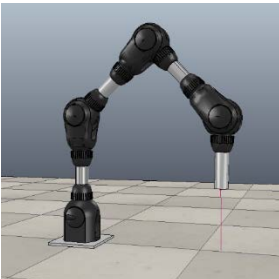




Master thesis / Bachelor thesis

New ways of Detection and Handling of Soft Errors in Embedded Control Systems



Embedded control systems can be found in almost all technical fields and correct execution is required for safety critical applications.

Radiation-induced soft errors can lead to a “bit flip” in digital integrated circuits. This can lead to the incorrect execution of embedded control software, which may lead to wrong behavior of embedded systems and, thus, to safety critical situations. Yet, many control systems have an inherent resilience to errors. Similar to noise, wrong behavior is detected when new

sensor values become available. This work targets to quantify the resilience of control systems against errors in the digital hardware, also considering current safety mechanisms. Based on existing SystemC models, simulation-based experiments are performed and evaluated. This work is very research-oriented and new ways for classification of resilience must be developed in cooperation with the supervisor.

The work is based on an advanced error injection environment at the EDA institute and a cross-layer approach to add safety measures from Stanford University. The error injection environment is programmed in C++ and quite complex. Thus, experience in C++ is advised.

Tasks:

- Setup of Control System Model based on SystemC and C++ Error Injection Environment
- Error injection experiments on Linux cluster
- Tool for automatic classification of the resilience of soft errors on the control performance
- Addition of cross-Layer safety mechanisms (SW, Architecture, Compiler, Circuit level)

Requirements:

- Some experience in C++ Programming advised
- Interest or experience in Embedded SW
- Interest or experience in learning SystemC

Interested? Contact me under:

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