

ASLA: Adaptive System-Level in AUTOSAR

Amel Belaggoun, Ansgar Radermacher, Valerie Issarny

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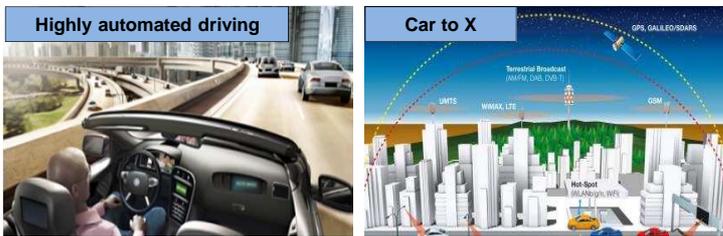
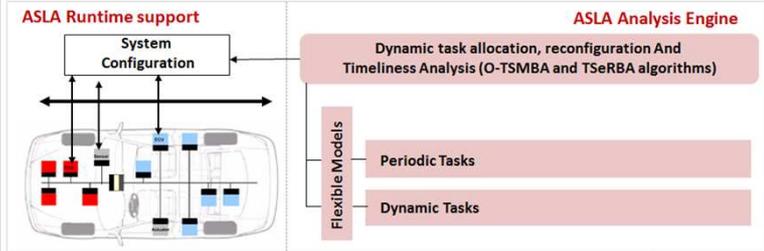
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Overview

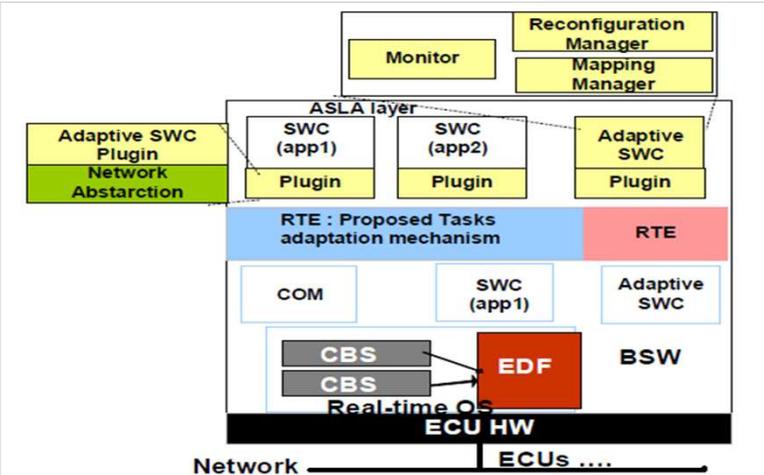
- E/E Complexity and Software Quantity is Growing Fast
 - Bring **more** features but use **less** resources
- Challenges in recent FEVs:
 - AUTOSAR Standard has no support for runtime adaptation
 - Safety-critical: **Mixed-Criticality** and **reliability** requirements
 - Cost-Effective: **Flexibility** requirement
- **ASLA Solution**: provide **task-level adaptation** techniques to AUTOSAR



- Real-time scheduling in automotive systems
 - **Periodic task model**
 - **Dynamic-priority scheduling**
 - **Schedulability** test to see if each task meets its deadline after adaptation
 - **Dynamic task model**
 - Dealing with tasks that have a varying period and execution time (i.e. stochastic execution time)

ASLA Approach

- On each ECU, ASLA **monitors health vector**, stores **state information** of the tasks and **broadcasts** the information
- The Adaptive SWC
 - **Monitor**: monitors events that trigger the adaptation and distributes any reconfiguration notification
 - **Mapping Manager**: offers the dynamic deployment of tasks on the ECUs
 - **Reconfiguration Manager**. Reconfigures the tasks inside or between the different ECUs.
 - **ASLA Plugins**. All the applications will run on the ASLA plugins.



Towards the Adaptive AUTOSAR

Ongoing work

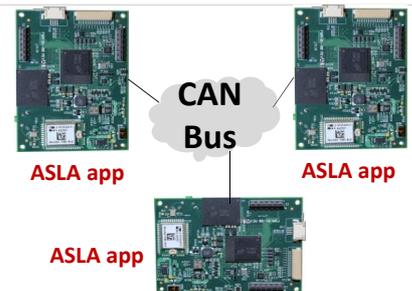
- Implementing ASLA's algorithms in ERIKA (OSEK/VDX certified)
- Building an experimental platform :

Hardware platform

- 3 STM32F4Discovery embedded MCUs
- Low-speed CAN network connects these 3 ECUs

Software platform

- ERIKA-OS under EDF scheduling
- C programming language is used



CONTACT INFORMATION

Amel BELAGGOUN amel.belaggoun@cea.fr
Ansgar RADERMACHER ansgar.radermacher@cea.fr
Valerie ISSARNY valerie.issarny@inria.fr