

The digital cockpit: Powering the future of mobility

2017-10-30

As the fastest growing segment in automotive, cockpit electronics is defining a new driving experience as vehicles evolve from being connected, to digital and ultimately autonomous. Cockpit electronics is the enabling technology for the enhanced safety, connectivity, information and entertainment features that provide the building blocks for a truly digital experience. Powering this new era of mobility are new centralized computing approaches consolidating previously separate domains in the vehicle cockpit.

[Digitization offers a new view from the cockpit](#)

Instrument clusters, head-up displays, and information and **entertainment systems** with larger and higher resolution displays are all elements of the emerging digital experience for drivers and passengers. The key to making all these digital functions practical is to stop considering them as discrete systems, developed in isolation. Instead, these systems must be viewed as a single canvas – the digital cockpit.

One of the most important aspects of the digital cockpit is its ability not just to support a wide range of embedded functionality but also to enable occupants to bring an increasing amount of digital content into the vehicle from personal devices, or the cloud, via the vehicle's computerized systems. The consumer sector has far outstripped the auto industry in bringing digital technology to market and in constantly updating and upgrading its capabilities. If a device has a display, consumers are conditioned to expect to be able to download information – and automakers are now welcoming this consumer-focused approach in the cockpit.

[The digital cockpit becomes the digital interior](#)

Central to the digital cockpit are larger, brighter, high-resolution displays with more design and graphics capabilities than ever. These displays integrate multiple domains such as driver information, infotainment and head-up displays

and pull a huge amount of content from consumer devices – from the cloud and from vehicle sensors or the road infrastructure – which can be accessed by the driver through one seamless interface.

As assisted and autonomous features free up the driver’s time to engage with the cockpit in new ways, large display surfaces will be a dominant design feature in the vehicle interior and become the primary way occupants interact with the all-digital cockpit.

Increased functionality and design flexibility enable displays to do more with their digital feeds and for automakers to differentiate the user experience. This new generation of digital cockpits benefits greatly from its flexibility in evolving the user experience. Regularly adding new functionality keeps occupants aware and informed during periods of assisted driving, with camera systems, ambient lighting and haptic feedback among the many possibilities to support occupant monitoring, object recognition and autonomous driving.

Transforming the digital cockpit into a computing platform

Addressing the digital cockpit’s increasing impact on processing power, in-vehicle electronics complexity, packaging space and cost, Visteon is building the foundation for an integrated, all-digital vehicle interior with domain controller technology.

SmartCore™ is the first cockpit domain controller using advanced virtualization technology to integrate several cockpit domains on one powerful system-on-chip (SoC). Content fed from multiple domains running on different operating systems can be shown on any connected display in the cockpit.

The SmartCore™ architecture is fully scalable and cybersecured through hardware-enabled virtualization of the different cores and controlled firewalls. This enables independent domains with different levels of functional safety (ASIL) requirements – such as assisted driver systems, driver monitoring and augmented reality – to operate separately and securely.

Using Visteon’s first-to-market virtualization technology, SmartCore™ shares resources like central processing, memory and other system components in a typical SoC setup across the different operating systems, but the solution is also fully capable of integrating any other virtualization technology. Advanced virtualization of the graphics processing unit (GPU) makes it possible for all domains to drive high-definition displays more effectively and enables dynamic sharing of graphics content.

SmartCore™ is the base platform for a new era of centralized computing in the cockpit. It supports the increase in the number, size and resolution of high-end displays with a scalable and modular architecture. It is the first cockpit domain controller that meets the high demand for scalable concepts delivering up to 20 TFLOPs by leveraging multi-core SoC stacks. Additional ECU and software integration will result in further opportunities for cost



reductions for automakers.

To enable faster configuration, integration and time to market, Visteon has created a set of tools for developing and verifying software used in domain controllers. SmartCore™ Studio simplifies cockpit domain configuration for automakers while SmartCore™ Runtime is a scalable middleware solution that enables communication between different domains. It also provides the system HMI to enable sharing of graphical assets on different displays.