

Multi-modal HMI: The future of in-car interaction

By Rachel Boagey

Many of today's drivers can expect to make calls, respond to social networking posts, listen to media and find the nearest hotel – all while driving. However, with this rise in the number of in-car engagement platforms, there is also a rising risk of accidents due to driver distraction. To effectively deal with use case scenarios like these, OEMs and other automotive parties are increasingly deploying complex multi-modal automotive user interfaces which work together to prioritise information and reduce the drivers' workload.

The global human machine interface (HMI) market has seen significant growth in the past few years and is projected to grow at a CAGR of 10.4% from 2013-2019. One company very interested in the HMI market is Tata Elxsi, a subsidiary of the Tata group based in Bangalore, India. The company engineers a multi-modal HMI to provide a more intuitive and natural way for people to operate and control a computer or a machine via the use of voice, touch, gesture, hand-writing and haptic interfaces.

Automotive World spoke to Anil Sondur, Vice President-Transportation Business Unit at Tata Elxsi, on the benefits of multi-modal HMI solutions, which help reduce complexity while focusing on the consumer demand for different interfaces.

“Designing a user interface that is simple, accessible, less

distractive, and affordable presents a key challenge. This comes with providing the same styling of HMI solutions across devices – be it infotainment systems or smartphones – minimise driver distraction,” explained Sondur.

He also explained that the number of electronic features in cars has multiplied a number of times in the last four to five years, all driven by

major developments in the infotainment side and in the consumer electronics side, as well as the telematics and communication side. “Today, having Internet connectivity, navigation, various kinds of services which are being driven through apps on the infotainment system is a standard offering that is coming down from luxury cars and perpetuating into B and even



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Upcoming HMI trends

Sondur explained the developments of voice technology over the years, saying, “There has been a lot of development in voice technology in terms of being able to embed those technologies into interconnected devices, enabling those interconnected devices to be integrated with automotive systems. All these developments have happened in the last couple of years and, therefore, voice is becoming a very important feature of interaction with HMI, of the HMI feature in the vehicle.”

However, he noted that gesture, although not fully developed yet, “is going to be an important feature within the HMI in the next few years.”

Display technology is also a medium where Sondur predicts much development in coming years. “I think improvement in display technology is going to be the number one change and very soon we are going to see display technologies with 3D features and larger display technologies.”

He also noted that an integration between the cluster and the infotainment head unit is imminent, explaining “I think this is one of the major trends on the hardware side, because processing power is improving by the day, display devices are improving by the day, and there is also the possibility of flexible, larger devices with many features. This will also provide an opportunity to build many more features into the vehicle in terms of providing connectivity.”

Changing consumer needs

Despite future plans and trends, Sondur also noted that constantly changing needs of the consumer within the car will require many different advancements to stop the HMI becoming out of date. He said, “The challenge has to be addressed from two perspectives, because as well as addressing consumer needs, an OEM uses its HMI as a way to propagate the brand, meaning the shelf-life of the HMI is as important for the consumer as it is the OEM. The HMI will soon be incorporating upgrades enabling OEMs to maintain a certain look and feel, or a certain set of usage methodology.”

One of the things currently being worked on by Tata Elxsi is creating an independent layer of HMI, which is generally called the abstraction layer, where the HMI can become independent of the rest of the technology or the hardware and software system within the vehicle. “Using this system, an OEM can

independently build on the HMI and control the development of it, maintaining the usability and the ability to learn that HMI quickly when adding new features,” he said.

Indian market

Ensuring its HMI solutions are catering for the Indian market, and other specific markets, was also an important subject explained by Sondur. The group carries out a strong user study as a mandatory activity to address the needs of that particular market. “The way a person in India would interact with any device will be very different from the way a person in any other part of the world would interact with a particular device. Therefore, consumer insight studies, ergonomic studies and observation techniques as to how people use the HMI, are very important,” he said.

Infotainment systems in the Indian market in general are restricted to entry level infotainment systems and uncomplicated HMIs. “Many of them, in fact, might only be in a radio based infotainment system. But slowly that’s changing, and more sophisticated infotainment systems are coming in to the mainstream. Therefore, one of the ways of making sure that we address this market is by building HMIs which comply with the usage patterns of the Indian consumer.”

Regarding the role of the multi-modal HMI in the future, Sondur explained that other functionalities such as look will become a part of interacting with the car. “By model year 2017 you will have many vehicles with fully-fledged voice driven HMIs.” The most important functionalities over the next few years, explained Sondur, will be voice and gesture, which by 2017 will be implemented in most mainstream cars.