



RISC Based Rail Driver Cab Communication Unit

Background

Siemens Transportation Systems are leading players in a world that's on the move. Its extensive portfolio includes signalling, communications and network control systems. The expectations placed on the rail industry have always been high and there is a subsequent strong emphasis on health and safety throughout the Siemens portfolio.

In 1998, a specific project was been launched by the European Commission - 'Managing the Human Factor in Multicultural and Multilingual Rail Environments'. An integration of the rail transport system means that trains will increasingly have to operate across the borders of countries with different systems, rules and procedures. Such differences may have profound implications for these operations in terms of the management of safety. For example, the same driver may be faced with several differences in language, rules and procedures, roles and responsibilities, signal-positioning etc. during a journey from, say, Amsterdam-Brussels-Paris.

The Application

Working with Blue Chip Technology, Siemens undertook a specific project on improving their cab driver display systems. Historically, this system is a text based piece of kit, which updates the driver on signalling and network information. You can appreciate how the



language barrier might impinge on the drivers ability to react quickly on text based information.

The challenge was to take the text-based system and evolve it to a graphical user interface with universal symbols, making the information more accessible to the driver. Blue Chip Technology won the contract to design a bespoke board which sits between the Man Machine Interface (MMI) display and radio interface – taking Siemens processed signalling information and converting this into a graphical representation.

The Solution

The bespoke board uses the MIPS based AMD Alchemy[®] Au1100 CPU, featuring highly-integrated technology including on-chip SDRAM, SRAM/

Flash EPROM memory controllers, an LCD controller, 10/100 BaseT Ethernet Controller, USB Host and Device, UARTs (3), and GPIOs (up to 48, 13 dedicated). This sort of RISC technology device provides a high-performance, very low-power, highly-integrated processing core – ideal for low cost, smaller form factor embedded applications. Power dissipation measures less than 0.20 watts for the 333MHz CPU version used in this build.

The boards main area is 123 x 113 mm, interfacing to both the Siemens GSM-R cab radio, (via a RS232 port) and a custom designed keypad, switching matrix. Equipped with 16MB of SDRAM for data and 32MB of Flash memory for Windows® CE.net OS and application storage, the MIPS module directly provides the LCD controller for the display with back-light and contrast adjustment.

The whole unit is conformally coated for hi-humidity applications and uses a single rail power supply for easier integration into peripheral systems. The system performs at extended operating temperature ranges of –30 to 75°C and has soldered RAM memory onboard. As clarity of display is a paramount consideration, the unit includes a high brightness display specification. Additionally, the Blue Chip custom board can handle multiple display interfaces – STN, PLANAR or LCD, letting Siemens go to their end customer with a choice of display options.

Why Blue Chip Technology?

As you would expect Blue Chip Technology has a wealth of hardware expertise which it brings to bear on custom developments. The electrical engineering design team helps customers solve many problems – board layout, chassis engineering, operating temperatures, space constraints, specialised IO and expansion. However, Blue Chip Technology has also



acquired detailed knowledge on embedded operating systems and can develop customised images, BIOS and drivers for specialised hardware.

“In some cases it suits our client to subcontract the entire hardware/software sub-system design to one supplier, “ explains Andy Pont, Blue Chip Technology Software Engineering Manager. “This approach means the customer has a single point of contact for dealing with all issues and offers a high level of integration between the hardware and the software.”

As part of the Siemens development, Blue Chip Technology produced a customised Windows CE.net image and BSP. The graphical display application was componentised and converted into a small CE.Net footprint. The board also incorporates an execute-in-place image, which uses less Windows storage and speeds up system booting – the unit only takes three second to boot up.