Master Thesis

**Emulating the Internet of Things with QEMU**

**Motivation**

The Internet of Things (IoT) brings processing and wireless communication capabilities to everyday objects, such as smart light bulbs or smart thermostats. Debugging and testing IoT applications on real-world devices is challenging due to lack of control and the non-determinism of both the environment and wireless communication. This combination makes it time-consuming and complicated to reproduce and track bugs. System emulators such as QEMU have established themselves as powerful alternatives.

**Challenge**

This work aims to implement device models for typical IoT devices in the modern QEMU emulator. This emulator already brings support for common ARM chips, and your task is to extend this support to the standard peripherals on an IoT board such as sensors, wireless radio, and actuators. Based on your interests, we will focus on different directions such as selecting different boards or peripherals. With our support, you shall design and implement these as extensions to QEMU and evaluate them in comparison to the real-world devices.

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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