AUTOSAR Adaptive Platform for future applications

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Overview

Introduction
- Why AUTOSAR?

AUTOSAR Classic Platform
- Overview and achievements

Game changers
- New challenges and use-cases
- New functions

Future of AUTOSAR
- Adaptive Platform
- New cooperation model

Summary
E/E innovations in vehicle development are increasing

90% of all innovations are driven by E/E

All major innovations are driven by E/E

90% of all innovations

Vehicles are connected to the back-end

AUTOSAR Vision

AUTOSAR aims to improve complexity management of integrated E/E architectures through increased reuse and exchangeability of SW modules between OEMs and suppliers.

Exchangeability between suppliers’ solutions

- **Supplier A**
  - Chassis
  - Safety
  - Body/Comfort

- **Supplier B**
  - Chassis
  - Safety
  - Telematics

- **Supplier C**
  - Body/Comfort
  - Powertrain
  - Telematics

Exchangeability between manufacturers’ applications

- **OEM a**
  - Platform a.1
  - Platform a.2
  - Platform a.n

- **OEM b**
  - Platform b.1
  - Platform b.2
  - Platform b.n

- **OEM c**
  - Platform c.1
  - Platform c.2
  - Platform c.n

- **OEM d**
  - Platform d.1
  - Platform d.2
  - Platform d.n

- **OEM e**
  - Platform e.1
  - Platform e.2
  - Platform e.n

- **OEM f**
  - Platform f.1
  - Platform f.2
  - Platform f.n
Aims and Benefits of Using AUTOSAR

AUTOSAR aims to standardize the software architecture of Electronic Control Units (ECUs). AUTOSAR paves the way for innovative electronic systems that further improve performance, safety and environmental friendliness.

- Hardware and software will be widely independent of each other.
- Development can be de-coupled by horizontal layers, reducing development time and costs.
- The reuse of software increases at OEM as well as at suppliers. This enhances quality and efficiency during development.
Partners (status November 2015)

9 Core Partners
- BMW Group
- Continental
- Daimler
- PSA Peugeot Citroën
- Toyota
- GM
- Volkswagen AG

46 Premium Partners
- Fiat
- Chrysler
- CNH Industrial
- Delphi
- Denso
- HELLA
- JTEKT
- Mentor Graphics
- Mitsubishi Electric
- Panasonic
- TRW
- ThyssenKrupp
- Valeo
- ZF

28 Development Partners
- Avelabs
- BaseWorks
- InChron
- INtime
- InTek
- eSR Labs
- EasyCore
- Items
- OFFIS
- Osb
- C&S
- OpenSynergy
- MIRABILIS
- STMicroelectronics
- SYMTA Vision
- Ruetz
- System Solutions
- Validas
- Symplify
- FF
- Autocab
- Autobahn
- Dassault Systemes
- DS
- Altran
- DSPACE
- CeA
- ETRI
- Fraunhofer
- IAV
- The MathWorks
- MBtech
- Renesas
- Infineon
- Freescale
- ST

111 Associate Partners
17 Attendees

General
OEM
Generic
Tier 1
Standard
Software
Tools and
Services
Semi-conductors
AUTOSAR is a global standard
Partners 2015

Europe
93 Partners

America
28 Partners

Africa
1 Partner

Asia
69 Partners
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➢ Summary
Main Working Topics

- **Architecture:**
  Software architecture including a complete basic software stack for ECUs – the so called AUTOSAR Basic Software – as an integration platform for hardware independent software applications.

- **Methodology:**
  Defines exchange formats and description templates to enable a seamless configuration process of the basic software stack and the integration of application software in ECUs. It includes even the methodology how to use this framework.

- **Application Interfaces:**
  Specification of interfaces of typical automotive applications from all domains in terms of syntax and semantics, which should serve as a standard for application software.

- **Acceptance Tests:**
  Specification of test cases intending to validate the behavior of an AUTOSAR implementation with AUTOSAR application software components or within one vehicle network.
AUTOSAR achievements and outlook (1/2)

Milestones, just to name a few

<table>
<thead>
<tr>
<th>Year</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>AUTOSAR founded</td>
</tr>
<tr>
<td>2004</td>
<td>First release</td>
</tr>
<tr>
<td>2005</td>
<td>Basic SW complete</td>
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<tr>
<td>2006</td>
<td>Feature enrichment</td>
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<tr>
<td>2007</td>
<td>Derived applications</td>
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<tr>
<td>2008</td>
<td>New development methods</td>
</tr>
<tr>
<td>2009</td>
<td>Release 4.1.1</td>
</tr>
</tbody>
</table>

- Multicore support
- Functional safety
- Ethernet
- Timing analysis
- Diagnostics
- Acceptance testing
AUTOSAR achievements and outlook (2/2)

Milestones, just to name a few

Long Term Objectives:
- Quality
- Maturity
- Backward compatibility
- Closing gaps
- Market needs
- Effort

10 years of AUTOSAR
6th AOC Nov 13

Release 4.2.1
- Large data communication via Ethernet and CAN FD
- Integration of non-AUTOSAR systems
- ...

Release 4.2.2
- CAN Flexible Data Rate
- Global time synchronization
- Sender Receiver Serialization
- ...

Release 4.3.0
**AUTOSAR release management**

*The principle of maximal two active major releases*

- **Backward compatible concepts**
- **Long-term concepts with controlled compatibility**

Further Development

- **Minor release**
- **Initial release**
Exploring AUTOSAR: software architecture
Exploring AUTOSAR: Example: Error Handling, Reporting and Diagnostic

The **Debugging** module supports debugging of the AUTOSAR BSW. It interfaces to ECU internal modules and to an external host system via communication.

The **Diagnostic Event Manager** is responsible for processing and storing diagnostic events.

The module **Diagnostic Log and Trace** supports logging and tracing of applications. It collects user defined log messages and converts them into a standardized format.

- All detected development errors in the Basic Software are reported to **Default Error Tracer**.
- The **Diagnostic Communication Manager** provides a common API for diagnostic services etc.
Exploring AUTOSAR:  
Example: energy efficient technologies

- **Partial Networking**
  - Shutting down and starting up communication of groups of ECUs (Partial Network Cluster - PNC) during normal bus communication.
  - ECUs that shall be shut down require special transceiver hardware.

- **Pretended Networking**
  - ECU local approach to switch into a low power mode while keeping up bus communication, e.g. by using mechanisms of ECU degradation.

- **ECU Degradation**
  - ECU local approach to reduce the number of active components and/or semiconductors in an ECU, e.g. degrade line drivers, MCU capabilities.
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Starting Point: selected main drivers

Main drivers for new automotive software systems have been determined.

- Highly automated driving
- Car-2-X applications
- Vehicle in the cloud
- Increased connectivity
Selected main drivers for new automotive software systems (1/4)

Highly automated driving will be on the road.

- Support dependable systems including fail-operational systems
- Support of cross domain computing platforms
- Support of high-performance micro-controllers and computing
- Distributed and remote diagnostics
- …
Selected main drivers for new automotive software systems (2/4)

Car-2-X applications will require the interaction of vehicles and off-board systems.

- Support cloud interaction
- Software as product
- Integration of non-AUTOSAR systems
- …
Selected main drivers for new automotive software systems (3/4)

Vehicle in the cloud will require dedicated means for security.

Layer 1
Individual ECU

Layer 2
In-vehicle network

Layer 3
E/E-Architecture

Layer 4
Connected vehicle

Cloud

Use cases

- Secure on-board communication
- Security architecture
- Secure cloud interaction
- ...

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Selected main drivers for new automotive software systems (4/4)

Upcoming use cases will lead to a stronger interaction of automotive software systems.

- Consideration of non-AUTOSAR and off-board systems within methodology
- Dynamic deployment of software components
- Interaction with non-AUTOSAR and off-board systems
Influence by new players
Cooperation with other standards

Open to connect with others

Identifying / monitoring open source projects
Challenges for the AUTOSAR partnership

Cooperation

- Efficient cooperation with other standardization bodies and/or open source projects
- New cooperation models to reduce time-to-market while increasing quality
- New players in the automotive industry
- Adaptation of development speed

Development

- Support major new features, future market needs and current technology trends
- Fast, efficient and high quality of software standardization by implementation
- Using existing software solutions for standardization, e.g. from consumer electronics
- Frontloading of validation and early availability of implementation
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New AUTOSAR product: The Adaptive Platform

Extend AUTOSAR Classic Platform by support of adaptive deployment and interaction with non AUTOSAR systems.
Architecture of the AUTOSAR Adaptive Platform

- Application Software Component
- Backend Proxy
- Application Software Component
- Application Software Component

- SW Configuration
- Platform Resources
- Platform Modes
- ...

- Communication
- HW Acceleration
- ...

- (Virtual) Machine / HW

- Standardized AUTOSAR Adaptive Lib
- Standardized AUTOSAR Adaptive Service

- Application Level
- Standardized Adaptive API
- AUTOSAR Adaptive Platform

- Platform Functionality
- Service Oriented Communication
Standardization process and specification validation

Specifications will be validated in parallel with the standardization.

- Operating system definition based on POSIX
- Middleware technologies for the implementation of service oriented communication, e.g. SOME/IP
- Definition of execution model(s) to support the different use cases of access freedom, e.g. full access, sandboxing
- Use of package format and managers for application deployment
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Summary
Releases and revisions of AUTOSAR

- **Classic Platform**
  - Release 4.2
  - Release 4.3
  - R4.2.2
  - R4.3.0

- **Foundation**
  - Release 1.0.0
  - R 1.0.0

- **Acceptance Test**
  - Release 1.0.0
  - R1.1.0

- **Adaptive Platform**
  - Release 1.0.0
  - R1.0.0
## Focus of AUTOSAR

### Major principles
- Split of standard into major products
- Ensure stabilization of releases
- Max. 2 releases are maintained simultaneously
- Consider market needs of AUTOSAR partners

### Content
- Architecture
- Methodology
- Application interfaces
- Acceptance tests

### Process & Quality
- Promote global use of the standard
- Establish a flexible work package structure
- Clear release and revision numbering scheme
- Ensure backward compatibility
- Life cycle plan for each release
- Continuous incorporation of new concepts
- Only validated concepts to be incorporated
Summary

Achievements
- Established a worldwide software standard focusing on automotive applications
- Classic Platform is massively used in series production
- Acceptance Tests Release 1.1.0 are published

AUTOSAR Products
- Already launched: AUTOSAR Classic Platform and AUTOSAR Acceptance Tests
- Planned for 2016/17: AUTOSAR Adaptive Platform and AUTOSAR Foundation

Future of AUTOSAR
- Improvement and stabilization of existing standard
- Anticipate the future by providing the next generation of platform software
- Creation of new eco-systems by new collaboration models

AUTOSAR will continue to be THE creator of automotive software standard.
Welcome to the AUTOSAR development partnership

AUTOSAR (AUTomotive Open System ARchitecture) is a worldwide development partnership of vehicle manufacturers, suppliers and other companies from the electronics, semiconductor and software industry.

AUTOSAR

- Paves the way for increasing integration of vehicle functions, improves quality, safety and environmental friendliness.
- Is a strong global partner in the development of open standard for in-vehicle communication.
- Is a key enabling platform for automated driving.
- Facilitates the exchange and update of software and hardware over the service life of the vehicle.

For information only (see disclaimer)

Published Releases

More information about AUTOSAR:
http://www.autosar.org

Become a partner and get exploitation rights for the AUTOSAR standard
request@autosar.org

For information only (see disclaimer)