

## **European Project “DREAMS” Integrates Novel Technological Building Blocks towards a Reference Platform for Mixed-Criticality Systems**

The FP7-ICT project DREAMS (Distributed REal-time Architecture for Mixed criticality Systems) has announced its progress to develop a methodology, architecture and a reference platform for complex, mixed-criticality systems across a broad range of application areas, including healthcare, avionics, and energy systems.

DREAMS was launched in October 2013 to realize the tremendous economic benefits of reduced maintenance and installation efforts, hardware cost, weight, size and energy consumption that could be generated from the reduction of discrete devices and cables of mixed-criticality systems.

The DREAMS team has created a development methodology that supports the mapping of mixed-criticality applications to heterogeneous networked platforms using modular certification techniques as well as algorithms for scheduling and allocation, and analysis of timing and reliability. Additionally, the team has produced generic models with different viewpoints, tools for configuration generation, resource allocation and scheduling as well as tools for product-line and design space exploration.

The architecture introduced by DREAMS is independent from any particular implementation technology, facilitating exploitation and preventing technology-obsolescence. Moreover, DREAMS enables the use of multi-core processors by offering memory virtualization, predictable networks-on-chip and hypervisors with support for segregation between different criticalities as well as safety and real-time performance. Gateways establish a safe and secure connection to deterministic off-chip networks such as Time-Triggered Ethernet, thereby allowing the implementation of clusters with networked multi-core chips. Such large scale mixed-criticality systems are required for fault-tolerance and to satisfy resource requirements exceeding the resources of a single node computer. The resource management services of DREAMS combine global strategies with local resource monitoring and local management schemes in order to deal with unpredictable environment situations, resource fluctuations and the occurrence of faults.

The DREAMS project has successfully completed the final integration phase which addresses the development and integration of the DREAMS technological building blocks that pave the way for the cost-effective implementation of mixed-criticality systems. For the final DREAMS platform, different integration targets will be considered. These include the Xilinx ZYNQ-7000 All Programmable System-on-Chip ZC706 Evaluation Kit, an Intel dual-core processor, the PowerPC based Freescale T4240QDS, and the ARMv8 JUNO Versatile Express board.

In the upcoming final year of the project, the project team will demonstrate three industrial use cases using these targets. A healthcare demonstrator will improve the access, efficiency, and quality of clinical processes to monitor the health status of patients in hospital scenarios. A wind-turbine use case combines supervision, control, protection, and Human-Machine Interface (HMI) systems. Furthermore, the DREAMS technology is evaluated using flight management, display management and sensor data provision in an avionic use case.

DREAMS is part of the European Commission’s Mixed-Criticality-Cluster (MCC) together with the projects PROXIMA, CONTREX and SAFEPOWER. A dedicated forum website to address the mixed-criticality community is available under <http://www.mixedcriticalityforum.org/>.

Project website: <http://www.dreams-project.eu>

Mixed-Criticality forum: <http://www.mixedcriticalityforum.org>