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PROJECT RESULTS

Service-oriented common framework

Applying SOA to embedded environments at device level

SIRENA has created a service-oriented common framework for specifying and developing distributed applications in real-time embedded computing environments, including industrial automation, automotive electronics, home automation and communications. The SIRENA Framework offers a universal service-oriented, technology-neutral infrastructure for high-level communications between networked embedded devices subject to constraints related to footprint and responsiveness.

Service-oriented architecture (SOA) makes networked resources available as platform-independent services. Developing such a framework in embedded systems makes it possible to create distributed perception and control systems in which system intelligence is obtained through network-based co-operation of heterogeneous smart embedded devices equipped with sensing/actuating capabilities.

The key objectives of SIRENA were to:

- Define a framework for application-level service specifications independent of operating systems and physical resources, networks and protocols, programming languages and application domains – allowing building of distributed interoperable systems based on SOA for mobile and flexible applications in a series of specific domains, and addressing embedded environments taking into account real-time constraints and quality-of-service (QoS) requirements; and
- Develop a proof-of-concept implementation of the SIRENA Framework and show its use in demonstrators for each of the domains addressed as well as through a cross-domain demonstrator.

Broad range of application domains

The SIRENA technology addresses a broad spectrum of application domains including home, building and industrial automation, automotive electronics and medical instrumentation. The economy of scale offered by this wide scope makes it possible to envisage production of low cost, low power electronic components able to service a large array of devices.

A completely new characteristic of the SIRENA approach is its applicability across multiple domains whereas existing solutions are specific to their particular domain and present large technical differences. SIRENA focuses on the current trend where disparate application fields are converging and various types of devices can be used indifferently in several application areas.

Although the market characteristics of these application domains are in general dissimilar and governed by different laws, they tend to

SIRENA (ITEA 02014)

Partners
Capgemini
Dortmund University
EADS
ESC
Fraunhofer FIRST
Invera
iXtronics
MATERNA
Paderborn University
Robotiker
Rostock University
Schneider Electric
Siemens Business Services
Traveltainer
ZIV

Countries involved
France
Germany
Spain

Start of the project
January 2003

End of the project
December 2005

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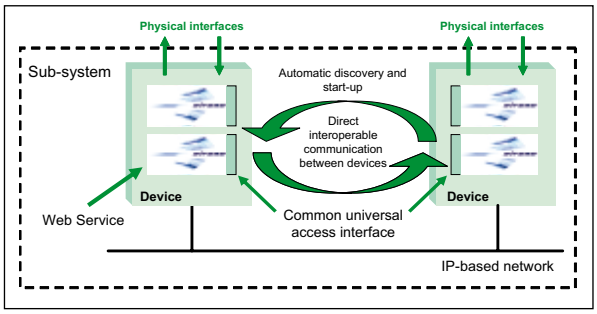

The SIRENA vision: service-oriented architecture for devices based on Web Services

be increasingly inter-related. Technological advances are progressively enabling integration of greater intelligence into smaller devices, as embedded devices are becoming ubiquitous and as IP networking is reaching out into the lowest levels of device hierarchy. The advent of such 'machine-to-machine' communications between intelligent devices of all kinds will create new opportunities that relate to all application areas covered by SIRENA. Hence, the market for SIRENA technology is vast and expanding.

Technological breakthrough demonstrated

SIRENA successfully demonstrated that present-day technology does indeed allow applying the SOA paradigm in the device space. The project thus demonstrated a technological breakthrough that paves the way for novel architectures in many areas and for many purposes.

The foundation of the SIRENA Framework is the *Devices Profile for Web Services* (DPWS), a device-oriented subset of the Web Services protocol suite. The generic toolkit delivered by the project is the world's first implementation of DPWS for embedded devices; and has been shown to be interoperable with other DPWS implementations.

Use of a uniform Web Services-based communications infra-structure also opens unprecedented perspectives for seamlessly integrating devices with higher-level applications.

Implementation already starting

Device manufacturers including Schneider Electric, EADS, Robotiker and ZIV are already implementing the project results. For example, Schneider Electric intends to completely integrate the results inside its 'Transparent Ready' (http://www.transparent-ready.com/index.htm) product programme but also envisages widening use of SIRENA technology to encompass other branches of activity inside the Schneider Electric group, notably in home and building control. As a medium-term target, Schneider Electric expects to integrate it in newer designs from chip manufacturers to reach a €4 bill-of-material cost level per device and, in the longer term, a €1 level.

Tool manufacturers or integrators such as CapGemini and Materna are providing some corresponding tools and integration methodologies. For example, MATERNA is integrating SIRENA framework management mechanisms. The implemented components consist of distributed management services and a model-based configuration tool able to deal with large and complex service infrastructures. These components and the experience gained in the area of embedded networked applications are a perfect starting point for customer projects. In other words, as soon as the first SIRENA-enabled devices emerge, MATERNA will be able and prepared to manage them.

Major project outcomes

Dissemination
- 25 publications
- More than 50 demonstrations
- Over 4000 website visitors each month

Exploitation
- Several interoperable DPWS toolkits
- Integration in several product ranges
- Several software tools

Spin-offs
- DPWS exploitation through one start-up company

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