1.8 DEMANES

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DEMANES, DEsign, Monitoring and Operation of Adaptive Networked Embedded Systems
Business Impact Interview: Matthijs Leeuw and Yolanda Rieter,

Challenge

The main challenge taken up by DEMANES was to provide component-based methods, framework and tools for the development of runtime adaptive systems, making them capable of reacting to changes in themselves, in their environment and in users' needs. This meant creating a toolkit that supports the design of adaptive multi-sensor networks for application domains including Cooperating Sensors at Home, Smart Safe &Secure Urban Transport and Environment, and Smart Airport Management.

Achievements

In all these domains, the project improved several functions that these adaptive networks are able to use to reduce operational costs; since the systems based on these networks are more flexible, less operational effort is needed to prepare and configure such systems for their tasks. Where such configuration had been manual in the past, the application of adaptive networks allows such configurations to be automated. An example of this is the Smart Home Lighting System developed in Spain. The DevLab members used their expertise in wireless sensor network technology and applications to help model and design the Adaptive Networked Embedded System and, along with Inabensa, has taken a leading role in the Smart Home use case.

The large size of the consortium and project was central to achieving the results, since many disciplines needed to be brought together to tackle the objectives of DEMANES. DEMANES results will be used by the follow-up project ACCUS (2013-06-01/ 2016-05-31), in which the connections of smart systems is the objective. Where formerly smart systems were standalone, by connecting these systems, information can be shared to improve efficiency and effectiveness, as in the coupling of the Smart Home to the Smart Grid that is a focus of ACCUS.

Business impact

The project's Smart Environment for Assisted Living demonstrator is expected to generate new business and services, including plans for a Finnish start-up company,

SenSoftia (www.sensoftia.com), to create new business opportunities, possibly in cooperation with Mega Electronics (www.megaemg.com), based on the mobile health results of the DEMANES project. Established by employees of UEF's Computational Intelligence (CI) research group in January 2014, SenSoftia is very active in product development for several hardware/software products related to telehealth, healthcare sensor integration, location-aware, air quality measurement, schedule/event, machine vision, data analysis, data security, wireless communication and applications/ services for learning systems as well as hospital information systems, cyber-physical systems and mobile platforms. SenSoftia has also had a four-year H2020 project accepted, to start in March 2015.

An unexpected application encountered during the project was the Smart Container Terminal for the port of Rotterdam. Transport plans are constantly being revised and updated on the basis of incomplete and unreliable data, leading to transport that often differs from the initial plan. By using floating truck data (pooling data from trucks heading towards a container terminal for pick-up or delivery), more efficient workflow is achieved since the terminal is more aware of likely subsequent actions. Several new services may be based on this pilot, such as system management services by Prime Data BV (a TNO spin-off company) and sophisticated climate

monitoring and control systems within Dutch greenhouses.

Another business impact highlight is the use made by Mega Electronics of two device platforms developed for the Smart Environment for Assisted Living demonstrator: eMotion Faros and eMotion Biolink. eMotion Faros is a small bio-signal measurement device for electrocardiography (ECG), electromyography (EMG), heart rate variability (HRV) and physical activity measurements in cardiology, telemedicine, occupational medicine as well as cardiovascular and neuromuscular research. Within the scope of cardiology, long-term arrhythmia monitoring is an important use case and since the device has internal memory and wireless transmitting capabilities, it can be used as an autonomous recorder and a remote-sensing component of a telemedicine system. eMotion Biolink is a connecting unit designed to connect eMotion Faros devices together and to external systems. The eMotion Biolink unit can be integrated into the building and act as a real-time data link between a patient recovering from a cardiac surgery and a supervising physician. When using eMotion Faros devices in cardiac rehabilitation, the patients in a room can be measured simultaneously and the data can be shown on a single screen or forwarded to remote analysis through eMotion Biolink.