Ford drivers

Analyst Comment

- Cerence's work with Ford began in 2005 in the early days of voice-enabled phone dialling, later evolving to the development of the first-of-its-kind Ford SYNC platform
- Cerence Drive utilizes speech recognition, natural language understanding (NLU), text-to-speech (TTS), and speech signal enhancement to create a conversational automotive assistant for Audi that listens, understands, and responds to drivers
- Recently Audi has also collaborated with Cerence to implement its Cerence Drive for more personal tone with in car assistant. The assistant will collaborate with and ask questions, navigate commands and queries with multiple steps

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Technology developments in information display units

Samsung patents its wearable Augmented Reality (AR) glasses that can provide directions. Mercedes Benz introduced a new feature that allows occupant to find and navigate to nearest COVID-19 test center

4-June-2020

Samsung patents AR glass that provides turn-by-turn navigation >>

SAMSUNG

- The U.S Patent and Trademark Office published a patent application received from Samsung for Augmented Reality (AR) glasses
- The Samsung AR glasses assist drivers in road navigation and will work in sync with a map app
- It uses a camera on the glasses to assist drivers in reading the road and will also provide them with realtime directions
- The AR glasses may also be controlled by the vehicle which have embedded AR support built in them

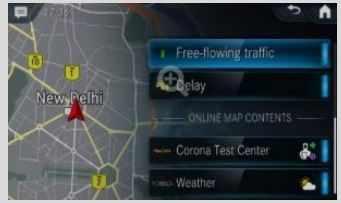
Analyst Comment

- The glasses seem to work like Head up displays that are used to project navigation and other information on windshield only the difference here is that the information is sent to a pair of virtual reality glasses
- As we progress where the whole windshield can be used to project information in drivers line of sight, this system seems to be critical in this case as it can be made possible using only a pair of glasses
- This seems to be an interesting innovation but, considering the competition that is available such as WayRay which uses AR and VR technology for HUDs without even having the need to wear any device, we expect this glasses not make a huge impact on the technology considering it is a wearable device

29-June-2020

MBUX to show COVID-19 testing centres in the head units >>

Mercedes-Benz



- Mercedes-Benz Research and Development India has equipped the third-gen of the new GLS launched recently with the MBUX multimedia infotainment system
- The infotainment system will allow the drivers to access details of/or navigate them to the nearest COVID-19 testing center when needed
- With this feature, the vehicle owners can request the COVID-19 testing center related information using voice commands and gestures

Analyst Comment

- All Mercedes-Benz cars sold in India with an integrated MBUX infotainment system will come with corona test center locations
- The company has collaborated with MapmyIndia, who already provides this feature on its platform, along with giving real-time updates related to COVID-19
- The recently launched third-generation Mercedes-Benz GLS has been updated with this feature, and other models equipped with the 12.3-inch MBUX infotainment system like the GLC, GLC Coupe will be updated in due course.
- We expect that the mapping and location intelligence features provide a means of convenience for occupants
- This feature seems to be critical for now, but eventually, it seems to fade in the coming years.

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Cerence further strengthening its hold in Voice control technology (1/2)

Cerence announced its debt financing funding round and expects to realize significant interest savings as a result of the successful completion of its debt refinancing on the other hand it developed a web based platform facilitating OEMs to develop custom voice domain

15-June-2020

Cerence announced completion of its debt refinancing >>

- Cerence announced that the company has successfully completed the refinancing of its senior secured term loan B and revolving credit facility through a combination of proceeds from the recent sale of $175 million 3% convertible senior notes due 2025 and a new $125 million senior secured term loan A credit facility
- The Company expects to realize significant interest savings as a result of the successful completion of its debt refinancing

Analyst Comment

- The company has been constantly innovating in the field of voice control technology in terms of product launches, collaboration and deployment of its products
- This debt financing reportedly will lead to interest expense savings of the company which it can utilize in product development for its portfolio

10-June-2020

Cerence Studio developed for custom voice-driven AI innovations >>

- Cerence announced Cerence Studio which is a web-based developer platform that allows OEMs and their technology partners to design and develop custom voice domains
- Cerence Studio provides access to Cerence's intuitive natural language understanding (NLU) technology and conversational dialog system to develop custom domains for automotive voice assistants

Analyst Comment

- Cerence Studio provides access to Cerence's intuitive natural language understanding technology (NLU) and advanced conversational dialog system to develop custom domains for automotive assistants
- Cerence is developing new technologies and has recently introduced many offerings which show that it wants to create its footprint in voice control technology. By developing different offerings like Cerence ARK, conversational AI, and Cerence UX service, the company is trying to get the edge over its competitors. It is also constantly upgrading its products by collaborating with different suppliers and thus OEMs were seen taking interest in deploying Cerence's technology in their vehicle

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Cerence further strengthening its hold in Voice control technology (2/2)

Cerence was seen 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

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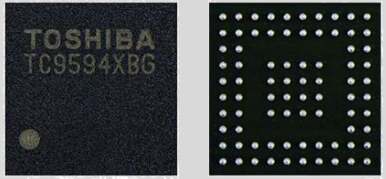
Technology Development in in-vehicle infotainment system (1/2)

Toshiba developed display interface IC to eliminate the challenge of incompatibilities between interface standards. Skoda Octavia deployed with third generation IVI system with interactive functionalities like voice, touch and gesture control for improved safety and convenience

2-June-2020

Toshiba adds automotive display interface bridge ICs for IVI systems >>



- Toshiba Electronics has developed two display interface bridge ICs for automotive in-vehicle infotainment (IVI) systems
- Toshiba has significant experience in developing interface bridge ICs for consumer use
- The new TC9594XBG and TC9595XBG devices add an automotive capability to the line-up, solving interface incompatibility issues, especially in IVI systems.

Analyst Comment

- According to the company the greater complexity and extended functionality of automotive IVI systems has lead to increased number of display panels incorporated into modern vehicles
- IVI systems often includes several different display interface types (like LVDS, etc.). Consequently, some current systems cannot support emerging protocols such as display serial interface (DSI) and embedded DisplayPort (eDP), due to incompatibilities between interface standards
- The company claims to solve this issue with the help of these ICs. It will be crucial to think about the long term benefits of this product as the future outlook of displays looks like the single display will have all the infotainment inculcated in it

19-June-2020

Skoda Octavia gets third-generation infotainment system >>

- The fourth generation Skoda Octavia gets the new-generation infotainment system with a central 10-inch display offers access to vehicle's settings with touch, gesture, as well as voice control and also allows the user to personalize the vehicle cabin settings
- The infotainment system will be available in three types which are Columbus, Swing and Bolero by the end of 2020

Analyst Comment

- The IVI system introduced looks like an integration of interactive features as well as passenger convenience and personalization
- Though the studies suggests that IVI systems increase driver distraction increasing the cognitive load the driver, integrating multimodal interactive inputs like voice, gesture and touch can greatly reduce the effect of distraction on the driver
- Compared to the previous generation, Skoda has tried to improve the operability of the system, as well as its range of functions to provide safety and comfort with the help of same platform

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Other Developments in in-vehicle infotainment system (2/2)

There was an increased traction from players to incorporate and advance the in-vehicle infotainment system in the recent past

The penetration of autonomous vehicles into the market will increase need of the services that can help passengers to spend their spare time into the vehicles.

In-Vehicle-Infotainment being the basic technology, developers are realizing the need and thus collaborating with suppliers for the same.


Collaboration


Deployment






26th May 2020

Continental entered into a strategic partnership with Pioneer Corporation to develop an integrated infotainment solution for a holistic user experience that is specially aimed at the Asian market. Continental integrates Pioneer's entire infotainment subdomain into its high-performance computer for vehicle cockpits as part of the agreement.

26th May 2020

Kia Motors upgraded its fourth-generation Rio with a new 'Phase II' UVO Connect telematics and advanced infotainment system. The Rio features an upgraded touchscreen navigation system, and is one of the first Kia models in Europe to offer the brand's innovative 'Phase II' UVO Connect telematics system, enhancing vehicle connectivity and control

21st May 2020

Visteon has collaborated with VW to develop VW Play, an all-new infotainment system for enhanced in-car connectivity. VW debuts the new infotainment platform in new Nivus SUV for the Brazil market. Offering a 10.1-inch in-plane switching display with 1540x720 screen resolution, the touch-panel optically-bonded product is fitted with a split screen feature that facilitates user personalization and possesses rear view camera capabilities.

19th May 2020

Telenav partnered with Alpine Electronics to develop an easy, low-cost way to quickly upgrade existing in-vehicle infotainment systems. VIVID is an in-vehicle infotainment system brings together entertainment and information services with hybrid navigation and integrated online smart voice assistant. The partnership will also benefit OEMs who want to update their in-market infotainment solutions

11th May 2020

SK Telecom will provide its integrated in-vehicle infotainment service to Volvo cars to be sold in South Korea under a business partnership that would help the mobile carrier expand its mobility ecosystem. SKT said its IVI service would be combined with various services optimized for each vehicle environment such as a car navigation platform and an artificial intelligence platform.

11th May 2020

Audi announced a new Generation 3 infotainment technologies expected to arrive in most 2021 Audi vehicles. MIB 3 (Modular Infotainment Toolkit) will provide customers with a number of new features including SiriusXM with 360L and hybrid digital radio and Function on Demand. For Audi A4 and A5 models with MIB 3 hardware, this will allow customers to purchase in-vehicle navigation for vehicles not optioned with it from the factory.

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Technology Developments in compact hardware for smart materials and automotive navigation

Bosch developed a MEMS sensor for navigation system and Microchip introduced a compact touch controller for smart surfaces in vehicles

8-June-2020

Bosch develops new MEMS sensor for automotive navigation systems >>

- Bosch developed a new MEMS sensor, SMI230 that ensures uninterrupted navigation and helps to depict realistic vehicle movements
- The sensor continuously registers changes in the vehicle's direction and speed, which then evaluates and transmits the information to the navigation system. There, the information is combined with the positional data from the global navigation satellite system (GNSS) and used for navigation
- Bosch semiconductor chips are primarily used as sensors for safety and driver assistance systems, but also in multimedia and connectivity applications

Analyst Comment

- The need to reduce the size of sensors always remains a challenge, when enhancing the quality/performance of the vehicle. Over the period, the technology has advanced and these challenges are taken care of through the use of MEMS (Microelectromechanical systems) integrated systems. MEMS helps in devising microscale sensors with higher accuracy in small size and low cost. In the automotive, there exists a maximum need for installing these sensors and utilizing them to refine the performance characteristics of the vehicles

29-June-2020

Microchip developed small touch controllers for Smart Surfaces >>

- Microchip Technology has now extended its maXTouch portfolio with the inclusion of the new MXT288UD touch controller family
- The MXT288UD-AM and the MXT144UD-AM automotive-grade packaged touch screen controllers offer low power mode, weatherproof operation and glove touch detection in multi-function displays, touchpad and smart surfaces for vehicles, motorcycles, e-bikes and car-sharing services
- The devices enable secondary touch surfaces to be placed in both the interior of cars and exterior of a motor vehicle, such as handlebars, doors, electronic mirrors, control knobs, the steering wheel, between seats or in an armrest.

Analyst Comment

- Automotive OEMs are looking to enhance the user experience through smart surfaces and multi-function displays, while still providing a convenient and distraction free environment according to the company
- Addressing these needs in the market and meeting the demand for compact solutions with increased performance and cost savings, this product may be proved as a reliable solution as secondary touch surfaces can be integrated anywhere in the vehicles interior or exterior. Being compact and low power consuming proves to be a critical parameter while deployment and designing of these systems

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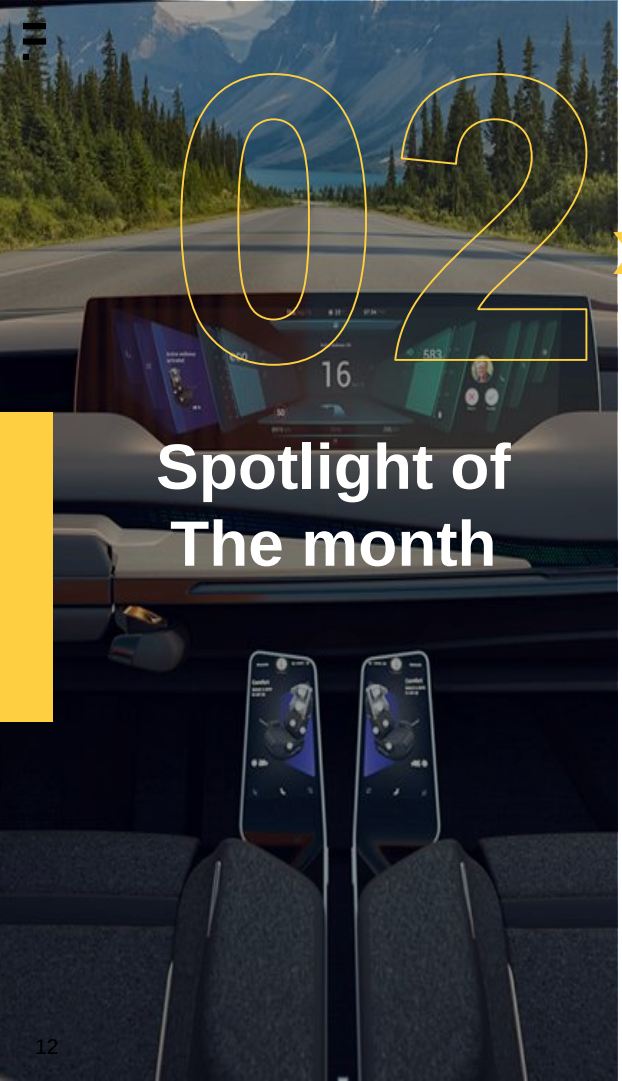

02

Spotlight of The month

Spotlight: Suppliers collaborate for GM Cadillac 2021's 38-inch curved OLED display

RIGHTWARE + LG → GM Cadillac

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SPOTLIGHT

Suppliers collaborate for GM Cadillac 2021's 38-inch curved OLED display

RIGHTWARE + LG → GM / Cadillac

22 Jun 2020

- **Rightware** collaborated with LG Electronics to **power graphics** for the 38-inch OLED display in 2021 Cadillac Escalade >>
- Rightware's designers in Seoul and Detroit worked in partnership with LG Electronics on the **design and implementation** of the Escalade's instrument cluster, control panel, infotainment screen, and head-up display

06 Feb 2020

- **LG supplied its P-OLED** display technology to Cadillac. The 38-inch display is comprised of three separate P-OLED display panels, the largest measuring 16.9 inches diagonally >>
- LG also got **GM Innovator of the year award** for its P-OLED cockpit technology in the 2021 Cadillac Escalade >>

- The combination of the size, curved surface, and OLED technology has Cadillac calling it an **"industry first"**
- Though the SUV with a 38-inch curved screen was scheduled to come in **2021**, the **COVID-19** impact may reportedly force GM to delay the 2021 models

FutureBridge on OLED technology for display panels

- There are some of the advantages in using OLED displays over other flexible display technologies like OLED displays are lighter, thinner, more flexible, and emit brighter colours than other existing display technologies such as LCDs. These displays consume less energy and provide wide viewing angles, thus making them ideal for automotive infotainment applications. This is the reason for that vendors are showcasing the latest automotive OLED displays, which is expected to increase its popularity in the coming years
- Apart from the increasing adoption of OLED displays in the automotive sector, other factors such as the rise in strategic partnerships, and the emergence of QD-OLEDs will have a significant impact on the growth of the organic light-emitting diode (OLED) adoption like the dashboard showcased by Harman and Samsung in Maserati at CES 2018 with OLED and QLED screens
- The challenge of this technology is that the lifetime of OLED decreases rapidly with increasing the brightness and also the manufacturing processes for OLED are expensive

Other players with curved screen technology

Mercedes-Benz

Source

BYTON

Source

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03

Research highlight of the month

MOBILITY INDUSTRY INSIDER

User interface for in-vehicle systems with on-wheel finger spreading gestures and head-up displays

KOOKMIN UNIVERSITY SINCE 1946 · 국민대학교 · KMU

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FutureBridge

User interface for in-vehicle systems with on-wheel finger spreading gestures and head-up displays (1/2) >>

19 Jun 2020, Sang Hun Lee, Se-One Yoon, Kookmin University, Republic of Korea

- Some Human Machine Interfaces in vehicles like central console is known to be distracting for the driver and can result in the delay in danger recognition and response times of the driver and significantly increasing the risk of an accident
- The study developed wheel finger spreading gestures, which enable the driver to keep their hands on the steering wheel
- A HUD to keep driver's eyes on road is used to reduce the driver's distractions and enhance the response time in hazardous road conditions

- The effectiveness of the new interface is verified through human-in-the-loop experiments using a driving simulator
- A total of 32 subjects were recruited to conduct experiments on a driving simulator equipped with the proposed interface under various scenarios
- The proposed user interface is claimed to be about 20% faster in task completion and emergency response than the traditional tactile one

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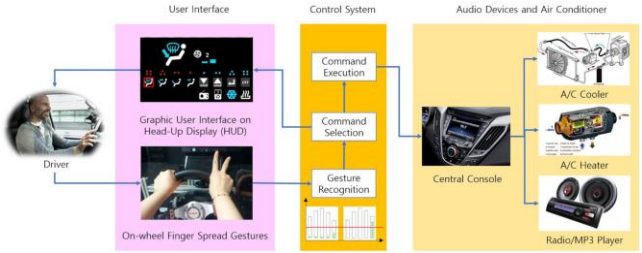
User interface for in-vehicle systems with on-wheel finger spreading gestures and head-up displays (2/2) >>

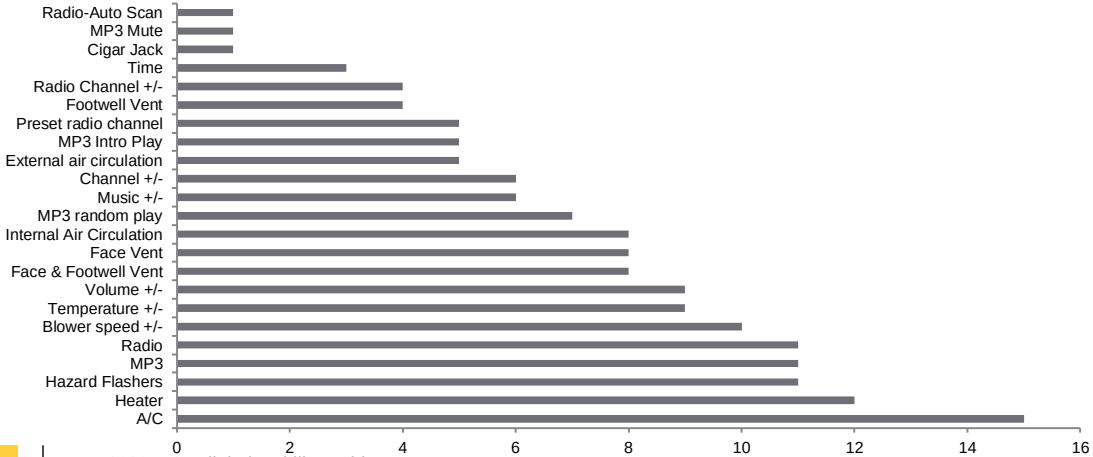
19 Jun 2020, Sang Hun Lee, Se-One Yoon, Kookmin University, Republic of Korea

Overall architecture of the system



Eye and head tracking device

Results of the survey used to determine the most frequently used switches on the central console



FutureBridge Analysis

Relevance to Client	High
Disruptiveness	Medium
Feasibility	High
Timeframe / Maturity	Near Future
Thematic Coverage	Driver Distraction, Human machine interface

Limitations

- The finger gestures have limitations in representing an object and/or an action for a task
- The numbers or kinds of open fingers cannot be intuitively associated with objects and actions
- A visual display is required to compensate for this limitation. In this study, a HUD was chosen over a screen on the central console

Results

- For the performance of the primary task, i.e. driving, the proposed interface yielded a 3% higher speed-keeping rate and a 2% higher lane-keeping rate than the traditional interface
- For the performance of secondary tasks, the proposed interface achieved a 34% faster task completion time than the traditional interface
- Regarding eye movement, the new interface obtained an 8% longer dwell time for the forward field of view and an 8% higher average fixation count
- Based on the questionnaire, the proposed interface obtained a 31% better speed-keeping capability, 64% better lane-keeping capability, 64% better secondary task performance, 57% better setting confirmation capability, and 109% better forward-looking capability compared with the traditional interface

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