Fujitsu and Visteon Work with Land Rover to Implement New State-of-the-Art “Virtual Image Cluster” for the 2010 Range Rover

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– Philip Hughes
Fujitsu Microelectronics America, Inc.
Introduction

Car manufacturers today use more and more electronics to provide high-performance graphics for in-vehicle systems, such as dashboards, cameras, GPS and multimedia entertainment systems. The result is a more compelling driving experience for consumers and flexible, cost-effective development for automakers.

Graphics Display Controllers (GDCs) are the core drivers of display systems, and therefore play a critical role in this shift from analog to digital systems. But that shift also requires close collaboration among the key development players, especially when dealing with complex systems such as cluster displays.

The recent graphics-display-controller project between Fujitsu Microelectronics America and Visteon Corporation illustrates the power of such collaboration.

The Situation

Land Rover wanted to move from analog clusters to digital ones to create a more compelling driving experience for its customers. Such a transition is technically complex, with both short- and long-term cost and design implications.

Fujitsu and Visteon worked with Land Rover to achieve a state-of-the-art digital cluster. The two companies worked together on Visteon's new “virtual image cluster,” which replaces the conventional instrument cluster for the 2010 Range Rover. This new “virtual cluster” integrates multiple functions and operating modes to present on-demand driver information via virtual gauges, graphical displays and a message center.

The Virtual Image Cluster

Visteon designed-in the MB86R01 “Jade” system-on-chip (SoC) graphics display controller into its new, reconfigurable 12.3-inch full-color Thin Film Transistor (TFT) display.

Using the advanced graphics interface provided by the Fujitsu MB86R01 “Jade” controller, the reconfigurable cluster presents information to the driver in an innovative way, while helping reduce driver distraction. The new display technology provides tremendous flexibility in presenting information to drivers, so that they get precisely the data they require, in all driving conditions.

The cluster redefines the functional role of instrumentation by providing an interface to safely manage the complexity of the Range Rover’s advanced vehicle systems through the reconfigurable message center, which acts as the information hub for the vehicle. (See July 27, 2009, press release: http://www.visteon.com/media/newsroom/2009/090727_story1.html.)
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“We worked closely with Visteon on the new design, which reflects our continuing commitment to deliver the industry’s optimal high-end, high-performance graphics controller technology, and to work closely with our customers to deliver innovative solutions,” said Phil Hughes, senior director and head of the Automotive Business Group, Fujitsu Microelectronics America.

The reconfigurable cluster platform is available as a standard fit on the 10MY Range Rover in Land Rover’s global markets. The Range Rover’s “virtual cluster” is the first production program launched from Visteon’s reconfigurable cluster platform and the latest in its range of clusters with graphic displays. The platform also offers vehicle manufacturers the flexibility to use one hardware solution with multiple graphic applications for easier vehicle differentiation or mid-cycle refresh.

The Fujitsu MB86R01 “Jade” Graphics Display Controller

The new “virtual image cluster” takes advantage of many of the features and capabilities of the Fujitsu MB86R01 “Jade” graphics display controller, including its excellent display resolution, hardware and software scalability, and support for third-party software systems and tools.

This highly integrated SoC processor is designed for high-end, high-volume embedded automotive graphics applications such as on-board and mobile navigation systems, graphical dashboard systems, head-up display (HUD) units and rear-seat entertainment systems.

The MB86R01 integrates the 32-bit ARM926EJ-S™ CPU core with the Fujitsu high-performance graphics display controller, the MB86296, for optimal CPU performance with sophisticated 2D/3D graphics features in a single, compact device.

Built using Fujitsu’s 90nm CMOS process technology, the MB86R01 “Jade” controller incorporates 320MHz internal memory frequency, and display resolutions ranging from 320 x 234 up to 1024 x 768. The GDC also features six layers of overlay window displays, with an alpha plane and constant alpha value for each layer, and two separate video-capture units that support YUV, RGB, ITU656, and other formats.

The MB86R01 incorporates an ETM9 (medium) and JTAG ICE interface, 8-channel DMA and 32-bit timers. The core frequency is 320MHz (generated by the on-chip PLL). On-board peripherals include a unified DDR2 memory supporting 320Mbps (up to 128MB), a parallel flash/SRAM host interface with decryption engine.
parallel ATA, SD-Card, CAN interface, Media LB, and USB 2.0 (host and function). There is also a DAC and ADC, along with I²C and I²S interfaces, PWM, SPI, UART, GPIO, and an external interrupt.

Other important features include bit-blt and texture mapping units (up to 4096 x 4096), alpha bit-blt and ROP2 functions. As with all the Fujitsu GDCs, the new MB86R01 supports built-in alpha blending, anti-aliasing and chroma-keying.

The SoC supports a broad range of third-party RTOS and HMI tools, providing Visteon with flexible options in developing software and graphic development tool chains for the Range Rover system.

“With this combination of features, the Fujitsu MB86R01 “Jade” is an excellent fit for the current Range Rover cluster and future applications,” said Phil Hughes.

**Fujitsu Leadership in Automotive Graphics**

The Fujitsu-Visteon collaboration is an example of a growing trend, namely, that semiconductor and component companies are playing a partnership role in automobile development. Companies like Fujitsu and Visteon are working as team players with automakers and tier-one suppliers, providing not just components, but system solutions. This helps reduce re-designs, control costs, improve performance and stabilize the development process. This kind of involvement also makes it easier for car companies and tier-one suppliers to develop system solutions and modular approaches.

And Fujitsu is the logical choice for such a collaboration. The company has a long history in this industry. The Fujitsu family of graphics display controllers is optimized for embedded graphic applications such as car navigation (note that no navigation information is provided on either the Range Rover T5 or TFTs). This means that, in addition to video input and many 2D and 3D rendering functions, there is a flexible layer concept, support for screen resolutions up to XGA (1024 x 768) and other features in the area of navigation, such as alpha-blending and anti-aliasing. All GDCs have a CPU interface that enables the direct connection of embedded CPUs and MCUs.

The Fujitsu GDC roadmap is well-established through the middle of the next decade, making Fujitsu the secure supplier for embedded graphics applications.

All this puts the company in an optimal position to work with car manufacturers and component suppliers early on, and to use its expertise in embedded graphics technology to facilitate the development process.

As part of that facilitation, Fujitsu integrates its technology with third-party technologies to develop system solutions. For example, in addition to its collaboration with Visteon, Fujitsu recently worked with Inova Systems to integrate its newly developed APIX® interface, which delivers a highly flexible system design for selected products, into several of the Fujitsu GDCs. Through this type of collaboration with leading technology, software and software tool providers, Fujitsu Microelectronics America is a flexible partner, providing automotive software and applications solutions to meet fast-changing customer needs.

In short, with its long history of experience in GDCs and its established roadmap for the future, Fujitsu is helping bring forward a technology that offers freedom of design for OEMs and maximum ease of use for the consumer.

**For More Information**

For more information on Fujitsu Graphics Display Controllers, please go to [http://us.fujitsu.com/micro/gdc](http://us.fujitsu.com/micro/gdc) or address e-mail to inquiry@fma.fujitsu.com.