Documentation

Team Exemplary

1.<u>Team members</u>

- Arfat Kamal
- Tasawar Siddiquy
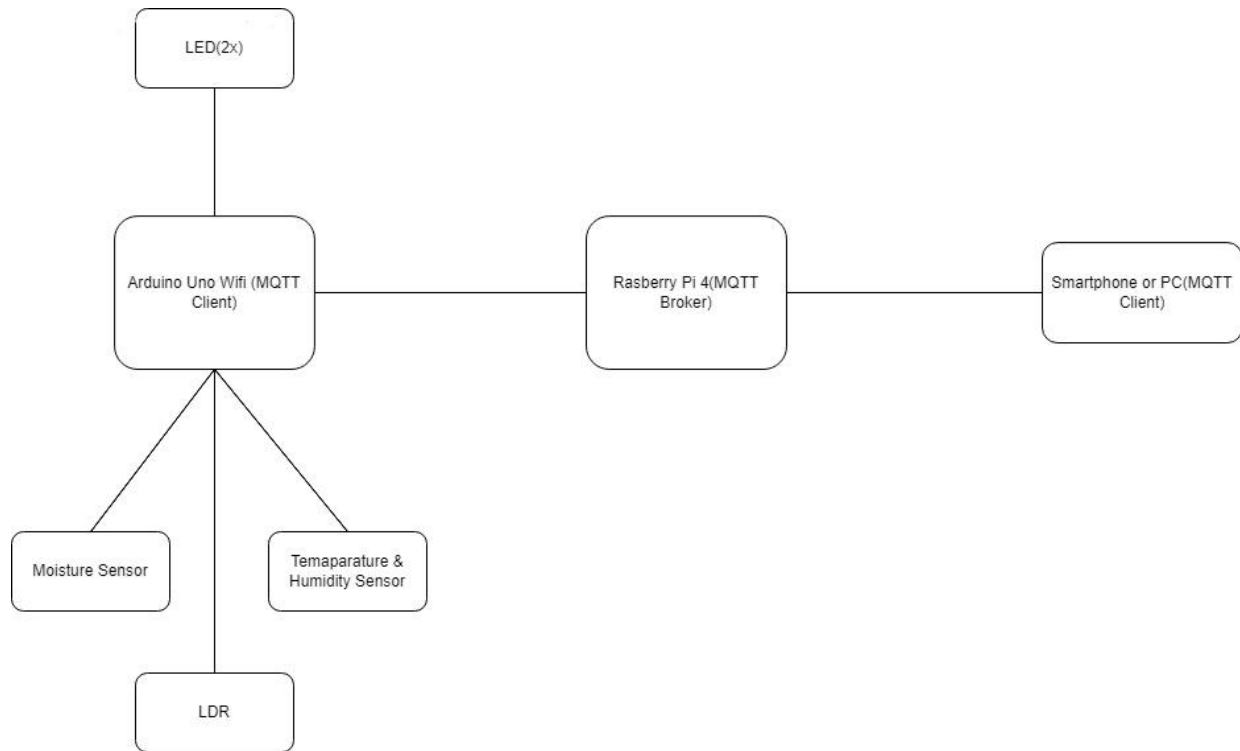- ASM Nurussafa
- Nirojan Navaratnarajah.

Listing of the individual team members

2.<u>Introduction</u>

Smart Plant Health Monitoring System is an emerging strategy for incorporating IOT (Internet of Things) technology into the field of home small scale gardens. Sensors can provide and receive data from plant pots via the Internet of Things. In this field, environmental conditions must be closely monitored in order to keep the plant healthy. To complete the objective, this project will employ microprocessors and microcontrollers, as well as necessary sensors.

3.<u>Concept description</u>

Automated Plant health monitoring system

LED(2x)

Arduino Uno Wifi (MQTT Client)

Rasberry Pi 4(MQTT Broker)

Smartphone or PC(MQTT Client)

Moisture Sensor

Temaparature & Humidity Sensor

LDR

Main application for the prototype

This Plant Health Monitoring System is aimed at people who really care about their plant's health but do not really have time to always spend time with it ,due to work or some other reasons. Since this is a Plant Health Monitoring System will ensure the health of the plant by getting readings of various environmental parameters and letting the person know incase action is necessary.So overall this project's application will be in small scale hobby plant growers in houses.

Which devices, sensors, actuators, apps etc. are using for your application?

4.Project/Team management

We plan to use the iterative development model to realize our project. Because it allows us to test and implement our model iteratively. It is useful because it lets us go back to the previous process whenever it is necessary.

Breakdown of tasks :
- Tasawar Siddiquy   - Temperature Sensor
- ASM Nurussafa   - LDR
- Nirojan Navaratnarajah - Humidity Sensor
- Arfat Kamal   - Moisture Sensor.

5.<u>Technologies</u>

The main roles of the sensors used in this project are listed below:

1. Temperature sensor :
   Plants use temperature as a seasonal cue. In some plant species, the timing of flowering is regulated by temperature,therefore monitoring the temperature in the plant environment is very important

2. Humidity sensor :
   The humidity sensor is a device that senses, measures, and reports the relative humidity (RH) of air or determines the amount of water vapor present in gas mixture (air) or pure gas.When relative humidity levels are too high or there is a lack of air circulation, a plant cannot make water evaporate (part of the transpiration process) or draw nutrients from the soil. When this occurs for a prolonged period, a plant eventually rots. Therefore it is essential to monitor humidity and take measures to maintain the humidity level at the best level.

3. Moisture sensor :Soil moisture sensors measure or estimate the amount of water in the soil. Water is required to serve as a carrier in the distribution of mineral nutrients and plant food. Plant cells grow by increasing in volume and for the cells to increase in volume they must take up water.So the moisture level in the soil must be monitored regularly and reported.

4. LDR sensor :   We use this sensor to sense the sunlight around the plant pot and the plant wherever the sunlight is maximum. This sensor returns a value of the intensity of light around it to the Arduino. The user is then notified about the light intensity via the Red LED light.

- ***Communication protocols***

In this project the MQTT (**Message Queue Telemetry Transport**) Protocol will be used to transfer sensor data from the Arduino to the raspberry pi. MQTT is a bi-directional communication protocol where each client can both produce and consume data by publishing messages and subscribing to topics. The big advantage of this two-way communication is that the IoT devices can send sensor data and at the same time receive configuration information and control commands.
The reason for selecting this protocol compared to HTTP, MQTT is faster, has less overhead and less power consumption. The other difference to HTTP is that in MQTT, a client does not have to pull the information it needs, but if there is new data to be sent, the server (broker) pushes the information to the client.

programming languages

1.The sensors will be connected to the arduino board with wires and we will be using the C/C++ language for coding the arduino board in the Arduino IDE in order to get the data from the sensors.

2.The data gathered from the sensors will then be sent from the Arduino to the Raspberry pi via the MQTT protocol, to implement this function the programming language we will be using on the Raspberry pi will be 'Python'.

6.Implementation

Describe the static structure of the environment.

Provide a class diagram for this purpose and briefly explain the classes or modules. Describe the use case(s) of your environment

7.Use Case

Give instructions on how to use your application. Potentially using an/more example(s), figures, screenshots etc.

8.Sources/References

Github Repository -
https://github.com/Asm-Nurussafa/Advanced-Embedded-System--Team-Exemplary