1st Workshop on Software Engineering for Applied Embedded Real-Time Systems (SEERTS)

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Abstract: Software engineering for research-intensive domains such as driver-assisted systems or autonomous driving in the automotive industry increasingly require highly sophisticated architectures as well as an optimized, safe, and secure interaction of a large number of actuators, sensors, and networked software components. In addition, connectivity, electric mobility, and heterogeneous development processes introduce new challenges for developers. The corresponding requirements in terms of real-time, causality, security, modularity, scalability or the use of various standards require appropriate domain-specific tools. Model-driven software development often plays an essential role for such tools. The SEERTS Workshop presents adequate technologies for the consideration of diverse and specific requirements within the embedded real-time domain (e.g. for robotics, automotive systems, etc.) and gives insights into their utilization in industrial applications.

Keywords: SEERTS, AUTOSAR, Real-time, Automotive, Software Engineering, Embedded Systems

1   Introduction and Workshop Goals

Embedded real-time systems still undergo development challenges driven by computation, energy, timeliness, or safety demands whilst addressing various design decisions, standards, or architectures. Industrial and research developments continuously have to face those challenges and adapt existing technologies or develop new innovative approaches. For instance, the automotive domain evolves towards an electrified and connected infrastructure intertwined with advanced driver assistant systems or autonomous driving. The dense existence of tools, standards, or frameworks exacerbate to understand systems comprehensively and reusing legacy code may further have spurious influence during the various development cycles.

The SEERTS workshop focuses on technologies to alleviate the spurious influence of diverse constraints in the embedded real-time domain and presents innovative solutions applicable in industrial applications.

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By participating at the SEERTS Workshop, developers get insights into state-of-the-art tools, technologies and applications that meet specific requirements. These special requirements give the SEERTS workshop its individual character, so that domain, real-time, tool, or technology experts can exchange experience, knowledge and know-how. For example, participants involved in parallel automotive systems would be able to learn model-based partitioning and mapping strategies for AMALTHEA models under APP4MC and take advantage of automated software parallelization processes under certain constraints.

Typical technologies involve parallelization strategies [Cu17] [HKI15], scheduling analyzes, tracing methods [HI15], simulation technologies, WCET analysis, resource blocking analysis and protocols [HIS17], models and domain specific languages [Hö17a], and domain specific extensions of existing embedded real-time technologies [Hö17b].

2 Talks and Contributions

With seven talks and eight SEERTS contributions, the workshop covers the above mentioned topics presented by experts from industry and research namely Robert Bosch GmbH, Daimler AG, Vector Informatik GmbH, HS Regensburg, FH Dortmund, DLR e.V., TWT GmbH, and Ulm University. The accepted submissions are entitled:

1. Reasoning on the Length of Trace Recordings for Reverse Engineering of AUTOSAR-compliant Models

2. On Latencies in Automotive Real-time Multi-core Control Systems

3. Quality Indicators for Automotive Test Case Specications

4. Improving the Efficiency of Dislocality Constraints for an Automated Software Deployment in Safety-Critical Systems

5. Multicore Performance Optimization with Open Source Technology Support

6. Software Mapping to Heterogeneous Hardware Using Dynamic Flow and Resource Tracing in Distributed Safety Constrained Many-core Architectures

7. Combining Eclipse IoT Technologies for a RPI3-Rover along with Eclipse Kuksa

8. Design Validation for Embedded Multi-core Systems in the Context of ISO 26262

The submissions were selected by the SEERTS program committee along with three rated reviews for each submission. The accepted submissions cover a comprehensive insight into state-of-the-art development activities within the automotive domain.

References

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