

Hardware Engineering

The interface between hard- and software

Background

The work group Hardware Engineering develops efficient and effective methods to merge the separately developed hardware and software. Furthermore the working group works on topics like circuit board layout and hardware description languages.

Development using Co-Design

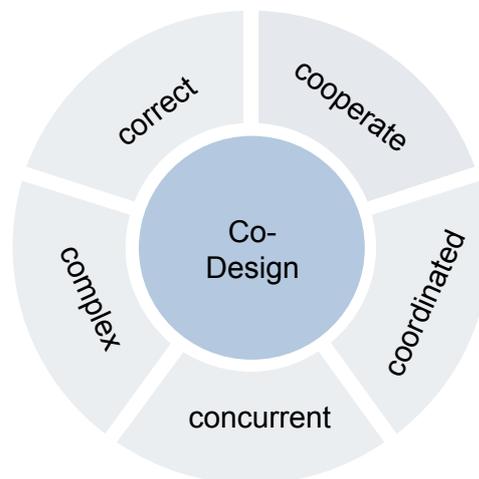
Conventional methods develop the software part and hardware part in separate development steps. The merging of both parts into one complete system happens at dedicated integration points. In contrast to this approach, the Co-Design develops both parts parallel.

Co-Design was developed as an answer to the evolution in micro electronics. Furthermore embedded system and real time applications increased in complexity causing a need in a systematic approach making the use of computer aided tools necessary.

Another catalyst for the development was the increasing automation of high tier design hierarchy. The challenge was solved by using computer aided tools on system level.

The third aspect is the cost factor which is a deciding factor if the technical solution is feasible. The competitive capability of a system is decided by cost and time-to-market.

INVENSITY support development with Co-Design using the experience gained in various projects on this topic.



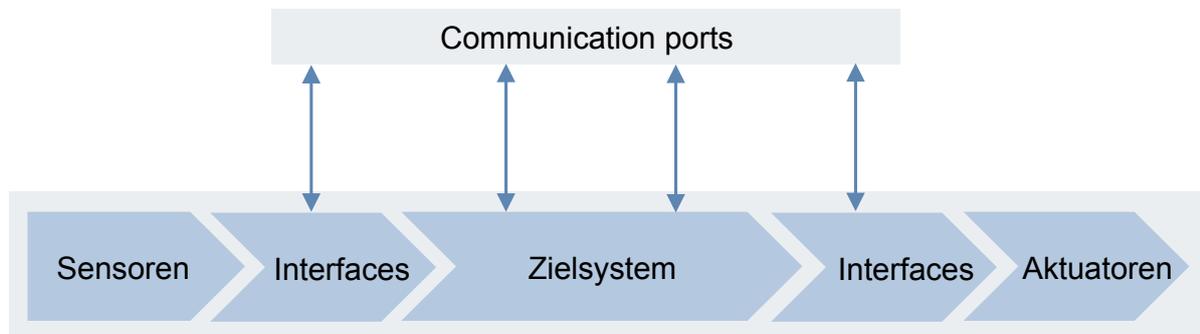
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Hardware Engineering

INVENSITY Center of Excellence Systems Engineering

Basic Structure of Harware / Software Systems

The basic components for a system are sensor, actuator, interfaces and the target system. Sensors convert physical or chemical factors into electrical signals. Those signals are processed by the target system and subsequently transferred to the actuator. INVENSITY's experienced Consultants offer expertise in different target systems as well as sensors and actuators.



Comparison between SW/HW-Implementation

Software is generally dependent on the used processor. Processors can be differentiated into General-Purpose-Processor, Microcontroller, digital signal processor and application-specific-instruction-set processor. Each of those processor types is specialized for a specific task. In case of specific hardware functionality the usual approach is to use application-specific integrated circuits which aren't necessarily programmable. In contrast field-programmable gate arrays are used as a programmable hardware module

System Design

A current trend in the last couple of years is a development method which is based on description and synthesis. Systems are specified by executable behavior description and subsequently the structure of the implementation is automatically generated with appropriate synthesis methods. If the design of every single component in a system was done by hand it would be a lot more time consuming and prone to failures.

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