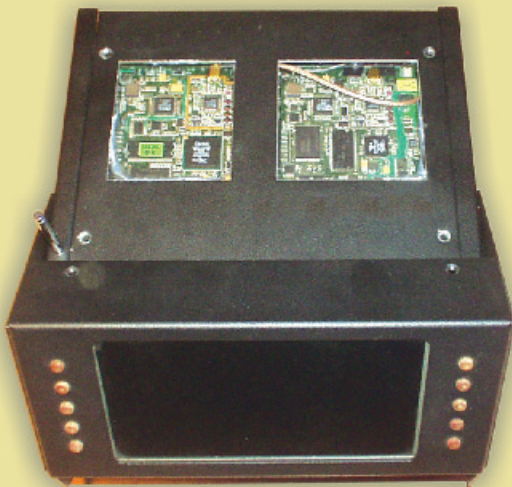




Design and Development of Car Telematics Platform

Introduction

Car Telematics is a wireless communication system aimed at providing drivers with safety information, vehicle tracking, navigation and entertainment from a central service center. The technology integrates diverse applications like navigation, GPS and dead reckoning, MP3 audio, FM radio, speech synthesis, voice recognition, array microphone, and voice and data communication over GSM/Bluetooth link into a single high performance system. This case study showcases Mistral's capability in designing a low-cost, versatile car telematics system; through a complex hardware design consisting of RF, analog, audio and high-speed digital signals on a small form-factor, and integrating various third-party applications.



“ This case study showcases a low-cost, versatile car telematics system with a complex hardware design consisting of RF, analog, audio and high-speed digital signals on a small form factor and integrating various third-party applications. ”

The Customer

One of the world's leading semiconductor companies specializing in high performance analog, mixed signal and DSP chipsets.

The Requirement

The customer wanted Mistral to develop a car telematics platform using their new, high performance MSA (Micro Signal Architecture) processor; to demonstrate the capabilities of the new processor in catering to the automotive electronics market.

The functional requirements of the Car Telematics system included the convergence of applications:

- Navigation System:
 - GPS Location Management
 - Dead Reckoning
- Audio and Speech Processing:
 - MP3 CD / Audio CD with CD block decoding
 - Text-to Speech for English, German and Japanese languages
 - Speech Recognition for English, German and Japanese languages
- Communication System:
 - GSM mobile phone connectivity
 - Bluetooth connectivity to local mobile devices

Solution Provided

Mistral designed and built a low-cost, small form-factor hardware around the new processor introduced by the customer. The software/firmware was built ground up; and included the device drivers, board support package, system framework, use case handler for concurrent execution of application on a real time operating system and a graphical user interface (MMI/HMI) front end. Mistral also integrated applications from multiple third-party vendors to make a complete demo reference design targeting the automobile industry majors.

This reference design attracted high interest from various automotive manufacturers at the ELECTRONICA USA and in other technology demonstration roadshows.

The Challenges

- The major challenge in the product engineering of a complex and evolving product like the Car Telematics platform was to develop the system on a “just out of Fab” processor. An in-depth understanding of the processor in the pre-design phase was followed by frequent interactions with the processor and tools design teams during the design phase, to avoid any glitches in the design
- Engineering all the required functionality around a single processor. The processor resource requirements for all the intended applications were collected in a matrix
- The performance parameters of the individual applications in terms of memory, MIPS, task deadline and priorities were tweaked to ensure operational concurrency
- Finding the right balance between using an external component, emulating the component in software and handling processor resources; while controlling the overall system cost
- Building a complex mixed signal design consisting of RF, analog, audio and High-speed digital signals in a small form-factor. The high sensitivity GPS and high-speed digital design, working in a small footprint, needed detailed pre-and post-layout simulation and analysis
- Designing complex use-case for the smart application features required to work concurrently. A thorough analysis of all functionality, its uses and its system implications were done. Then the use cases were carefully and appropriately designed to realistically demonstrate the system performance and capabilities
- Seamless porting and integration of various applications from different IP vendors. The design team at Mistral had to interact with 4 teams in 3 geographical locations across the world at various stages. This was achieved by setting up a very close and consistent interaction system, with a risk management plan, between the various core developers and the customer.

Key Achievement

- The Mistral team designed a system incorporating features like GPS, DR, GSM (Voice/SMS), MP3, ASR and TTS all running on a single processor; resulting in a low-cost, small form-factor car telematics product
- This enabled cost reductions of at least 50 percent over current telematics system implementations
- System scalability was another important achievement; required in order to cater to varying market requirements within the shortest time-to-market.

Customer Benefits

- The car telematics platform designed by Mistral enabled the customer to showcase their newly released MSA processor into the global telematics market
- System scalability in order to suit every manufacturer's requirement, within the shortest time-to-market
- Outsourcing the total solution allowed the customer to focus on their strength
- Achieved a high-level of system integration, involving multiple vendors, with Mistral as the single point of contact
- Early-to-market advantage among the single-processor car telematics solutions, with advanced features and telematics applications execution concurrency
- Low recurring-engineering cost
- Leveraged Mistral's proven expertise in embedded software and hardware technologies, to architect and develop the product faster-to-market.



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