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Embedded Systems Applications: Future Society Applications

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Developing reliable software for embedded systems is a formidable challenge. The main objective is to create a piece of software, usually called firmware, running on a specific microcontroller. In most applications, embedded systems fall into the category of control and monitoring systems that is why embedded software has to be safe and predictable, while operating under severe resource and timing constraints. Unfortunately, the development of embedded software is not as mature as other engineering fields, and it is roughly understood by the majority of developers as programming, or writing code. In the context of FP7 project 'MODUS' the research team has developed an open-source toolset, addressing 4 discrete domains of the ESD Software Market, resolving much of these issues and enabling SME developers to produce dependable embedded code. Most of the papers in this Special Issue emanate from MODUS work.

The first paper, Loupis (2014) presents a MODUS-oriented market analysis in the domains of Formal Verification tools, HW/SW co-simulation tools, Software Performance Optimization tools and Code Generation tools. The versatility of the application this technology serves is amazing. With all this performance potential, the technology has carried with itself a large number of issues which the industry essentially needs to resolve to be able to harness the full potential contained. Michael Berger et al., (2014) focus on the technical methodologies that can assist formal verification and formal model checking. The selected model verification tools to be supported by the MODUS toolset are SPIN and RAISE. Both of the tools are LTL (Linear Temporal Logic) model checkers. Schatten (2014) analyses a set of principles for building learning agent organizations, a formalization of learning processes for agents, a framework for modelling knowledge transfer between agents and the environment, and a tailored organizational structure for smart residential buildings based on Nonaka's hypertext organizational form. In the work presented by Stepanić et al (2014) on a general level they relate embedded systems to a general class of objects and argue about their role in human life. On a somewhat more specific level, they consider in more details the development of the unmanned aerial vehicles. In Strugar et al. (2014) the authors explore embedded systems development practices of Croatian firms and compare them with the practices of the firms from South Eastern European (SEE) countries through an SME survey. Results reveal the use of cutting-edge technology and processes to a lower extent compared to their

counterparts from SEE countries. Vrankić et al (2014) analyze the Stackelberg equilibrium in which the consumer is the leader and the producer of embedded software is the follower. Comparative statics analysis of producer's reaction is carried out and confirms the intuition that the higher the product price, more workers are employed and better software is produced. Derived results are illustrated numerically where Stackelberg and cooperative equilibrium are compared. It is shown that the welfare loss is smaller with higher quality software for any number of employees.