



Service-oriented ecosystem enables low cost devices to form interactive ‘web of objects’

Technological innovation in web-service profiling enables low-cost devices to speak the same language while providing a smart approach to interactive service-oriented support systems

The EUREKA ITEA software Cluster SODA project has created a service-oriented ecosystem for high-level communications between computer systems and smart embedded software components in even low-cost devices in the so-called ‘web of objects’. This enables all types of device to communicate using the same language and to interact. Uses for this technological innovation will be in a wide range of applications for industrial automation, automotive electronics, home and building automation, telecommunications and medical instrumentation. The concept was adopted globally by OASIS as the Devices Profile for Web Services (DPWS) standard in mid 2009, driven by Europe as a result of this EUREKA project.

Ever higher levels of integration in electronic components now make it feasible to embed intelligence in even low-cost devices. The so-called ‘web of objects’ involves networking devices such as sensors and actuators interconnected between themselves and with the information technology (IT) world using web communication protocols such as the Internet protocol to provide intelligent control and

support to our everyday lives.

Such standard protocols enable direct communication from high level IT applications – such as an enterprise application server – to any low-cost component, like a temperature sensor, with full plug-and-play connectability and interoperability between sensors/actuators and the IT system. For example, it is now possible for an

or IT system will speak exactly the same language – the Web Services language. “With Web Services, you can directly connect your device to the ERP server without any intermediaries or protocol conversions or data manipulation,” says SODA project leader Francois Jammes of Schneider Electric.

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Francois Jammes - Schneider Electric, France

enterprise resource planning (ERP) server in a factory to communicate directly with a manufacturing line – sending orders for direct processing by the line, with reporting, statistics, etc. fed back to the ERP system.

Making it simple and easy

While much of this was possible after a fashion before, the new technology now makes it very simple and easy to do. All devices, from the temperature sensor in the home to the personal computer (PC)

homes, communications, the car industry and public transport. The basic technology enables communications between any device, sensor or actuator that we can find. These devices can then communicate with IT systems, personal computers or even personal digital assistants to provide complete applications over the Internet or intranets.”

The original proof of concept of embedding web services in low-cost



devices was developed in the earlier ITEA SIRENA project. "No one at the beginning of SIRENA even thought it would be possible to embed web services in a €3 device. This is now possible, with the required environment in terms of tools and open-source software," explains Jammes.

"I initiated SIRENA, where I convinced 15 German, Spanish and French partners to join. Based on the success of SIRENA, we built SODA with 27 partners from 7 countries. Several partners were technology providers that put their results into open source. Others were tool providers and some were integrators, able to demonstrate applicability in their domains. ITEA provided the framework for an open, flexible, industry-oriented project, funded by the public authorities."

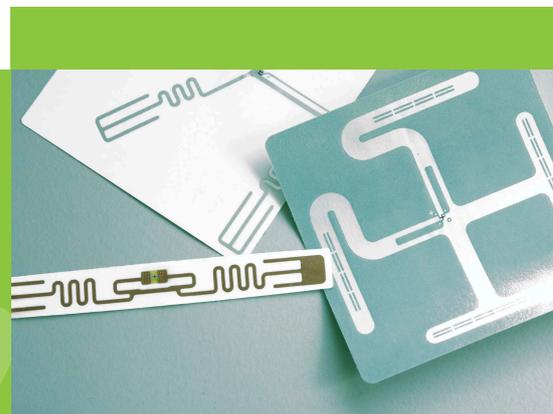
in a home, it is possible to have air-conditioning or home-automation systems controlling temperatures, lights, etc. that can be easily interconnected using this technology and be connected to an operator over the Internet. It is also possible for users to control their home heating and cooling systems remotely over the Internet.

The ITEA project set up demonstrations of full application life cycles in several domains, including industrial automation, telecommunications network and terminal management, home automation covering both linking of disparate domestic systems and care for the elderly, and e-move – allowing flexible routing of public transport providing on-demand service.

Devices Profile for Web Services (DPWS) was adopted as a standard by OASIS – the Organisation for the Advancement of Structured Information Standards – in June 2009. OASIS drives the development, convergence and adoption of open standards for the global information society, focusing on web-service standards as well as standards for security, e-business and application-specific markets. Founded in 1993, OASIS has more than 5,000 participants representing over 600 organisations and individual members in 100 countries.

Success in the SODA project has enabled Europe to become a driving force in the web-services domain. The intention of DPWS is similar to the universal plug-and-play (UPnP) standard

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Integrating different software services

SODA developed the overall ecosystem to manage applications based on service-oriented architecture (SOA). SOA provides a way of integrating different software modules offering services by enabling them to work together even if they are substantially different in concept. For example,

The results are already being used in real applications. For example, Schneider Electric exploits such interoperability to help integrate and interconnect systems from different businesses acquired over the past ten years. And EADS Secure Networks is using it in its professional mobile radio solutions for emergency services communications systems.

that allows any type of device to be plugged into a PC. However, DPWS offers dynamic discovery and is fully aligned with Web Services technology. It allows for seamless integration of device-provided services in enterprise-wide applications, which lies at the heart of the 'web of objects' concept.

Project participants:
France, Belgium, Finland, Germany,
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