Advanced ECU design with AUTOSAR software and tooling

Since its inception in 2003, AUTOSAR has established itself as the foundation for electronic control unit (ECU) design and development. From an engineer’s perspective, whether integrating the latest AUTOSAR release, or developing a new ECU extract from the OEM, the AUTOSAR design process must be as streamlined as possible – and support increased levels of functionality as ECU complexity grows.

The Mentor AUTOSAR solution is at the forefront of addressing these challenges. Volcano VSTAR™ is Mentor’s embedded implementation of the AUTOSAR standard and is a complete offering to meet all ECU platform needs. Unique to Mentor’s AUTOSAR solution is support from a single Volcano tool that covers the entire AUTOSAR development cycle. Volcano AUTOSAR tools provide a round-trip solution from ECU extract updates and stack upgrades to automatically configuring a stack.

Mentor® Volcano™ Vehicle System Builder™ (VSB) is the configuration front-end to Mentor’s VSTAR platform. Volcano VSB is the natural configuration companion that contains import functions for standard automotive exchange formats. This critical function is coupled with the VSB ECU configuration generator, which is based on supplied data that automatically configures applicable parts of the ECU and provides design support for software components. As the ECU software is generated, the correctness of the configuration is continuously verified by a built-in consistency checker. Engineers are able to achieve continuous integration and release with VSB tools that support SWC authoring and configuration along with the round-trip capability to seamlessly update ECU configurations.

Integration and configuration

Mentor provides integration with customer-specified combinations of microcontrollers (MCUs), peripherals, microcontroller abstraction layers (MCALs), OEM-specific compatibility modules (basic software (BSW), complex device drivers (CDD), and software components (SWC)) compilers, and debuggers of choice.

PRODUCT FEATURES:

- Adaptive AUTOSAR and Classic AUTOSAR software platforms
- Usable in all vehicle domains
- Communication stacks for LIN, CAN/CAN-FD, FlexRay, and Ethernet
- AUTOSAR operating system supporting all classes of scalability
- Profiling option for execution of time-critical applications
- Scalable for small footprint platforms
- Top-down toolchain supports AUTOSAR methodology
- ECU Configuration Generator
- Round-trip interfaces to other tools
- Export and import various formats
- Powerful scripting support

MENTOR TOOL SUITE INTEGRATION:

Mentor offers a complete integrated tool suite for top-down vehicle system and ECU design which includes:

- **Volcano Vehicle System Builder™ (VSB)** – ECU configuration flow tool
- **Volcano Vehicle Systems Integrator™ (VSI)** – Simulation tool
- **Volcano VSA COM™** – Network design tool for AUTOSAR-based ECUs
Mentor’s embedded systems for automotive

VSTAR integrates perfectly with other embedded automotive offerings from Mentor. Since VSTAR contains the vehicle interface, it can be integrated with an application OS either on a stand-alone microprocessor or in a System-on-Chip (SoC) architecture.

Operating system (OS)

The VSTAR OS is an AUTOSAR OS that can be efficiently implemented on different processor architectures. The VSTAR OS is available in all AUTOSAR scalability classes and supports multicore architectures. Mentor has a long tradition of developing efficient and optimized OSes in various industries.

Runtime environment (RTE)

The VSTAR RTE tool integrates the AUTOSAR application with the VSTAR software platform, VSB has complete support for SWC designs and RTE configurations. The RTE enables the partitioning of software components and BSW into different runtime segments and provides safe compartmentalization of the OS when integrating 3rd party components or mixing safety-related SWCs in one node.

Microcontroller abstraction layer (MCAL)

Mentor works closely with MCU and compiler vendors to expand the portfolio of solutions and provide the best fit for ECUs. Mentor is constantly integrating VSTAR with suppliers of microprocessors and providers of MCALs; these companies include Renesas, NXP, Infineon, ST Microelectronics, Fujitsu, Cypress, and Texas Instruments to name a few. Mentor can also supply custom MCALs integrated with VSB.

Safety

VSTAR have been implemented with safety as a top concern adhering to the ISO 26262 and ASIL D standards. VSTAR is implemented with SPICE level 3 development processes. A key concept in ISO 26262 is the Safety Element out of Context (SEooC); OS, E2E protection, and watchdog are some of the component/packages available as SEooC with ASIL classification.

More about Mentor

Mentor, now a Siemens business, provides advanced systems engineering solutions with a leading portfolio of automation design tools and software, built on deep expertise in systems engineering, to help customers solve the most complex design challenges facing the industry. Solutions reside in three key areas for automotive electrical and electronic design: connectivity and networking; in-car experience; and subsystems and technology.