

PROSPECTS OF APPLYING AUTOSAR ARCHITECTURE FOR EMBEDDED SYSTEM SOFTWARE DEVELOPMENT BEYOND THE AUTOMOTIVE INDUSTRY

During the last few decades, the complexity and level of integration of embedded systems have greatly increased. Along with this, the complexity of the software developed for and running on these systems has also risen.

One of the most impacted industries is Automotive. Modern cars today contain more than a hundred electronic control units (ECU), with different hardware, connected through different interfaces and networks, and often these ECUs need to interact with each other and the outside world. Without common standards such complexity and diversity often lead to development of platform-depended, hard to maintain and update software. To address these issues AUTOSAR (AUTomotive Open System Architecture) was proposed and incorporated by the industry.

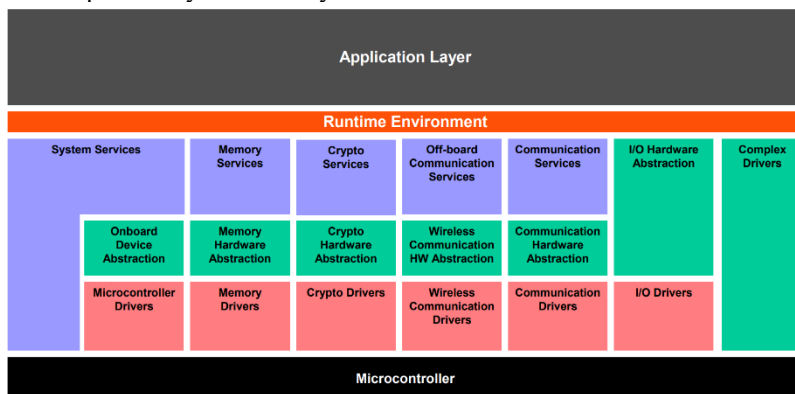


Figure 1 – AUTOSAR layered software architecture

The separation of hardware-independent application software and hardware-oriented basic software in AUTOSAR is achieved through the abstraction layer RTE (runtime environment). This enables the development of application software that can be readily ported to other hardware platforms or reused in other projects.

Nowadays AUTOSAR has extensive documentation on requirements and description of all elements of the layered architecture, and all these documents can be used in other fields and industries, apart from the automotive, where there is a need for reliable, standardized software.

For example, due to the extensive damage inflicted by Russian aggression on Ukraine's energy infrastructure, rebuilding and renovating its power generating capacity will be crucial in the forthcoming years. This will include not only restoration of buildings and heavy equipment, but also electric and electronic systems of the damaged powerplants.

One of the main electronic components of the power unit is the excitation system, which, similar to a modern vehicle, comprises various sensors, electronic control units, and communication interfaces to the power plant infrastructure.

Software that controls the excitation system must be highly reliable and robust, and able to run on different hardware platforms and configurations, depending on the requirements for the power unit and generator. This opens the possibility to incorporate AUTOSAR architecture principles during the software development for such systems to achieve:

1. development of reusable control algorithms and high-level logic application software components;
2. development of the standardized reusable diagnostics and communication services;
3. separation of the hardware-dependent drivers from other software components;
4. creation of more reliable software due to industry-proven standardized and documented approach to development, that will also simplify any safety assessments and certification.

REFERENCES

1. AUTOSAR Classic Platform architecture [Electronic resource]. – Access mode: <https://www.autosar.org/standards/classic-platform/> (Date of access 11.03.24).