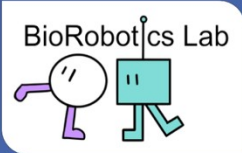


Optimization and Biomechanics for Human Centred Robotics KIT BioRobotics Lab



Prof. Dr. Katja Mombaur

Endowed Chair by Hector Foundation II
Institute for Anthropomatics and Robotics (IAR)

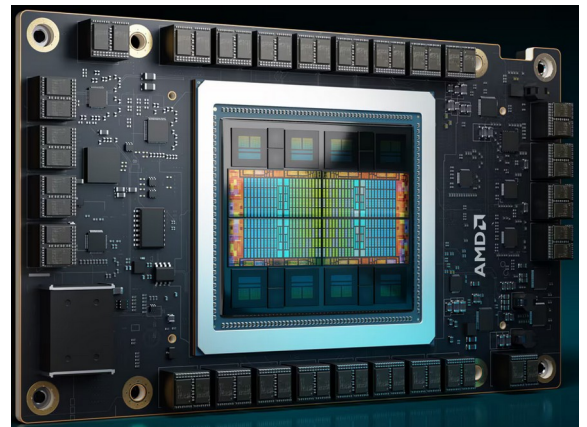


Bachelor's or Master's Thesis: Aggregate functionality on GPUs and accelerator hardware

Supervisor: Jonas Große Sundrup (jonas.grosse-sundrup@kit.edu)

Background

Numerical methods are a core pillar of modern robotics research. The faster these methods, the more effective the robot control. However, a lot of the capability of these methods hinges on aggregate steps, where one needs to collect all numerical information available and decide on the next course of action. While accelerators are extremely good at computing a lot of things in parallel, and distribution is usually fairly straightforward, their aggregation capabilities are not as clear.

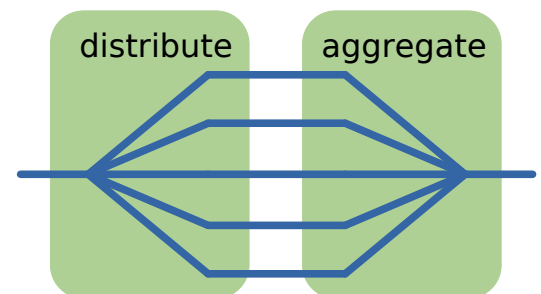


Scope of the thesis

This thesis will focus on the evaluation of the capabilities of available accelerators to compute aggregate information. To do so, the student will implement a numerical problem with a high amount of aggregate steps and will investigate both algorithmic as well as hardware-provided approaches to improve the aggregation performance on the problem.

The student will benchmark the different approaches to provide the necessary insights to make an informed decision on the capabilities of novel architectures for offloading compute onto such hardware, and their suitability for different kinds of aggregation problems in the area of robotics and beyond.

The exact scope of the thesis depends on whether it is a Bachelor's or a Master's thesis. A code framework to work within will be provided.



Recommended knowledge

- fundamental knowledge about mathematical or numerical methods
- C++ programming experience