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, 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 in this online spreadsheet, include your GitHub user name: https://docs.google.com/spreadsheets/d/1EVhwT6Po7qomKvNZlxkwAHvhh9SjmeX8XIWqP8yGphY/edit?usp=sharing (there should be 8 teams, with 3 people per team)
- You will be invited to the project repository and an MS Teams channel for your team.
- We suggest agile development with one week sprints for lightweight coordination.
- As a first task, propose three project ideas per team in the above spreadsheet.
- Use GitHub issues with labels (see repository) for *todo*, *doing*, *done* tasks.

Deliverables

The following deliverables are required:

- Repository on GitHub (you'll get an invite by email)
    - README.md with the names of team members
    - Arduino Sketch with the BLE peripheral source code
    - AndroidStudio project with Android app Kotlin source code
- 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 your setup, which part is which
    - Show the main use case / functionality in action

Constraints

The following constraints have to be met:

- Attribution
    - If your code builds on 3rd party code, provide a link and refer to the license
    - If parts of your code / docs are based on “AI” tool output, provide the prompts
- 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, powered via USB or LiPo batteries**
    - Implements the BLE peripheral role providing one or more services
- Smartphone app
    - Is an Android app written in Kotlin (libraries can be Java), with a Compose UI
    - Implements the BLE central role, connects to a Feather 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 or batteries 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 and timeliness of deliverables
- Team work, via the git commit log

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, ...