



Embedded network breakthrough enables ambient computing

Exploiting service-oriented architecture helps increasingly intelligent devices around us work together easily in small networks using web-based communication.

A EUREKA ITEA Cluster project has developed a common web-based services infrastructure allowing devices with embedded intelligence to work together like personal computers and peripherals do with the universal 'plug-and-play' standard. The SIRENA approach simplifies the assembly and operation of domestic, automotive or industrial automation networks and telecommunications equipment. It can be used in many other fields, such as telemetry and medical instrumentation systems. Success in this project places Europe at the forefront of innovations in ambient computing, creating an intelligent environment for easy communication with information-processing devices.

Sticking a four euro chip into a washing machine or a fridge can provide previously undreamt levels of built-in intelligence. But, persuading devices to communicate and work together is much more difficult. The personal computer (PC) field has developed the universal plug-and-play (UPnP) standard that allows anything from a printer to a camera or a video recorder to be plugged into a network and communicate. Now SIRENA is generalising and broadening this approach, enabling a host of low-cost smart devices to work together simply using a service-oriented interaction paradigm on top of the Internet protocol (IP).

Service-oriented architecture

Service-oriented architecture (SOA) provides an environment in which networked resources are available as independent services accessible without knowing their individual operating methods. As a result, SOA is being increasingly used for building web-based computer applications of all kinds. SIRENA set out to demonstrate that this popular approach could be applied successfully at device level as the basis of a new market

independent communications between networked equipment and sophisticated new applications encompassing embedded devices.

Typical applications could include a domestic heating and ventilation system, equipped with a range of internal and external sensors, which automatically adjusts radiators, air conditioning units and sun blinds and provides regulated

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Harm Smit - *Schneider Electric, France*

delivering a wide range of applications on any type of smart device in networked systems.

SIRENA's universal framework creates distributed control and command systems with intelligence obtained through network-based cooperation between various small smart devices equipped with sensing or actuating capabilities. The infrastructure allows high-level device

temperatures in different zones of the house, all programmed through domestic TV.

Partners who think alike

EUREKA played a key role in establishing the three-year project. "We found a group of like-minded partners from different horizons keen to develop such an approach at the ITEA Project Outline meeting in 2002," explains Harm Smit of French



project leader Schneider Electric. These included equipment manufacturers, tool makers and SMEs as well as universities and research centres in France, Germany and Spain.

SIRENA exploits the Devices Profile for Web Services (DPWS), now found in Vista the latest version of Microsoft Windows, which enables intelligent devices, including PCs, to communicate across a network using Web Service protocols. Since they are neutral with regards to implementation technologies, these protocols are supported by all major players in the industry, an unprecedented fact in computer and network history. Alternative technologies tend to be tied to a particular operating environment or programming language, thus creating technology islands.

This equipment-independent application-

that will automatically be recognised and start communicating. The result is simpler systems integration, increased reliability and robustness, improved flexibility through ease of adding or replacing devices, and enhanced interoperability. Additionally, using the same protocol family across the board promises seamless smart device integration into business processing scenarios, such as those managed by Enterprise Resource Planning (ERP) systems. "Using the DPWS platform will also help the market develop quickly," says Mr Smit.

Prize-winning technology

SIRENA won the 2006 ITEA Achievement Award for an outstanding contribution to integrate greater intelligence into small devices, creating new opportunities in all application areas covered by the project. The project outcome forms the basis of a vast new market, forecast to grow rapidly

The results are already being implemented by device manufacturing partners including EADS, Schneider Electric, Siemens Business Services and ZIV. SME partners such as ESC, INVERA, iXtronics and Traveltainer will use the results in products and/or services in the near future. And tool manufacturers/integrators Capgemini and Materna are providing relevant tools and integration methodologies. Results were achieved in close cooperation with the research partners Fraunhofer FIRST, Robotiker, Paderborn University, Dortmund University and Rostock University.

The work carried out in SIRENA is also forming the basis of two follow-up projects: SODA that involves 30 partners in the framework of ITEA 2 looking at the tool infrastructure required to support the SIRENA environment; and SOCRADES, an EU Sixth Framework Programme

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level approach paves the way to where disparate fields are converging and various devices are used indifferently in several areas. Instead of having specific standard per business sector, SIRENA now provides a universal alternative suitable for many sectors.

It is possible to interconnect any type of intelligent device. Applications can be set up by simply plugging in equipment

within two to three years, delivering a common services infrastructure for a wide range of real-time embedded networked applications on all types of low-cost smart embedded devices in networked systems.

The project has gathered widespread interest and recognition. One year after the project ending, its website has enjoyed a record of 4992 monthly visits.

project developing next-generation SOA-based industrial automation systems. "The Framework Programme is better funded but we appreciate the flexibility in organising and allocating work in the project and the low administrative overhead that EUREKA allows," adds Mr Smit.

Project participants:
France, Germany, Spain

Budget: 12.9 MEuro
Duration: 34 months

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