Concept and Implementation of a Fault Management Framework for a dependable in-vehicle E/E-architecture

Task

Safety-relevant automotive systems have particularly high requirements for dependency and fault-tolerance. Facing the increasing number and complexity of the functions implemented with electronic systems, more applications are integrated onto one electronic control unit (ECU), in order to keep the number of in-vehicle ECUs under a certain level. The increasing density of applications on the ECUs makes it necessary to offer a special framework, which centralizes fault management mechanisms in order to prevent faulty applications from having negative effects on other applications running on the same ECU – the Fault Management Framework.

To achieve this goal the Fault Management Framework makes use of “Dynamic Reconfiguration”, a statically defined configuration which specifies how to react to faults during runtime and thereby to enhance fault tolerance (by e.g. deactivating or restarting faulty parts before they can damage the whole system). As part of the EU project EASIS (www.easis.org), which aims to provide a standard software platform for integrated safety applications, the Fault Management Framework shall be integrated into the EASIS software platform as a standard software module.

Goal of the Thesis

According to the industry V-model, this diploma thesis, with regards to the development of the FMF, was structured in the following steps:

- Assessment of different approaches/functionalities (e.g. AUTOSAR, see www.autosar.org) on fault handling and dynamic reconfiguration for the Fault Management Framework
- Design of an appropriate concept
- Implementation and prototyping on an evaluation board of Freescale (µC MC9S12XFR128 with integrated CAN and FlexRay interfaces) with C and OSEK OS (www.osek-vdx.org)
- Evaluation of the prototype with appropriate evaluation cases with Rest-Bus simulation tools (CANoe, www.vector-informatik.com)

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