

Master thesis topic

01.01.2023

Benchmark for Onboard computing in mobile applications

Motivation

Developers of onboard applications need information about which hardware is best suited for their algorithms. Performance benchmarks of mobile hardware are often limited to CPU performance alone. Choosing appropriate hardware is a challenge given the limited computing power, as well as the available electrical power. Using a new benchmark on the performance of Mobile Compute Units typically used in mobile robots and satellites (e.g., Raspberry Pi 4, Upboard Squared, NVIDIA Jetson), this choice can be made.



Objectives

The goal of this work is to develop a benchmark that provides information about how fast certain operations can be executed on the corresponding hardware and how much the hardware is utilized. In addition, the benchmark should provide information about how much energy the algorithm consumed during its execution. The aim here is to determine whether energy can be saved by outsourcing code to dedicated low-energy cores (Intel CPUs / ARM CPUs) without sacrificing performance. The benchmark should support all common hardware architectures (ARM, X86). The work is divided into three parts:

1. Development of a concept for a benchmark of onboard systems
2. Implementation of the benchmark (development of scripts to analyze the performance).
3. Flexible porting and testing of the benchmark on different embedded and low performance systems (different CPUs + GPUs).

Requirements

For the job, a basic understanding of how CPU and GPUs work is an advantage. Furthermore, knowledge in the area of (Linux) operating systems is important.

We offer

- Interesting work in current research topics.
- Opportunity to contribute own ideas in solution design
- Intensive supervision and support

Duration

6 months

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