

Semester / Bachelor / Master Thesis:

Performance Improvements in Novel MCU Platforms

Motivation and Informal Description: Over the past decade, there has been a continuous trend towards designing more energy efficient systems. Big-little platforms, containing both high performance and power-efficient cores, can exploit this architectural heterogeneity to introduce significant energy savings. Unfortunately, such systems require advanced features such as fine-grained DVFS and multi-threading, both of which are beyond the capabilities of low-performance microcontroller units (MCU's). More recently, a novel dual-core platform, consisting of a heavy and a light core, has been proposed. These systems have architectural homogeneity, but exhibit a difference in power consumption between the cores. While it has already been shown that this type of heterogeneity can improve the energy efficiency, there is still an open question regarding the performance improvements of such platforms.

Project Description: The main goal of this thesis is to demonstrate the potential performance improvements of the heavy-light platform. These platforms require a framework to optimally distribute the load between the cores. In our current phase, we have a two simulation models, one in Matlab, another in SystemC. Your tasks will be to extend these models, and to quantify the possible performance improvements. You will then extend our current scheduling framework to include new algorithms. Depending on your interests, you can also get involved in the design of new energy-aware scheduling policies. Finally, you will empirically demonstrate the improvements on our demo-board.

This involves the following tasks:

- Extend Matlab models to include performance metrics
- Extend current bare-metal scheduling framework
- Build testing infrastructure to measure energy and performance improvements

Requirements: Familiarity with Matlab and C/C++.

Interested? Please have a look at <http://www.tec.ethz.ch/research.html> and contact us for more details!

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