

IoT Project 2023

Two different options are available for the implementation of the IoT project:

- Solo project,
- Group project: each group must be composed of 2 students.

No other options are available.

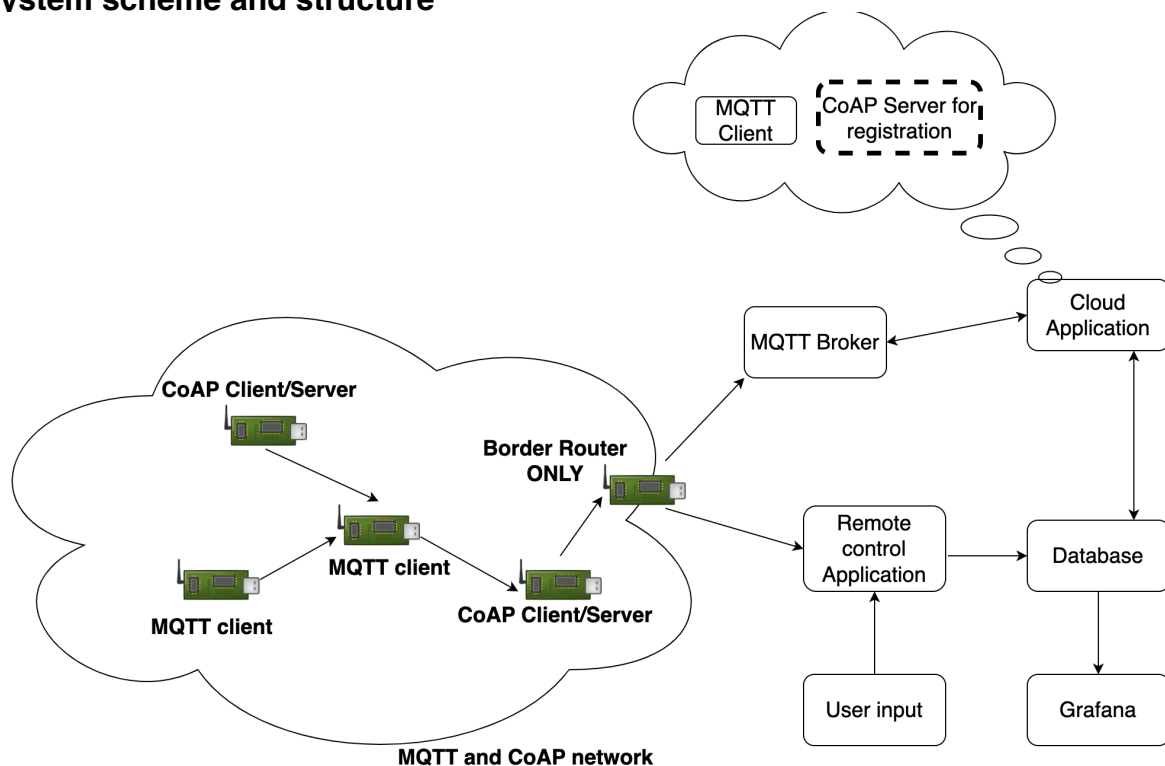
The project **must** be discussed in the same exam session in which the oral part of the exam will be given.

In the case of group project, the project can be discussed if at least one of the two members will give the oral part of the exam in the current session.

Project Objective

Development of an IoT telemetry and control system. The use-case of the project is open and must be defined by the student(s), examples are industrial control systems, logistics systems, smart office cooling and heating systems, etc.

System scheme and structure



The system must comprise the following components:

- A *network* of IoT devices, including sensors collecting data from the physical system/ environment and actuators. The sensors must use MQTT and the actuators must use CoAP. The devices that use CoAP are CoAP Server that expose their resources. The network must be deployed using real sensors (nrf52840 dongle or TI launchpad). In the network a border router must be deployed in order to provide external access¹.

¹ For the sake of simplicity, during the deployment we suggest to simulate the network on Cooja with both MQTT and CoAP sensors.

- [GROUP PROJECT] The CoAP actuators must register to the Cloud Application, acting as a CoAP Client. This to create a directory of actuators in the Database.
- [SOLO PROJECT] The list of actuators is statically created and exploited by the User Application via a configuration file.
- The *Cloud Application* collects data from MQTT sensors, store them in a MySQL database.
- The *Remote control Application* reads information about actuators and sensors from the database and implements a simple *control logic* in order to apply some modifications to one or more actuators based on the data collected from the sensors, e.g. some closed-loop control logic.
- It is required to provide some User Input to implement the User logic for the IoT application. The User input can be implemented as a command line interface.
- A web-based interface deployed using Grafana must be developed in order to show the data collected and stored on the database.

Guidelines/Requirements

- The application can be implemented using JAVA or Python
- Data should be encoded in a proper format that might depend on the specific use-case. The selection of the encoding language should be motivated, and it is going to be part of the evaluation.
- Button and LED interactions with sensors must be used.

Project submission

Projects must be submitted at least **4 days prior to the day of the exam**, e.g., if the exam session is the 08/06/2023 the last day for the submission (included) will be 04/06/2023.

The project must be submitted using this link: <https://forms.gle/3CKJJfizFvP67b5s8>.

Students must submit the **code** of the project and a **document describing the implementation and the use-case**. For the latter both a report or a detailed presentation are accepted.

Project discussion

The project discussion will take place the day of the exam, in person. In some exam sessions, with a lot of students registered to the exam, you will be contacted to schedule the discussion of the project some days before, still in person. The discussion, 10 minutes max for SOLO PROJECT, 15 minutes max GROUP PROJECT, will consist on the demo of the execution of the application, showing all the implemented and required features (5-6 minutes), and on 4-5 minutes questions on the code.