PROJECT PROFILE

2A403: Caring Cars

AUTOMOTIVE ELECTRONICS

Partners:

Deimos Aplicaciones Tecnológicas
GRUNDIG Elektronik
Mobilera
NXP IC Lab
Philips Electronics
Robotiker
Telefónica I+D
TOFAS Turk OtomobilFabrikasi
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Key project dates:

Start: June 2007
End: December 2009

Countries involved:

The Netherlands
Spain
Turkey

The objective of Caring Cars is to increase car safety and enable wellness applications in an automotive environment – reducing accidents, while improving air quality and citizen's health. The project will create an open automotive infrastructure, based on a network of sensors already available in vehicles, plus new sensors to monitor human conditions. By adding external communications, it will also be possible to support healthcare applications. Better integration of wireless communications networks with citizens' needs for health and wellness coupled to mobility will also strengthen the European semiconductor industry in creating chipsets for mobile terminals with new features and services.

Over the past four decades the number of sensors and the volume of electronics in cars – and their levels of sophistication – have increased exponentially. Today, electronics in high-end vehicles can amount to almost a quarter of the total manufacturing cost.

Around a quarter of the sensor market consists of automotive applications. According to market research company Strategy Analytics, the volume of electronics installed in cars has grown from 2% to more than 20% of the production cost in the last 20 years. And automotive electronics are forecast to continue to grow at an average rate of 7% per year and, during this decade, the world market for automotive electronics should double.

The expectation is that 20 to 40% of the total car bill of materials will be attributed to electronics while 90% of all innovations in cars are related to electronics. And, as the growth in the automotive sensor market will outpace that of the car electronics market, it is reasonable to say that sensors will play a key role.

Innovative sensor network

The MEDEA+ 2A403 Caring Cars project will therefore not focus on building completely new systems but will try to deploy the electronics already available and establish an innovative sensor network. The existing electronics and sensors will be augmented with additional, wearable and portable sensors as well as communications modules. With wearable sensors, the system will be able to gain access to data not available to the current range of in-car sensors. Furthermore, flexibility and extensibility will increase.

The resulting sensor network can then be used to run applications that will monitor a driver's vital signs and respond accordingly. In this way, the in-car environment can be adapted to the driver, resulting in a reduction of the accident potential and a corresponding decrease in the overall costs of transport. Additionally, the system can be used to monitor the state of health of passengers and alert healthcare services accordingly.

Caring Cars aims at a high level of integration of on-board sensors and applications in an intelligent and auto-configurable way. The infrastructure visualised will be capable of serving various applications relevant to an automotive environment, such as entertainment, productivity and health-

care. The main target however is in-car wellness to address the huge indirect costs of transport in the EU.

Reports of the European Environment Agency estimate the indirect costs of transport at about 8% of gross domestic product (GDP), a substantial part of which is attributable to accidents. Each year, an estimated 40,000 people are killed and about 1.7 million injured on the roads in Europe. A major goal of this project is to address these costs by turning the car into a safer and more caring environment. The project will build systems to reduce the number of accidents by increasing the wellbeing of the driver and monitoring his/her condition.

Signalling human error

Research shows human error is the source of over 90% of all road accidents. Many accidents can be prevented if the driver is made aware of his/her physical condition and is encouraged to focus his/her attention or stop the vehicle. Research has also shown that solitary drivers are more prone to accidents than drivers accompanied by an adult passenger. An interactive voice-based dialogue supported by sensor-based information can play a role in reducing road accidents by mimicking the role of an adult passenger.

In an indirect way, the in-car wellness approach also addresses healthcare. It fits with existing ideas for the improvement of healthcare where, in addition to a number of direct healthcare-related issues, interest is also increasing for early detection of medical problems and improving wellness. This project fits well with this approach and the systems visualised by this project can play an important role.

Since a vehicle is a mobile environment, special attention will need to be paid to connectivity of the in-car network to external networks, most notably for connection with various kinds of professional units – healthcare, police, fire brigade, etc. Security and availability are important factors as well as respect for privacy.

If a crash cannot be prevented, this project can improve several critical aspects during accident or disaster recovery, such as:

- Assessment of the gravity of the situation;
- Identification of potential risks for more casualties or environmental pollution; and
- Situational awareness – via cameras and sensors – of rescue personnel involved, and the command-and-control capabilities.

The networking and communication facilities will enable healthcare professionals to obtain early access to data relating to the car and its passengers. Later, when they are on site, communication of data to hospitals will increase the efficiency of the emergency services.

Building on existing standards

Applications visualised by the project include intelligent adaptive interior lighting, monitoring vital signs, voice dialogue, driver-attention monitoring and data exchange from car to emergency services and from an emergency vehicle to a hospital. To support these applications, Caring Cars will build sensor networks, application-specific processors and interface controllers. The intention is to rely on existing technologies for the network infrastructure. Wherever possible, existing standards such as FlexRay will be used.

Sensors and technologies developed in this project should also find applications in other controllable environments such as offices, homes and hospitals. Furthermore, the resulting improved techniques of information exchange to improve post-crash care will also be applicable to other more general disaster situations.

Better integration of wireless communication networks with citizens' needs for health and wellness, coupled to mobility, will strengthen the European semiconductor industry for the creation of chipsets for mobile terminals with new features and services. European chipmakers have key strengths in mobile and dashboard electronic systems both for consumer and commercial healthcare service vehicles.

By allowing the car environment under network control to be coupled to mobile terminals and dashboard applications, numerous new healthcare and wellness application are possible. Such 'ambient-intelligence'-based applications will allow much better control of air quality, lighting, display interfaces, audio and other environmental factors – ensuring a better compromise between the health risks of mobility, sustainability and the economic gains of efficient transportation.

Providing such control in high-end cars will be a major benefit for aging populations, and provide spin-off to health applications in commercial and public buildings such hospitals and offices.

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