ARTEMIS Call 2008 Project
100032

SMART

A new wireless sensor network infrastructure

EXECUTIVE *summary*

SMART will propose a reconfigurable low-power Wireless Video-Capable Sensor Network infrastructure. To achieve this goal, SMART will address a number of scientific and technological challenges by developing a new Wireless Sensor Network (WSN) node employing either a reconfigurable application-specific processor or an off-the-shelf reconfigurable devices, plus the tools to design and deploy working prototypes.

CONTRIBUTION *to SRA*

The SMART project will achieve world leadership in the emerging field of Wireless Sensor Networks by bridging the gap between off-the-shelf reconfigurable devices, low cost and a novel reconfigurable processor (called RASIP) with a high degree of adaptability and low power. This know-how will generate excellent advantages for the corporate partners of the project as well as for to the European Union in general in the emerging markets of globally networked, interoperable embedded systems. In addition, the chosen field of video-capable Wireless Sensor Networks has a very broad range of applications and thus markets. From home safety, bridge and tunnel monitoring, and health monitoring to pipeline monitoring and smart farming with a direct impact onto environmental protection and agricultural productivity.

MARKET INNOVATION *& impact*

SMART will have significant impact in the areas of sensors, smart systems integration, middleware development and wireless networking, by specifying and implementing miniaturised, very powerful and ultra low-power wireless sensor nodes.

The development of an ultra-low cost reconfigurable WSN node means that it will be possible to build new WSN applications and customise in new areas at very low research and development costs. As a result, SMART aims to boost market share for European companies across different industrial sectors. The inclusion of data and video compression algorithms in the WSN and the high levels of reconfiguration in SMART will

substantially improve the flexibility and functionality of the new nodes increasing productivity and decreasing time-to-market. Real-world trials, with numerous nodes, will give European companies significant insight into the WSN evaluation and certification methods, infrastructures, software and services.

RELEVANCE & CONTRIBUTIONS *to Call 2008 Objectives*

Relevant to ARTEMIS Sub Programme 3 to provide methods, tools, technology and models with which developers will be able to build "smart environments", SMART will provide a complete framework which includes sensor network hardware (off-the-shelf and the newly developed RASIP processor), middleware and software for WSN applications. The SMART architecture, since it is independent of the sensors and actuators used, will provide a highly flexible solution that can be incorporated in numerous application areas including industrial

systems, home networks, e-health, transport systems, avionics, environmental monitoring etc.

Relevant to ARTEMIS Sub Programme 7 to enable sustainable urban life through rationalisation in the use of resources while increasing comfort and security in urban environments, SMART will provide a highly secure and video capable WSN framework with very low power consumption requirements. This system can be easily exploited in many urban area applications and it will certainly increase the comfort and safety of people living in urban environments.

In terms of the ARTEMIS Sub Programme 6 objective for security, privacy and dependability (SPD), SMART will have built-in the RASIP processor data encryption algorithms, enabling protection from sideband attacks. All developed in a low-power system that can evolve through reconfigurability after it is deployed in the field, this allows for fault tolerant operation and operational upgrades of the system, as well as its adaptation to new
applications. The cost- and power- conscious architecture will facilitate large-scale deployment of the SMART WSN nodes to an ever-increasing number of applications including critical plant- and pipeline monitoring. Full-scale deployment ensures that SMART will be fully evaluated.

R&D INNOVATION *and technical excellence*

In order to achieve its aims SMART will design and implement a sophisticated low-power WSN node, based both on off-the-shelf reconfigurable units and on RASIP. The RASIP processor will employ a real-time reconfigurable technology and a very low power CPU, as needed in WSN environments. For the interoperability of off-the-shelf sensors and the new processor, SMART will develop and implement the middleware for the seamless programming, configuration and management of the WSN infrastructure. The RASIP processor will support innovative encryption and authentication schemes needed for deployment in sensitive environments.

Since the field of video-capable WSNs is a key area for a broad range of applications from critical plant monitoring to health care SMART will develop and implement innovative video compression algorithms in the Reconfigurable Devices and a mechanism to sense the environment and re-configure the Reconfigurable Devices in real-time. As a result SMART will implement highly-secure nodes providing high resistance to side-channel attacks. All of the above will be developed and deployed in a prototype that will validate SMART's complete infrastructure in a large real-world trial consisting of both complex video-capable and low-end miniaturised sensor nodes. Thus, SMART aims to place the user at the centre of the future developments and offer efficient and secure personal and environment based WSN embedded infrastructures that will be part of the every day's activities of millions of European citizens.

PROJECT *partners*

PHILIPS

ihp

LIPPERT
THE EMBEDDED PC COMPANY

POLITÉCNICA

Nanosens

MÉTODOS Y TECNOLOGÍA

TECHNISCHE UNIVERSITÄT
CAROLO-WILHELMINA
ZU BRAUNSCHWEIG

THALES

Telecommunication Systems Institute

ARTEMIS

www.artemis.eu

PROJECT COORDINATOR
Evangelos Ladis

INSTITUTION
Hellenic Aerospace Industry S.A.

EMAIL
egladis@haicorp.com

WEBSITE
www.artemis-smart.eu

START
March 2009

DURATION
36 months

TOTAL INVESTMENT
€4.5 M

PARTICIPATING ORGANISATIONS
11

NUMBER OF COUNTRIES
5