Embedded WiSeNts

Cooperating Embedded Systems
for Exploration and Control featuring
Wireless Sensor Networks

Project Information

Embedded WiSeNts

- Coordination Action EU / IST / FP6
- 1.Sep. 2004 - 31.12.2006
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Participants

TUB (Germany), UCAM-CL (UK), DIKU (Denmark), SICS (Sweden), UT (Netherlands), YTU (Turkey), CINI (Italy), DEI (Italy), ETHZ (Switzerland), AICIA (Spain), INRIA (France), USTUTT (Germany)

Goal of the project:

The project aims to develop a new research domain, integrating the broad context of embedded systems with ubiquitous computing and wireless sensor networks in support of Cooperating Objects. The key actions are concerned with integration of existing research in the field and related fields, supporting teaching and training in the area of Cooperating Objects and developing a technology roadmap to drive the vision forward.

In the scope of the project, a **Cooperating Object (CO)** is defined as a collection of sensors, actuators, controllers or other COs that communicate with each other and are able to achieve, more or less autonomously, a common goal.

Project Results and Public Documents

WP2: Research Integration

- **Platform and Tools Survey:** Critical evaluation of Wireless Sensor Network platforms, operating systems, programming and simulation environments, and testbeds.

WP4: Education and Training

- **Teachware improvement and dissemination:** Repository for teachers and students listing courses and teaching material on COs. **http://teachware.distlab.dk/**

WP3: Road Mapping and Technology Adoption

- **State-of-the-art Studies:** A survey of the current state-of-the-art and open research issues.

- **Visions for innovative applications:** Explores application areas that could potentially be realized in a 10-year horizon once CO-technology becomes widely available.

- **Research Roadmap:** Describes emerging trends and technological opportunities and proposes a research agenda.

Available documents can be downloaded from the project website!

Embedded WiSeNts - Studies

♦ **Study 1: Applications and application scenarios**

Overview of Cooperating Object (CO) applications and application scenarios that can be readily understood today and identification of relevant projects and activities in the CO domain. The study identifies general application characteristics for all domains and classifies CO applications according to the following categories: Control and Automation, Home and Office, Logistics, Transportation, Environmental Monitoring for Emergency Services, Healthcare, Security and Surveillance, Tourism, Education and Training.

♦ **Study 2: Paradigms for algorithms and interactions**

Up-to-date overview of the fundamental design paradigms, algorithms and interaction patterns that enable the realization of systems based on COs for the following four thematic areas: Wireless Sensor Networks for Environmental Monitoring, Wireless Sensor Networks with Mobile Nodes, Autonomous Robotic Teams and Inter Vehicular Networks. The most relevant algorithms are identified and classified according to the application requirements of Study 1.
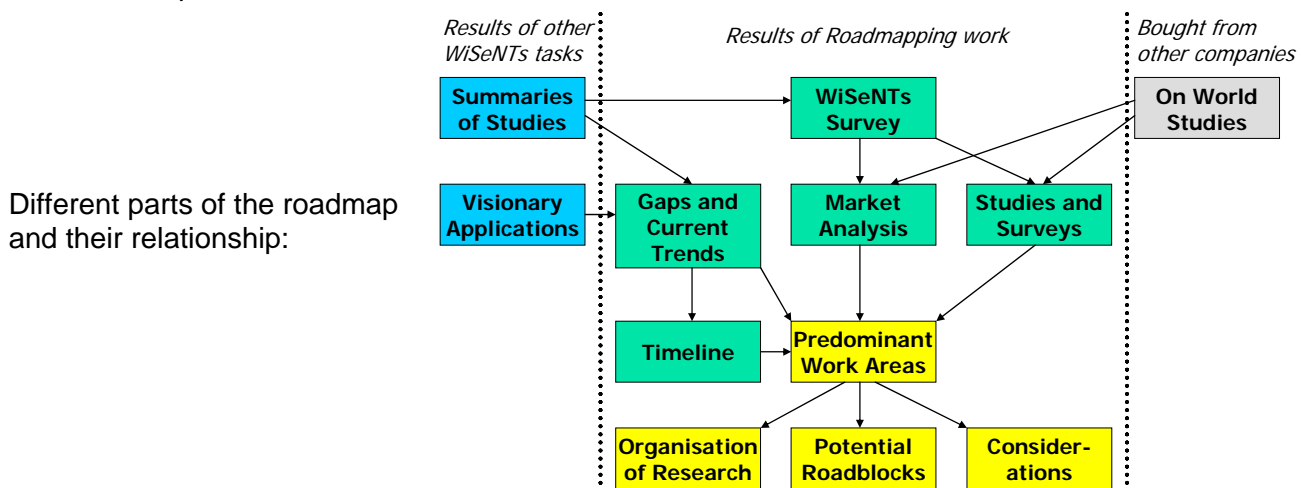
♦ **Study 3: Vertical Systems Functions**

Discussion of roles and effects of Vertical System Functions, that is, functionality that, due to their nature, needs to be taken care of throughout the entire application, and not in only one layer of the more traditional layered approach. The study includes the following types of vertical system functions: Context and Location Management, Data Consistency, Communication functionality, Security, Privacy and Trust, Distributed Storage and Data Search, Data Aggregation, Resource Management, Time Synchronisation.

♦ **Study 4: System Architectures and Programming Models**

Survey on the current state-of-the-art of programming models and system architecture for COs. System architectures are studies at two different levels: individual nodes, that includes the structure of operating systems, and interaction of different nodes, that includes communication models. The study points out some of the limitations of current approaches and proposes some research perspectives.

Embedded WiSeNts - Research Roadmap

Presents the vision of the Embedded WiSeNts consortium and its associated industrial partners regarding the future development of research in the field of COs.

Different parts of the roadmap and their relationship:

Distinguishing features of the roadmap:

♦ List of important gaps in the field and current trends, including an estimation of the time when each gap will be solved.
♦ Market analysis rating the importance of different application areas.
♦ Suggestions for predominant work areas that should be tackled in the next years.
♦ Organisation of research describing needed interactions between main research groups.
♦ Potential roadblocks or major inhibitors that hinder the acceptance of CO technology in society.

The roadmap document is available at: http://www.embedded-wisents.org/dissemination/roadmap.html