Analysis of Alternative Hardware Architectures in Embedded Systems Regarding Safety and Reliability

Task

Embedded sytems must manage a multitude of various tasks. Some of these tasks can be solved notably well, using CPU based systems (microcontrollers, DSPs, etc.). Other tasks in turn, can be solved peculiarly well with systems that consist of reconfigurable hardware (FPGA, CPLD).

HW/SW codesign approaches engage in the integration of the advantages of both hardware platforms into one system.

In this thesis, HW/SW codesign is to be examined taking the ATMEL FPSLIC as an example. This chip contains both a microcontroller and a FPGA whereas the former will be programmed in C and the latter will be programmed in VHDL. A codesign environment will allow corporate simulation and debugging.

The specific tasks that have to be resolved in this thesis are:

- What application classes could profit of this kind of architecture? What are the concrete advantages (functional and non-functional qualities)?
- How great is the additional effort caused by the development of the functionality on two different hardware platforms (various languages, interfaces, etc.)?
- How well is this additional effort being intercepted by the development environment (co-simulation etc)?

The modified task of the lab course shall be implemented examplary.

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