

# MSE TSM MobCom Team Project

10.11.2024, T. Amberg ([thomas.amberg@fhnw.ch](mailto:thomas.amberg@fhnw.ch)) and H. Stormer ([stme@zhaw.ch](mailto:stme@zhaw.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, based on the objectives stated in the [module description](#), 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.

## Methodology

- Add yourself to a team and provide three project ideas per team in this Google sheet: <https://docs.google.com/spreadsheets/d/1xNpG1o43zMsC7emLFJxohgLZEydCDNORX74Om1PIL3o/edit?usp=sharing> (there will be 7 teams with 2 people each)
- Create a project repo or join one: <https://classroom.github.com/a/dshj-7kx>
- Agile development with one week sprints for lightweight team coordination.
- Github project board (see repo) with "To Do", "In Progress", "Done" tasks.

## 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, 8 minute talk)
  - Introduction (use case)
  - System architecture (reference model, HTTP and BLE interfaces)
  - User interface (screenshots, navigation)

- Software design (simplified class diagram and sequence diagram)
- 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 Kotlin / Java app, with a Compose UI written in Kotlin
  - 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 your presentation slides
- Presentation including demo video, slides and oral performance
- 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, ...