Advanced Internet and IoT Technologies Assignment 04

HAW Hamburg SS 2022

Prof. Dr. Thomas Schmidt, Michel Rottleuthner, M.Sc. Deadline: June 15, 2022

1. **Discover IoT Devices**

   IoT nodes are often very constrained battery powered mobile devices. Running discovery protocols that broadcast the whole network may therefore be undesired as they increase the network load. Also, in many cases ad-hoc broadcasting would simply not work reliably because sleepy nodes may be unreachable during longer time periods due to heavy duty cycling.

   In such scenarios it is benefitial to offload the discovery to other (non-constrained) network hosts.

   Tools: `git, make, RIOT, aiocoap`

   (a) Setup a CoRE Resource Directory (RD) on the Raspberry Pi (see aiocoap documentation).

   (b) Use the example firmware *examples/cord_ep* to register an IoT node at the RD.

   (c) on a Linux machine (eg., the Raspi), use *aiocoap-client* to manually discover the IoT nodes that registered at the RD and then access its ressources.

2. **Make Your Custom Firmware Discoverable**

   Integrate the previously learned RD features into your custom firmware application so that other hosts can query the RD and discover your node.

   Tools: `git, make, RIOT, aiocoap`

   (a) Integrate the CoRE RD registration functionality to your custom firmware.

   (b) Discuss potential solutions to let the IoT node automatically find the RD.

      i. Implement one such mechanism so that your IoT node does not need to know the IP of the RD beforehand.

   (c) Implement a client program in python that queries the RD to discover IoT nodes.

      i. Add a feature that automatically reads all sensors of each discovered device.

3. **Inter-device IoT Application**

   Now that we have a number of IoT nodes that can be automatically discovered and provide data of phyical sensors we want to build an application that combines multiple devices to implement a higher order application with multiple devices.

   Tools: `python`

   (a) Extend your python application.

      i. Figure out via sensor readings whether the IoT node faces up or down.

      ii. If at least one node faces down, the application should turn off all LEDs of all nodes.