Deploy rich, dynamic graphical instrumentation while managing essential safety requirements

Driver information systems are an area of rapid innovation in today’s automotive industry. Electromechanical dials and lamps are being replaced by LCD displays carrying not just the traditional information, but a wealth of new information and opportunities for new functions and interactivity. Driver information, multimedia, navigation, camera/video, device connectivity, and advanced driver assistance systems (ADAS) are being combined into displays that can be dynamically reconfigured to suit the vehicle mode, the circumstances or environment, or driver preference. All this coincides with a growing focus on safety standards such as ISO 26262 to manage the safety implications of increasingly complex vehicle systems and meet more rigorous legal and regulatory requirements.

The Mentor® Automotive Safety Certifiable Digital Instrument Cluster solution provides an integrated package that enables safety-critical driver information to be displayed simultaneously with rich 3D graphics on a single instrument cluster display. OEMs and tier one suppliers can now deploy instrument clusters that deliver best-in-class user experiences while shortening time to production and reducing costs associated to safety standards compliance.

Mixed safety criticality on a single SoC

Today’s driver information system includes a mixture of safety-critical and non-critical information. These designs typically utilize separate processors and separate systems in order to meet the certification requirements. As technology advances and cost pressures mount, the opportunity and motivation exists to combine the safety-critical and non-critical components onto a single System-on-Chip (SoC). The unique low-overhead isolation features in Mentor’s solution enables a safety-critical system to be deployed alongside non-critical systems on a single-core or multicore SoC with maximum resource efficiency. The technology enables safety-critical and non-critical information to be mixed on the same display while maintaining secure separation between the two subsystems.
Mentor’s cluster solution integrates the Nucleus® SafetyCert™ RTOS, which has been engineered for safety certifiability, to meet the stringent requirements of ISO 26262. Nucleus SafetyCert enables a real-time, safety-certified programming environment that includes the Nucleus kernel, the Nucleus process model for space partitioning, runtime libraries, connectivity, networking, and data storage.

Reducing safety certification costs
Using pre-certified components such as the Nucleus SafetyCert RTOS and safety certification costs can be dramatically reduced. Because Mentor’s digital instrument cluster technology leverages a hardware separation mechanism, fewer lines of code in the system are required, which further reduces the cost of safety certification.

Rich user experience
The instrument cluster remains prominently in the field of view of the driver and is increasingly recognized as an important differentiator among automobile manufacturers. A rich user experience with exceptional graphics creates a premium experience and enhances the brand of the vehicle. Mentor’s cluster solution enables the use of either automotive Linux® or the Nucleus® RTOS to deliver the primary graphics experience. Mentor Automotive has partnered with Socionext Inc., to provide a reference integration of their CGI Studio software development platform for rich 3D and 2D graphical interfaces. The mixed safety-criticality capabilities of Mentor’s solution are complemented by the mixed safety-criticality features of the CGI Studio runtime and tooling to deliver an end-to-end solution for separation of safety-critical graphics. Using the Mentor Automotive solution, mixed safety-criticality systems can be deployed in less time without compromising results. The solution is also compatible with other graphical interface frameworks such as Qt®.

Smooth and responsive
One crucially important aspect of graphics quality is performance. Potentially stunning graphics can be reduced to poor graphics by slow or choppy animations. Another important aspect of performance is graphics startup time. Today, the accepted industry minimum automotive instrument cluster graphics performance is 60 Frames-per-Second (FPS), and the typical requirement for system startup including graphics to be fully operational is within 1.5 seconds. Maximizing graphics performance and boot time is a tough challenge requiring careful utilization of multiple specialized hardware devices. Mentor Automotive offers a portfolio of products for graphics performance, including Mentor Embedded Sourcery™ Analyzer for analysis and debug of performance issues.

More about Mentor Automotive
Mentor Automotive provides a leading portfolio of automation design tools and software, built on deep expertise in systems engineering, to help customers solve the most complex design challenges facing the industry. Solutions reside in three key areas for automotive electrical and electronic design: connectivity and networking; in-car experience; and subsystems and technology.