Passenger Use Cases may include personalization, navigation entry, augmented navigation, Media Playback and RSE. Opportunities for data sharing and in-car collaboration evolve around hospitality and trip planning, social networking, collaborative entertainment, and distraction offload.
Creating A Dynamic HMI For Next-Gen Device Integration

By: Alan Tran

Integration is always a challenge in a fragmented world. Synchronization of infotainment, communication and professional networking is, however, no longer a trend but a necessity.

The days of having several individual devices for communication, entertainment, information and work are quickly disappearing. Forecasts indicate that in the next four years Smartphones will be our principal device. By 2017 it is estimated globally that there will be 100% more purchases of Smartphones than Desktop PCs and three times as many Smartphones as Tablets.

There are, comparatively, only a handful of Smartphone applications designed for use in cars. The 50 or so Apps cover Navigation/Search, Radio/Music/News, Health alerts, Social networking, Leisure planning and OEM Masterservices. The world of car-enabled apps continues to improve in simplicity, distraction minimization, affordability, and includes related human machine interfaces for in cars. In the last 10 years, Luxoft has been one of the few companies specializing in the development and design of human machine interface systems specifically for the automotive market.

Automotive Industries (AI) asked Vasily Suvorov, VP Technology Strategy at Luxoft, to share his expertise on where the next generation device integration is headed.

Suvorov: Currently there are three options for connectivity: device hosted, hybrid and in-dash. Each of these three options utilizes various platforms. Usually when connectivity is device hosted it is via MirrorLink, AppLink or Luxoft’s iviLink. When we are speaking of hybrid we are talking about Aha radio, Toyota’s entune, as well as systems from Mercedes and BMW. The example of an in-dash option is Chevrolet’s myLink.

Looking at the penetration of car connectivity in the USA we have found that 28% of people have Bluetooth in their primary car, 21% have listened to online radio in the car, but only 6% actually have built-in IVI in their primary car. What we have learned indicates that in-dash performance is not optimal yet. I think that the hybrid model (with apps which run on both head unit and a mobile device) will win eventually, but enabling apps to run on a mobile device first is easier to accomplish and therefore should be a priority. While OEM branding and control must be there, we also need to work on convergence on app connectivity/deployment standards across industry. I’m sure that leveraging open standards will help us actually realize connectivity for mid-tier and entry-level cars.

AI: What are some of the open source standards that are available for in-car connectivity?

Suvorov: In 2012 Luxoft launched its iviLink which allows clients to develop their own products and bring them to market more quickly while reducing costs. iviLink works with iOS, Android, Linux, and QNX. You can read more about iviLink and download SDK at www.iviLink.net. Currently we are merging iviLink with Ford’s SmartDeviceLink, which Ford had contributed to GENIVI Alliance. We are very excited about this opportunity as it helps defragment the market for app developers and converge on a single field-proven technology going forward.

AI: Tell us more about the Genivi Smart Device Connectivity Effort?

Suvorov: There is a CE Connectivity Expert Group that is leading a tremendous effort that should result in market defragmentation by unification of open sourced efforts. The CE Connectivity Group is standardizing specifications for the so-called Smart Device Connectivity Component, a software module enabling head unit connectivity runtime for mobile apps. We are learning from and collaborating with a wide range of technologies including MirrorLink, iviLink, and Livio. These contributions are being made by Luxoft, Jambit, BMW, Livio, and JLR, which all will become part of the Genivi Compliant Statement. As I mentioned before, Ford is contributing the technology behind the SYNC Applink called SmartDeviceLink (SDL). The source code for SDL is being hosted at GENIVI’sgit repository and is open to the entire automotive community.

AI: How do you see the “Use Cases” for in-Vehicle Apps?

Suvorov: You could say that there are three types of driver personas; the novice, the pragmatist and the enthusiast. Each of these types require a certain amount of personalization,
The rate of innovation in connected car HMIs and the pace of its market adoption greatly depends on our ability to work together to define common APIs which will help app developers, OEMs and the rest of the ecosystem, and bring more apps and services to cars while making cars more safe. “

**AI:** What are the concerns over driver distraction?

**Suvorov:** Transportation authorities and vehicle makers are highly concerned over rising driver distraction because of all the new infotainment features. In addition, roads are becoming more complex, which increases distraction. In Europe there is ESoP recommendations for HMI, in the USA there is NHTSA guidelines and in Japan there is already the JAMA regulation; all of which are trying to mitigate the dangers of driver distractions. This is creating a greater necessity for app integration and HMI to be developed in a way that minimizes risk factors.

**AI:** How are risks minimized with Driver Workload Management?

**Suvorov:** The driver’s ability to concentrate on the road can be easily overloaded by various car features and events that compete for his or her attention. It’s important to estimate in real-time how much of the driver’s attention span is available to deal with dynamic information or car features that are non-essential to handling the current road conditions. We can do this by estimating the driver workload through automatically analyzing real-time car sensor data, traffic information and driver behavior. The information is used to adjust the behavior of HMI in such a way as to focus driver’s attention on handling the car. We call this Situational HMI.

**AI:** Can you give some examples?

**Suvorov:** Let’s imagine that you’re driving with your spouse on vacation and using a built-in navigation system with Situational HMI technology. Your spouse has a Smartphone with a Situational HMI app that is connected to the car. In case of the “low workload” the driver would see a detailed navigation screen and the passenger simultaneously sees the detailed POI information as well as other helpful tips, making the drive safe and fun for everyone in the car. As driver workload rises to “medium” level (maybe approaching a complex junction), HMI will automatically simplify the navigation screen for the driver, while adding helpful navigation tips on the passenger’s smartphone. The driver’s attention stays on the road and the passenger is ready to help when required. In case of a “high workload” (bad weather, heavy traffic, etc.), Situational HMI will even further simplify and rearrange the driver’s navigation screen and redirect all distractions such as calls, etc. to the passenger’s smartphone. Hopefully, you can see why we call it a Co-Pilot scenario.

**AI:** What are the next steps in developing these Apps?

**Suvorov:** In order to bring the technology to market, especially the entry-level and mid-tier vehicles, we need to focus on standardizing API’s, interfaces and enabling cooperation of all industry players. I am happy that the GENIVI Alliance is forming a special interest group that is focusing on understanding requirements and defining interfaces for bringing driver workload management estimation algorithms into the head unit environment. This has a high significance for us and we are developing a wide range of reference applications for workload management scenarios.

**AI:** In summary what would say is our greatest call to action in this field?

**Suvorov:** Integrating workload management is helping to unlock the value of multiple screens and the development of human machine interface systems that will minimize safety concerns. At the same time it’s clear that multiple, incompatible connectivity technologies and closed ecosystems are really counterproductive. The rate of innovation in connected car HMIs and the pace of its market adoption greatly depends on our ability to work together to define common APIs which will help app developers, OEMs and the rest of the ecosystem, and bring more apps and services to cars while making cars more safe.
Automotive Software Engineering

- HMI Design and Development
- In-Car Connectivity
- In-Vehicle Infotainment
- Connected Navigation
- Apps Integration

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