Lehrstuhl für Bildverarbeitung

RWTH AACHEN UNIVERSITY

Keywords

Low-Field MRI | Compiler Development | Embedded Systems

Master-Thesis

Design and Evaluation of a Domain Specific Language for Sequence Interpreting in Low-Field MRI Consoles

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Background

Magnetic resonance imaging (MRI) is an imaging technique that uses magnetic fields and radio waves to create detailed images of the inside of the body. Low-field MRI systems work with a weaker magnetic field.
In the DeLoRI project, together with the Fraunhofer MEVIS Institute, we are developing a low-field MRI device to support cancer diagnostics. For the construction of the main magnet, a precise measuring probe is needed to measure the homogeneity of the field consisting of permanent magnets and thus improve the image quality in the later course of the project.

Tasks

This thesis aims to explore a novel approach to controlling various systems in an MRI scanner. Traditional systems are based on predefined sequences that trigger specific hardware events. This thesis will investigate the possibility of calculating such sequences in real time using a dedicated programming language (DSL) and a just-in-time compiler. This will then be executed close to the hardware, enabling flexible adaptation of sequences. This improves imaging, as it is possible to change important parameters immediately in real time.

Your Profile

For the successful implementation of the project, you should have an interest in one or more of the following subject areas:

- Theoretical Computer Science | Compiler Development
- Embedded Systems | FPGA Development
- Just-In-Time Compiler

Our Offer

The call for applications is aimed at master's students with a technical background (e.g. electrical engineering or technical computer science) and is carried out in cooperation with Fraunhofer MEVIS. A workstation can be provided at the Chair of Image Processing, includes modern IT infrastructure, a workshop and rapid prototyping facilities.