VECTOR

Case Studies: Projects for Series Vehicles

Embedded Software and ECU Projects

V1.1 | 2018-10-11

Sensor and Actuator Drivers for an Engine ECU

The Challenge

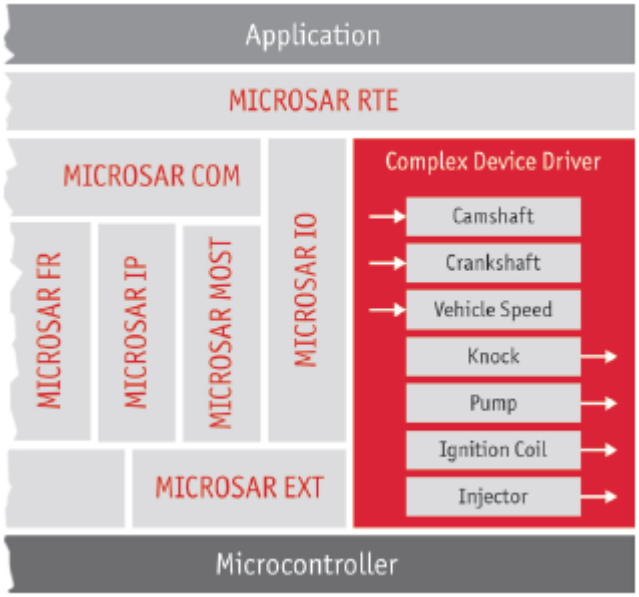
- Introduction of AUTOSAR 4 software for an engine control unit

The Benefit

- Vector AUTOSAR 4 solution as SWOTS
- AUTOSAR compliant software architecture
- AUTOSAR software drivers (CDDs) as a basis for the application software development
- → Know-how transfer and development of Complex Device Drivers

The Solution

- Usage of Vector AUTOSAR 4 basic software
- Additional development of AUTOSAR complex drivers (CDDs) for:
  - Sensors: Camshaft, crankshaft, vehicle speed, knock detection, misfire detection
  - Actuators: Engine speed, ignition coil, pump, fuel injectors
- Consulting for software architecture, on-site integration and AUTOSAR configuration support



On-board Tester for Head Unit ECU

The Challenge

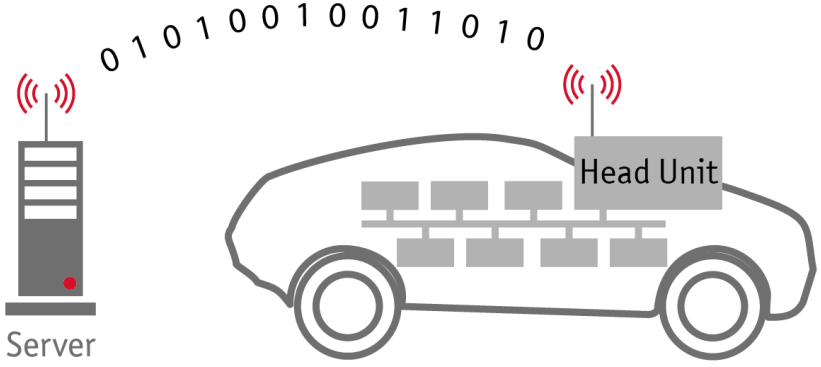
- Introduction of "over the air" access for in vehicle diagnostics data
- Head unit ECU shall act as an vehicle internal UDS diagnostics tester
- AUTOSAR 3 only specifies one UDS server per ECU → additional UDS client (on-board tester) required

The Benefit

- Detailed knowledge of Vector AUTOSAR 3 solution leads to fast and efficient implementation due to
  - Vectors expertise in basic software
  - Project specific implementation

The Solution

- Development of an "on-board tester" client software component (SWCs) including detection of external car-workshop tester
- Joint on-site integration



Faster End of Line Flash-Download of a LIN Slave ECU

The Challenge

- Integration of a CANbedded LIN slave stack into an AUTOSAR environment
- Diagnostics via AUTOSAR CAN and CANbedded LIN
- Integration of two flash bootloader (CAN and LIN) for mutual updates

The Benefit

- LIN slave ECU as AUTOSAR system
- High-speed flashing via private CAN in production
- Re-flashing of ECU in the field via LIN slave capabilities

The Solution

- Implementation of a complex driver to connect the CANbedded LIN slave stack to an AUTOSAR ECU
- Implementation of a specific component to connect the AUTOSAR PduR with LIN TP (CANbedded slave)
- Usage of hardware specific boot mode header for reset safety
- Cascaded start of CAN and LIN flash bootloaders

Elec. AC Compressor ECU for HD Machines

The Challenge

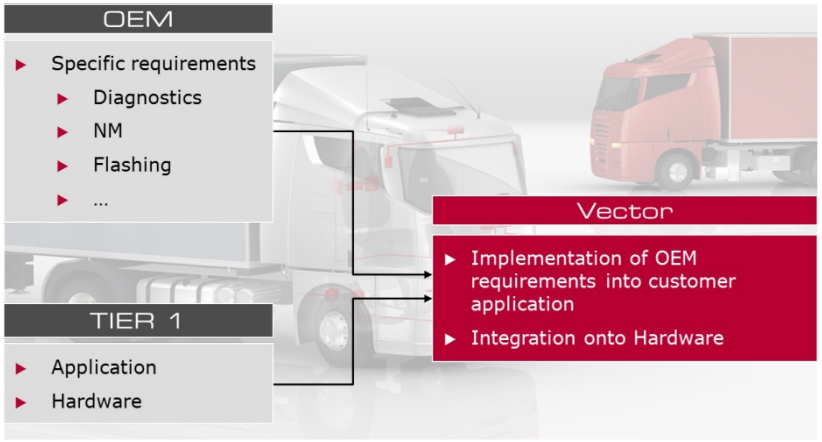
- Integrate customer application (OEM independent) into ECU software
- Development of complete firmware (incl. BSW)
- Provide automated test solution

The Benefit

- Reuse of application through OEM independent software design
- Basic software and OEM-specific know-how is not required at customer site
- System testing with Vector in-house test solution

The Solution

- Configuration und implementation of BSW
- Creation of diagnostic specifications
  - Fault memory
  - Diagnostic tables
- Start-up of complete system
- All parties committed to Vector test solution



Network Controller for a Telematics ECU

The Challenge

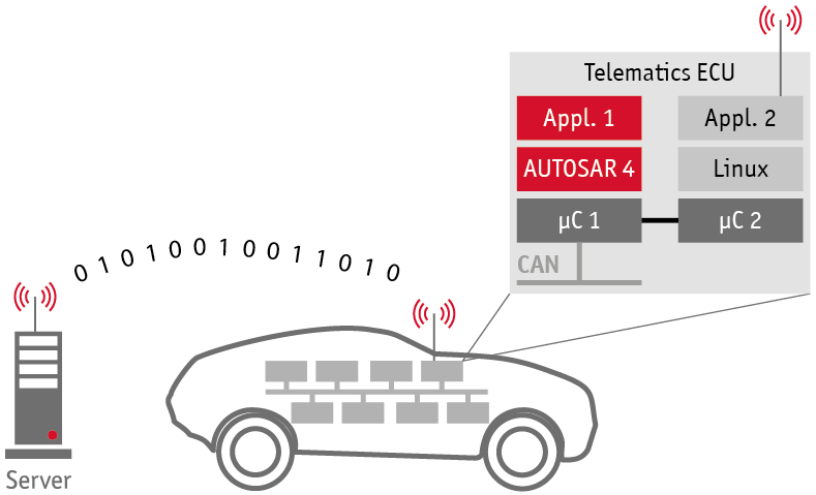
- Telematics ECU with a 2-controller architecture (mobile phone application controller, vehicle network controller)
- Customer has high expertise in mobile phone applications
- Vehicle network specific (BSW) know-how required

The Benefit

- Combination of domain specific know-how in a cooperation for ECU software development
  - Faster implementation
  - High quality due to domain specific expertise

The Solution

- Vector develops complete SW for network controller including automated test
- Functions of network controller (ASR 4):
  - CAN/Ethernet communication and routing
  - UDS diagnostics
  - Power management of complete ECU
  - HW self diagnostics for sensors and actuators
  - Flash download via CAN/Ethernet, over the air



Battery Cut-off Switch

The Challenge

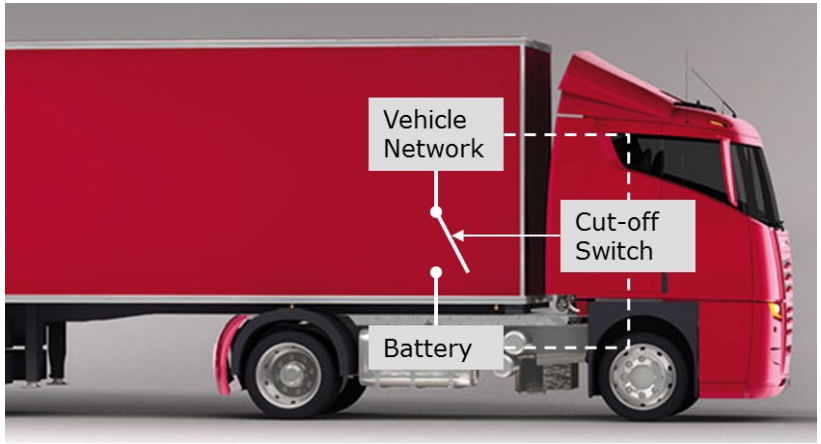
- Easy cut-off of a vehicle power supply
- Implementation of regulatory requirement for the transportation of hazardous goods
- Usage in several vehicle platforms

The Benefit

- Simple solution of complex requirements
- One ECU for several vehicle platforms
- No coding at end of production necessary

The Solution

- Complete software implementation of a battery cut-off switch
- Self detection of the used vehicle platform with CAN signals
- Self diagnostics of the complete ECU



Gateway and Special Function ECU

The Challenge

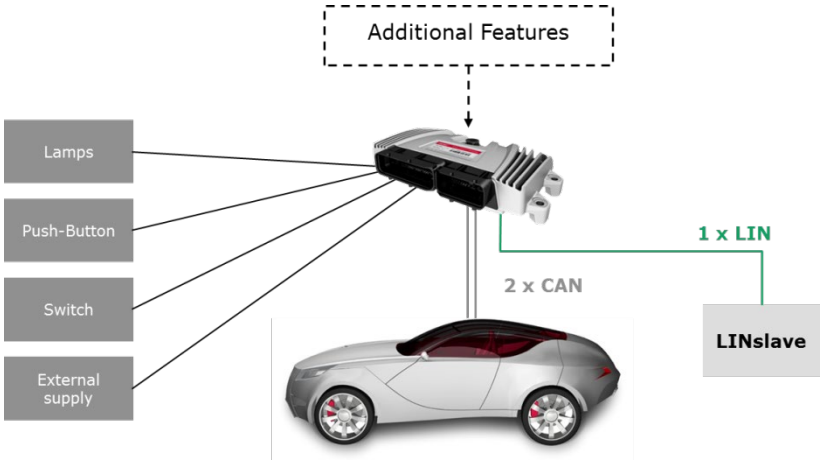
- Customers first AUTOSAR project
- Insert new ECU to an existing E/E architecture
- Short development time
- Integrate special features on the ECU

The Benefit

- Short time to market for series vehicle to meet the challenging schedule
- Understanding of
  - AUTOSAR processes for series development
  - AUTOSAR software development

The Solution

- Use of series-qualified and off-the-shelf ECU
  - Standard HW for development and series usage
  - Less population according to customers needs
- Support customer with
  - AUTOSAR integration
  - Software development
  - Hardware and software testing



Multi-purpose Gateway ECU to extend the existing E/E

The Challenge

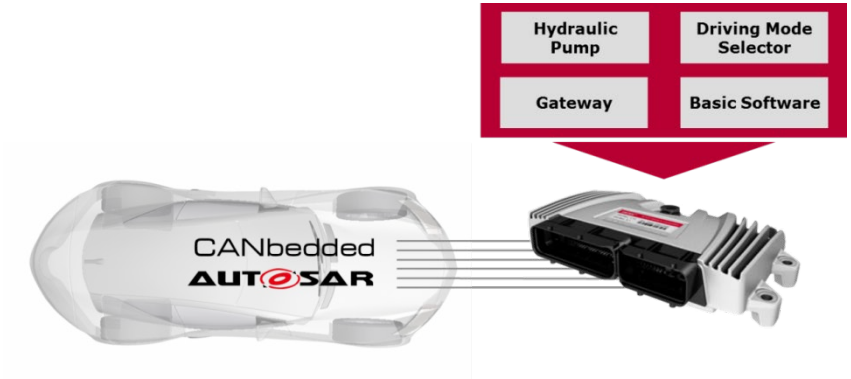
- Gateway-functionality between
  - 6 x High-Speed CANs with
  - CANbedded and AUTOSAR
- Realization of complex driving mode selector switch
- Control of a hydraulic pump

The Benefit

- Plug-and-play solution for existing E/E architecture
- Quick solution of complex requirements: Basic software, application and series hardware developed by one supplier

The Solution

- Use of a Vector standard ECU with customer specific adjustments (less-population)
- Model realization within MATLAB/Simulink®
- Implementation, integration and verification of the complete ECU through Vector
- Ongoing maintenance of software for platform adoptions



ECU for Enhanced Dynamic Driving

The Challenge

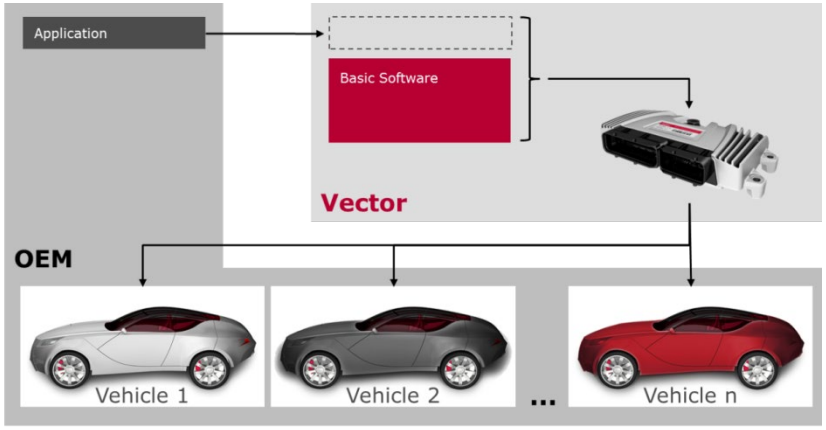
- Platform ECU development for enhanced vehicle dynamics functions
- To be used in various car production series

The Benefit

- Cost-efficient hardware solution (VC)
- Deep know-how transfer of basic software knowledge to the customer:
  - Configuration of basic software
  - Integration of application
- Usage in different vehicles

The Solution

- Usage of Vector standard-ECU
- CANbedded-based software architecture
- Integration of customer application



Improving Basic Software and Series Hardware

The Challenge

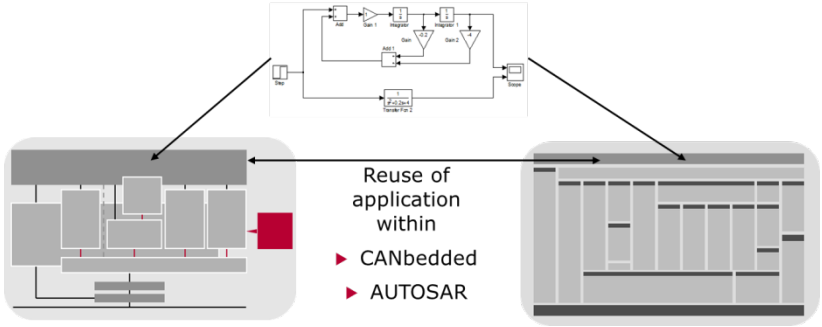
- OEM requests the change from
  - Existing hardware to a new ECU
  - CANbedded to AUTOSAR while keeping the application unchanged

The Benefit

- Reuse of application without adoptions for future projects
- Easy access to the AUTOSAR world for customer
- New, lighter and more cost efficient hardware designed

The Solution

- Porting of existing ECU architecture to a new and lighter housing, while keeping the performance identically
- Minor application adjustments to fit both worlds, CANbedded and AUTOSAR



For more information about Vector
and our products please visit

www.vector.com

Author:
Vector Group