PROJECT PROFILE

A404: Silicon systems for automotive electronics (SSAE)

AUTOMOTIVE ELECTRONICS

Partners:

Alcatel Microelectronics
Atmel
Conti Temic
FCI
Fiat-CRF
Infineon
JCAE
Magneti Marelli Sistemi Elettronici
PSA Peugeot Citroen
Robert Bosch
STMicroelectronics
Valeo

Project leader:

Andre Coustre,
PSA Peugeot Citroen

Key project dates:

Start: January 2001
End: December 2004

Countries involved:

Belgium
France
Germany
Italy

Several emerging technologies will impact future car design and production. European companies could lead the way in designing new architectures and generic chipsets to support electronic/telematics applications in future vehicles. They should also ensure that the new architecture could become the next world standard. The experience of two car makers and results of the MEDEA Sysnet automotive electronics project are the basis for this work. The goal of MEDEA + SSAE is to define suitable architecture based on the availability of new body, telematics, car multimedia and comfort functions, as well as design and evaluate system-level components and specific connecting devices that will be part of it.

Electronics have been part of automotive design and construction for the past 20 years. The electronic equipment inside today's vehicle is principally devoted to the car's main functions. Electronics are now an integral part of modern engine control for ignition and fuel injection, as well as for automatic gearboxes; and enhanced safety is achieved with airbags, ABS and ESP braking systems.

However, other sophisticated functionality, which can enhance the travelling experience, is starting to emerge. In-car communication, e.g. the ability to link cars to the Internet, and add this to positioning and navigation information from satellites, is opening up a new industry that advocates are touting as a new dawn for the car. Telematics with functions such as intelligent navigation and security applications using a mixture of GPS positioning and GSM mobile communications are just emerging. Clearly voice recognition and voice synthesis technologies will become of increasing importance.

Research from UK-based consultancy Strategy Analytics suggests that, by 2007, up to 55% of all new cars produced across North America, Europe and Japan will have built-in telematics terminals. The consultancy also estimates that, by the end of the same year, the market for these terminals will be worth around € 23 billion (up from € 5.8 billion at the end of 2000).

New in-car networks

As in other application areas, the time has come for electronics and software to become key technologies for the automotive industry. Electronics have advanced beyond providing specific functionality and become an integral part of an in-car network of applications, where electrical wires are replaced by multiplexed networks to provide links between a car's different electrical and electronic components, using suitable software. Fault-tolerant buses will be linked and controlled by a variety of central units and multifunction modules that will operate data acquisition, transfer and storage, required by the car's operations.

A new electrical and electronic vehicle architecture is needed to tie together the intelligent switching units (ISUs) for body and comfort functions, the telematics box (T-Box), the multimedia box (M-Box), other

electronic control units (ECUs) and peripheral electro-mechanical modules (mechatronics). It should also conform to standards, such as Bluetooth wireless communications and Automotive Multimedia Interface Collaboration (AMI-C) specifications, and be compatible with manufacturers' standard production platforms.

The new architecture will provide a way for manufacturers to provide sophisticated functionality more economically in a wide range of vehicles to suit different customer's demands. And it will help them accommodate new functionality more cost-effectively within their operations as technology progresses.

Designing new components

The goal of the MEDEA+ A404 SSAE project is also to design and find out how the silicon components and specific connecting devices will perform as part of such an architecture, and how reliable and cost-effective they can be. The software architecture itself will be defined in the parallel EUREKA Information Technology for European Advancement (ITEA) cluster Embedded Electronic Architecture (EAST-EEA) project, which started at the beginning of 2001 and is due to end in 2003.

As the cost of implementing a new architecture is of major concern in the MEDEA+ project, the focus is being placed on developing multifunction chip modules – and their software – which can easily be mass-produced for a number of car ranges. Because car development cycles last for two years, it is also important that SSAE develops prototypes which manufacturers can use in their research and development programmes as early as possible. The chips will be designed so they can accommodate the harsh temperature swings of the automotive environment that operates in two ranges: -40° to +85°C and -40° to +105°C.

The project is based on a four-year schedule, which corresponds to three generations of vehicles. Technical and technological evolution between the vehicle generations will follow a smooth progression, but progress will depend on the availability of relevant equipment, components and services.

The project has 12 partners that provide a broad expertise in car manufacture, electronics and telematics equipment supply, semiconductor production and service provision. These partners include car maker PSA Peugeot Citroen (project leader) and Centro Ricerche Fiat (CRF), equipment suppliers VALEO, JCAE (ex Sagem automotive), Magneti Marelli Sistemi Elettronici, Conti Temic, and five chip manufacturers – Alcatel Microelectronics, Atmel, Bosch, Infineon and STMicroelectronics. European service providers will support telematics and multimedia products. Standardised optical connection for multimedia will be manufactured by FCI.

Taking a market lead

The MEDEA+ SSAE project should provide the opportunity to increase the competitiveness of European semiconductor producers in the worldwide automotive market. The main competition to provide the central processing units (CPUs) that can be used by the multifunction modules comes mainly from Japan and the USA (Fujitsu, Motorola and NEC). Motorola is a leader in mechatronics and local interconnection network (LIN) design.

European car manufacturers are well respected due to their expertise in the luxury car segment. Entertainment, communications and navigation functions are certainly areas where Europe plays a leading role. This can immediately influence the European semiconductor manufacturers who can develop these multifunction components successfully.

Estimating market potential is straightforward. The electronic equipment will cost around € 460: € 70 for the ISU, € 120 each for the T-Box and the M-Box, and € 120 for the mechatronics modules. The global automotive market accounts for 15 million vehicles each year. So in 2005, if all cars will contain one ISU with 20 mechatronics modules, and 50% of the cars are sold with telematics and/or multimedia functionality built in, then global turnover could reach € 5 billion. The European silicon portion of that would account for 60%.

Overall, this MEDEA+ project will define and design the core modular trans-platform chips required to consolidate a new electrical and electronic car architecture. It will make possible the sharing of technical know how between different companies that could not work alone on such a project, enabling European producers to become competitive with those in Japan and the USA on the global market – and result in increased employment.

MEDEA+

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MEDEA+ focuses on enabling technologies for the Information Society and aims to make Europe a leader in system innovation on silicon for the e-economy.