Project: IoT - From the Microcontroller to the Cloud

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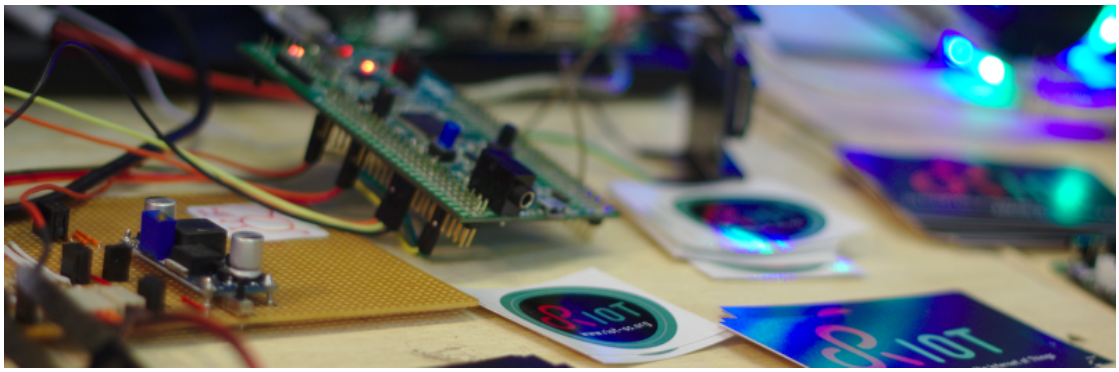

Context

The *Internet of Things* aims to seamlessly integrate billions of so-called *Smart Objects* into traditional Internet infrastructures. From the hardware perspective, Smart Objects emerged when tiny, cheap computers became available, combining energy efficient micro-controllers, low-power radio transceivers, and sensors as well as actuators interacting with the physical world, often powered by batteries. These systems enable a connection between the phyisical and the digital world. In order to further process the gathered data, to control the actuators, or to manage the devices typically a cloud-based backend is used.

Procedure

During the project the participants will work together in teams to develop a software solution which allows for a secure and energy-efficient transport of sensor data from these *Smart Objects* towards a cloud backend. Furthermore the gathered data shall be visualized from the cloud. To achieve this goal the participants are asked to implement a firmware for *Smart Objects* on top of the open source operating system *RIOT*. The software is going to be evaluated in an IoT testbed running on real IoT hardware and an IPv6 connection. For collaboration and version control the teams will use *git*.

Technologies

During the course the following tools, protocols, and programming languages are going to be used:

- ANSI C
- RIOT (https://www.riot-os.org)
- FIT IoT-Lab (https://www.iot-lab.info)
- Protocols of the TCP/IP-Suite
- AWS IoT Cloud

Requirements and prior knowledge

Basic knowledge of the programming language C and Internet protocols is a requirement for the project. No particular prior knowledge in regard to IoT specific protocols or embedded software development is necessary.

The participants require a laptop or PC running a Linux distribution - or to setup a VM accordingly.

The project can serve as a basis for a thesis.