

MSE TSM MobCom Team Project

09.11.2021, 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

- Team building and template via <https://classroom.github.com/a/zhVdcc4e>
- 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 (to get a repo use the Classroom link above)
 - Arduino C source code
 - Native Android app source code (and APK)
- Presentation (PDF, 10 minutes)
 - Introduction (use case)
 - System architecture (reference model, HTTP and BLE interfaces)
 - User interface (screenshots, navigation)
 - Software design (simplified class diagram and sequence diagram)

- Code quality and testing (static code analysis and testing checklist)
- Discussion (achievements, technical issues, lessons learned, outlook)
- Demonstration video (MP4, 2 minutes)
 - Explain setup, which part is which
 - Show the main use case / functionality in action

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 the BLE peripheral role providing one or more services
- Smartphone app
 - Is a native Android app, written in Kotlin and/or Java
 - Implements the BLE central role, connects to the nRF52840 device
 - Uses a backend server or cloud service to store and retrieve data
 - Includes a visualization 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 online including demo video, slides and oral performance
- App code quality / 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, ...