Master Thesis

**Tock OS: A Secure, Rust-based Runtime for the Internet of Things (multiple theses)**

**Motivation**

The Internet of Things (IoT) brings processing and wireless communication capabilities to everyday objects, such as smart light bulbs, smart thermostats, or smart keys. Rust is a new programming language offering high-level programming and safety features known from Java, Python or Haskell at a performance and flexibility that commonly only C and C++ offer. This combination opens the door to employ Rust as a systems language to develop Operating Systems and system runtimes for the Internet of Things.

**Challenge**

This work aims to extend Tock OS (tockos.org) with a set of new features such as (select a subset based on interest and background): (1) Porting to new platforms, (2) integrating new programming concepts such as futures, (3) improving energy efficiency, (4) providing an abstraction layer to run Contiki application with Tock, (5) adding new network stacks such as Thread and BLE. With our support, you design and implement your goals and evaluate its performance on real-world IoT devices. In benchmarks, we will compare the performance of your “modern” Rust runtime to existing IoT operating systems in selected metrics such as energy efficiency, memory usage, and CPU load. You can conduct this thesis individually or as a team of two students. We will adapt the content accordingly. For details and further questions, please contact us. Just come over for a coffee and discuss this thesis with us.

**Background & Requirements**

- Computer Science or related programs
- Courses in computer networks, distributed systems, or related ones
- Solid experience in C or C++
- Experience with Linux

**Contact**

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