

# MSE TSM MobCom Team Project

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## 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 sprints, product backlog and board

## 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 (5 minutes, MP4)
  - 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, beyond the built-in ones, 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
  - Wearable step counter
  - Door sensor / intrusion alert
  - Occupancy sensor for a room
  - Bike sensor (e.g. mounted to wheel)
- Peripheral as a controller
  - Dice or "enchanted" object for a smartphone app / game
- Peripheral as an actuator
  - Kid screen-time notification bracelet for parents