

SAMVEDAN - SEMI FINALS

TEAM ID NUMBER: 111

Smart Tool for Crop health Analysis

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TEAM NAME:

AGRIHACKERS

TEAM MEMBERS



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3rd year ECE



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3rd year ECE



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3rd year CSE





Our Institution

- Sri Sivasubramaniya Nadar College of Engineering, Chennai.
- An autonomous college affiliated with Anna University founded by Shiv Nadar.





Project Brief - Innovation

AN OVERVIEW

- **Goal:** To create a tool to analyze the health of crops and suggest remedies using Machine learning techniques.
- Interface tool with hardware (sensors and modules) to:
 - **Measure** abiotic components
 - **Detect** diseases and pests attacked
 - **Process** data and retrieve results
 - **Suggest** remedies and required nutrition levels
- The device should help the farmer with the suggestions & lead to the betterment of the crop's health.



Current progress

Hardware

Crop chosen for analysis: Tomato plant

Integration of the sensors and modules is done and we are able to get the output from the sensors and view the results graphically on the ThingSpeak platform.

Email alerts to the farmer regarding any deviation of sensor data is done.

Sensors used : Soil moisture sensor, DHT11, LDR, DS18B20, Servo motor(optional), Spresense camera.

Module used: ESP8266 wifi module

Software

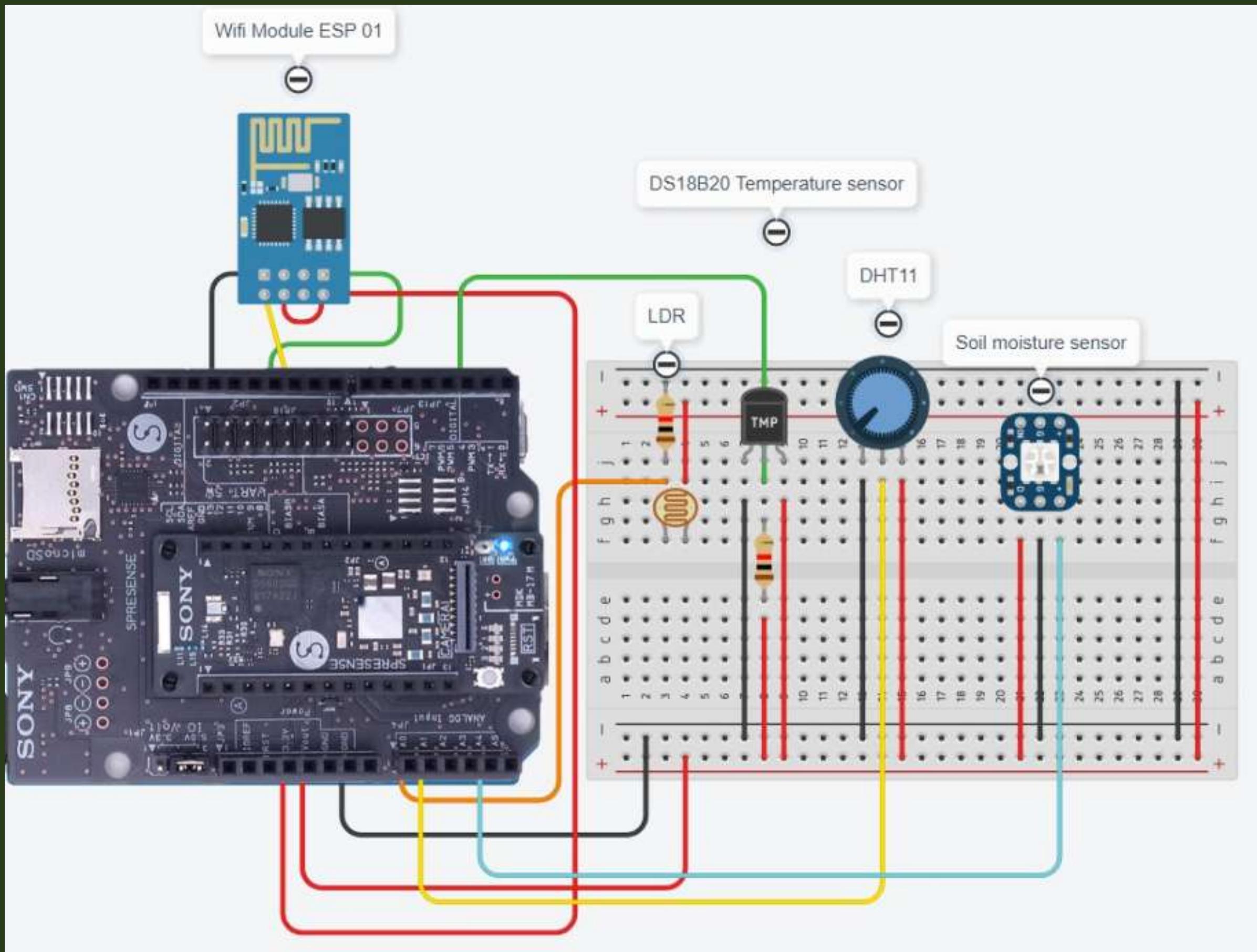
CNN Model is used to identify the diseased and healthy crops (for potato, pepper and tomato plants). Dataset of tomato plants are fed from the firebase platform and results are obtained using the model. Cloud processing is done in order to link other devices and different farms.

Platforms used:

ThingSpeak, Google Colaboratory, Arduino IDE, Firebase



Circuit design



Process of planning and implementation

Brainstorming ideas & finalised with an agriculture based solution

Talked to farmers and agricultural experts to know in detail about the problems they face

Filtered out major problems that were feasible to work with

Hardware design and sensor integration

Development of CNN model on Google colab

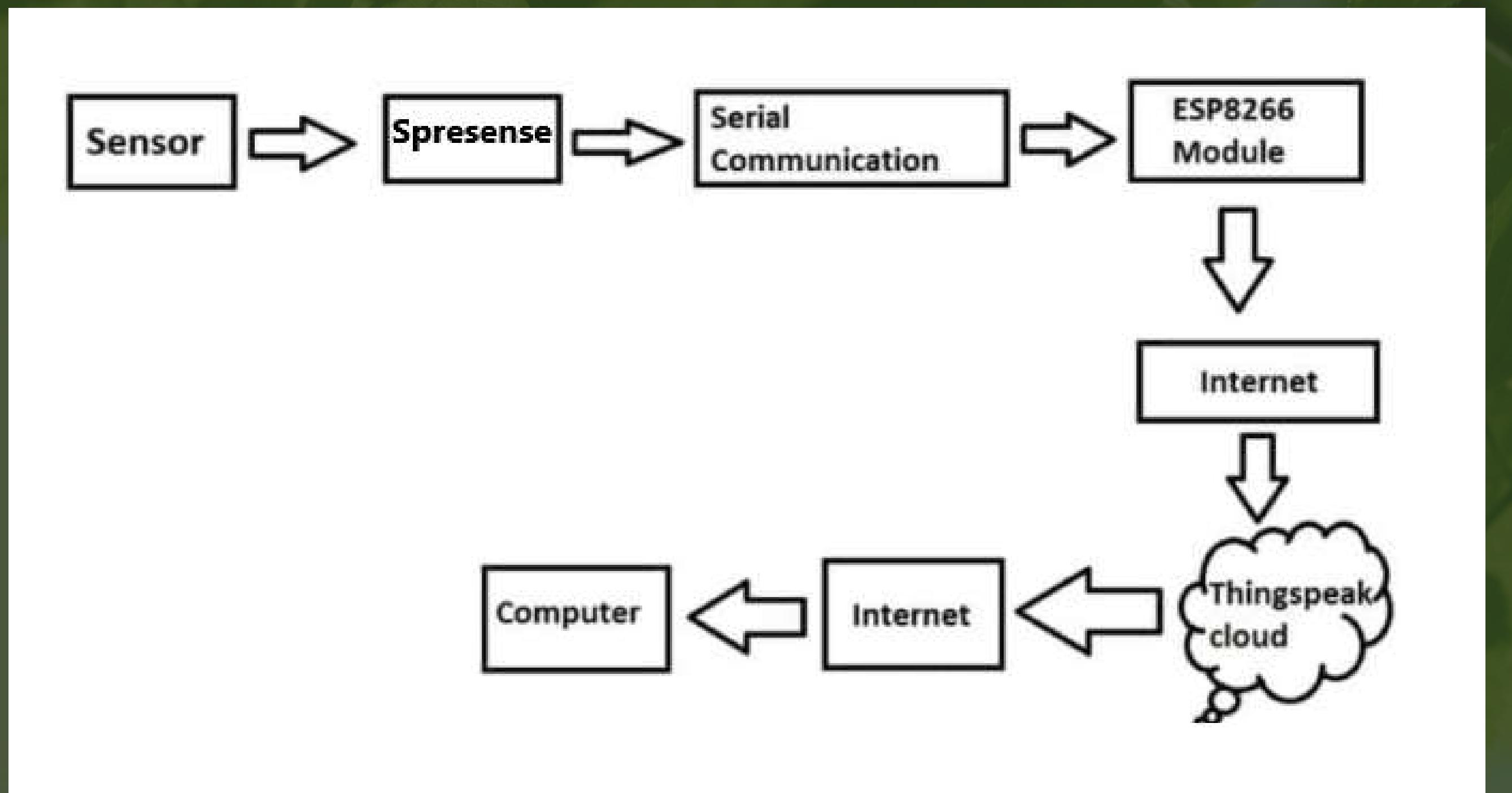
Testing of the device on tomato plant

Data collection: About 1000 sensor output entries in ThingSpeak + Firebase data set

Overcame most of the challenges and have a successful working prototype

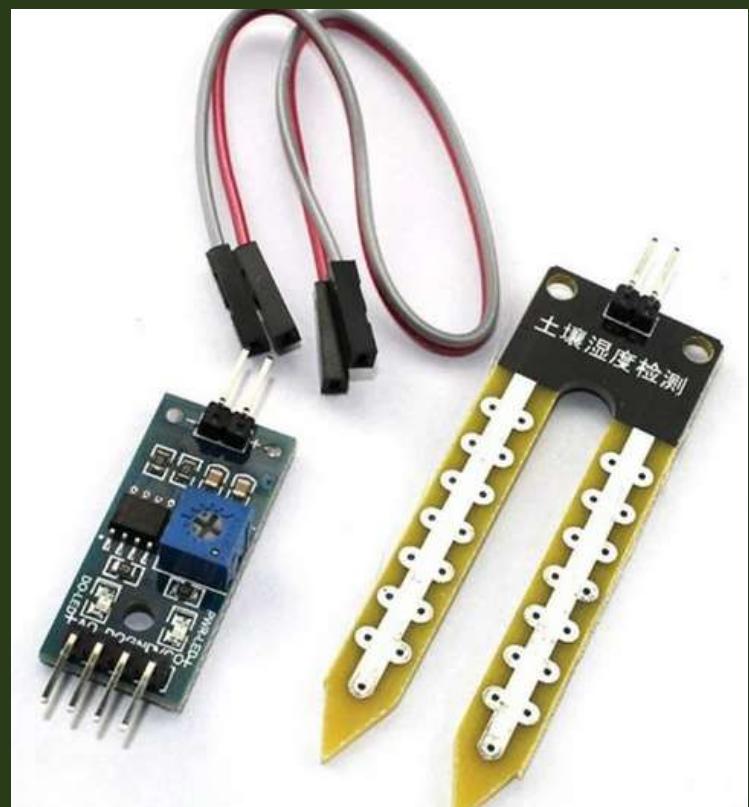
Setting up Wifi connection

Block diagram for sending data to ThingSpeak

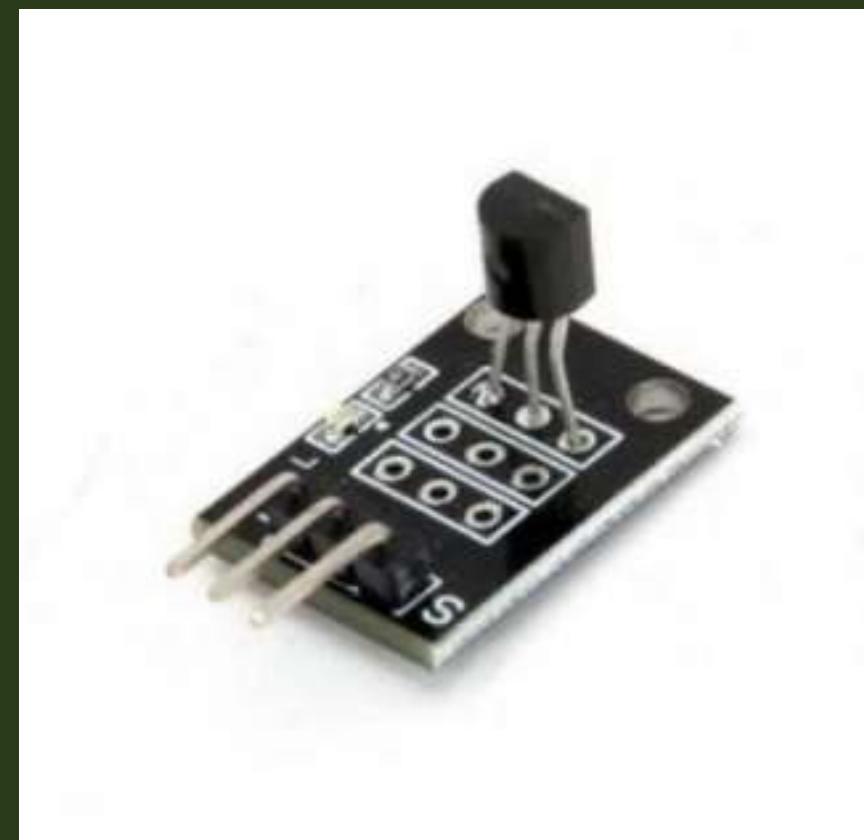


Sensors used:

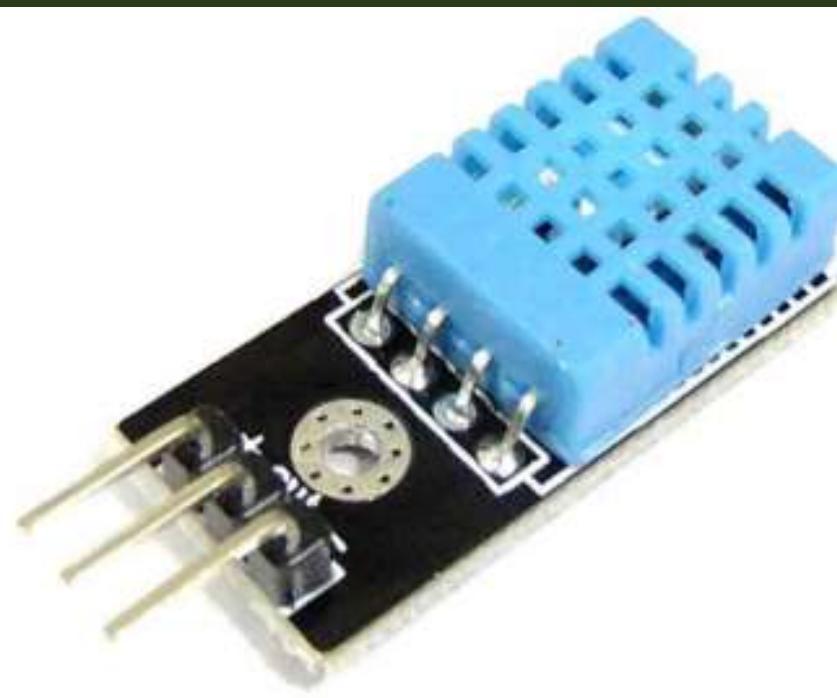
Soil moisture sensor



DS18B20 Soil Temp sensor



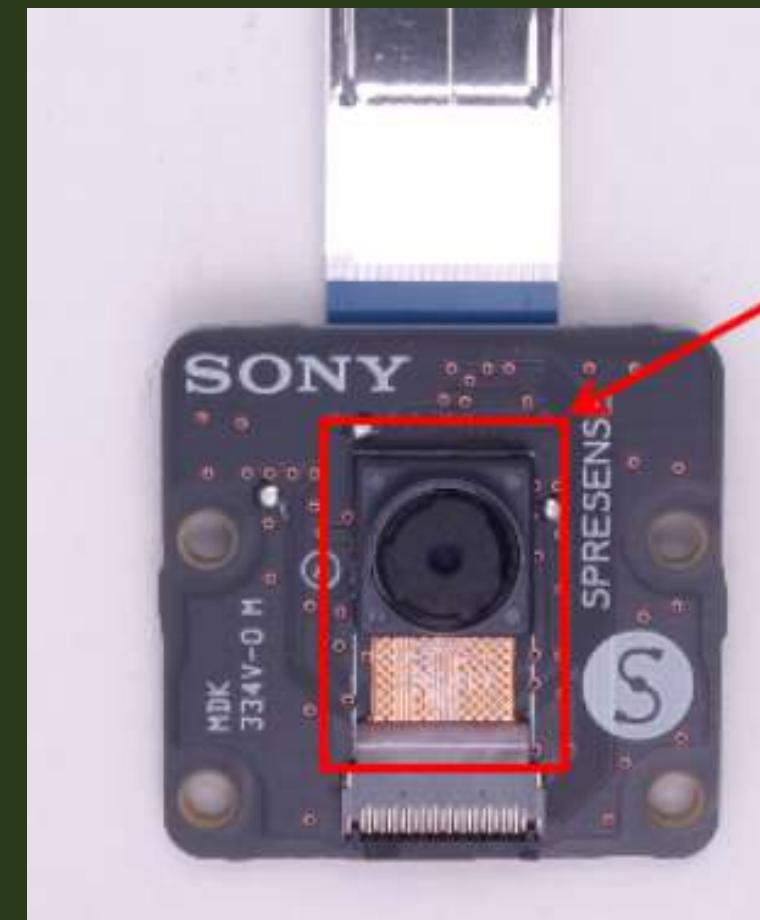
DHT11



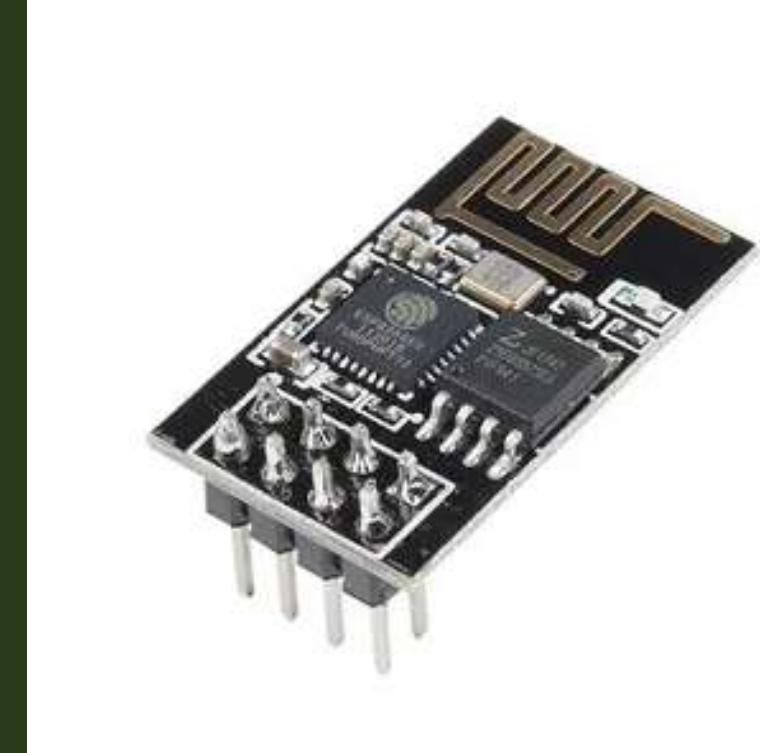
LDR Sensor



Add ons used

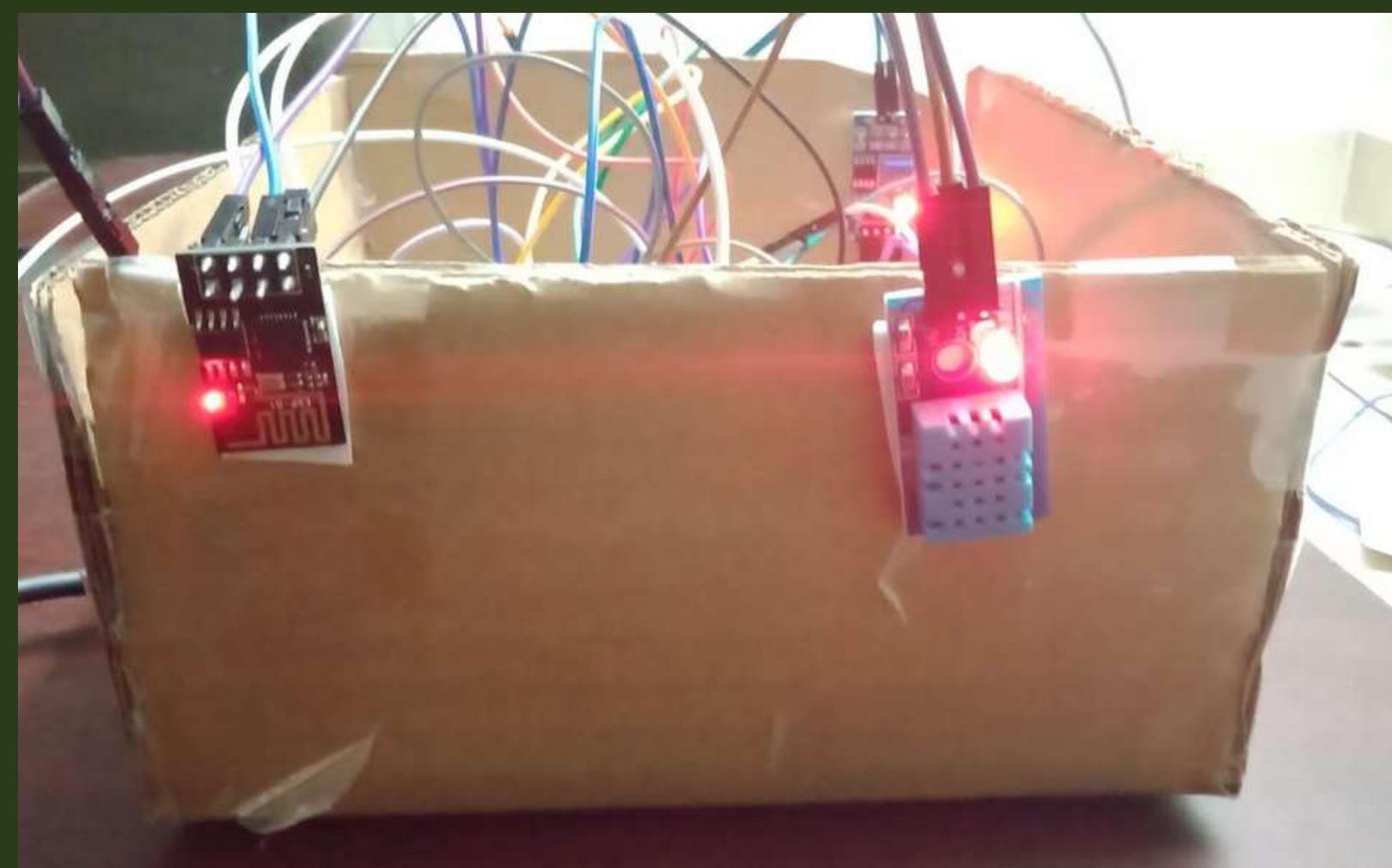
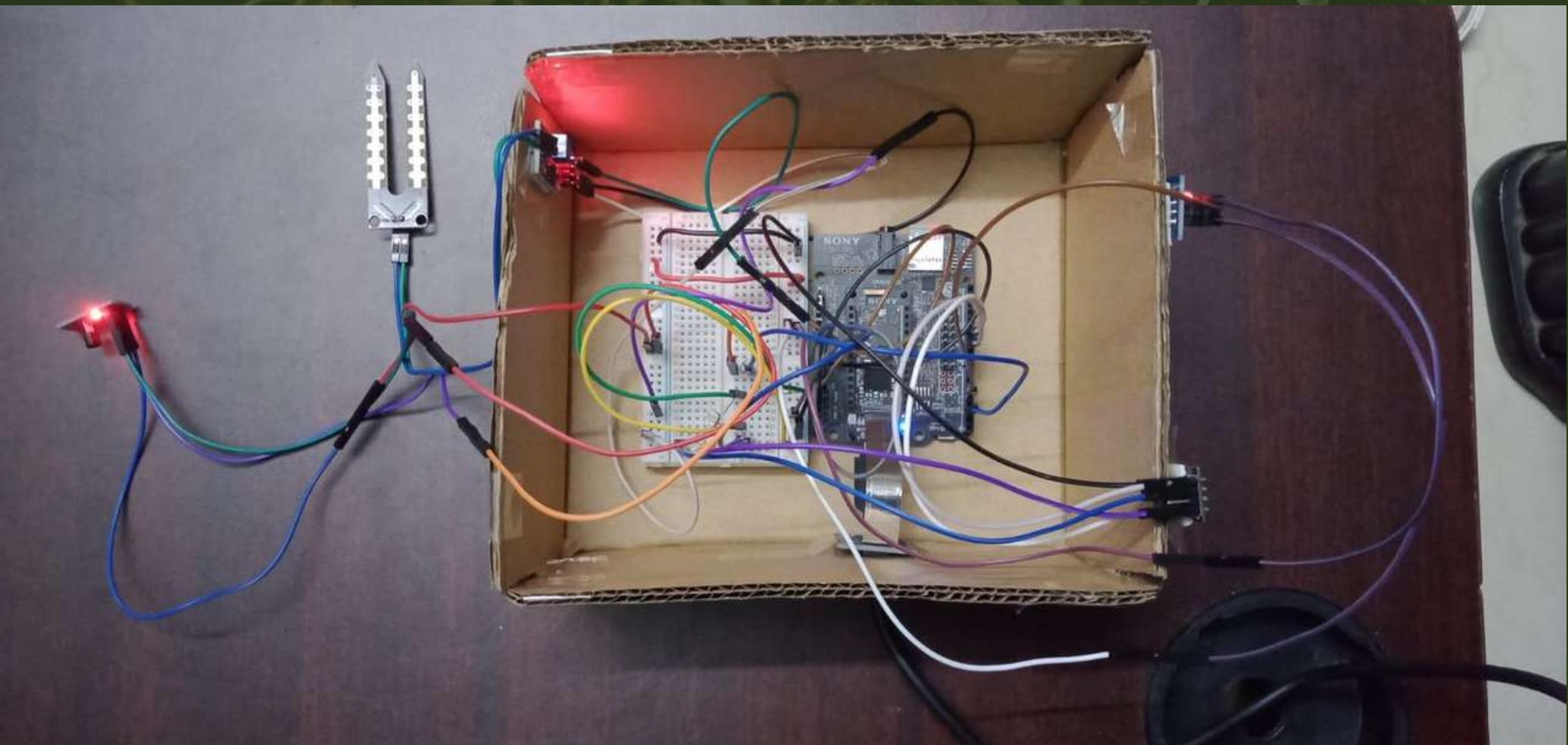


Sony Spresense Camera
Camera for image capturing

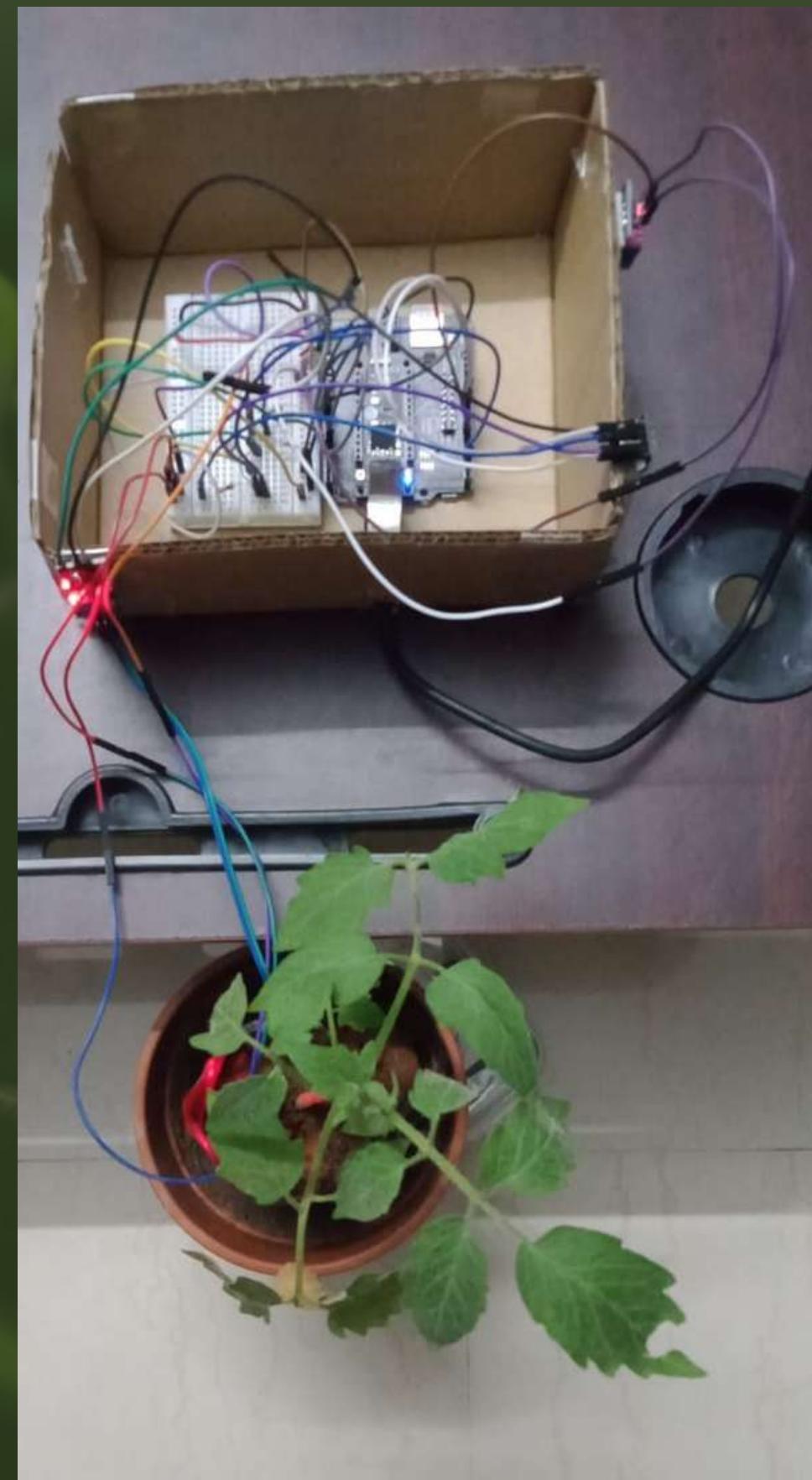
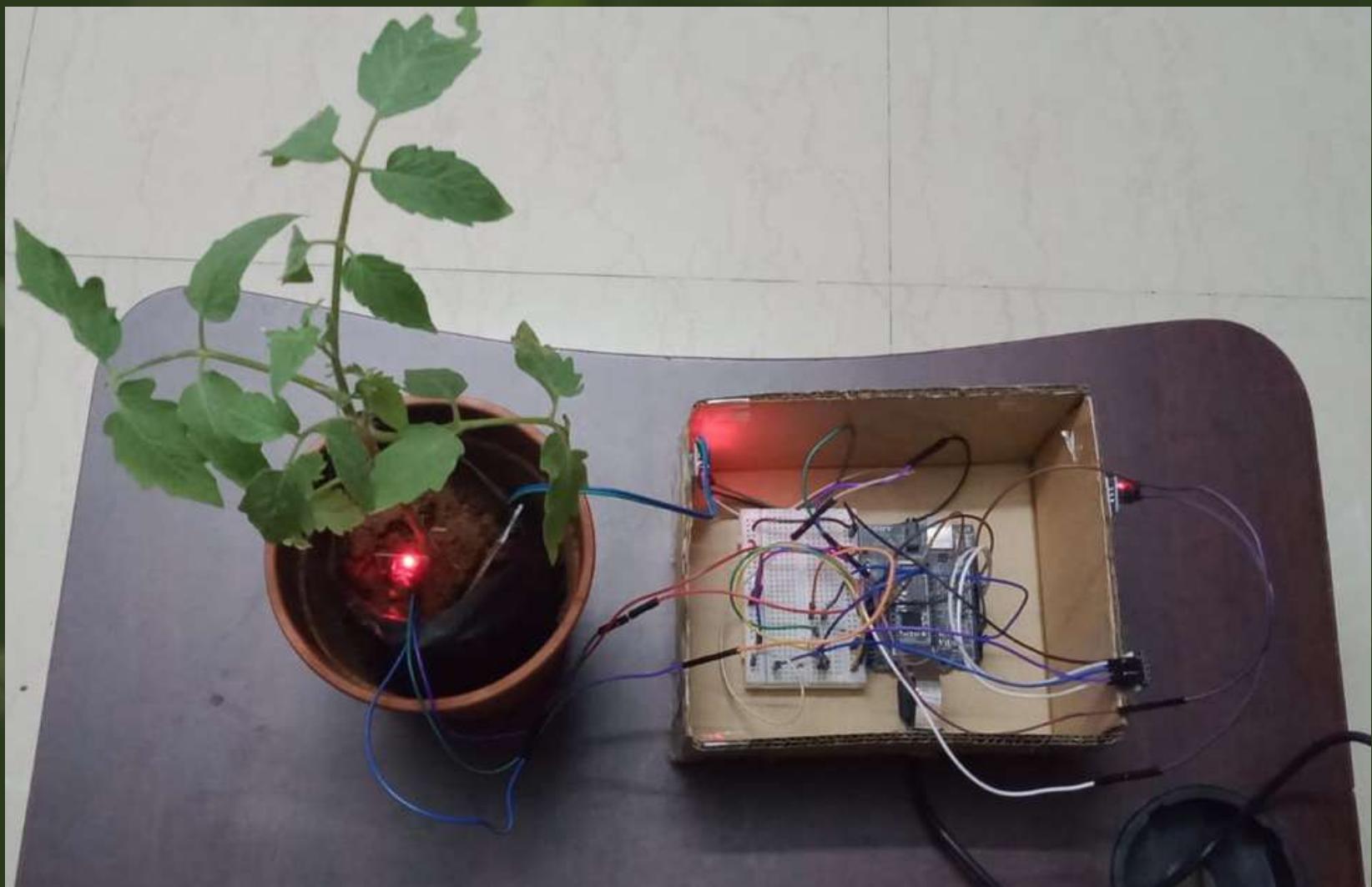
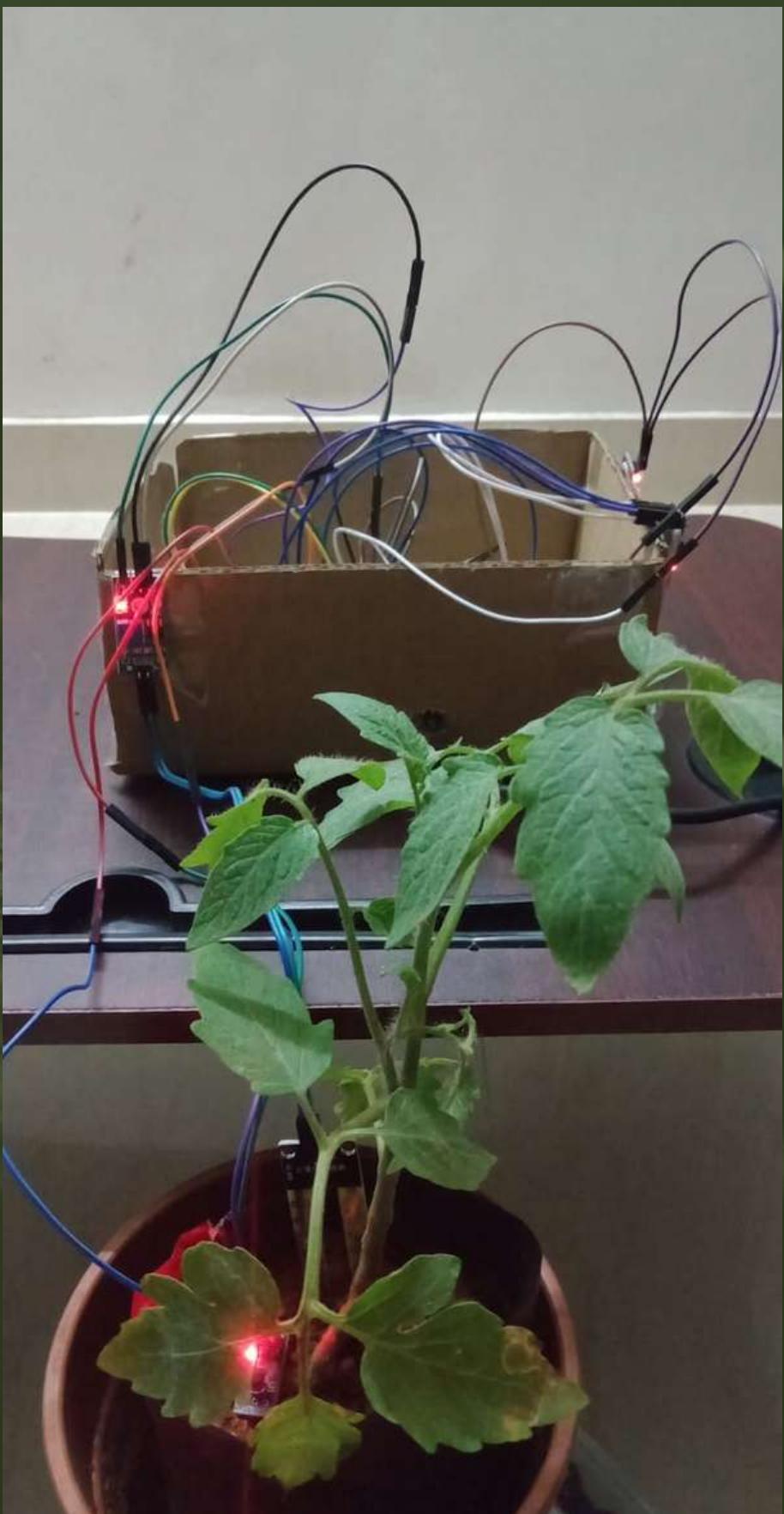


ESP8266 ESP-01
Wifi module

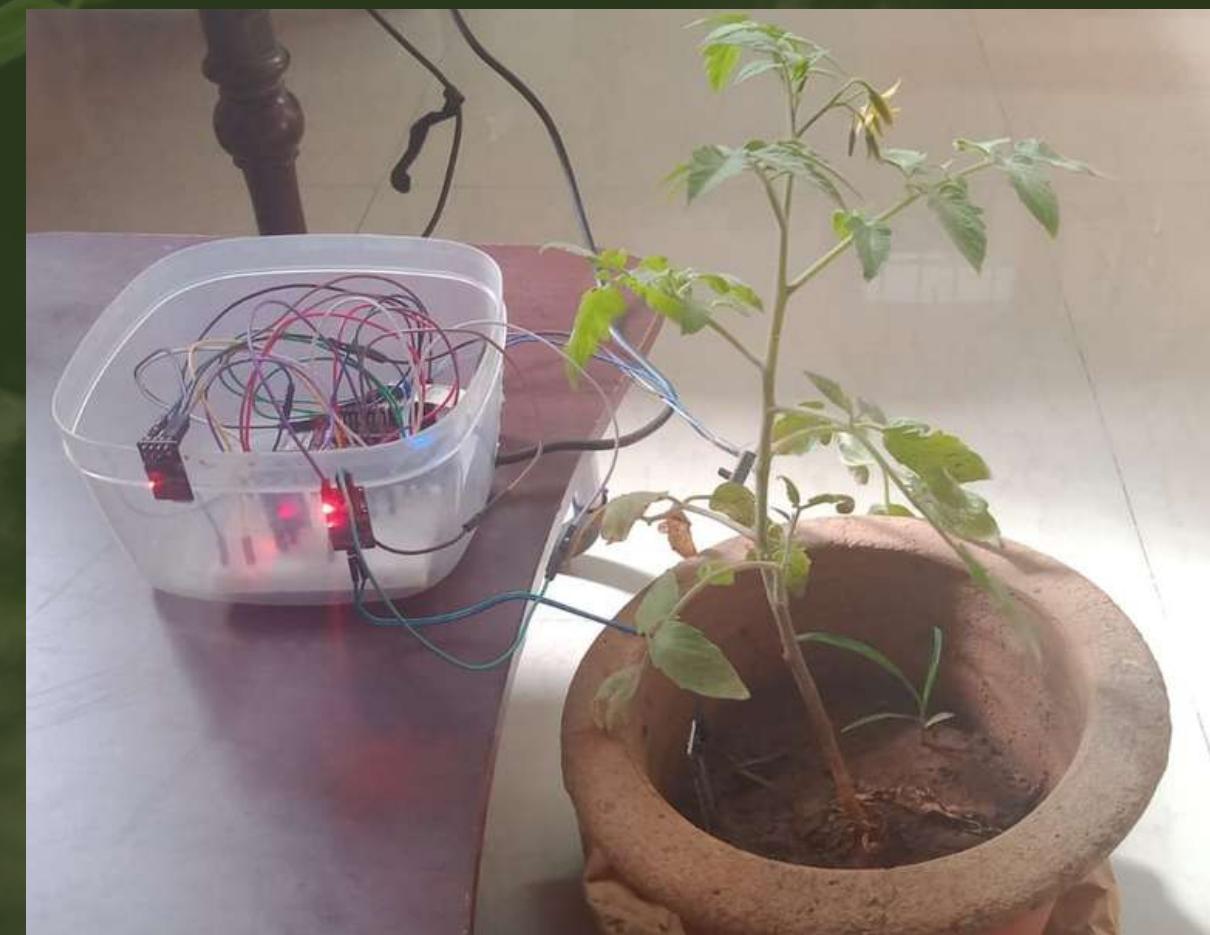
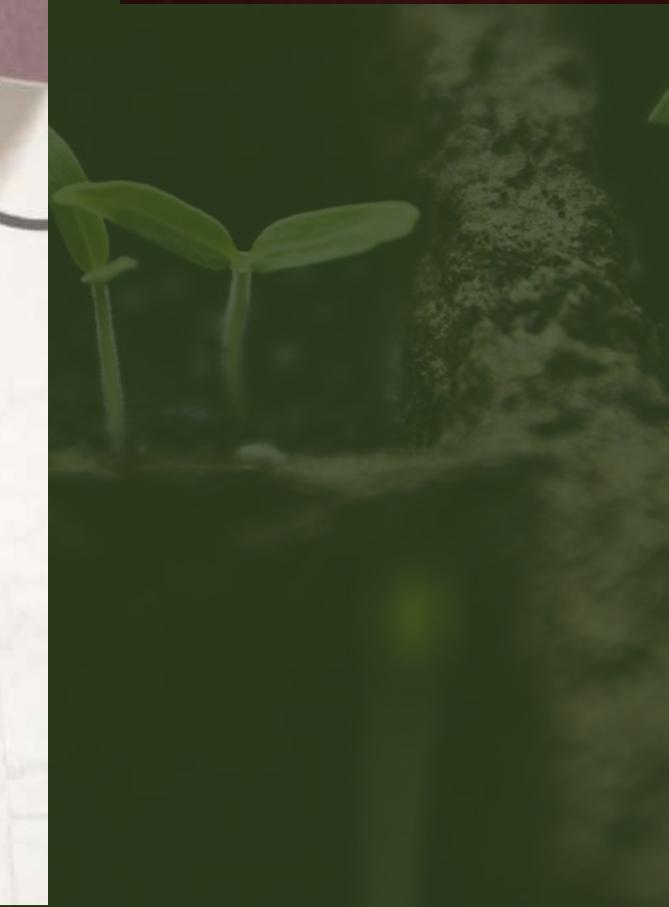
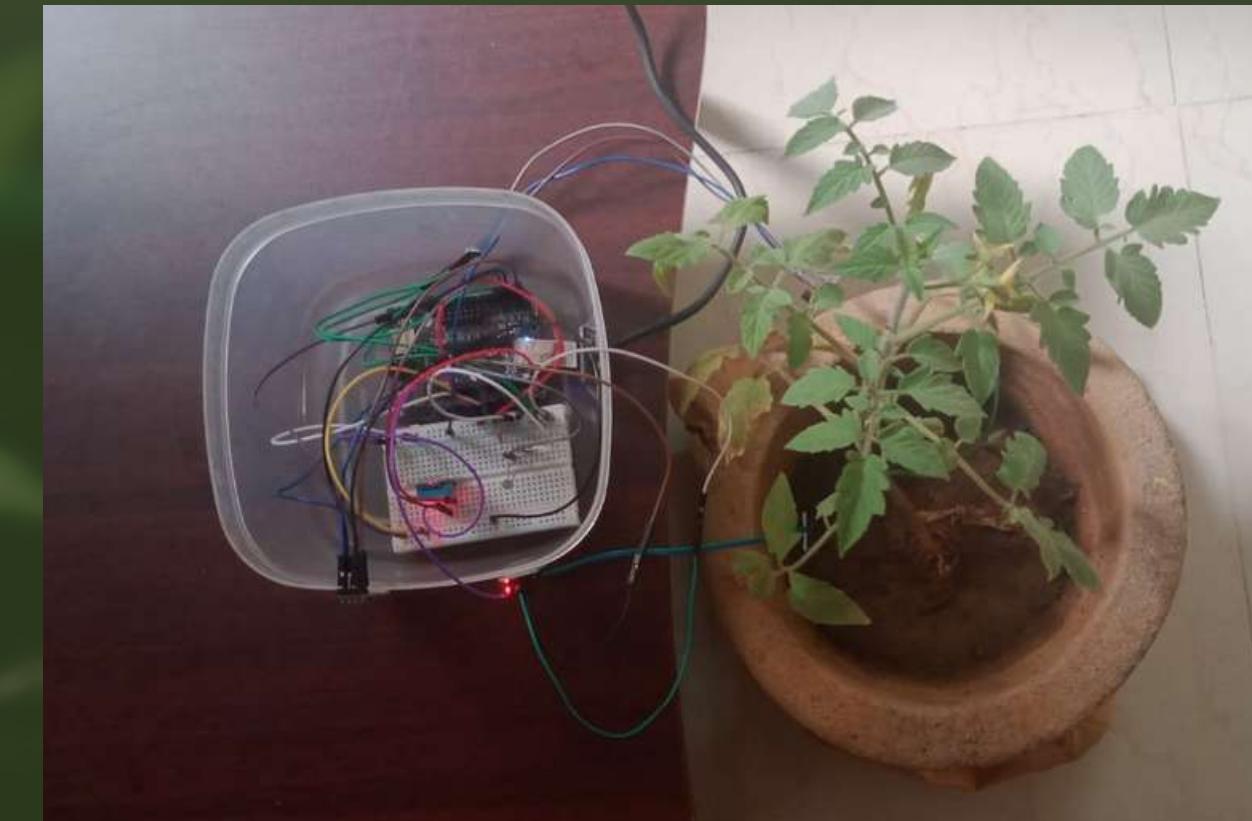
PHOTOS OF OUR OLD DESIGN



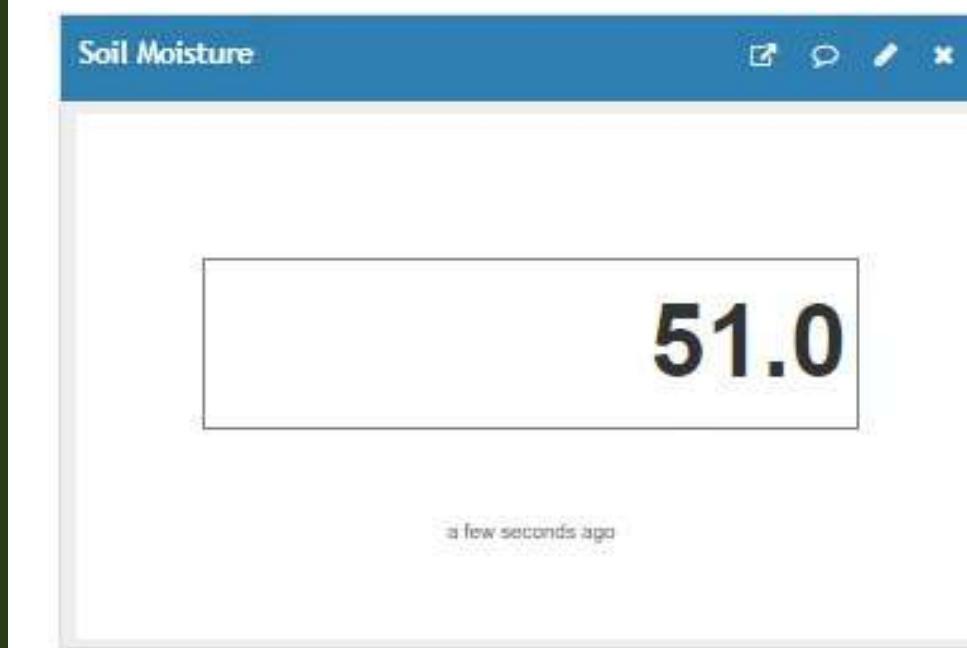
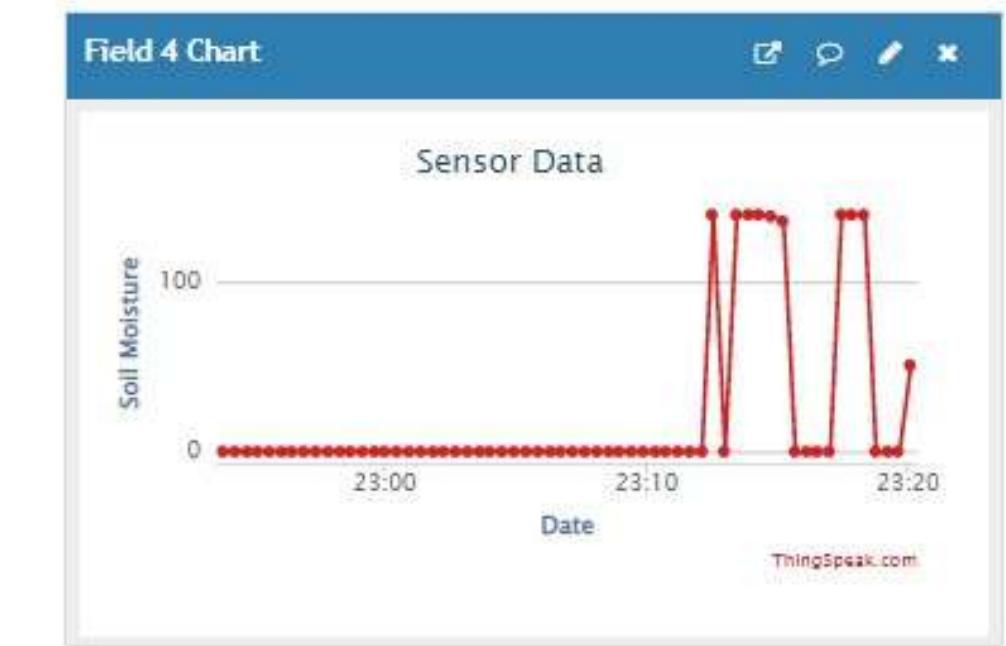
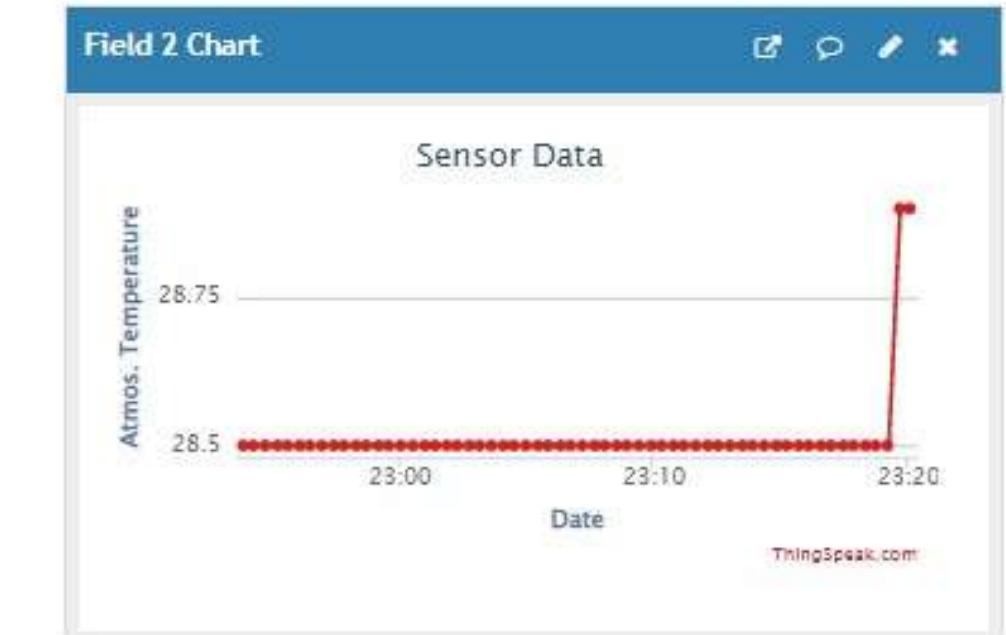
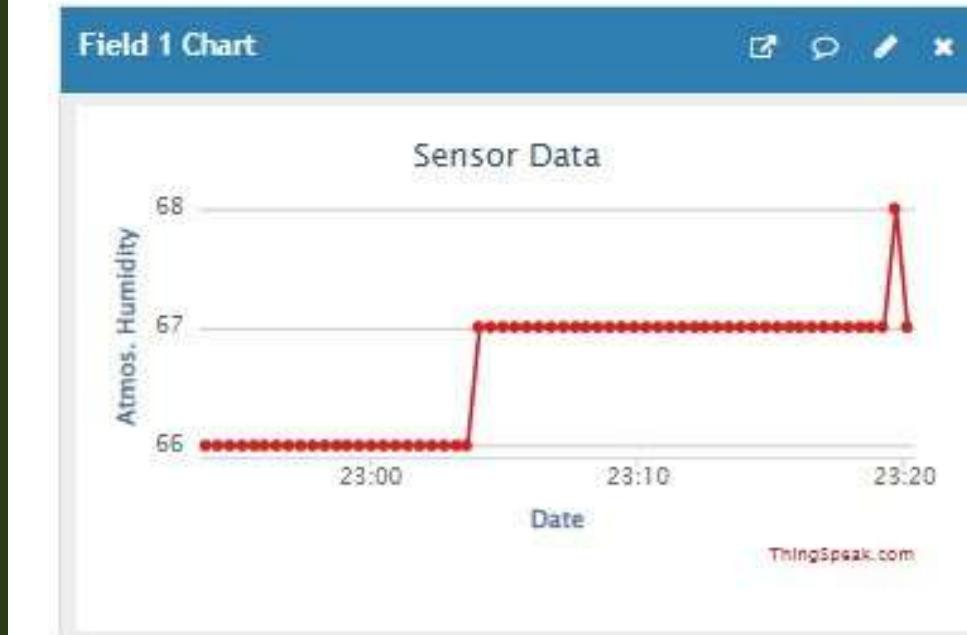
DEPLOYMENT OF THE OLD DESIGN



PHOTOS OF NEW DESIGN



SENSOR OUTPUTS IN THINGSPEAK



Unique features

EXPLAINING THE DIFFERENCE

- Our device will provide suggestions and recommendations.
- Email alerts will be sent to the farmer to alert about the deviation in the sensor output.
- Integration of all the required sensors for efficient monitoring and improving accuracy
- Crop specific suggestions using ML and cloud processing to link other devices and farms.



Rs. 13,000

Approx cost including Spresense boards

Rs. 800

Approx cost excluding Spresense boards

**Farming and agricultural
sector, Ranchers, Crop
producers and processors,
Home farmers**

Target market


**AgrIoT, Digital
Matter**

Competitors

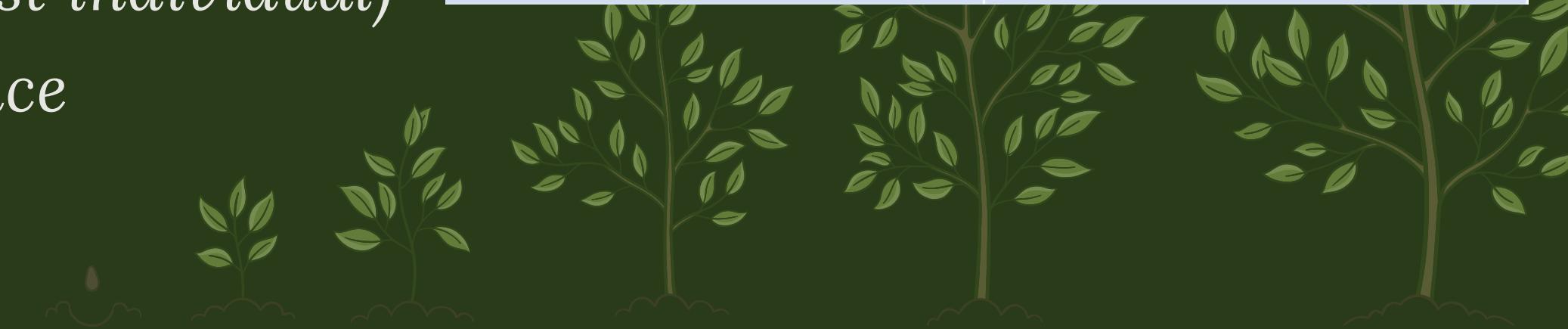
Challenges faced

- Connecting Wifi module to ThingSpeak
- Availability of soil specific sensors

Future developments

- Field test
- Expert intervention at crucial circumstances to increase reliability and accuracy.
- User interface (an app) for displaying the results and providing discrete suggestions
- Increase range of crops to test
- Interconnecting different farms (not just individual)
- Using solar power to power up the device

Name of the disease	Suggestions
Bacterial Spot	Avoid overhead watering by using drip or furrow irrigation. Spraying with a copper fungicide.
Buckeye Rot	Avoid compacted, poorly drained soils. Fungicide sprays with chlorothalonil, mancozeb, or copper fungicides will give good control.
Septoria Leaf Spot	Crop rotation of 3 years and sanitation is recommended. Repeated fungicide applications with chlorothalonil or copper fungicide will keep the disease in check.





Thank you