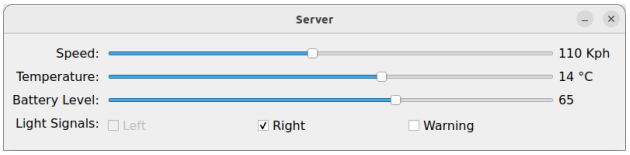
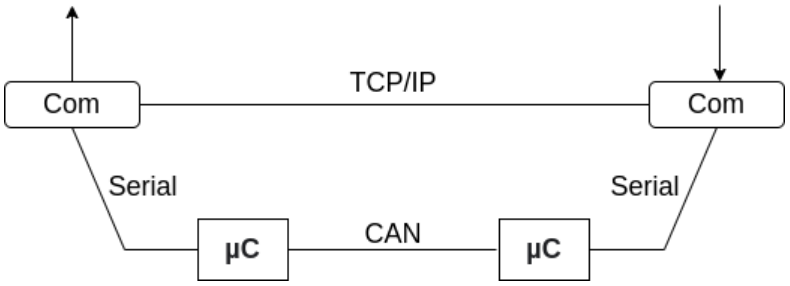
Teamwork Project

Programming and Development of Embedded Systems

1. The client and the server shall not depend on a specific communication protocol
    - They shall be able to communicate to each other using TCP/IP and Serial & CAN protocols
2. Max. speed is 240 km/h
3. Temperature is in the range of [-60, 60] °C
4. Battery level in percent.





Team A	Team B	Team C	Team D
Pedro, Albin, Daniel, Liban	Joel, Alexandros, Ridwan, Artush	Jonatan, Pernilla, Ellenor, Osman	Mary-Jane, Kalle, Hannes, Chike
Daily meeting: 10:00 - 10:15	Daily meeting: 10:15 - 10:30	Daily meeting: 10:30 - 10:45	Daily meeting: 10:45 - 11:00

1. Git and Github are used for collaboration. Follow the Github Flow strategy.
2. Actively participate in the development of the project.
3. To organize the project use Github Project.
    a. Use scrumban. Scrum master is shared, 1 / week.
    b. A sprint is one week. Sprint review and sprint planning on Thursdays
4. Every team has a slack channel for communication and it has been linked to the repo.
5. Use C++ and Visual Studio C++ style guide.
6. For the icons on the client GUI, use MaterialIcons-Regular.ttf font.
    a. For more info look at here.
7. On the server GUI, there shall be:
    a. A slider for speed. Speed is an integer in the range of 0 and 240.
    b. A slider for temperature. Temperature is an integer in the range of -60 and 60
    c. A slider for battery level. Battery level is an integer in the range of 0 and 100.
    d. Three checkboxes for the light signals. When the left is checked, the right shall be disabled and when the right is checked, the left shall be disabled. When none of the checkboxes is checked, all of them shall be enabled.

8. On the client GUI there is a simple dashboard to display speed, temperature, battery level, light signals and status of the communication if there is a problem in the communication between client and server.
9. The communication between client and server shall be abstracted using an abstract base class in order to make the applications independent of a specific protocol. The supported communication protocols shall be TCP/IP and Serial & CAN 2.0B.
    a. The abstract class on the server shall provide buffering and the following functionalities
        i. Inserting speed in the buffer.
        ii. Inserting temperature in the buffer.
        iii. Inserting battery level in the buffer.
        iv. Inserting the light signal states in the buffer.
        v. Sending the buffer over the chosen communication protocol.
        vi. Getting status of the communication.
    b. The abstract class on the client shall provide buffering and the following functionalities
        i. Extracting speed from the buffer.
        ii. Extracting temperature from the buffer.
        iii. Extracting battery level from the buffer.
        iv. Extracting the light signal states from the buffer.
        v. Receiving the buffer over the chosen communication protocol.
        vi. Getting status of the communication.
10. In the implementation of the communication protocols, use multithreading and ensure that the shared resources are protected.
11. If there is a problem with the communication
    a. On the server side an error message shall be printed to the terminal
    b. On the client side an error icon and an error message shall be displayed.
    c. The client shall try to reconnect to the server automatically
12. When speed, temperature, battery level or light signals on the server side are changed, the changes shall be communicated to the client side and they shall be displayed on the client GUI.
    a. If temperature is below 5 °C, its symbol color should be white
    b. If temperature is in the range of 5 and 39 °C, its symbol color should be blue
    c. If temperature is above 39 °C, its symbol color should be red
    d. If the battery level is below 25%, its symbol color should be red
    e. If the battery level is in the range of [25, 49]%, its symbol color should be yellow
    f. If battery level is above 49 %, its symbol color should be green
    g. If a light signal is checked, the corresponding light symbol(s) on the client shall blink intervally and a sound should be played. When the warning checkbox on the server is checked, both the light symbols on the client shall blink.
13. There shall be a CMakeLists.txt file in the root of the project to
    a. To switch between the communication protocols
        i. A variable shall be defined and based on its value a macro may be defined. Then in main.cpp files of the client and the server you can check if the macro has been defined then you create and use an instance of the chosen communication protocol class.
    b. Build both the client and the server programs
    c. To upload the PlatformIO projects to the microcontrollers

14. Every team shall present its work.
    i. Each team has 20 minutes Order: team A, team B, team C and in the end team D
15. Every team shall create a powerpoint for its presentation. The following topics shall be covered in the powerpoint and the presentation
    a. Introduction
        i. Who are you?
    b. The project overview.
        i. You can use the project layout
        ii. Briefly present the project and its main features
    c. The tools, platforms, frameworks and methodologies you used
        i. I.e. git, github, github project, Qt, Scrum, CMake, and etc.
    d. Your work and how you performed the project
        i. The way you worked
        ii. Use diagrams to explain responsibilities of different parts of the system
    e. Challenges
    f. What you learned from the project
    g. **Demo**
    h. Questions?