Automotive Electronics - A Challenge For Systems Engineering

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Abstract

Increasing demand for dynamically controlled safety features, driving comfort and operational convenience in upper class cars require an intensive use of ECUs (electronic control units) including software. A network of up to 70 ECUs which are communicating via busses is mandatory for the required functionality. On the one hand, complexity of ECUs is rapidly increasing and time to market is decreasing. On the other hand, automotive electronics is developed together with many suppliers under control of the OEMs. Furthermore, 30% of the value added in automotive is up to electronics. Thus, from a technical, an administrative and from a business point of view the car manufactures have a vital interest to improve and shorten the software development process for ECUs together with all partners involved.

As a consequence, a general objective is to improve the ECU development process based on standards. Besides OSEK as an already accepted standard for ECU software operating systems in Germany, the OEMs are also interested in standards for bus systems or for model exchange formats, to mention just a few. In addition, an improved ECU design process covers system analysis, system specification, system design, automatic code generation, an integration of ECUs and the corresponding software in a real environment as well as calibration and after sales services. A special topic is the independence of an ECU hardware architecture development and the corresponding function development. Another highlight is adding surplus value with respect to functionality by an intelligent combining of already existing ones.

This presentation gives an overview about the current situation in automotive electronics design, presents a new design process and discusses the challenges.