

MESSAGE FROM THE COORDINATOR

As reported in the last newsletter, the project lifetime of SAFURE was extended by four additional months. Within the last months of the project, the consortium is working on the implementation of the developed methodology that ensures safety and security by construction. This methodology is enabled by a framework developed to extend system capabilities, so as to control the concurrent effects of security threats on the system behaviour. At the end the project, this will allow European suppliers of safety-critical embedded products to develop more cost and energy-aware solutions.

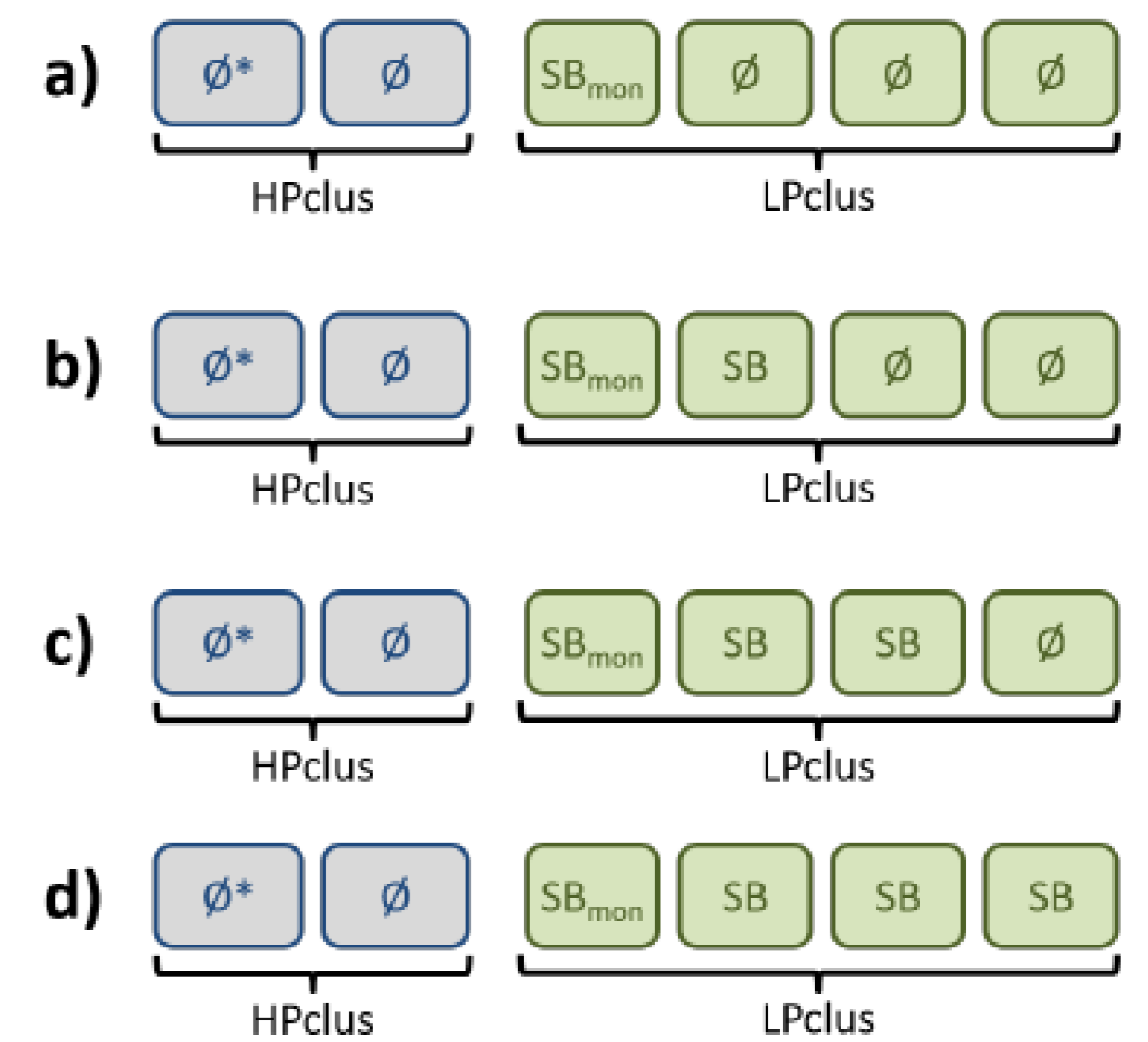
In this issue

- Message from the Coordinator
- Project Progress and Highlights
- SAFURE Workshop co-located with Hi-PEAC Conference 2018
- Upcoming Meetings and Events

PROJECT PROGRESS AND HIGHLIGHTS

One of the latest results was the finalization of the report "**Analysis of run-time and software applications on multi-core**".

The developed methodologies were integrated to characterize applications on different hardware setups relevant for the use-cases. Results on benchmarks and an avionics prototype are provided along with the methodologies. The figure shows the experimental setup of the avionics prototype (a) in isolation, (b) with contention in one core, (c) with contention in two cores and (d) with contention in three cores. The temperature modelling that is done for validating the scheme in WP4 is currently performed on an x86 platform. This is because of troubles with the implementation on the previously proposed telecommunication use-case platform, which is currently unable to read temperature sensors on the JUNO board. Partners are currently working on solving this issue.



Regarding the integration and evaluation of the use-cases, the following results have been achieved:

- The first iterations of the telecommunication, automotive multi-core and automotive network demonstrators were presented. Algorithms and scheduling schemes have been integrated into the commercial tool SymTA/S. Work on the integrated use-case for combining the automotive multi-core and network use-case, focusing on network and security constraints, has begun.
- The most critical test, which checked the Performance Monitoring Counter (PMC) infrastructure, developed by BSC, on an automotive multi-core use case board, has been done successfully.
- Preliminary evaluation on a representative function of the automotive use-case shows that execution time can increase up to 7.2% only due to multi-core contention. For the telecommunication use-case, secure Bluetooth based communication between several devices on different physical architectures was developed.
- For the combined automotive use-case, the hardware gateway has been finalized and the first type of CAN message has been encrypted using HMAC-SHA256 and verified with Magneti Marelli.
- The second type of CAN message has been encrypted using AES-GCM and verified with MAG.
- The hardware gateway has been successfully integrated with powertrain control unit in the combined automotive use-case.
- Regarding CAN messages, man in the middle attacks and corrupted messages are managed and the test environment has been created for the combined automotive use-case.

Start date: 1 February 2015

End date: 31 May 2018

Duration: 40 months

Project reference: 644080

Project costs: € 5,702,631

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Consortium:

Project coordinator:

Technical leader:

Project website:

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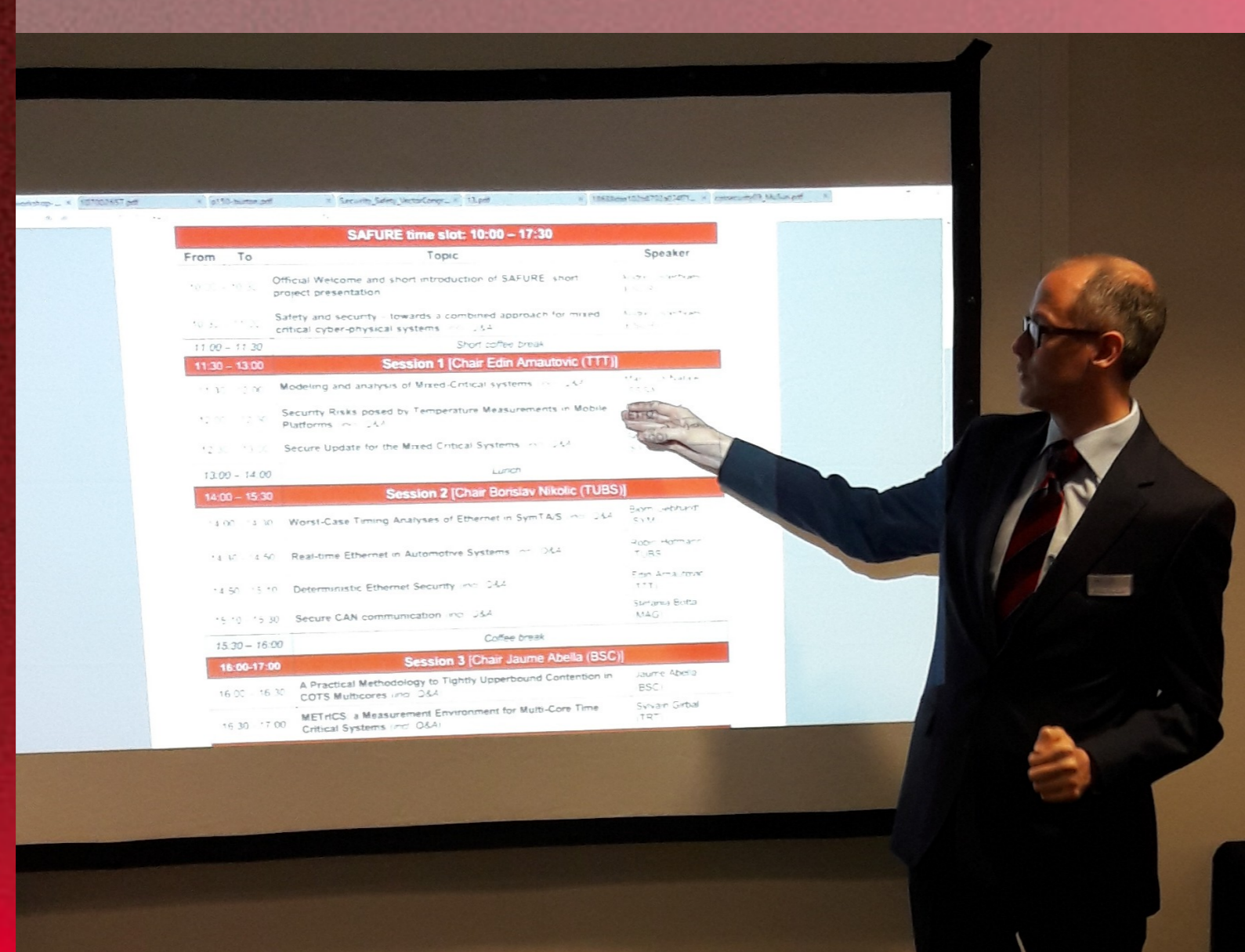


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PROJECT PROGRESS AND HIGHLIGHTS

Furthermore, the SAFURE partners developed methods for the analysis of systems in overload conditions (timing). The previous algorithm has been revised and extended with a new version that includes additional experimental data including a fuel injection system. The extended version has been published in the ACM transactions on embedded systems. The research on the analysis in overload conditions has been completed. In addition, research on the placement of time-critical tasks on multicore systems have been performed, extending the previously work and applying to a fuel injection case study provided by Bosch as part of the WATERS challenge 2017. Moreover, these results have also been presented in two workshops as part of the Euromicro DSD/SEAA conference in Vienna from 30th August - 1st September 2017. Furthermore, randomness tests for the MDSC algorithms have been performed. Some design modifications in FPGA are required. Further, a Hardware Setup for MDSC – MACSec comparison has been designed. The implementation of MDSC in FPGA is finished, and the simulation is performed. Currently the team is working on the integration of these systems in the operations.

SAFURE WORKSHOP CO-LOCATED WITH HIPEAC CONFERENCE 2018



The SAFURE project hosted a workshop at the HiPEAC conference, which took place in Manchester, UK from the 22nd to the 23rd of January 2018. The [HiPEAC conference](#) is the premier European forum for experts in computer architecture, programming models, compilers and operating systems for embedded and general-purpose systems.

During the [SAFURE workshop](#) the SAFURE partners presented their work and accomplishments within the project. The project goals and progress were further shown by the Technical lead, André Osterhues, from Escript. Stefania Botta from Magneti Marelli also presented a small demonstration video, in order to show some demonstrators that could not be brought with. A poster further explaining the automotive prototype, developed by the SAFURE project, was displayed during the two days of the conference. More information on presented topics as well as all presentations are available on the website: <http://hipeac.safure.eu/>.

SAFURE AUTOMOTIVE PROTOTYPE

<p>Automotive Multicore Use Case</p> <p>Powertrain multicore ECU with hard real-time, safety and security requirements. Function consolidation to reduce costs, complexity and time-to-market.</p> <ul style="list-style-type: none"> • Multicore contention model successfully applied • ISO 26262 compliance • Secure communication on CAN line assured 	<p>Automotive Network Use Case</p> <p>Evaluate tools and methods to enforce safety and security in automotive Ethernet networks and enable full-operational communication architectures</p> <p>Goals</p> <ul style="list-style-type: none"> • Software-Defined Networking for real-time systems • Safety, fault tolerance, error recovery, and admission control • Cryptographic methods for end-to-end security • Timing verification of new Ethernet standards (AvB, TSN) and inter-domain traffic CAN over Ethernet
<p>Combined Automotive demonstrator</p>	<ul style="list-style-type: none"> • System is analyzed with a worst case analysis of SymTAS • Ethernet messages used to model the traffic of an Ethernet system. • Necessary input parameters for worst-case results:
<p>Automotive Secure Control Unit</p> <p>Secure CAN communication guaranteed:</p> <ul style="list-style-type: none"> • Prevent attacks on communication channel • Functional classification of messages is supported • Error handling implemented 	<ul style="list-style-type: none"> • SymTAS offers charts like Gantt charts to make results more visual and understandable for the user. • SymTAS can calculate the worst-case load of a network and latency results of messages. The results are created for every network link and is reported at the corresponding sending port.
<p>Results</p> <ul style="list-style-type: none"> • The hardware gateway to convert CAN messages to Ethernet packages and vice versa has been finalized and successfully integrated. • Secure communication is guaranteed applying different kind of crypto algorithms depending on the functional classification. • Main in the middle test has been performed. • Paper published at SAE 2018 World Congress and Exhibition. 	<p>Results</p> <ul style="list-style-type: none"> • The most critical test, on multi-core automotive use case board, was done successfully. • The worst-case analysis has been integrated into the SymTAS ethernet product and is being used at major OEMs. • Paper published at VNC Conference in Kyoto, December 2016. • Book chapter in "Networked Real-Time Embedded Systems", published by Springer Netherlands.

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PAST AND UPCOMING MEETINGS AND EVENTS IN 2018

24th - 28th of June 2018, San Francisco, USA

[The Security Track at the ACM Symposium on Applied Computing](#)

9th - 13th of April 2018, Pau, France

[Highlighting Future and Emerging Technologies and Designing Autonomous Systems](#)

19th - 23rd of March 2018, Dresden, Germany

[9th European Congress on Embedded Real Time Software and Systems \(ERTS2 2018\)](#)

31st - 2nd February 2018, Toulouse/France

[HIPEAC conference 2018](#)

22nd - 24th of January 2018, Manchester, UK

[SAFURE Workshop co-located with HiPEAC conference 2018](#)

22nd of January 2018, Manchester, UK



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