MSE TSM MobCom Team Project

08.11.2020, thomas.amberg@fhnw.ch and ulrich.fiedler@bfh.ch

Motivation

The team project is part of the TSM MobCom course and motivated as follows:

- Make the connection from theory to practice. Apply the knowledge acquired in the theory part of this course to develop your own "connected product" consisting of a smartphone app and a peripheral device, in a close to real life scenario.
- This project is part of the learning objective assessment, counting 30%.

Learning Objectives

Through the team project, you will:

- See what it takes to design and implement a viable connected product.
- Learn how to make the best use of limited smartphone display size.
- Learn how to prototype a device with sensors and actuators.
- Learn how to provide value to users and stakeholders.
- Learn how to conduct a software project in a team.
- See also Module Description on Moodle.

Methodology

- Agile development with 1 week sprints for lightweight team coordination.
- Project board with columns "to-do", "doing", "testing", "done" for tasks.
- One lecturer will act as product owner, approving transition to "done".

Deliverables

The following deliverables are required:

- Code including README on GitHub*
    - Arduino firmware C source code
    - Native Android app source code (and APK)
- Presentation (PDF, 15 minutes)
    - Introduction (use case)
    - System architecture (reference model, HTTP and BLE interfaces)
    - User interface (screenshots, navigation)
    - Software architecture (reduced class diagram and sequence diagram)
    - Code quality and testing (SonarQube report, checklist, automated tests)

- ○ Discussion (achievements, technical issues, lessons learned, outlook)

- ● Demonstration video (MP4, 3 minutes)
  - ○ Explain setup, which part is which
  - ○ Show how the below constraints are met
  - ○ Show the main use case / functionality in action

A repository URL will be provided via GitHub Classroom at the project kick-off.

Constraints

The following constraints have to be met:

- ● Use case
  - ○ Provides real value to a specific target group*
  - ○ Is demonstrated with a working end-to-end prototype
- ● nRF52840 device
  - ○ Includes one or more sensors or actuators**
  - ○ Runs stand-alone, without a computer, e.g. on batteries
  - ○ Implements a BLE peripheral providing one or more services
- ● Smartphone app
  - ○ Is a native Android app, written in either Kotlin or Java
  - ○ Implements a BLE central, connects to the nRF52840 device
  - ○ Uses a backend server or cloud service to store and retrieve data
  - ○ Includes a visualisation of sensor data or actuator state

*Not just a boring tech demo. **Additional sensors and actuators are available on demand.*

Evaluation Criteria

During evaluation we will give 0, 1 or 2 points each for:

- ● Viable use case, explanation of user benefit in presentation slides
- ● Presentation in class or online including demo, slides and oral performance
- ● App code quality (as measured with SonarQube) / testing / stability
- ● User interface / user experience / scope of features
- ● Completeness of deliverables
- ● Timeliness of delivery

Example Use Cases

- ● Peripheral as a sensor: weather station, step counter, intrusion alert, bike sensor, ...
- ● Peripheral as a controller: dice or "enchanted" object for a smartphone game, ...
- ● Peripheral as an actuator: kid screen-time notification bracelet for parents, ...