Lab Exercise 2 – Networking with Contiki (Part 1)

Objectives:.

- Introduction to digital/analog peripherals in Contiki.
- Use the sensors (button, light, temperature) on the sensortag.
- Gain familiarity with 6LoWPAN, the IPv6 implementation for wireless sensor networks.
- Use TCP connection to collect data from sensortags.

Introduction:

There are two parts in this practical.

The first part introduces you to the sensor event functionality of Contiki. The goal is to understand the basics of Contiki, gain familiarity with the programing environment and the SensorTags.

The second part introduces you to the Contiki 6LoWPAN networking stack interface. The goal is to understand the basics of 6LoWPAN/RPL and to gain familiarity with using TCP connections to transfer information from the sensortags.

TCP Networking (5 Marks + 2 Bonus)

Create a folder called *prac2* in your repo folder and set *prac2* as your contiki project name (Makefile). See the main lab page on the website for submission instructions.

You must demonstrate a simple network with one rpl-border-router running on a sensortag and another sensortag running the `tcp-server` instance. You must be able to run ping6 on the PC and ping the `tcp-server` sensortag via the rpl-border-router (`make connect`). Modify the `tcp-server` to implement the commands below. You must be able to use the nc6 (netcat6) command to send a buzzer turn on/off command and LED set/read values to, as well as display the sensor values collected from the sensortag. Implement the following commands:

- Use 'r', 'g' and 'a' key strokes to toggle LED Red/Green/all on the sensor tag with a frequency of 2Hz. (**2 Marks**)

- Use 'b' key stroke to turn on/off the buzzer (**1.5 Marks**). Use 'i', and 'd' key strokes to increase and decrease the sound frequency by 10Hz per second for 5 seconds. (**1.5 Marks**)

- **Bonus:** Use 'p' and 'h' key strokes to remotely collect ten samples from the pressure sensor (BMP_280) or ten samples from the humidity sensor (HDC_1000), respectively. The sensor value should be read at a frequency of 1Hz and displayed in nc6 terminal. Refer to the sensor-interface example in contiki-examples/humidity sensor. (**2 Marks**, one for each of the sensors)

References:

- Tutorial 5 – Sensors
- Tutorial 6 – 6LoWPAN Introduction
- Simple HTML guide: http://www.simplehtmlguide.com/basics.php