Smartphone Ecosystem Begets Smarter Vehicles

Comparing advances in mobile technology and smart cars is like comparing apples and oranges, but automobiles – which have become smartphones on wheels – are becoming "smart cars," made possible by the innovations in mobile technology.

By Kevin Yee and Peter Lefkin

While there's a great deal of excitement over self-driving vehicles and connected cars, drivers are expecting more on a day-to-day basis when they get behind the wheel. The experience they have with their smartphones and tablets is dictating how they evaluate the onboard systems of the cars they drive or plan to purchase. Customers are looking for a similar experience.

To that end, technology used to advance smartphones – and tablets and other devices – is what is allowing the fast evolution of smarter cars, including audio, visual and tactile interfaces such as touchpads to deliver applications such as infotainment systems, assisted-driving systems, built-in GPS, satellite radio menus and even vehicle-to-vehicle communications.

One of the earliest hints of technology jumping from industry to industry which has since become reality is the digital camera and the necessary interfaces to integrate it into a mobile phone. Today, the camera interfaces that connect the camera's sensors to other hardware such as processors and in turn support a variety of smartphone applications can be found in cars. The rear-view camera that makes backing up safer and easier is a perfect example of smartphone camera technology exported to the automotive world.

As mobile has evolved, the ecosystem has grown and expanded. All of the products and companies surrounding mobile chips, peripherals, test equipment and software have spurred a lot of other activity influenced by mobile, the automotive sector being just one example. The investments made in mobile interfaces are benefitting automakers and consumers and the rising Internet of Things market, but just as there are still many frontiers left in mobile technology development, there are plenty of hurdles ahead to build the smart cars drivers are expecting. For example, specifications and standards must address the need for quality and robust interfaces in Automotive. MIPI Alliance is one such organization that is committed to defining and promoting interface specifications for mobile devices and mobile-influenced applications, among other key players.

More Than A Connection

It's important to clarify that we are talking about more than a connected car, as what is connected is really limited to a specific part of the automobile. The connected car revolves around the wireless connectivity and those standards specifically, including vehicle-to-vehicle and vehicle-to-device communication. The smart car encompasses other areas such as infotainment and assisted-driving systems – even body-wearable electronics. The term "smart car" is a more accurate representation of what cars have become and where they are going.

And this smart car segment is growing rapidly, especially in comparison to the more mature PC and mobile device markets. As a newer frontier, so to speak, the automotive tech sector has areas still waiting to be fully exploited, including power train systems, safety systems, infotainment and other after-market opportunities.

Research firm Databeans predicts the automotive semiconductor market will continue to gain share, growing at a compound annual growth rate of 8% over the next five years, with the market expected to reach a high of $28.5 billion in 2015 and hit $40 billion in 2020. This growth is being driven by ever-increasing electronic content incorporated into today's vehicle, which is required to meet the demand for growing technological complexity.

Evidence of this rapidly expanding smart car market can be seen at major trade shows such as the Consumer Electronics Show or Mobile World Congress. A few years ago, the only electronic car-related items on display would be limited to audio systems. Now technology vendors have cars on the show floor so they can demonstrate new and advanced applications leveraging the technology and the user experience derived from the mobile space.

Driving A Little Faster Than the Speed Limit

Comparing the mobile sector with the automotive sector is a bit like comparing apples and oranges. For one thing, the lifecycle of smartphones is about a year, whereas the life cycle of a vehicle is about a decade, so from a technology adoption perspective the consumer device market is a quite different – essentially faster-paced – than the automotive sector.

It's not just about how long people keep their vehicles. The automotive sector has a very long lifecycle in terms of testing reliability and safety that are different than those of mobile such as ISO 26262, AEC-Q100 or even the ASIL requirements. But that being said, because of the maturity of the technology within mobile, what the automotive sector has been able to do is leverage and accelerate the adoption of technology within its own specific automotive requirements and timeline and much quicker than has been done in the past.

Traditionally, it's taken anywhere from 10 to 20 years to get new technology designed into a vehicle, but now we're seeing a faster rate of integration. Cameras are an excellent example. Even more cameras are in development for specific uses in cars such as adaptive cruise control, obstacle detection, driver monitoring, and collision avoidance. The MIPI® Camera Serial Interface (CSI) used in almost all mobile phones today is the same being used in most automobiles today. The rapid pace of development is because the automotive market is reaping the benefits of technology that has already been proven in the mobile market, the maturity in the market and the economies of scale the mobile market has provided.

But beyond the camera technology, this is being extended to the display, audio, sensors and even the wireless connections. The MIPI® DSI℠ display interface used in mobile phones is now migrating to cars in line with the growing desire to have HD resolution screens within an automobile. Additional mobile interfaces such as MIPI® I3C℠ for sensors, MIPI® SoundWire for audio, MIP®I DigRF℠ and MIPI® RFFE℠ for wireless interfaces traditionally used in mobile phones continue to proliferate into more and more automotive infotainment systems and communications systems. At the same time, there are new contenders in the smart car arena outside of the traditional automotive industry, which makes this market even more dynamic.

Ultimately, consumers will drive the pace of smart car evolution. They already see their smartphones as another appendage. It's a natural migration for them to expect those same cameras, touch screens and other applications when they get behind the wheel. Automakers, along with mobile and new technology players on the scene, are in a good position to respond to the market by leveraging innovations such as camera and sensor interface specifications already proven in the mobile industry. As an organization,

MIPI is excited about the proliferation of its specifications into mobile-influenced segments and pleased to be able to provide mature technology to help accelerate and evolve the smart car movement.

Author Bios

Kevin Yee is the Strategic Marketing Director of the IP Group with Cadence Design Systems, Inc. He is responsible for driving worldwide IP enablement for Cadence working with eco-system partners and strategic accounts. Prior to Cadence he held roles as VP of Sales and Marketing in various IP and VIP companies. Having more than 25 years in the semiconductor industry, Kevin has served a variety of senior management roles in R&D engineering, Product planning, Sales, Marketing and Business Development in system, semiconductor, FPGA, IP/VIP and EDA companies. His background includes system/ASIC design, FPGA architecture, IP development and holds several patents on design architecture. Kevin has been involved with industry standards organizations such as PCI-SIG, USB I/F, JEDEC and has been involved with MIPI since 2008.

Peter Lefkin is the Managing Director of the MIPI Alliance since February 2011, having returned to the role after leading the establishment of its operational support structure in 2004. Prior to joining MIPI Alliance in a full-time capacity, Peter served in various roles in support of the IEEE Industry Standards and Technology Organization (IEEE-ISTO) from its inception in January 1999 through February 2012 as one of two founding employees. During this time, Peter also led the formation of the IEEE Conformity Assessment Program (ICAP) in the role of Director to develop conformity assessment programs in support of IEEE Standards. Peter is currently an employee of IEEE in the role of Director, Alliance Services.