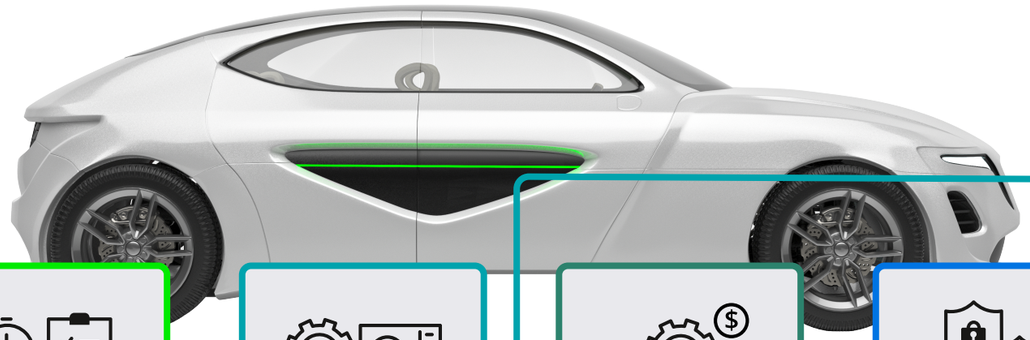
Real-time ECU software development: Challenges, methods and tools



Short development cycles | **Software complexity** | **Development efficiency** | **Safety and security**

Short development cycles

Challenges	Solutions
Fast time to market • Shortened development cycles • Late feature requests • Different feature requests from a range of OEMs • Reuse of existing functionality	**EB tresos, real-time BSW** • AUTOSAR Basic Software that fulfills specific requirements of all application domains. • Road-tested for broad range of OEMs
Evolution after SOP • Competition-driven innovations requires later updates. • Regulatory changes and the rapid advancement of technology	**Pre-integration** • Pre-integration of EB tresos on latest microcontrollers • Automated integration and validation environment
High-quality standards • Automotive development cycles are getting shorter • Quality expectations are consistent on a high level • Focus on functional development	**Reliable basic software** • Trusted by OEMs for complete range of automotive real-time applications • Extensive maintenance of software products to ensure highest quality standards.
Verification of OEMs requirements • Ensure the fulfilment of the OEM specifications on every level	**Verification with EB tresos** • Tracing of OEM requirements into EB tresos

Software complexity

Challenges	Solutions
Real-time applications • Real-time µC multi-core support • Distribution of application over several cores • Basic software needs to run on several cores (e.g. gateway applications)	**Real-time basic software** • Partitioned Runtime Environment (safety/non-safety) • Multi-core OS (safety/non-safety) • Distributed basic software
Variant management • Realization of one ECU which is used in different environments (left-hand and right-hand drive vehicle)	**AUTOSAR post-build** • Post-build loadable (updateable) and selectable (multiple variants in one ECU)
Integration of third-party software • Additional functionality provided e. g. by OEMs • ECU consolidation, multiple development partners for different application parts	**Open tooling environment** • Template integration providing AUTOSAR architecture proposal • Extensive partner ecosystem with OEMs, tool vendors, and semiconductor manufacturers • Open tooling environment with EB tresos Studio • Virtualization capabilities for deeply embedded systems

Development efficiency

Challenges	Solutions
State-of-the-art software development • Distributed development teams • Need for joint integration platform with automated tool environment	**Support for modern development tools** • Tool supporting collaborative workflows (“splittable configuration”) • Tool with command-line features • Flexible tool environment
AUTOSAR integration knowledge Required competence range (AUTOSAR, OEM specifics, µC, application, and more)	**Individual project support** Worldwide engineering expertise for fast localized support

Safety and security

Challenges	Solutions
Freedom from interference **Memory protection** • Unintended writing to memory of another partition • Register/configuration corruption due to unintended writing to processor registers **CPU time protection** • Blocking of partitions & wrong allocation of processor execution time **Communication protection** • Loss of information & corruption of information	**Highest safety levels** • AUTOSAR Basic Software from QM up to ASIL D for single- and multi-core • Mix of safety and QM software possible • Safety OS provides read and execution protection • Availability of safety functions and mechanisms independent from QM software • Fulfill safety requirement “Availability“ (e.g. electrical power steering) • Key functions stay intact even if QM parts fail
ECU cyberattacks • Protection of ECU against cyberattacks	**Enhanced security measures** • Penetration-tested and vulnerability-checked basic software (in-house cooperation with ARGUS) • Security extension for communication (IDS, IPSec, TLS, ...) • Seamless integration of EB zentur (EB's HSM firmware product)

inquiries@elektrobit.com · elektrobit.com/eb-tresos