



## **JES**

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Project plan  
ICT Infrastructure project  
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# **1 Project definition**

## **1.1 Project background**

Our plants suffer from inconsistent watering. Some receive too much water, while others don't get enough. To address this, we are developing an automatic watering system that ensures optimal hydration and plant health. So far, we have researched components, planned the implementation phases, and outlined the necessary steps. The key benefits of this project include efficient and consistent plant care using IoT automated solution, and open-source code for others to replicate or improve.

## **1.2 Project purpose**

This project will create an automatic plant watering system that collects and processes environmental data, triggering irrigation when needed.

## **1.3 Project goal and results**

The main goals of this project are to build an automated watering system, make sure the sensor data is collected reliably, finish the project on time, and share the results and source code. A successful result will be a system that can monitor and keep the soil moisture and temperature at the right levels. It will also include a database and show the data with graphs.

The project will deliver a working system that accurately measures and controls the soil moisture and temperature. The system will also collect and show data about these factors, making it easy to track the plant's health. The project will include documentation, both technical and non-technical, along with system diagrams and research findings. It will also include a virtual machine for testing the system and a database to store the sensor data.

The software used in the project will include Arduino reading data from the soil moisture and temperature sensors. Raspberry Pi will be used to process the data and provide remote access. Database will store the sensor data, and Grafana will be used to create graphs that visualize the data.

We will also create system diagrams and write reports about the project. The documentation will explain the design, the code, and the results, and will be useful for anyone who wants to understand or build on the project.

Through the project, we will gain practical experience in programming microcontrollers to collect sensor data, integrating IoT devices, managing a database, and coding in Arduino Ide and Python. We will also learn how to manage a project, including scheduling tasks, tracking progress, and making improvements along the way.

## **1.4 Project Organization and Partners**

The project is led by Jade Malin, who serves as the project manager. The other project members are Selma El Uharani and Emilia Hauskaviita. Harto Holmström is the coordinating teacher and a key stakeholder, alongside Tero Karvinen. The future users of the project include anyone interested in automating plant watering to maintain plant health.

## **1.5 Project Budget and Schedule**

We will adhere to the guideline of 55 hours for project management and 215 hours for project implementation. A mandatory group meeting will be held every Friday from 11:00 to 13:45, along with required meetings with the coordinating teacher. The project budget is set at 100 euros. The project started on January 31, 2025, and will conclude on May 16, 2025.

## **1.6. Risk**

Adapting to new tools and methods could take longer than expected, so we will allocate dedicated time for learning and break tasks into smaller chunks. Delays in tasks may impact the overall schedule, which is why we will regularly track progress and adjust the schedule as needed. Debugging may take significant time and cause frustration, so we will reserve time for testing and troubleshooting. Hardware components could break or malfunction, so we will handle them carefully.

Since the project requires expertise in Arduino, Raspberry Pi, coding, and database setup, we will prioritize learning key technologies and seek external help if needed. Misconfigurations or compatibility issues could cause delays, so we will double-check configurations before assembly. Clear communication is essential for smooth collaboration, and to avoid misunderstandings, we will utilize collaboration tools (Microsoft Office, Github) and hold regular check-ins.

## **2 Project work plan**

### **2.1 Project phasing and timing of the overall work**

Phase 1 involves ordering the necessary components for the project. The workload includes online shopping for the required parts, which will take place in Week 7. This phase depends on the completion of project planning, and the expected outcome is the successful delivery of all components.

In Phase 2, the physical IoT components will be assembled. This will occur in Week 8 and requires the completion of Phase 1. The workload includes connecting the Arduino Uno to the Raspberry Pi 3, as well as attaching sensors and the water pump to the Arduino. By the end of this phase, the physical IoT part will be fully assembled.

Phase 3 focuses on building the non-physical IoT components. This phase is scheduled for Week 9 and is dependent on the completion of Phase 2. The main tasks include configuring the Raspberry Pi and setting up the database. The expected result is a functional non-physical IoT infrastructure.

Phase 4 is dedicated to coding and debugging which will take place between Weeks 10 and 13. It depends on the successful completion of Phase 3. The workload includes writing code and debugging the codes for the database, water pump activation, and sensor functionality. The outcome of this phase will be a fully functional IoT infrastructure.

Phase 5 focuses on setting up and configuring the database. This will occur in Week 14, following the completion of Phase 4. The primary task is finalizing the database setup, resulting in a fully operational database.

In Phase 6, the graphical interface will be built and integrated using Grafana. This phase is scheduled for Week 16 and requires the completion of Phase 5. The workload includes integrating data into Grafana to develop a functional graphical interface. By the end of this phase, the graphical interface should be fully operational.

Finally, Phase 7 involves finalizing the project and completing the final report. This phase will take place in Week 18 and is dependent on the completion of Phase 6. The primary task is writing the final project reports. The result will be a completed and fully documented project.