PRODUCT BRIEF

BlackBerry QNX Platform for Instrument Clusters

The QNX Platform for Instrument Clusters was created to help automakers and their Tier 1 suppliers respond to evolving challenges with the development of full digital instrument clusters. BlackBerry QNX ISO 26262 ASIL B pre-certified graphics stack, coupled with the ASIL D pre-certified RTOS and tool chain makes this innovative solution a powerful, customizable, and safety certified option for automakers.

An Overview

The instrument cluster in the car is evolving from the venerable analog versions with mechanical dials to one that is fully digital with spectacular renderings of the same dials in digital form. Digital instrument clusters offer richer functionality and displays versus their analog counterparts. Advancements in silicon and display technologies have transformed the look and feel of instrument clusters in cars.

Instrument clusters have special requirements: 1) They must display vehicle information almost instantaneously with no apparent lag; 2) The information displayed must be accurate and reliable. This is one of the reasons analog clusters have worked so well for years. Digital clusters replacing analog clusters must adhere to the same requirements, which when translated to digital computing parlance includes: 1) The cluster which is run using a system on chip (SOCs) and software must have very fast boot times typically under two seconds to ensure they are alive when the start button is pressed; 2) The combined solution of software on an SOC must have great performance to ensure vehicle information is rendered in real-time on the screen. This includes the requirement that the motion of the needles on the gauges and dials must be smooth, which demands a fast frame rate, more than 45 frames per second (FPS); and 3) The software must be safety certified to ISO 26262 ASIL B or even higher.

The QNX Platform for Instrument Clusters is built upon BlackBerry QNX's RTOS which is safety certified to ISO 26262 and ASIL D. The RTOS hosts a highly optimized OpenGL based graphics framework targeting multiple hardware SOCs and their concomitant graphical processing units (GPUs). The platform includes a graphical monitor to ensure that the icons and labels rendered on the displays matched what are pre-defined in bitmap image files. This is essential because one would not want a P for "Park" to be rendered as an R for "Reverse". The platform supports leading cluster User Interface (UI) frameworks. This integrated platform provides all the necessary features to enable car manufacturers to build digital instrument clusters with stunning visual effects while reducing their time-to-market. Automakers want to convey critical information to the driver while enhancing the look and feel of the cluster for a competitive advantage. The QNX Platform for Instrument Clusters is designed specifically, to help address this requirement.

Version 1.0 of the Platform was introduced in June 2017 and has been adopted for production programs. In comparison, version 2.0 delivers greater flexibility, better performance and support for the x86 64-bit architecture. Instead of specifying the checking criteria for up to 64 symbols on the cluster through a configuration file before start-up, cluster developers can now specify checking criteria within the cluster application, when necessary, for as many symbols as required. The tests used for validating the correctness of the rendering has also been improved to use simpler algorithm and catch the most common rendering failures. QNX Platform for Instrument Clusters 2.0 also delivers the support for animated sequence checking, which is defined as a series of images on the same Graphical Checking Area (GCA) on the display that go through fast transition to represent an animation, such as an animation that shows a door closing.

The Benefits

- Safety certified to reduce development, certification cost, and risk
- High performance graphics framework to power compelling User Interfaces (UI) and User Experience (UX)
- Faster time-to-market through pre-integration with hardware and cluster UI frameworks

Safety Certification: Cost and risk reduction

Traditional analog clusters have safety-grade LEDs that illuminate telltale symbols. In a digital instrument cluster this critical information is often rendered by software. It is critical that this software is safety certified. The automotive industry has requirements that warning lights, signals, gear positions on digital instrument clusters adhere to ISO 26262 ASIL safety standards. The QNX Platform for Instrument Clusters is built upon QNX's Neutrino OS SDP 6.5, which is ISO 26262 ASIL-D certified. This safety certified kernel supports a framework called Screen that includes an ISO 26262 ASIL B graphics solution. The certification for the graphics framework to ISO 26262 ASIL B is performed by one of the world's leading safety auditing bodies, TÜV Rheinland. This software solution has a unique graphics monitor subsystem to validate that the symbols displayed match what was intended. This validation is done with minimal performance impact to the system and can have various tolerance levels specified by the customer. The graphics

monitor subsystem leverages the concept of a "safety bag" (coined by the railways safety standard EN 50128), which offers a simple and elegant method to ensure functional safety in sophisticated systems. The QNX Platform for Instrument Clusters is also delivered with key certification artefacts, such as Hazard and Risk Analysis and the Safety Case, to aid cluster manufacturers in their system-level certification. As described above, this is a comprehensive safety certified platform that is suitable for all digital and hybrid cluster solutions.

High Performance Graphics Framework

To power compelling User Interfaces and User Experiences the QNX Platform for Instrument Clusters has a high-performance graphics framework. As instrument clusters become progressively digital there will be a growing need among automakers to differentiate their offering. Digital displays and renderings offer far more capability, richer content, and visually discriminating renderings which automakers will exploit for a competitive advantage. Drivers will expect rich, vivid displays of information and responsive UIs. The QNX Platform for Instrument Clusters built on top of a hardware accelerated optimized OpenGL based UI framework and supporting popular powerful GPUs allows automakers to realize their vision in differentiation. The platform's graphics subsystem is based on the latest OpenGL standard and is a complete UI framework that interacts with hardware such as GPUs to render, compose, process, and manage various graphical content as well as user input to deliver rich renderings and best-in-class user experience. This framework is deployed in millions of in-vehicle systems with a user interface, such as infotainment systems, instrument clusters, and driver information displays.

Quick Time-To-Market

Time to market and risk to on-time production is a major issue for automakers. By using certified components and pre-integration with hardware and cluster UI frameworks the QNX Platform for Instrument Clusters reduces both risk and time-to-market by shortening development and certification time. A digital instrument cluster integrates hardware (e.g. SOCs and Displays) and software (e.g. board support packages, operating system, graphics framework, cluster UI components, and other software) from multiple suppliers to create the final product. Pre-integration of hardware and software components reduces time for optimization of performance, test, and validation. The QNX Platform for Instrument Clusters pre-integrates popular cluster hardware (SOCs), board support packages, a reliable RTOS, high-performance graphics middleware, and leading cluster UI frameworks from Crank Software, Disti, ElektroBit and Rightware. This level of pre-integration significantly reduces project timelines, risks, and costs for cluster manufacturers.

The Technology
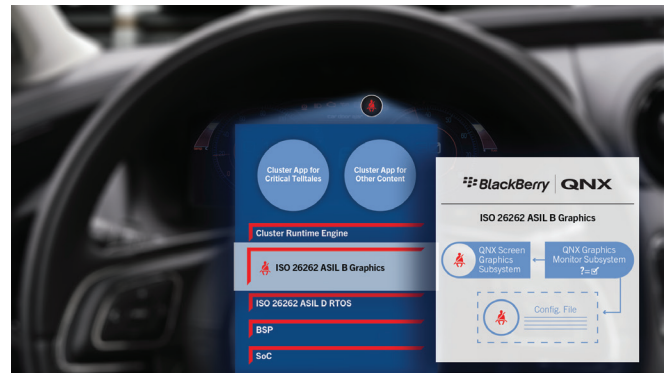
The Product Package

The QNX Platform for Instrument Clusters includes software and documentation.

Software

- QNX Graphics Monitor Subsystem
- Board Support Package for popular cluster hardware
- QNX OpenGL reference cluster (in source)
- Sample cluster applications from leading cluster UI framework vendors (in binary only)

Documentation

- ISO 26262 ASIL B certificate for QNX Graphics for Safety, issued by TÜV Rheinland
- Safety Manual for QNX Graphics for Safety
- Installation and Usage Guide
- Hazard and Risk Analysis for QNX Graphics for Safety
- Safety Case for QNX Graphics for Safety
- Release Notes

The Hardware Support

Version 2.0 of the product includes full support for Intel GordonRidge reference board. The Platform can be adapted to support the customer's chosen hardware through BlackBerry QNX's experienced team of safety professionals and technical support experts.

About BlackBerry QNX

BlackBerry QNX, is a leading supplier of safe, secure, and trusted operating systems, development tools, and professional services for connected embedded systems. Global leaders such as Ford, Audi, Cisco, General Electric, Lockheed Martin, and Siemens depend on BlackBerry QNX technologies for their next generation of secure vehicle software platforms, network routers, medical devices, industrial automation systems, security and defense systems, and other mission and/or life-critical applications. This includes full software lifecycle management via secure over the air software updates. Founded in 1980, BlackBerry QNX is headquartered in Ottawa, Canada, with its products distributed in over 100 countries worldwide.

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