UE17CS490A – Capstone Project Phase – 1

End Semester Assessment

Project Title: IMPLEMENTATION OF PRECISION AGRICLUTURE MONITROINIG SYSTEM USING RASPBERRY PI AND CROP PREDICITON USING MACHINE LEARNING ALGORITHM

Project ID: PW21CBR01

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Problem Statement

Agriculture is the unpredictable way of yielding the crop where the farmers only test the soil such as moisture level, soil type, and soil moisture. Whenever the soil losses its moisture level water pump should be on immediately so the farmer should on the pump. It takes the time for farmer to do the manual work. The farmer uses pesticides to get the high yield of the crop, without knowing much about the pesticide and how much quantity should that are used. Framer should check the daily climate condition or the previous year's parameters he should go thorough for the present yielding purpose.

So to overcome these problems framers can use the smart agriculture method, in that farmer can easily get the details of the farm as well the immediately get the accurate value of the parameters. The sensors are inserted in some part of the field and the data is sensed by the sensor and sent it to the cloud and as well as to the farmers mobile through GSM, he can get to the know about weather condition of the farmer whenever he is far away from the field.

Abstract and Scope

In olden days farmers used the manual method of yielding the crop; testing the soil ph value, and based on some assumptions they predict about the climate conditions.
They may face problem if they assume some of the data which may be not accurate, the productivity of the crop may effect. They didn't know about the moisture, level of water and particularly weather condition which trouble a framer more.

The overview of our project is that we are collecting the reading of the sensor parameters and storing it in the cloud (IOT) for the further use. The sensor using in this process are soil moisture sensor, temperature humidity sensor, light sensor color sensor. In this human effort will be less. Farmers can get the field details easily through these sensors with accurate values. The collected data provide the information about the various environment factors. It gives the information about the temperature, humidity of the air in agriculture fields through MMS to the farmer, if it fallout from optimal range. The system can be used in greenhouse and temp dependent plants

Literature Survey

Literature Survey - 1

Smart Precision based Agriculture using Sensors

Smart precision based agriculture makes use of wireless sensor networks to monitor the agricultural environment. Zigbee and raspberry pi-based agriculture monitoring system serves as a Reliable and efficient method for monitoring agricultural parameters. Wireless monitoring of field not only allows user to reduce the human power, but it also allows user to see accurate Changes in it. It focuses on developing devices and tools to manage, display and alert the users using the advantages of a wireless sensor network system. A smart system based on Precision agriculture would pave the way to a new revolution in agriculture. The user can monitor the agriculture environment from a remote location, thus providing a greenhouse condition for the plants. India being an agro based economy; precision agriculture can bring about an improvement in the primitive methods, thus developing the country stature hugely.

Literature Survey

PROPOSED METHOD:

The proposed model aims at developing a smart system that would provide an ideal environment for the crops. The sensors sense the soil moisture and the humidity levels, and this information is sent via zigbee network to a remote computer. The remote computer will be capable of controlling the motor and humidity fan located on site. This reduces human effort to a great extent and also ensures that an optimal environment is provided for the crops thus improving crop quality.

The working is as follows:

The soil moisture sensor senses the moisture level. The level when reaches below permissible level, a notification is sent to user mobile. The user then can, using the smart phone app, turn on the motor. The relay helps turn on the motor and the water starts flowing out of tubes. The moisture sensor keeps a track of the moisture values every 1 minute. Each time an algorithm compares the level with the required value. Once it reaches the required level, motor automatically turns off, and a notification of the same is passed on to user.

RESULTS

The sensor data obtained from the sensors are displayed in the above user interface. A graph is plotted for the digital values of moisture and humidity. The control to the motor and fan is through the control panel in the interface. An appropriate communication port has to be selected to enable Serial communication between the zigbee and the remote computer.

CONCLUSION AND SCOPE:

Wireless sensor networks can help bring about a revolution in automating agriculture. This project would simplify plant monitoring process and reduced human effort drastically. User can create customized environment for the plants, thus providing them with optimal growth conditions. The scope for the project can be further widened by the use of more sensors and then storing the sensor data in the cloud enabling access from anywhere in the world. Also, an analog output instead of a digital one would help us determine accurate sensor values. Additionally, interfacing the software with Android technology would increase its scope. The sensor values can also be converted into analog outputs. This would help getting a clear idea of the environmental condition through past records. The data can also be stored in the cloud enabling access anywhere anytime

Literature Survey - 2

Precision Agriculture using Internet of Things and Wireless sensor Networks:

ABSTRACT:

Agriculture is the science, art or practice for cultivating the soil, producing crops using different preparation methods and technologies and marketing the resultant products produced in the farming. India is an agriculture based country. Most of the Indian families follow agriculture as their main occupation. Farmers can be termed as the ecosystem engineers as they cultivate the crops in the ecosystem using different engineered methods, techniques & The traditional farming practices along with the following conditions such as dependence on monsoon, fragmented land farming and holding, poor infrastructure in rural areas and less usage of technology applications still holds the Indian agriculture behind in the race of modern agriculture. As the Indian agriculture still follows the traditional methods which do not give efficient results in contrast to the effects observed with the help of new Technologies. The modern farming practices revolve around the new concepts such Internet of Things (IoT), Wireless Sensor Networks (WSN) and Precision Agriculture (PA).

Literature Survey

PROPSODE METHOD:

Considering the need of modern technology in farming, we propose a system which is integrated to have a control on all the deployed systems in a single system. The farmers can use the system conveniently as it has a simple user interface. Also the system will keep the farmers well notified about the every minute event that occurs in the field based on farmer can take a better action.

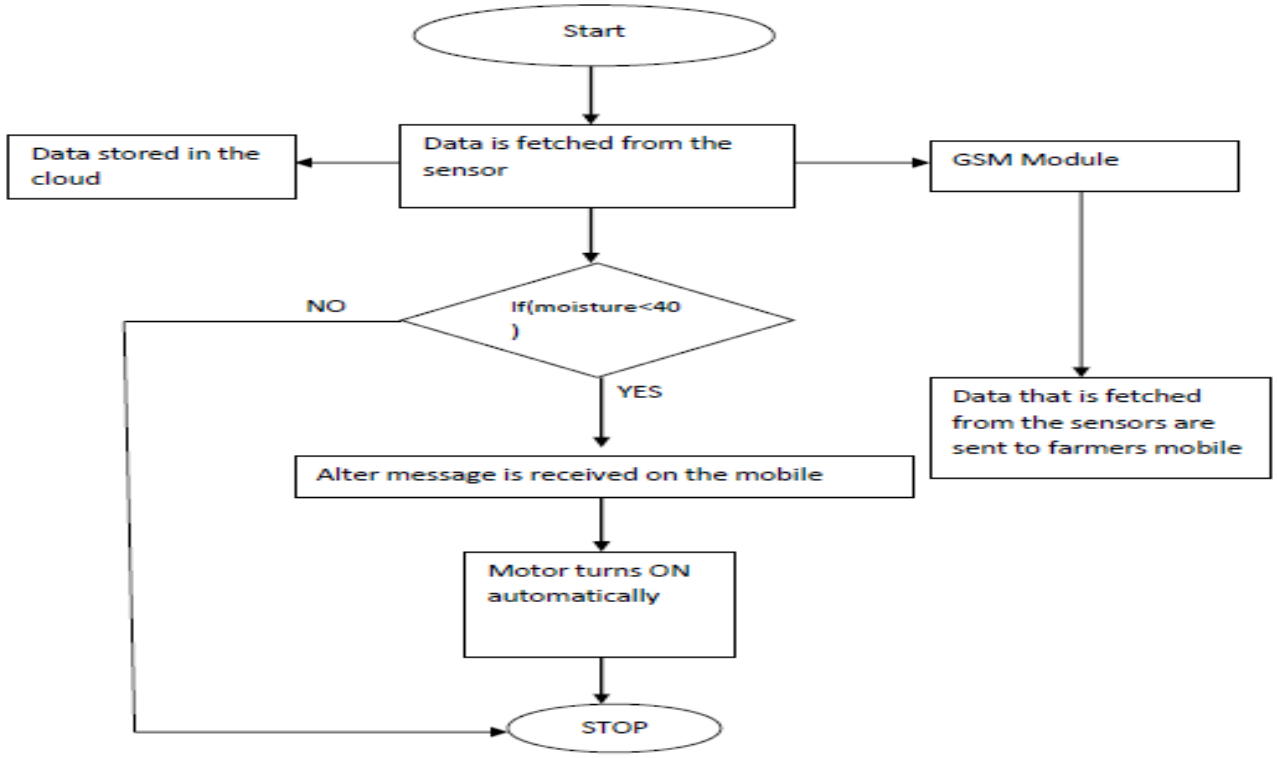
CONCLUSION:

As an important constituent part of the IoT, sensor networks enable us to interact with the real world objects. In this project we are dealing with the sensor network design that plays major role in connecting agriculture to the IoT. The connection sets up the links among agronomists, farmers and farm leading to improvement in the production of agricultural yield. It is a comprehensive system designed to achieve precision in agriculture with keeping farmer's ease of access to the data in mind.

Suggestions from Review - 3

- Add more content to literature survey

Design Approach



Design Constraints, Assumptions & Dependencies

Assumptions:

Getting the details of the parameter to their mobiles time to time about the field

Disadvantage:

- Productivity may or may not be more
- We cannot estimate weather conditions as pollution is increasing gradually etc.

Advantages:

- Productivity is enhanced
- Based on the fertility, weather conditions crop is selected
- It also reduces the cost of traditional farming equipments

Design Constraints, Assumptions & Dependencies

Dependencies:

Hardware:

- raspberry pi
- Lcd
- Buzzer
- Pump
- Sensors

Software:

- Pycharm ide

Design Constraints, Assumptions & Dependencies

- Blynk/Thingspeak

Functional Requirements

The main functional are:

- When the water content decreases in the soil the system should automatically ON the pump for the flow of water.
- If detected water level is less than the predefined value then the system continuous the cycle of notifying the user, turning on the pump, then if it reaches its level the pump automatically turns off and same is notified to user.
- The temperature, humidity values are taken from the sensor which may be exact so that the farmer can get good yield by using this method.

Design Constraints, Assumptions & Dependencies

Non Functional Requirements

- Maintainability :

  If the water level reduces to less than the minimum level, then the soil losses its moisture level the sensor notifies the user through GSM so user can maintain the moisture level.

- Reusability :

  The previous dataset can be reused for the improvement of the yield. The dataset will be stored in the cloud by this we can collect the dataset.

- Portability :

  Here the things like sensors are fixed we cannot carry the sensors from one place to another place.

- Performance :

Design Constraints, Assumptions & Dependencies

We have a two parameters called Temperature and Humidity then we will get a values of these parameters based on this farmer will grow the crop abd the dataset will be stored in cloud we can fetch the data from the cloud by using Thingspeak.

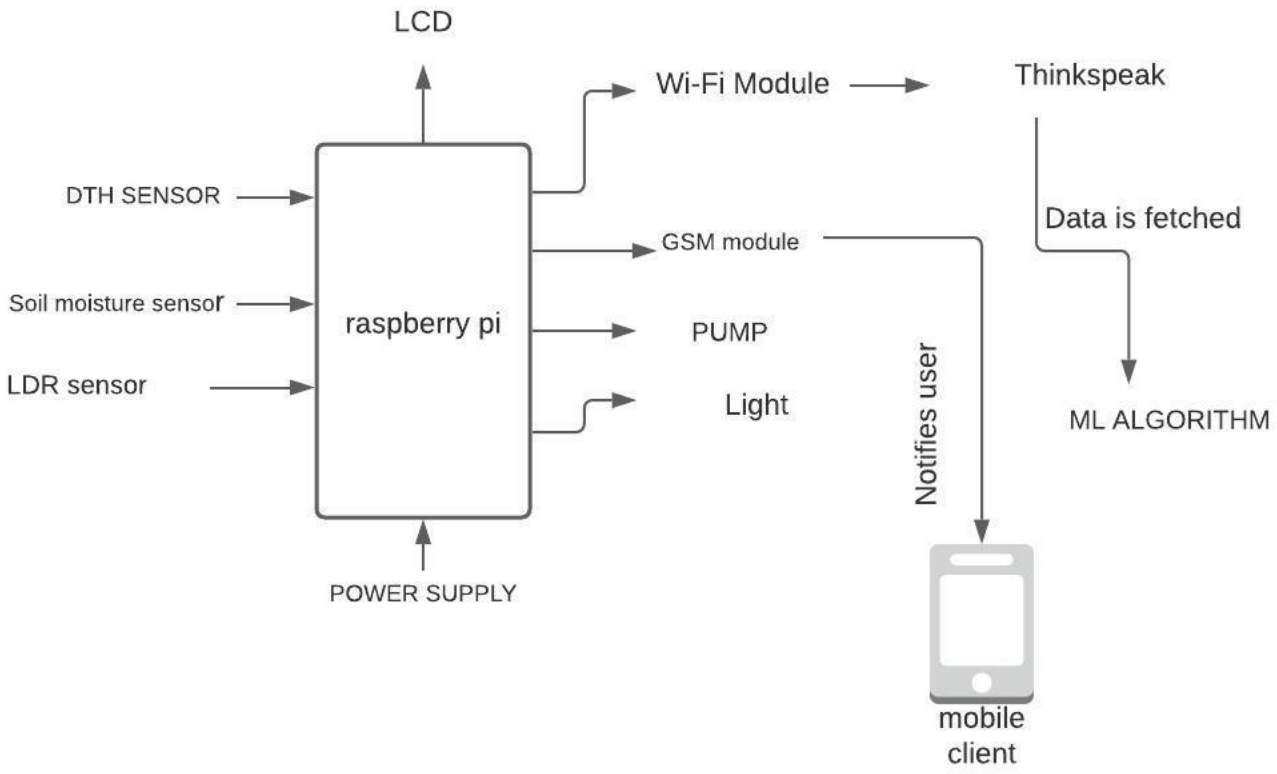
Proposed Methodology / Approach

- We have approached the easy way, in which the farmers can get the parameter values easily using sensors and accurate value
- To enhance the productivity of the crop there by supporting both farmer and nation we have to use the technology which estimates the quality of crop
- Wireless sensor network are sensors of different types are used to collect the information of crop conditions and environmental changes these information is transmitted through network to the farmer or devices that initiates corrective action.
- It also helps in collecting information about conditions like weather, moisture, temperature and fertility of soil, level of water, pest detection, and animal intrusion in to the field, crop growth, and agriculture.
- The proposed model aims at developing a smart system that would provide an ideal environment for the crops. The sensors sense the soil moisture and the humidity levels

Architecture (if applicable)

This section is about overview of the project, years ago the farmer used to get the parameters details manually by testing the soil ph and soil type, temperature, humidity etc
The farmer will get the detailed accurate value of the parameters. We use raspberry pi as the main processor and Raspbian OS in which program will be executed. To the processor the sensors are wires are connected, when the sensor sensed values are sent to the processor and then to the IOT (things speak). The data also sent to users mobile through GSM module, so that the farmers get to know about their field.
When the water level is decreased in soil, soil loss its moisture level then user gets notified through GSM about it and automatically water pump is turned on. And the same is sent to IOT (things speak) where it can be stored. The collected data can be used as reference when it is used in future.

Architecture (if applicable)



Design Description (if applicable)

1. User Interface Diagrams

The parameter details will be sent to the user mobile and to the cloud through respective GSM and Thingspeak. As our system doesn't have any screen. It has only the interface which the user can interact (notification).

2. External Interfaces

The system will be connected with the Wi-Fi module. Diagram is same as High Level System Design.

1) Wi-Fi Module: Used to connect to Thingspeak.

2) Power pins: Used to supply power to microcontroller.

3) Analog pins: Used to provide analog inputs to the microcontroller.

4) Digital pins: Used to provide the inputs in the digital form to the microcontroller.

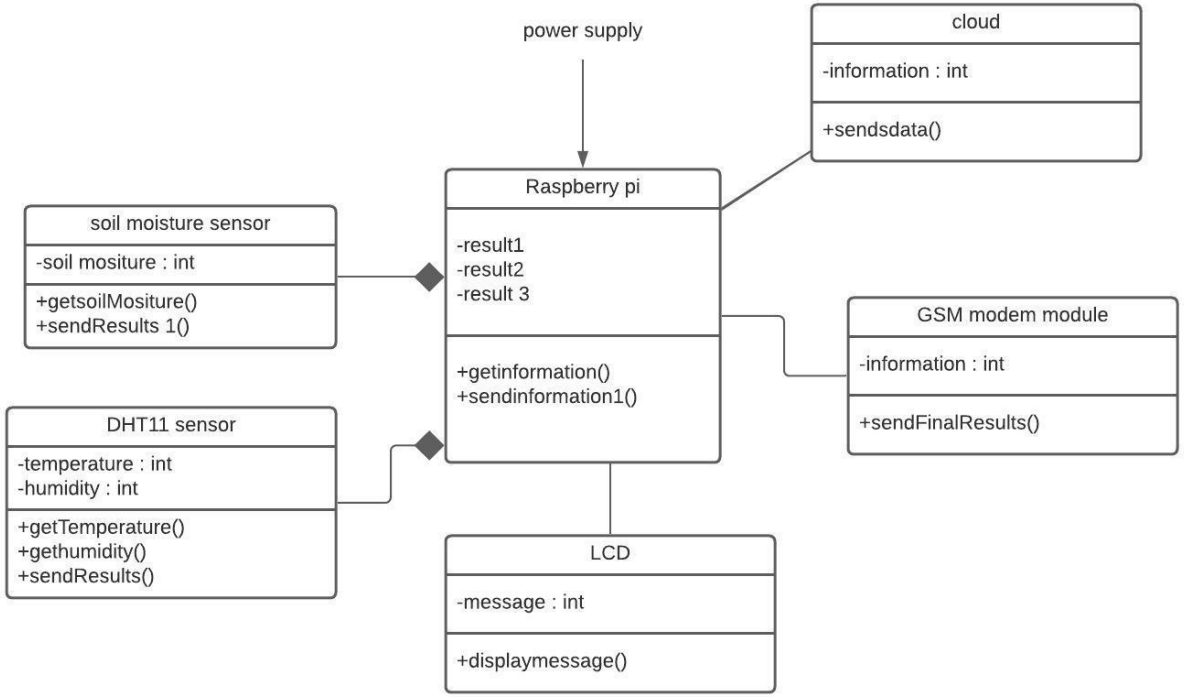
5) Pump : Used to connect to motor from Raspberry pi.

3.Report Layouts

The project contains the report for verification and validation for following:

1) Sl.No.
2) The material used for testing.
3) Class of the material output by the system.
4) Actual class of the material.

Design Description (if applicable)



Technologies Used

- IOT(thing speak)

  We use this because to get the clear picture of visualization and to store the data in the format of CSV which can be used future in algorithm

- GSM (global system for mobile communications)

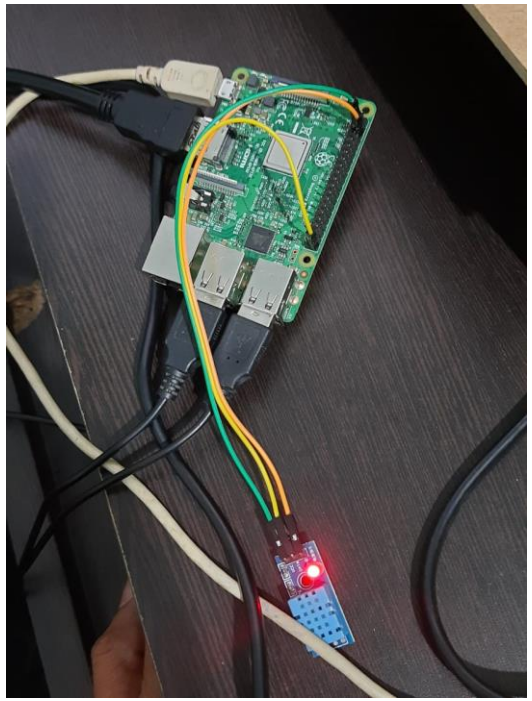
  This helps farmer to get details of the farm, with accurate values every now and then

- Sensors

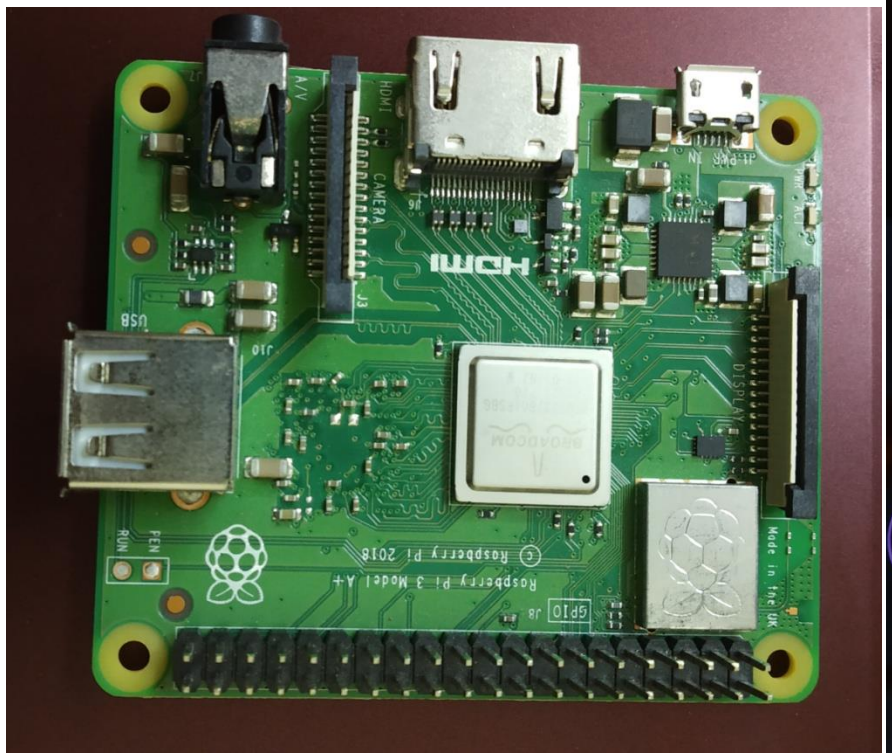
  1. DHT sensor
  2. Soil moisture sensor

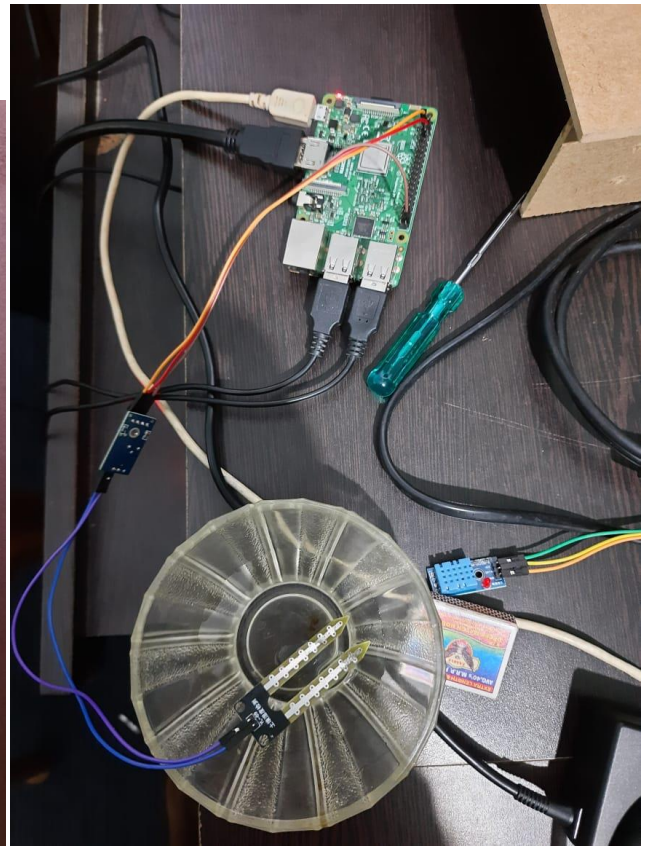
Project Progress

- We are working on the implementation of sensors, trying to combine the both the sensor. So that the sensor work at a time when program is executed

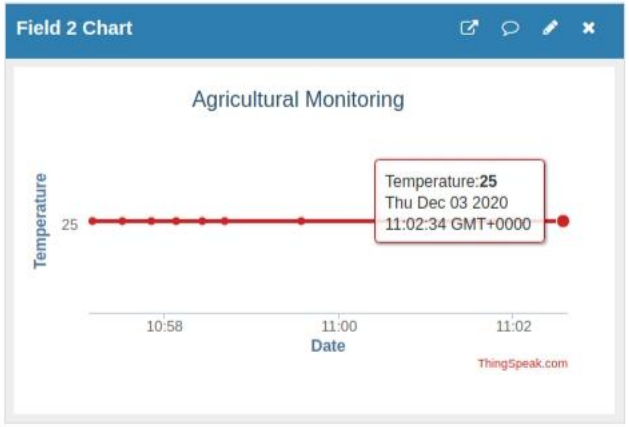


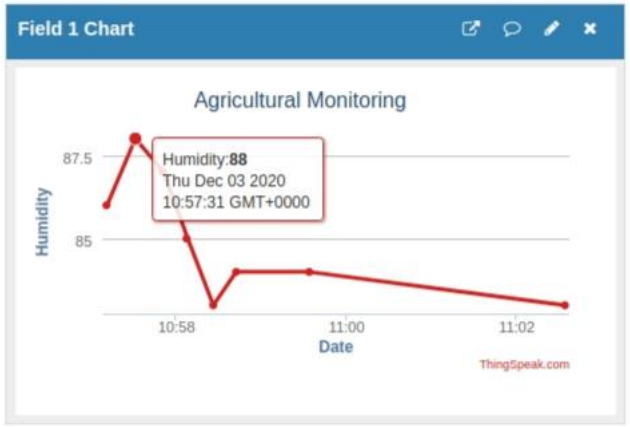
Project Progress





Project Progress





References

- Agricultural Crop Monitoring Sensors using IoT –A Study International Journal of Engineering Research & Technology(IJERT)2018
- https://www.ijert.org/agricultural-crop-monitoring-sensors-using-iot-a-study

Any other information

Provide any other information you wish to add on.

Note: Changes can be made in the template, with the consent of the guide for inclusion of any other information.

Thank You