Chair for Integrated Systems
TUM Department of Electrical and Computer Engineering
Technical University of Munich

Forschungspraxis, Assistant (Student), Master's Thesis, Bachelor's Thesis

Development of a Monitoring & Fault Injection Infrastructure for an MPSoC Demonstrator Featuring a Hybrid NoC

Enabled by ever decreasing structure sizes, modern System on Chips (SoC) integrate a large amount of different processing elements, making them Multi-Processor System on Chips (MPSoC). These processing elements require a communication infrastructure to exchange data with each other and with shared resources such as memory and I/O ports. The limited scalability of bus-based solutions has led to a paradigm shift towards Network on Chips (NoC) which allow for multiple data streams between different nodes to be exchanged in parallel.
For an MPSoC based demonstrator that is intended to demonstrate fail-operational capabilities (e.g. for automotive use cases) it is necessary to not only monitor and display the current state of the system but also inject faults into the system as well.

Goal

The goal of this work is to develop an infrastructure to monitor the traffic load and task execution in an MPSoC on an FPGA, inject faults in the system's NoC, and provide a GUI on a host PC to display the system's status and control the fault injection. This work can be split in several work packets.

Prerequisites

To successfully complete this project, you should already have the following skills and experiences:

- Good programming skills in either a hardware description language i.e. (System)Verilog or VHDL and/or C and JavaScript (or another programming language of your choice to create a GUI)
- Solid Python programming skills
- At least basic knowledge of the functionality of NoCs
- Self-motivated and structured work style

Learning Objectives

By completing this project, you will be able to

- Understand the concept of TDM NoCs
- Create and extend hardware modules in SystemVerilog
- Create tests to validate hardware modules
- Create and extend software on a host PC that communicates with hardware modules on an FPGA

- Document your work in form of a scientific report and a presentation

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