Embedded electronics -- cars get cooperative

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(PhysOrg.com) -- European researchers have developed a groundbreaking middleware platform that could lead to thousands of new applications in a range of industries. Beginning with in-car electronics, the platform can access the functionality, but hide the underlying complexity, of embedded sensors, making development and deployment of new services a snap.

Modern devices and appliances are literally riddled with embedded sensors, from the relatively simple devices that make your microwave turn off, to the electronics that control the braking in your car.

These systems are often designed for a specific task, but their functionality - sensing a sudden deceleration for example - could be used in other ways, and in cooperation with other sensors, to create totally new applications.

There is a problem, however. Embedded sensors are complicated, and difficult to access and control.

Now European researchers in the EMMA project have developed a new middleware platform, called EM2P, that takes the difficultly out of developing new applications for existing embedded sensors. It acts as an interface between designers and the electronics.

Banishing complexity

“We sought to hide the underlying complexity of in-car embedded sensors so that developers could quickly design new applications with existing electronics,” explains Antonio Marqués Moreno, coordinator of the EMMA project. “EMMA will foster cost-efficient ambient intelligence systems with optimal performance, high reliability, reduced time-to-market and faster deployment.”

The project hopes that, by hiding the complexity of the underlying infrastructure, its work will open up new prospects in the field of embedded, cooperating wireless objects. It aims is to provide open interfaces to third parties. But its work goes further, into hardware, to develop a robust wireless communication interface to link various sensors together.

Challenging transport

Transport is a useful but challenging test case, and the EMMA project focused on this area for its work. There are many opportunities to enhance road safety, for example, by communicating between sensors within a car, and with other cars or street signs. There is a range of potential applications with logistics, too.

“One of the particular strengths of EM2P is its scalability,” says Marqués. “It only worked with one car, but it has been designed to be able to work with an entire city’s vehicle population, which offers enormous opportunities for traffic management and many other areas.”

One of the key advantages of the EM2P platform is that it works on a concept of cooperating objects, so it is able to communicate at very different levels within a traffic system using the same level of abstraction.

So it can work in-car, where FIAT used EM2P to study the potential for a system that senses the performance of each engine cylinder and gives the driver a real-time update on engine performance.

But it could also work between cars - opening the prospect of cooperating cars - and, of course, it can work with traffic infrastructure like lights, warning signs, and other signalling information. All of this via the same middleware platform.

Moreover, EM2P is able to support different physical communication technologies, which allows for interoperability and greater flexibility of applications. So even if the project's wireless hardware does not become standard, the platform is still relevant.

Proof of the pudding

The EU-funded EMMA project set out to develop proof-of-concept demonstrators to show that the middleware works. “We were not trying to build a commercial application, but rather show that the system worked,” notes Marqués.

And it worked very well. “Though, you know how these things progress: the first time there were problems, but the second time it worked fine,”

Marqués adds. The City of London traffic management team offered to help.

A modified car, equipped with EMMA's wireless system, informed London's traffic infrastructure of any obstacles sensed by the car's radar. This sounds, perhaps, unremarkable, but it shows that the tools now exist to easily design new applications from existing embedded electronics, and apart from the host of applications it offers in traffic management, it could also be applied to any embedded electronics system.

"We wanted to facilitate the design and implementation of embedded software," says Marqués. "EM2P was designed to be used with any embedded electronics, but for our test case scenario we looked at embedded software for cooperative sensing in the transport domain."

The project is also part of a broader effort to develop wireless 'cooperating objects', and EMMA's work contributes to research in the European CONET network. EMMA will, itself, continue working in a new project, called PECES, where it will further refine the EM2P concept.

It all means that, finally, embedded electronics will get uncomplicated.

The EMMA project received funding from the ICT strand of the EU's Sixth Framework Programme for research.

Researchers from Newcastle University developed a wireless system, 'Smartdust', that could help reduce congestion on the roads. ITV News (November 2006) report with professor Philip Blythe - actively involved in the EMMA project - explaining the concept.

More information: www.emmaproject.eu/

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