Advanced ECU design with fully compliant AUTOSAR 4 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.

Mentor® Automotive Volcano™ AUTOSAR has been at the forefront of addressing these challenges. Volcano VSTAR™ is Mentor’s embedded implementation of the AUTOSAR standard and 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® Automotive Volcano™ 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 with support for SWC authoring and configuration along with the round-trip capability to seamlessly update ECU configurations.

Integration and configuration

Mentor Automotive 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.

Mentor’s embedded systems for automotive

VSTAR integrates perfectly with other embedded automotive offerings from Mentor Graphics. 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. VSTAR is available with Mentor’s application solutions which include; Mentor® Embedded Linux®, Mentor Embedded Nucleus® RTOS, and XSe® Connected OS™.

Operating system (OS)

The VSTAR OS is an AUTOSAR OS that can be efficiently implemented on different processor architectures. Mentor Graphics has a long tradition of developing efficient and optimized OSes in various industries including industrial, medical, consumer goods, automotive, smart energy, and more. The VSTAR OS is available in all AUTOSAR scalability classes and supports multicore architectures.

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 into different runtime segments and provides with the OS, safe compartmentalization when integrating 3rd party components or mixing safety-related SWCs in one node.

Microcontroller abstraction layer (MCAL)

Mentor Automotive 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 (Freescale), Infineon, ST Microelectronics, Fujitsu, Spanision, and Texas Instruments to name a few. Mentor can also supply custom MCALs integrated with VSB.

Engineering tools

Mentor’s RTA Tools are an add-on to VSTAR. These tools help integrators profile and debug the application and VSTAR with minimal intrusion of the system behavior. RTA Tools are configured with VSb with single-point activation for measurement of events. The information gathered by RTA Tools is analyzed in the Mentor® Embedded Sourcing™ Analyzer tool which includes AUTOSAR-aware agents.

Safety

VSTAR have been implemented with safety as a top concern adhering to the ISO 26262 standard. 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 Automotive

Mentor Automotive 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.