AUTOSAR Safety Solutions for Multicore ECUs and ADAS Systems

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Elektrobit
Agenda

- Architecture requirements for ADAS ECU
- Overview of different architecture approaches
- Compare and contrast each architecture
- Questions & Answers
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Architecture requirements for ADAS ECUs

**Dependability:**
- Functional Safety (ASIL-D)
- Safety Microcontroller
- Security, Reliability, Availability, Maintainability

**Performance:**
- Advanced ADAS Algorithms
- AUTOSAR SWC
- Realtime Requirements
- High Performance Multi-Core Microcontroller
- Multi-Microcontroller ECUs
- Support for hardware acceleration (e.g. OpenCL)

**Compatibility:**
**Software Features**
- Can, Flexray, Ethernet support
- Standard Diagnostic capabilities (e.g. OBD)
- Network Management (e.g. Partial Network)

**Development Process**
- Use of standard AUTOSAR formats
- e.g. ECU Extract, Diagnostic Extract
Agenda

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Overview of different architecture approaches
Full AUTOSAR architecture

- Safety Microcontroller
- AUTOSAR Multi-Core Safety OS
- ADAS algorithms as SWC
- Advanced hardware drivers integration as Complex Device Drivers
  - e.g. OpenCL, AVB
  - Proprietary video bus systems

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<th>Pro</th>
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<tbody>
<tr>
<td>Easy integration into OEM/T1 AUTOSAR process</td>
<td>Advanced hardware support needs AUTOSAR complex device drivers</td>
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<td>One System</td>
<td>High Performance Safety Microcontroller necessary</td>
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Full AUTOSAR architecture
Microcontroller partitioning architecture

- Partitioning in Safety and Performance Microcontroller
- Separated applications treated as different ECUs during development
- Private Network for communication

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<tr>
<td>Scalable (combine two or more Microcontroller)</td>
<td>Additional hardware costs</td>
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<tr>
<td>Suitable Microcontroller already available</td>
<td>Need for private communication link</td>
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<td>Complex Flashloader and Startup</td>
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Core partitioning architecture

- One Microcontroller with several performance cores and one safety core (typically Lockstep)

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<tr>
<td>No need for private network hardware</td>
<td>No suitable Microcontroller available today</td>
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<tr>
<td>Performance and Safety in one Micro</td>
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Hypervisor architecture

- Host OS with AUTOSAR guest system on one Microcontroller
- Hypervisor could be part of Guest OS

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<td>Hypervisor as Gateway between different OS</td>
<td>Limited realtime capabilities</td>
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<tr>
<td>Hypervisor as Security Gateway between car and cloud</td>
<td>Limited Performance</td>
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Agenda

1. Architecture requirements for ADAS ECU
2. Overview of different architecture approaches
3. Compare and contrast each architecture
4. Questions & Answers
Compare and contrast each architecture

**Full AUTOSAR**
Safety or Performance

**Microcontroller Partitioning**
Safety & Performance

**Core Partitioning**
Safety & Performance optimized

**Hypervisor**
Security Architecture

**Software Architectures define next generation Microcontroller Architectures**

**AUTOSAR is part of each architecture as a common standard for**
- Basic Software, Safety and Security in ECUs
- Synchronized development process between OEM and T1
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Questions & Answers
Thank you

Contact us!

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