MAJOR PROJECT REPORT

(Project Term January – May 2021)

COURSE CODE: CSE96D
(SMART AGRICULTURE: SAATHI)

Program & Section: Diploma CSE JK802

Submitted by

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Under the Guidance of

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School of polytechnic
Department of Computer Science
Lovely Professional University, Phagwara

January – May 2021

DECLARATION

We hereby declare that the project work entitled ("Smart agriculture: SAATHI") is an authentic record of our own work carried out as requirements of Major Project for the award of degree of: Dual degree CSE diploma from Lovely Professional University, Phagwara, under the guidance of Mrs. Sweety Sehgal, Miss Amandeep Kaur Sandhu, during January to May, 2021.

(Signature of student)
Turwash Chakraborty

(Signature of student)
Akash Tripathi

(Signature of student)
Utkarsh Sinha

Date: _____

This is to certify that the above statement made by the student is correct to the best of My Knowledge and belief.
(Name, U.ID and Designation)
Faculty Mentor

AKNOWLEDGEMENT

- We would like to express our special thanks of gratitude to our mentors, **Mrs. Sweety Sehgal and Miss Amandeep Kaur Sandhu** who gave us the golden opportunity to do this wonderful project on the basis of Major Project, which also helped us in doing a lot of Research and we came to know about so many new things we are really thankful to her.
- Secondly, we would like to thank our parents who inspect of being far away from us continuously encourage us to do our best in every condition as a result of which we were able to work in a pedantic enjoyment. Without their moral support, it was very difficult to complete this project.
- Finally, I would also like to thank my whole team who helped us a lot in finalizing this project within the limited time frame.

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PROFILE OF THE PROBLEM

The idea of dedicated proposed model for Smart agriculture came from the incident when we saw the struggle of farmers on agriculture land. Worldwide, India is portrayed as an agriculture powerhouse. However, on the contrary, despite giving endless efforts contribution, farmers struggle to make ends meet, just because their crops get destroys due to several factors. And there is huge effect on farmers health as well.

Internet of Things has capacity to transform the lives of people in the world in an efficient manner. So we thought of transforming lives of farmers by IOT. Because the growing population would touch more than 3 Billion in few years, and to feed such an immense population, agriculture industry need to embrace IoT.

The demand for more food has to address challenges that include excessive climate conditions, weather change and different environmental affects that results from farming practices.

The destiny of Indian agriculture must be worked with understanding and excessive cease technologies that can expand production and furthermore regains the attention of farmers in this industry.

These smart farming techniques would assist farmers to lessen scrap and enhance capacity. It is basically a high tech and capital intensive system for growing crops in a sustainable manner for masses.

This technology can help farmers to monitor field conditions from anywhere with the help of sensors and can also irrigate fields with an automated system. It is the application of Information and Communication Technology into the field of agriculture.

Till now In India there are only few agriculture lands, which are practicing smart agriculture techniques. And that too they are using only few IOT sensors (one or two).

EXISTING SYSTEM

1 Traditional farming, used by Indian farmers:

Majority of farmers nowadays following traditional farming, which has been practiced in till since many years. In this system crop damage is more, profit is less and farmers have to visit their filed unnecessary many times.

Many trips have to be taken in order to manually check the soil humidity on a regular basis. Also farmers face many injuries and health issue due to this Many trips have to be taken in order to manually check the soil humidity on a regular basis.

It can be difficult to know the exact amount of water to give plants, thus causing stress for the crops by over or underwatering Overwatering crops could lead to higher water costs than what is really needed.

It is sometimes difficult to know the optimal time to plant without data Manually measuring key data points about crops is often difficult, time-consuming, and more likely to be inaccurate Stray cows and wild boars enter farmers' fields and destroy crops.

It has become a common problem for them and the growers have been left troubled and worried.

2. Very few smart agriculture Land with very less IOT devices:

In India, there are only few farmers that that are practicing smart agriculture, with very less equipment. This is because there are very less organisation, and they are proving smart agriculture equipment in very high rates, which is not in reach of farmers

There is lack of knowledge of new technologies to farmers, which makes them suffer. And they are facing serious problems, on their field.

PROPOSED SYSTEM

SAATHI now offer IoT solutions by providing affordable sensors that monitor soil humidity/moisture levels and soil/air temperatures/ nearby animals and automatically report it directly to the Internet without needing any WIFI, GSM or regular Internet connection.

This helps farmers know what is best for their crops without having to manually estimate or make an educated guess. With better data being fed to them live from their own crops, farmers can be the best possible decisions for planting, watering, and pest control.

Less trips out to the crop field parcels to manually check soil humidity levels, checking of animals harmful for crops and soil temperature means more time can be spent on other parts of the business, like bookkeeping or meeting with customers.

By using the Internet of Things to better monitor soil conditions, farmers will find that: There is better management of the land through data (which is more accurate than human testing). Farmers can combine outside data (like weather forecasts) with their own land parcel data to optimize crop watering and maintenance.

There are less costs for employee time, water, and crop care Farmers have healthier crops by optimizing water and soil care Having real-time data can help landowners and farmers reduce manpower, water usage, and other maintenance costs, thus reducing costs and environmental impact.

SCOPE OF THE MODULES

Besides making hardware modules, it was our goal to make it in more flexible manner like making it less expensive and more customizable for user.

FUTURE SCOPE

- SMART FARMING
- LESS INVOLMENT OF FARMERS ON FILED
- BETTER YIELD

PROJECT PLAN

In the planning phase the architecture is established. This phase starts with the requirement document delivered by the fusibility and maps the requirements into an architecture. The project plan defines the components, their interfaces and behavior of the hardware components and coding part. The deliverable input is the project plan.

The design document describes a plan to implement the requirements. This phase represents the "how" phase. Details on computer programming languages and environments, backend, application architecture, hardware modules, connections and many other details are established. The design may include the usage of existing components.

Analyzing the requirement of necessary modules allows for many things to remain simple which, in turn, will eventually lead to a higher quality product.

MODULE DESCRIPTION:

1. **Arduino Uno**: The Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output pins that may be interfaced to various expansion boards and other circuits.

2. **Jumper Wires**: A jump wire (also known as jumper wire, or jumper) is an electrical wire, or group of them in a cable, with a connector or pin at each end (or sometimes without them – simply "tinned"), which is normally used to interconnect the components of a breadboard or other prototype or test circuit, internally or with other equipment or components, without soldering.

3. **Power Supply Module**: Breadboard power supply module, compatible with 5V, 3.3V. Apply to MB102 breadboard. Input voltage: 6.5-12 V (DC) or USB power supply. Output voltage: 3.3V/5V can switch over. Maximum output current: <700 ma. Fluctuation two road independent control can switch over to 0 V, 3.3 V, 5 V. On-board two groups of 3.3V, 5V DC output plug pin, convenient external lead use.

4. **Ultrasonic Sensor Module**: The HC-SR04 ultrasonic sensor uses SONAR to determine the distance of an object just like the bats do. It offers excellent non-contact range detection with high accuracy and stable readings in an easy-to-use package from 2 cm to 400 cm or 1” to 13 feet.

5. **Water Level Sensor**: The water level sensor is super easy to use and only has 3 pins to connect. S (Signal) pin is an analog output that will be connected to one of the analog inputs on your Arduino. + (VCC) pin supplies power for the sensor. It is recommended to power the sensor with between 3.3V – 5V.

6. **Rain Detector**: The rain sensor detects water that comes short circuiting the tape of the printed circuits. The sensor acts as a variable resistance that will change status: the resistance increases when the sensor is wet and the resistance is lower when the sensor is dry.

7. **Piezo Buzzer**: A "piezo buzzer" is basically a tiny speaker that you can connect directly to an Arduino. "Piezoelectricity" is an effect where certain crystals will change shape when you apply electricity to them. By applying an electric signal at the right frequency, the crystal can make sound.

8. **PIR Motion Sensor**: The HC-SR501's infrared imaging sensor is an efficient, inexpensive and adjustable module for detecting motion in the environment. The small size and physical design of this module allow you to easily use it in your project.

9. **Humidity and Temperature Sensor**: It uses a capacitive humidity sensor and a thermistor to measure the surrounding air, and sends a digital signal on the data pin. In this example, you will learn how to use this sensor with Arduino UNO. The room temperature and humidity will be printed to the serial monitor.

10. **Servo Motor**: A Servo Motor is a small device that has an output shaft. This shaft can be positioned to specific angular positions by sending the servo a coded signal. As long as the coded signal exists on the input line, the servo will maintain the angular position of the shaft.

11. **Soil Moisture Sensor**: This sensor measures the volumetric content of water inside the soil and gives us the moisture level as output. The sensor is equipped with both Analog and digital output, so it can be used in both Analog and digital mode.

12. **Bread Board**: Breadboard provides a way of constructing electronics without having to use a soldering iron. Components are pushed into the sockets on the breadboard and then extra 'jumper' wires are used to make connections.

SOFTWARE REQUIREMENT AND LANGUAGE USED

Arduino IDE Software: Arduino is an open source platform used for building electronics projects consists of both a physical programmable circuit board (often referred to as a microcontroller) and a piece of software, or IDE (Integrated Development Environment) that runs on our computers, phones and PCs are used to write and upload code to the physical board.

Programming language used:

We have used C in Arduino.

HTML, CSS and JavaScript for designing website, SMART AGGRICULTURE SAATHI.

PHP is used for creating database. Which will store login credentials of user.

WINDOWS 10 is used as Operating System.

GENERAL DISCRIPTION

- ARDUINO UNO R3
- CONNECTING WIRES
- ARDUINO LIBRARIES

SPECIAL REQUIRMENT

- **ARDUINO LIBRARIES:**

  AdafruitSensor.h
  SoftwareSerial.h
  DHT.h
  servo.h

DESIGN

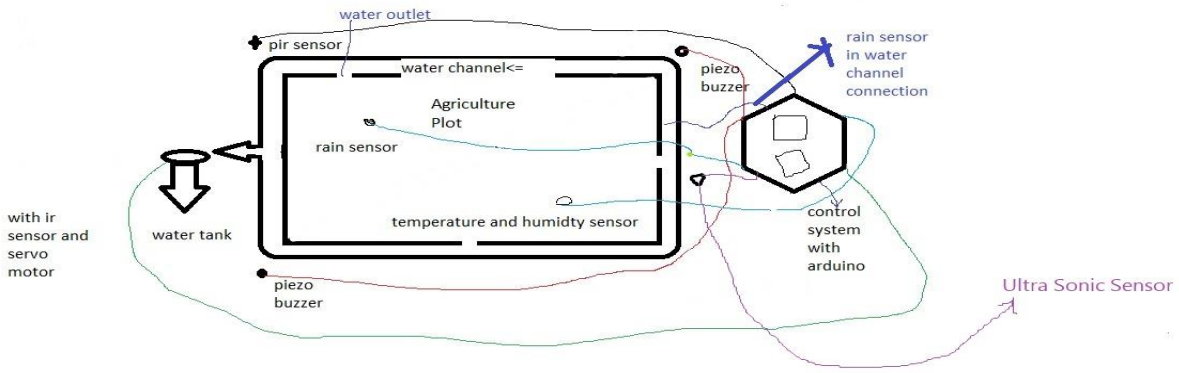


Fig. 1 Project layout

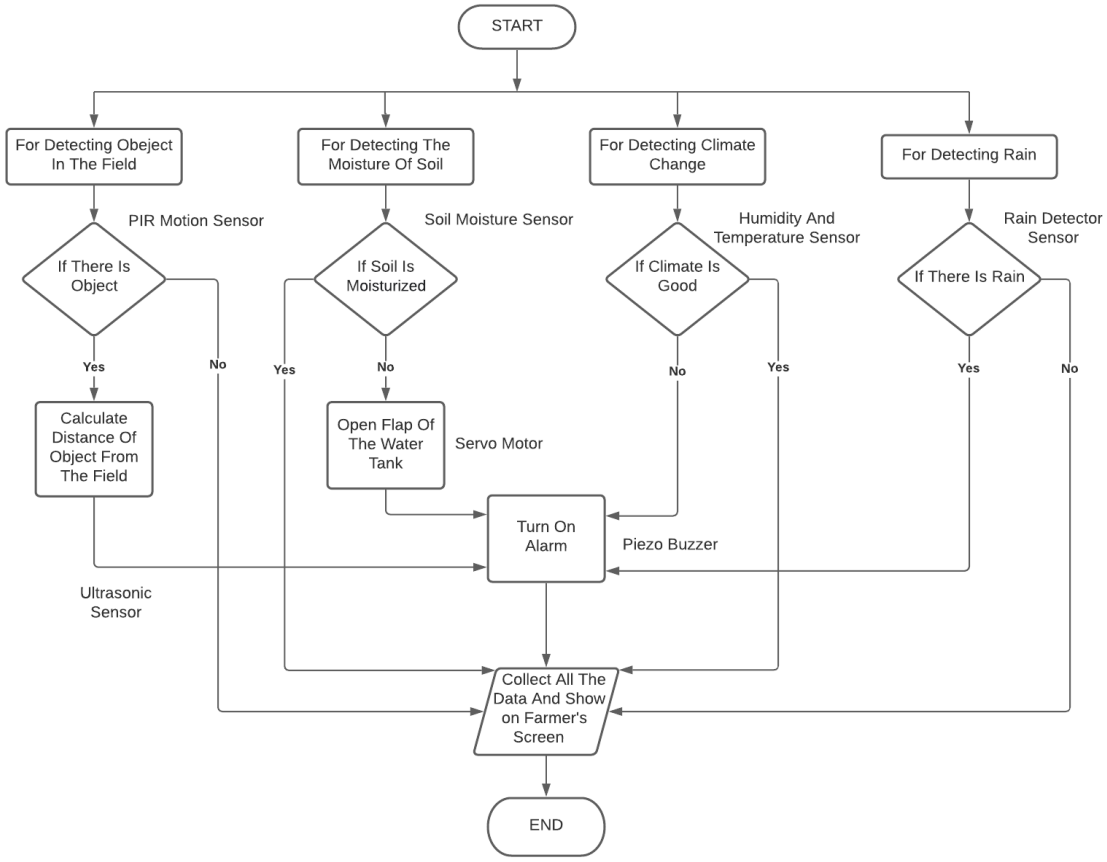


Fig. 2 General Flow Chart

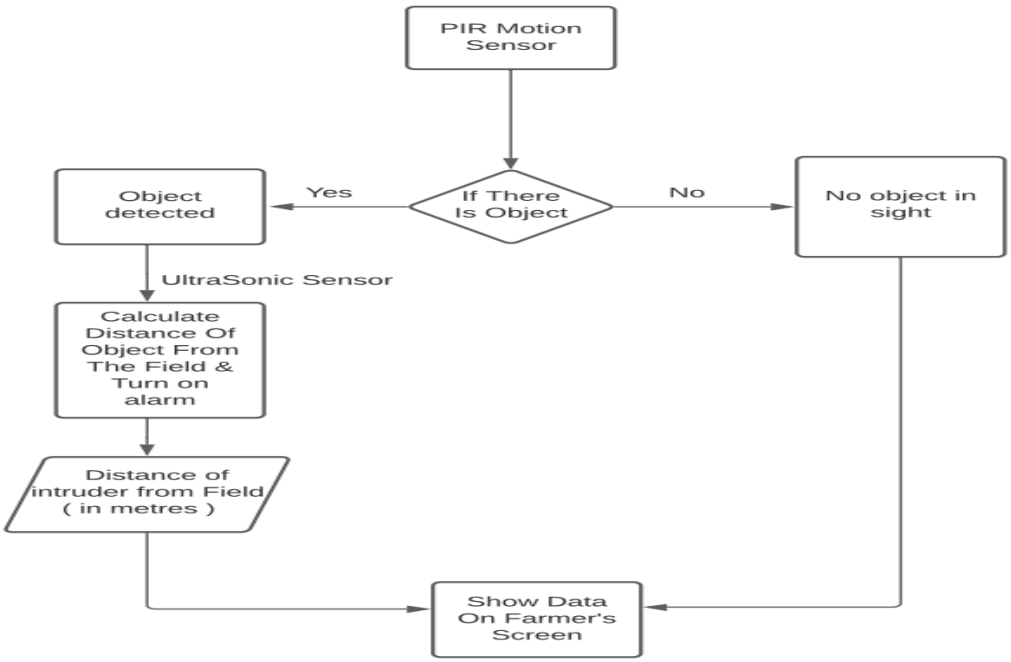


Fig. 3 PIR motion sensor Flow Chart

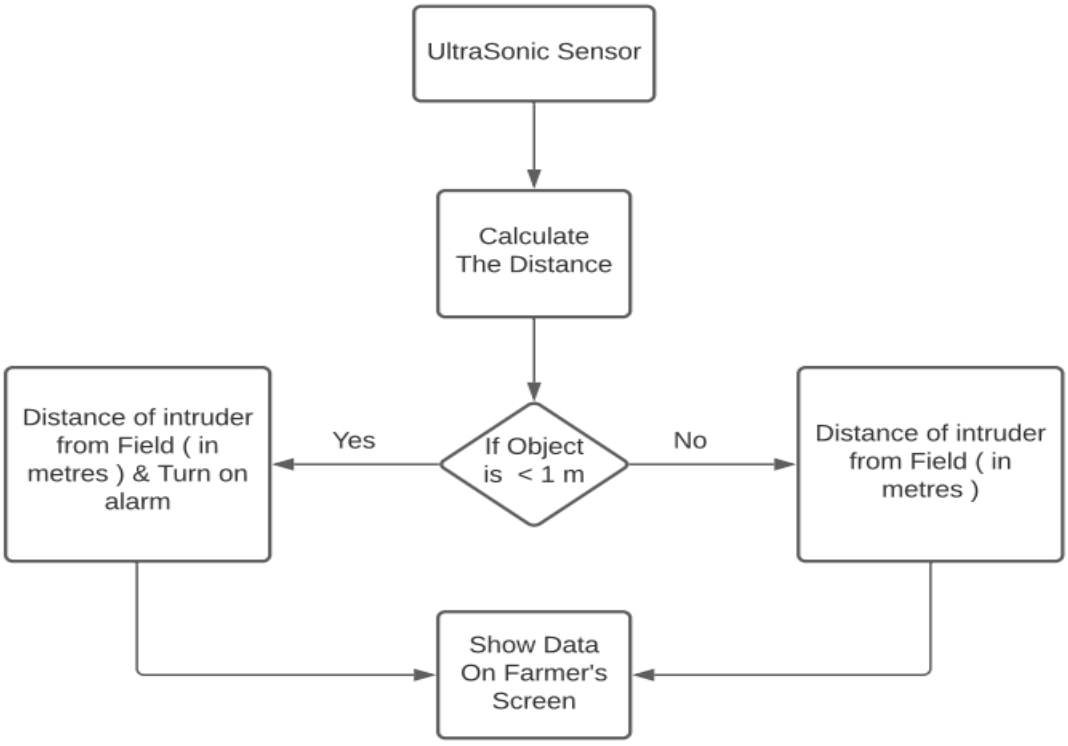


Fig. 4 Ultrasonic sensor Flow Chart

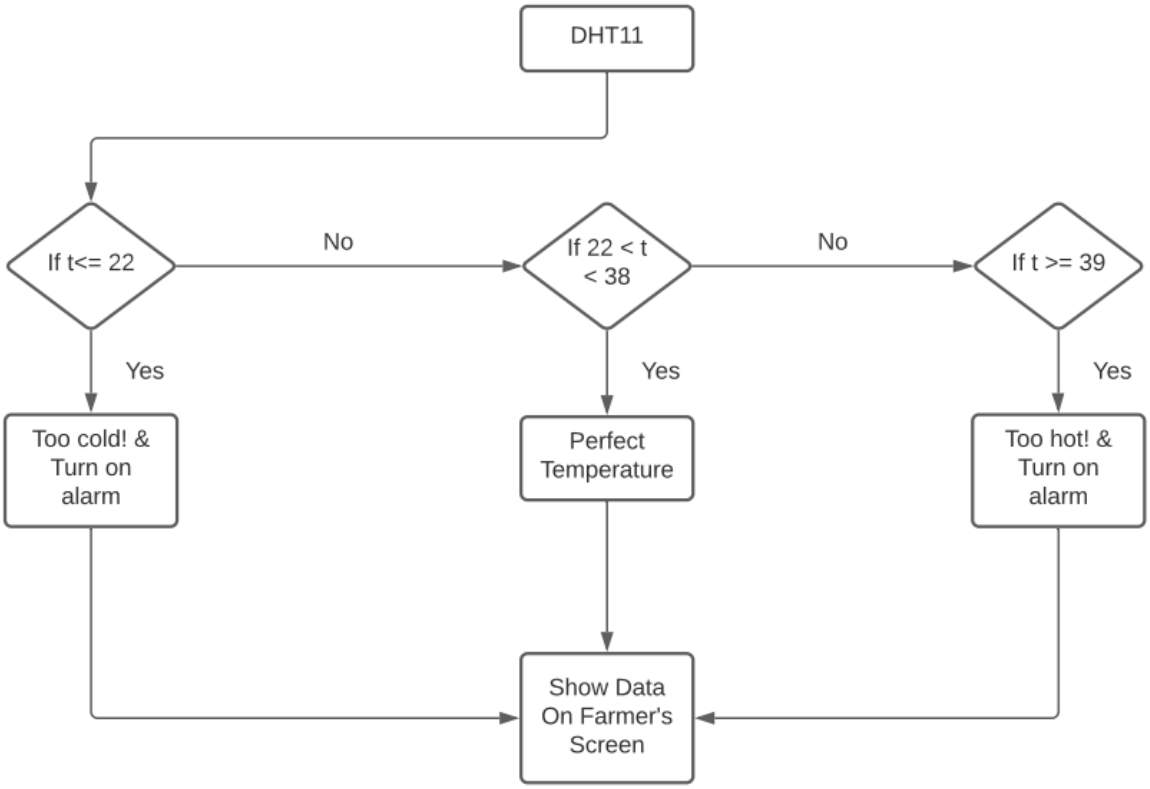


Fig. 5 DHT11 sensor Flow Chart

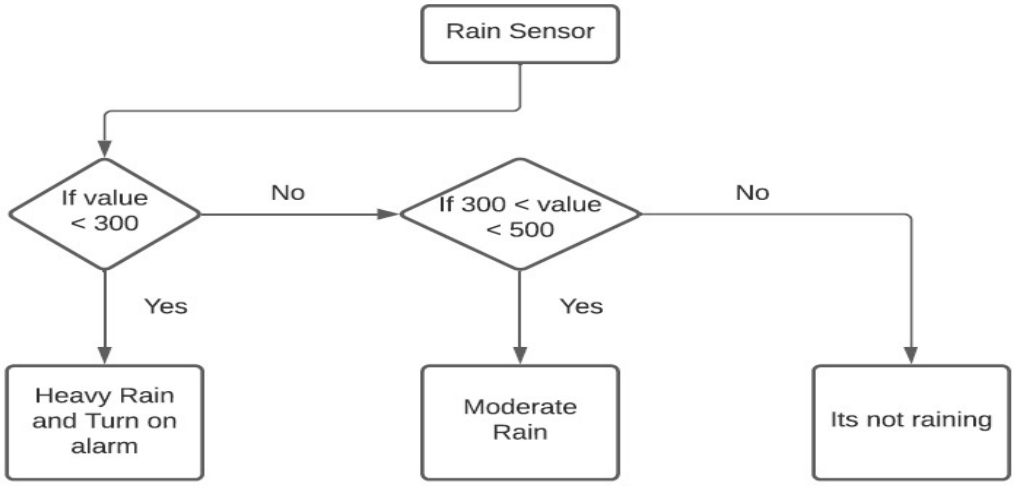


Fig. 6 Rain sensor Flow chart

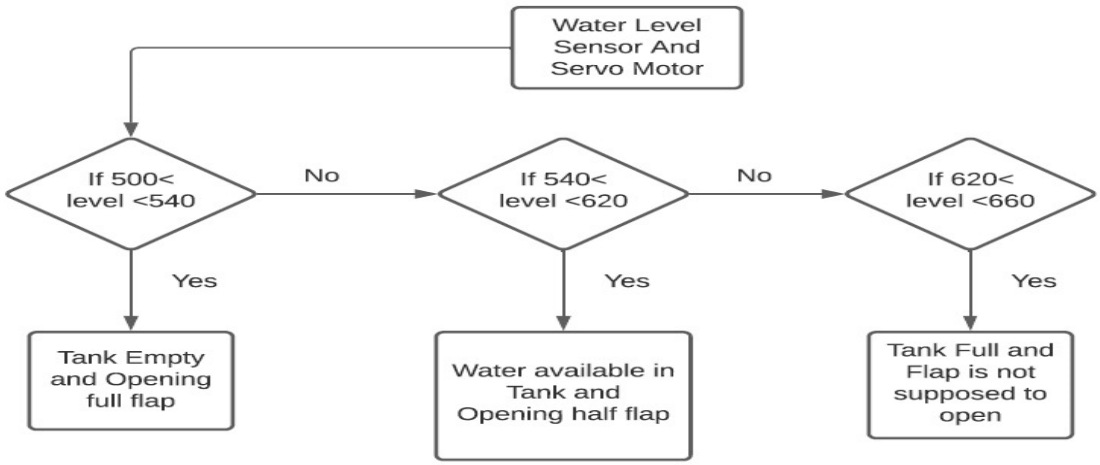


Fig. 7 Water Level sensor and servo motor flow chart

CODE DESIGN IMPLIMENTATION

CODING IN ARDUINO

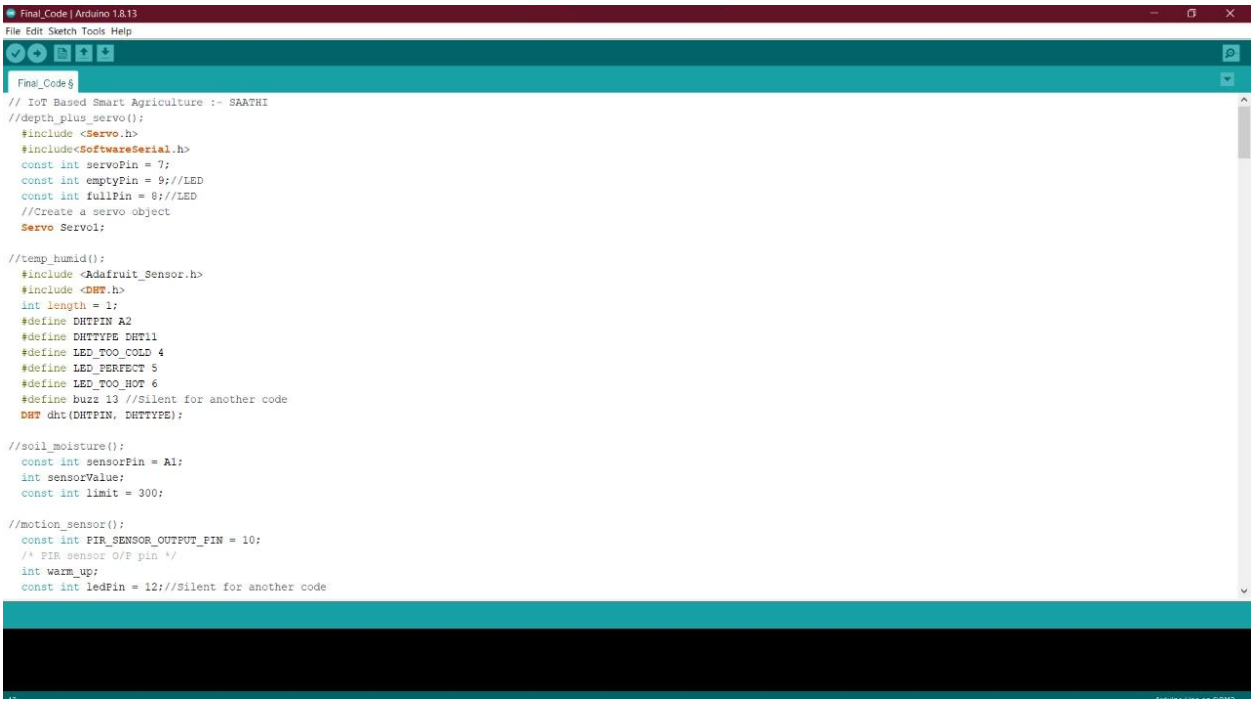


Fig.8 Depth and Servo motor coding

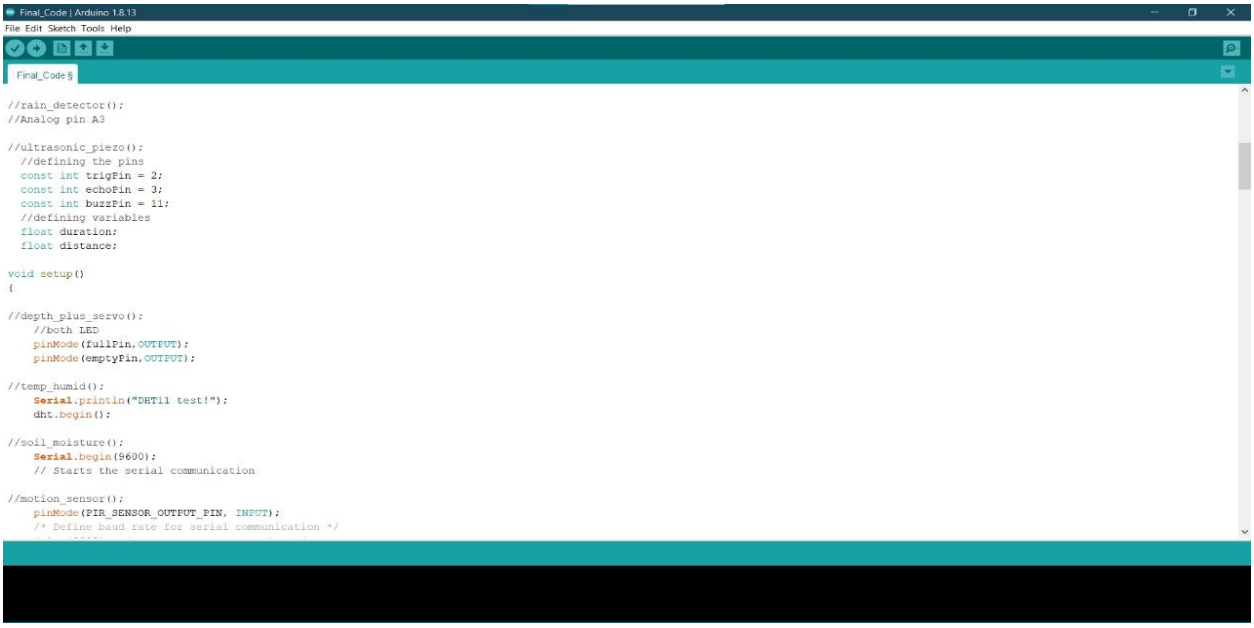


Fig. 9 Temperature and soil moisture coding

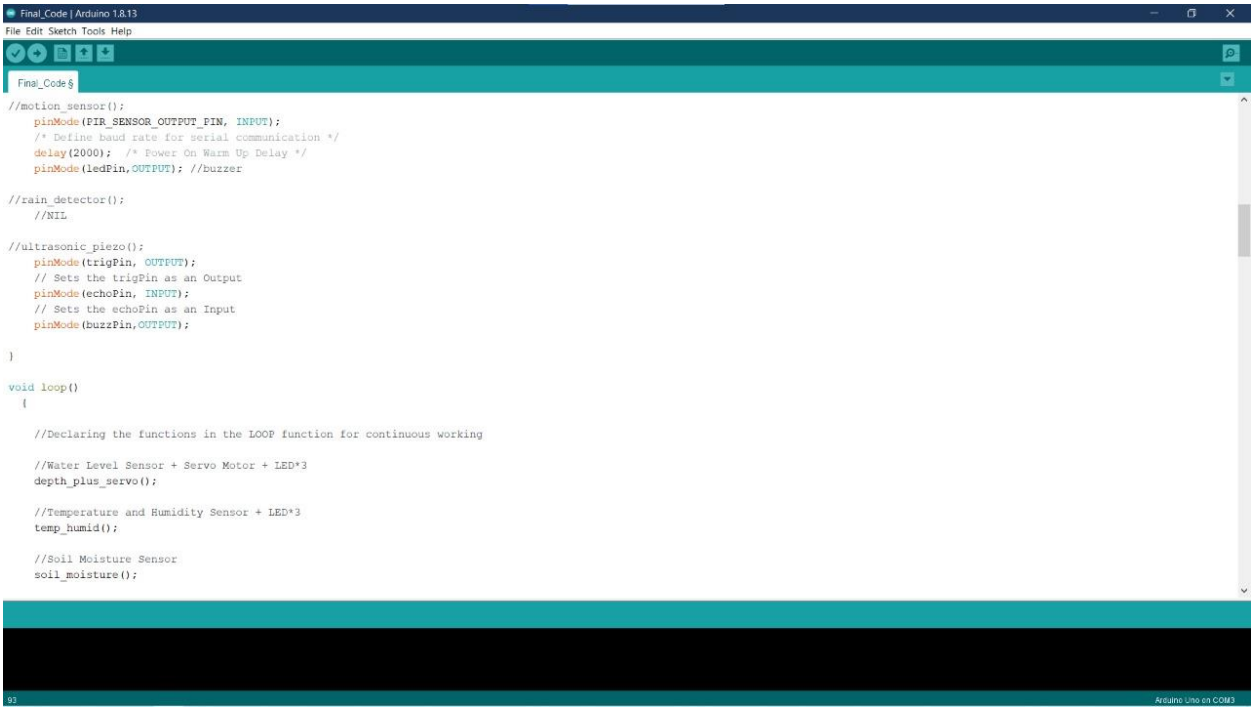


Fig. 10 motion sensor and piezo buzzer coding

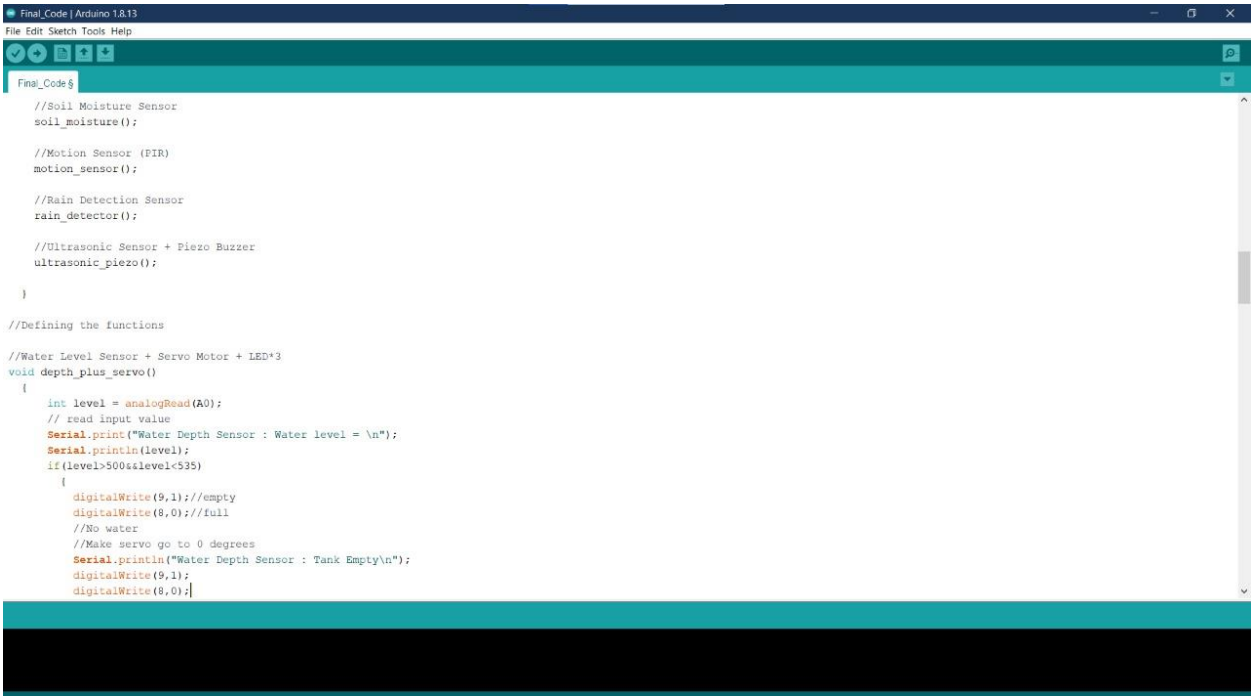


Fig. 11 Rain detector sensor coding

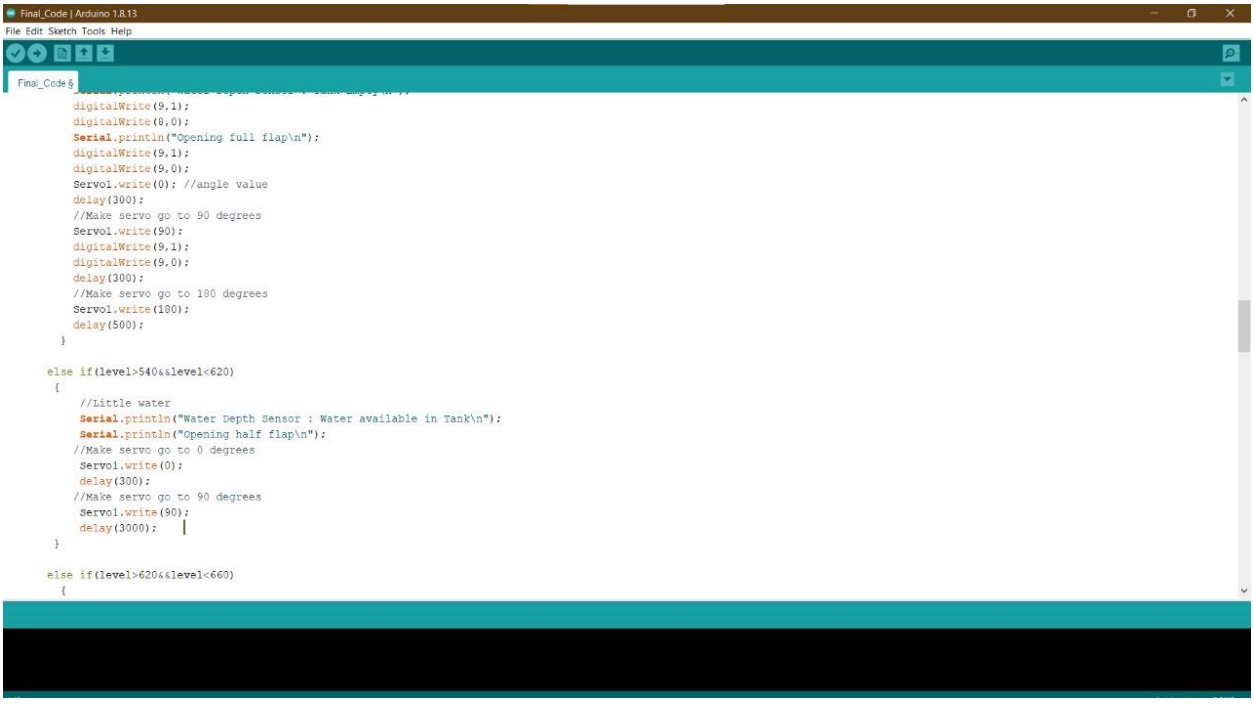


Fig. 12 Defining functions of depth and servo motor

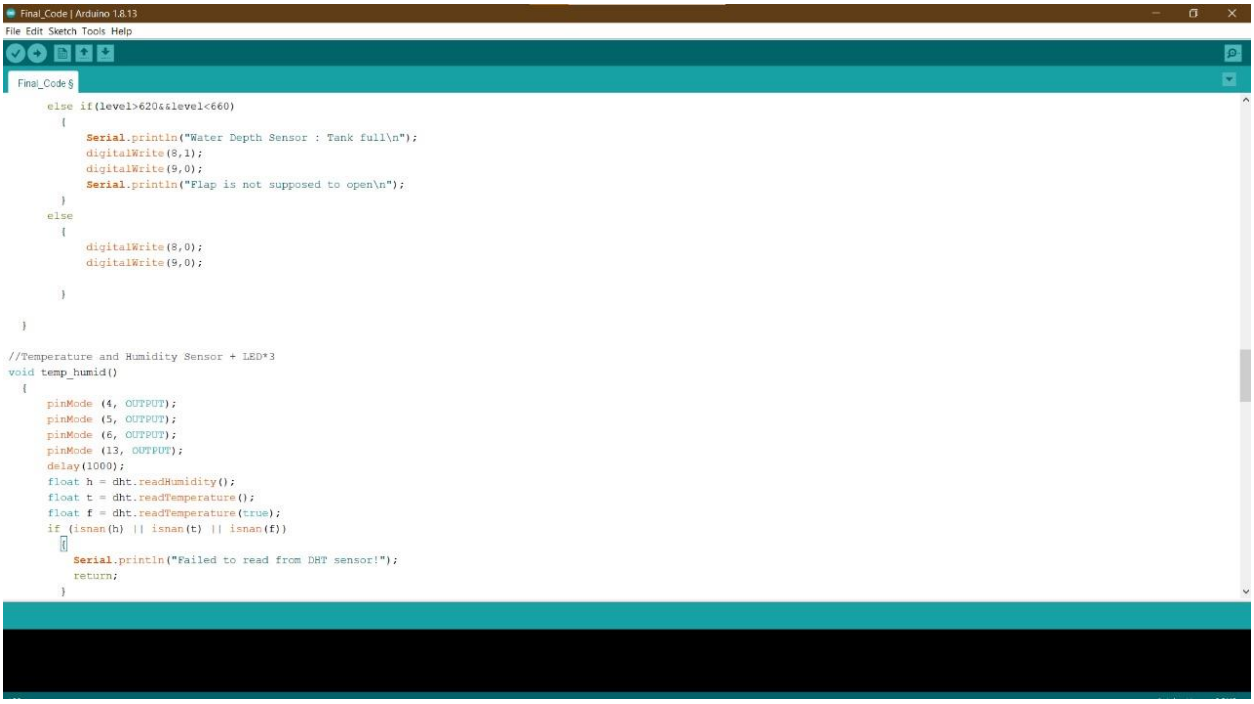


Fig. 13 Defining functions of temperature and humidity

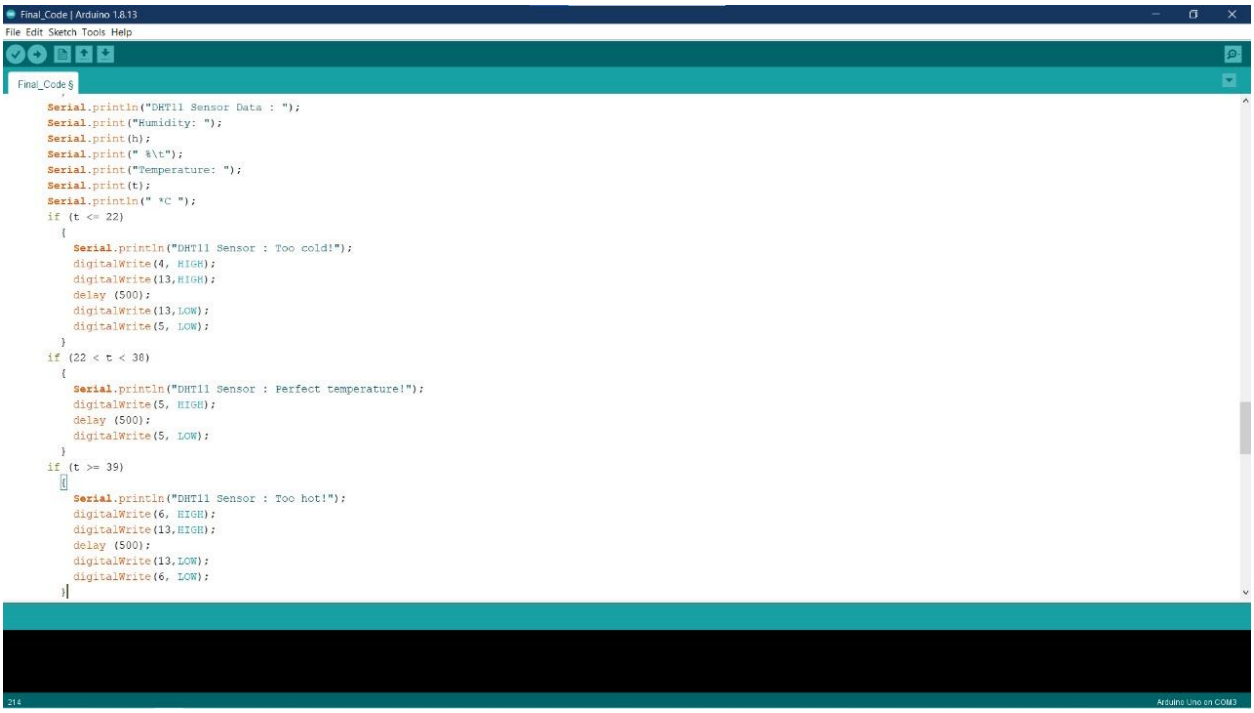


Fig. 14 Defining functions of temperature and humidity

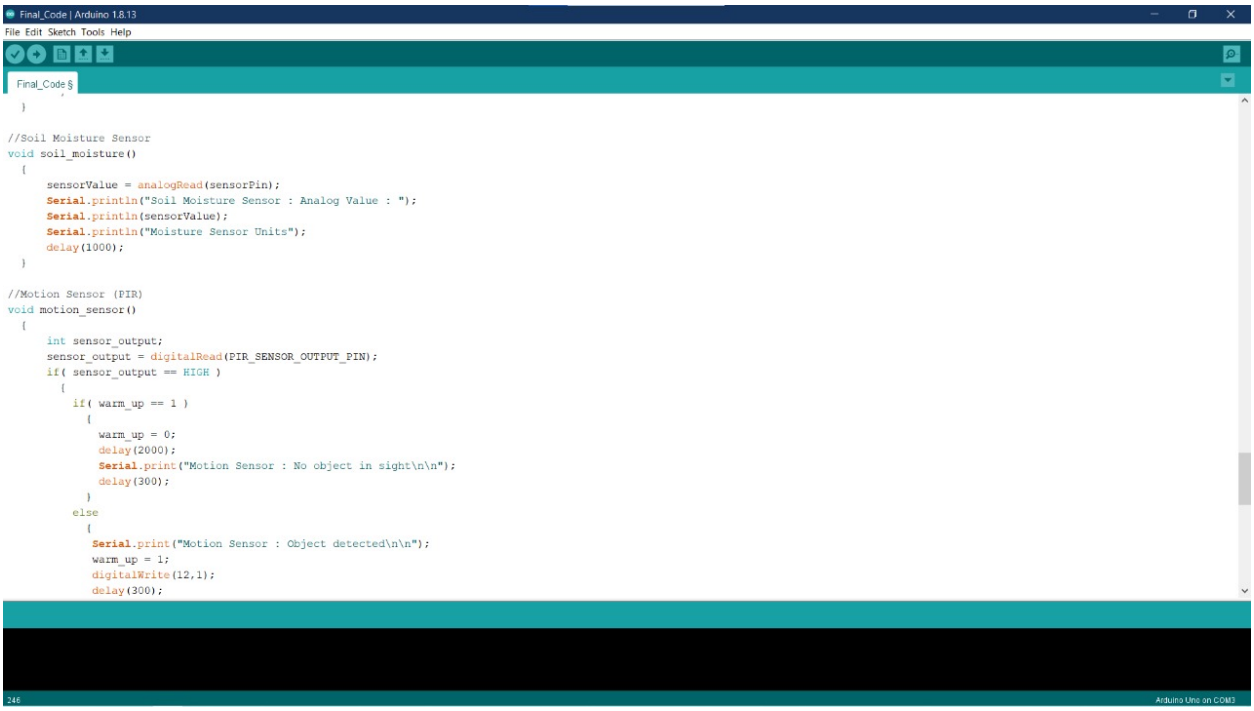


Fig. 15 Defining function of motion sensor and

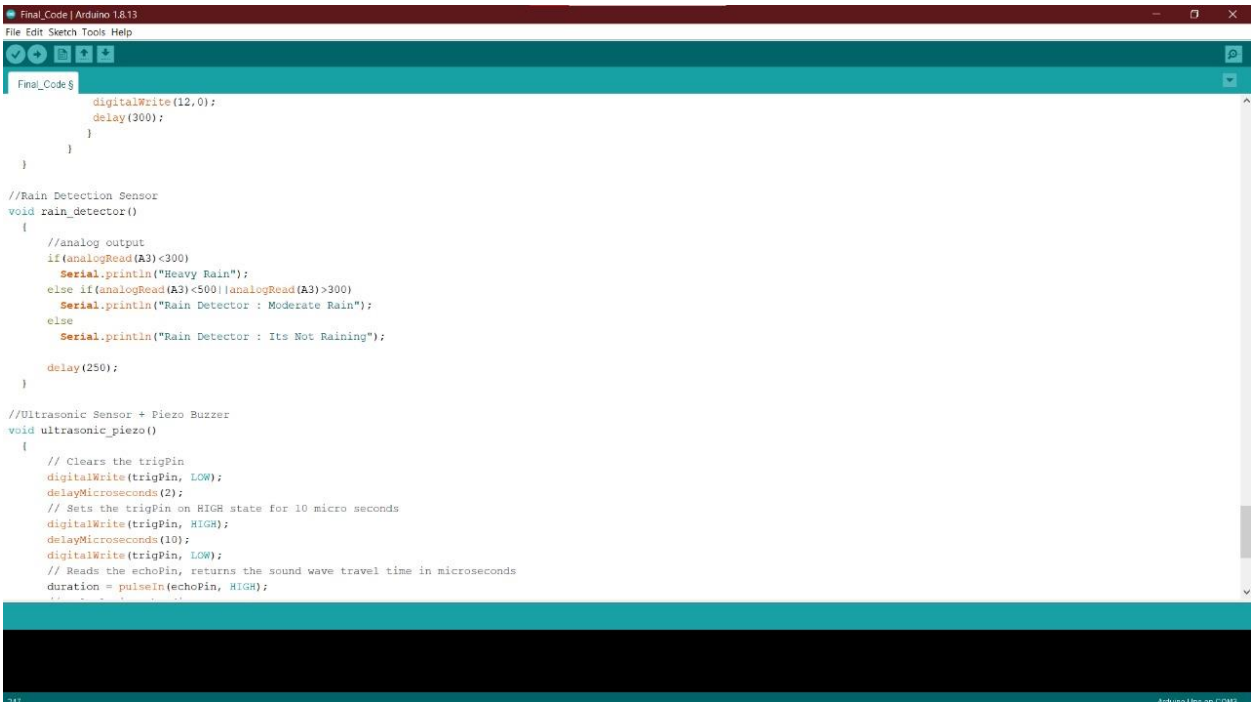


Fig. 16 Defining function of rain detector sensor

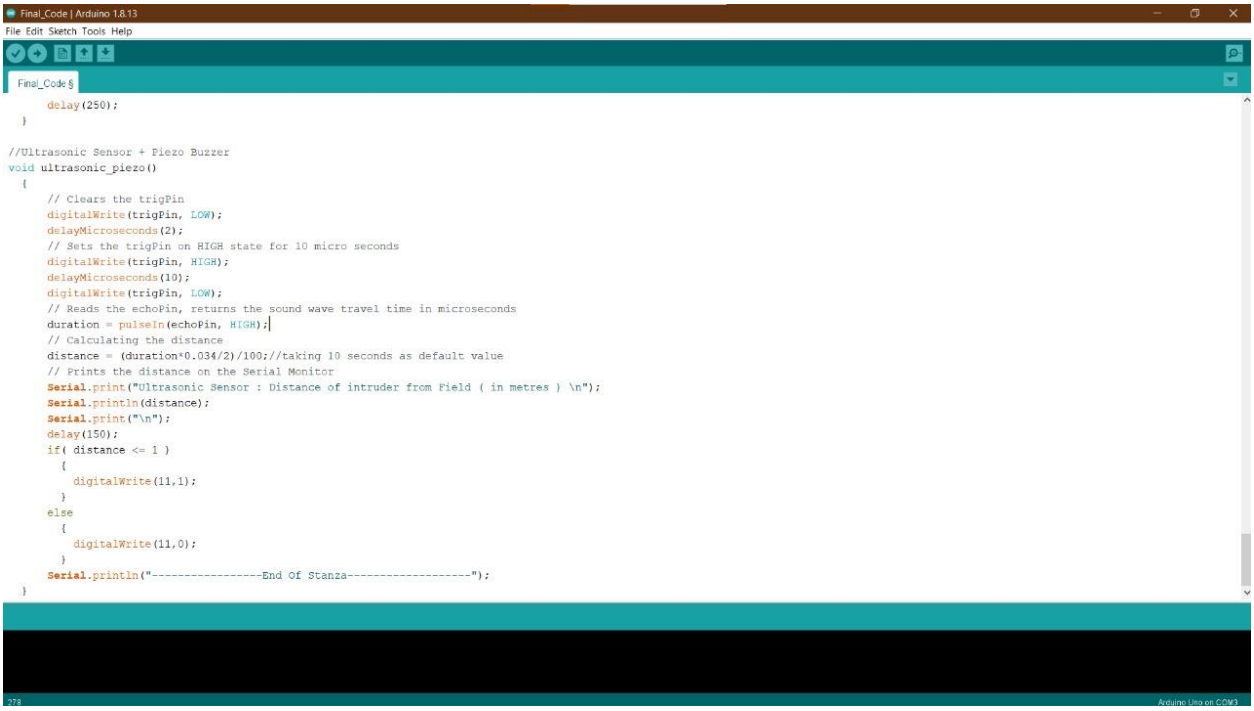


Fig. 17 Defining function of ultrasonic sensor and piezo buzzer

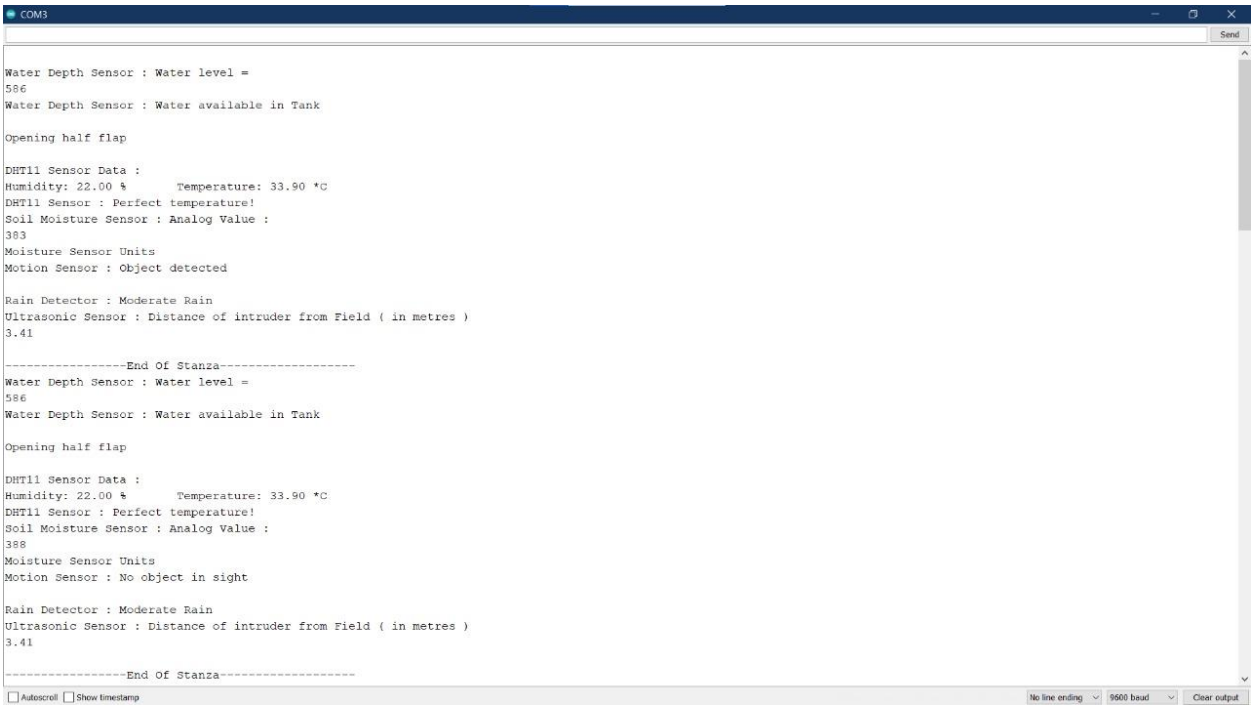


Fig. 18 Live data Output

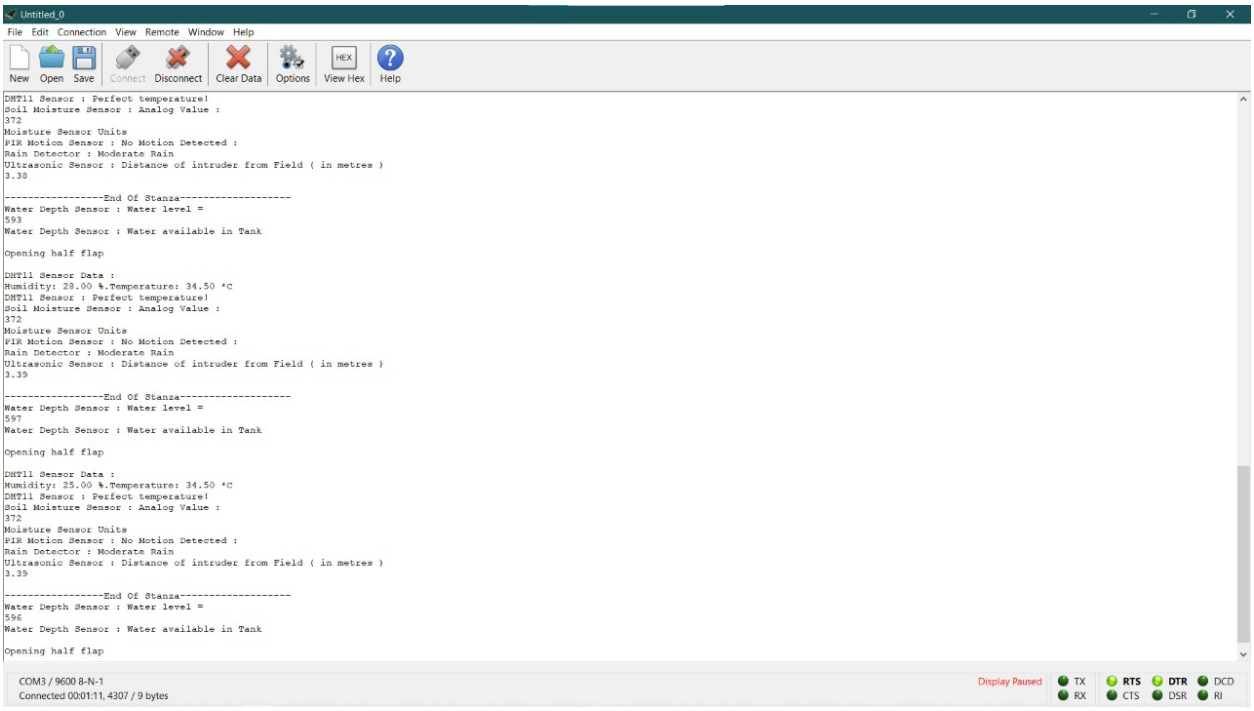


Fig. 19 Live data Output

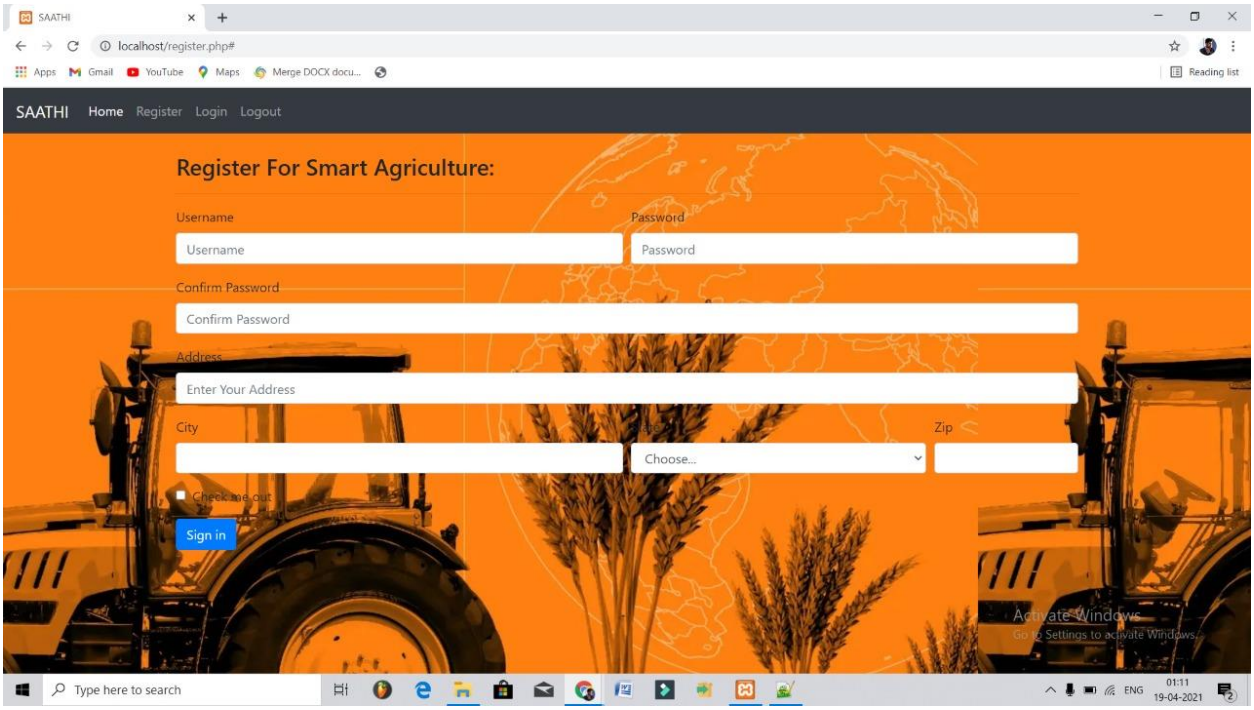


Fig. 20 Registration form for smart agriculture

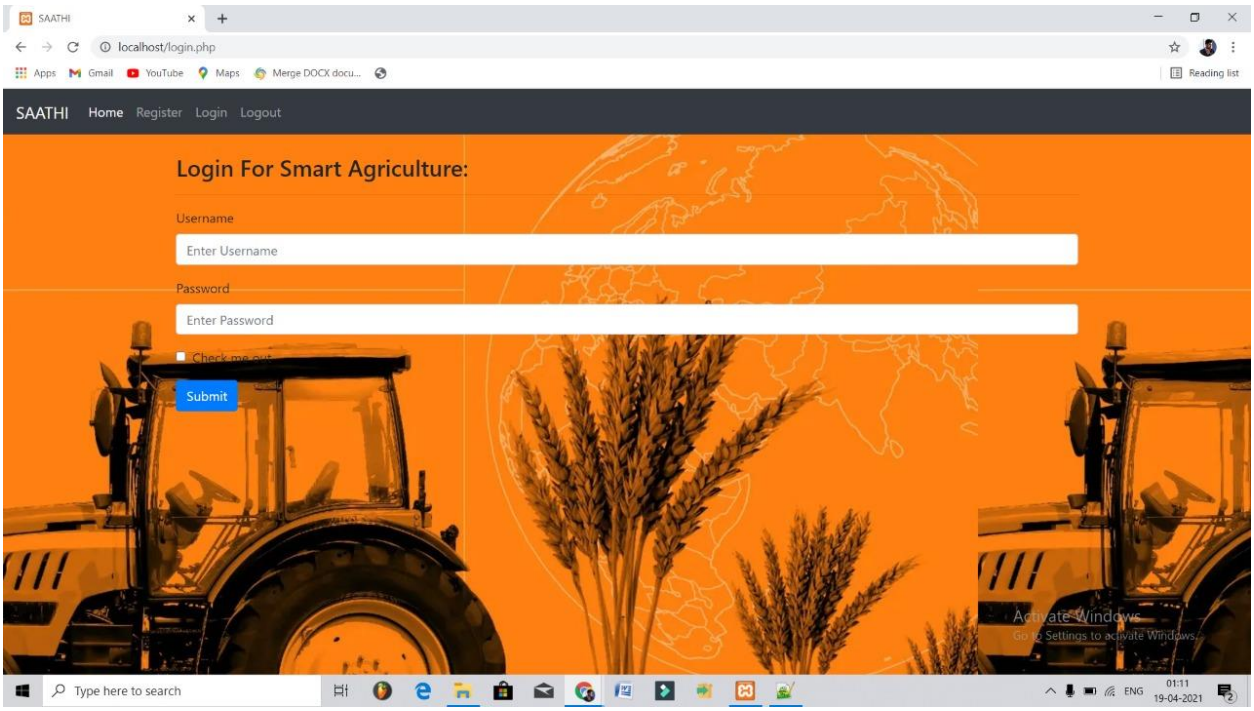


Fig. 21 Login form for smart agriculture

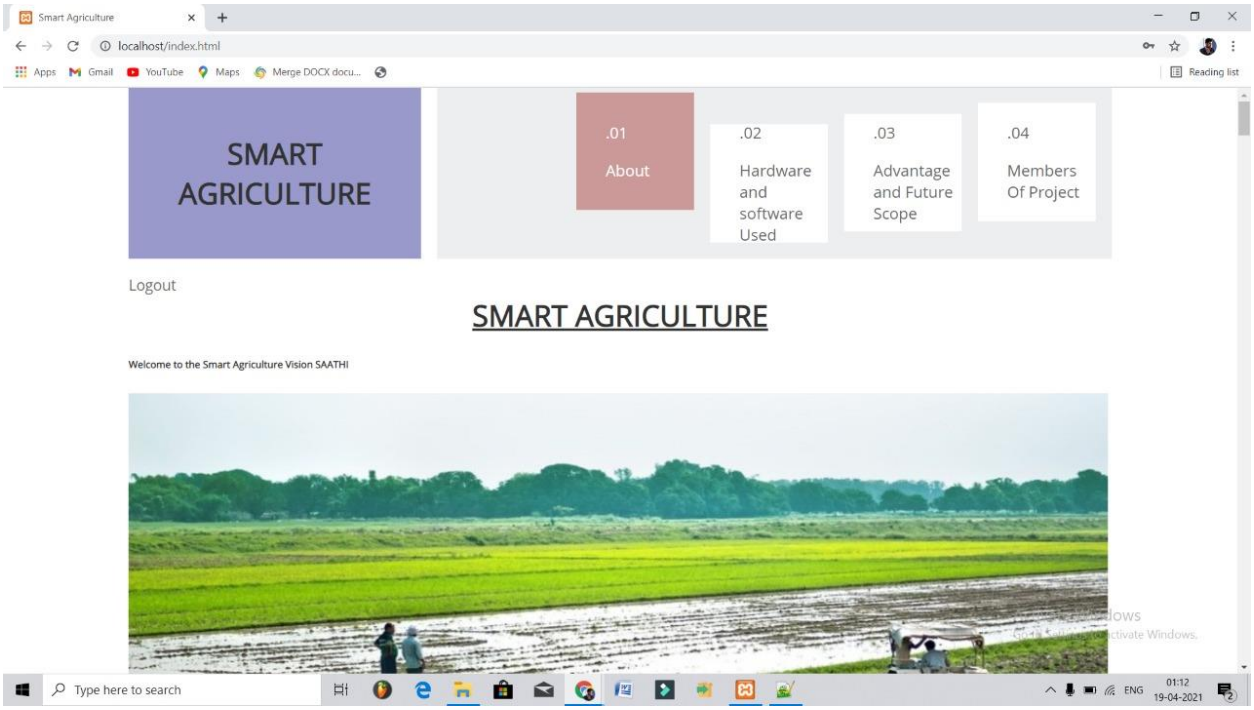
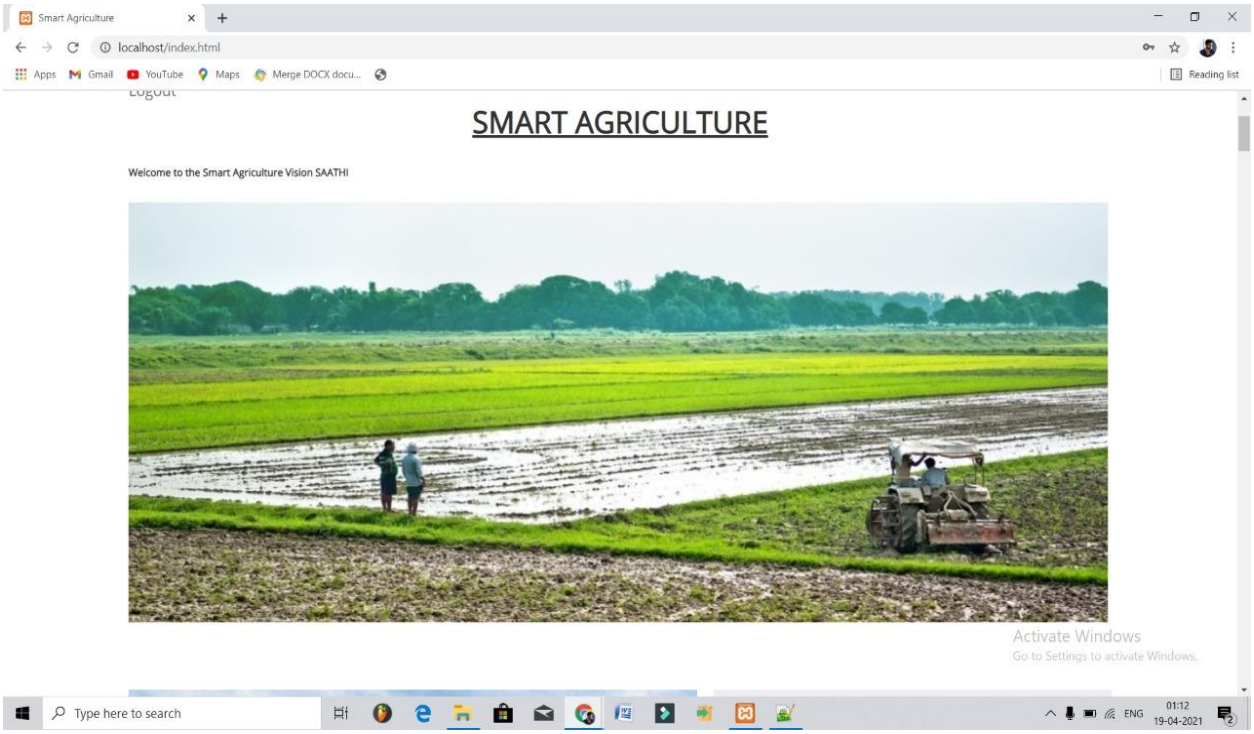


Fig. 22 website



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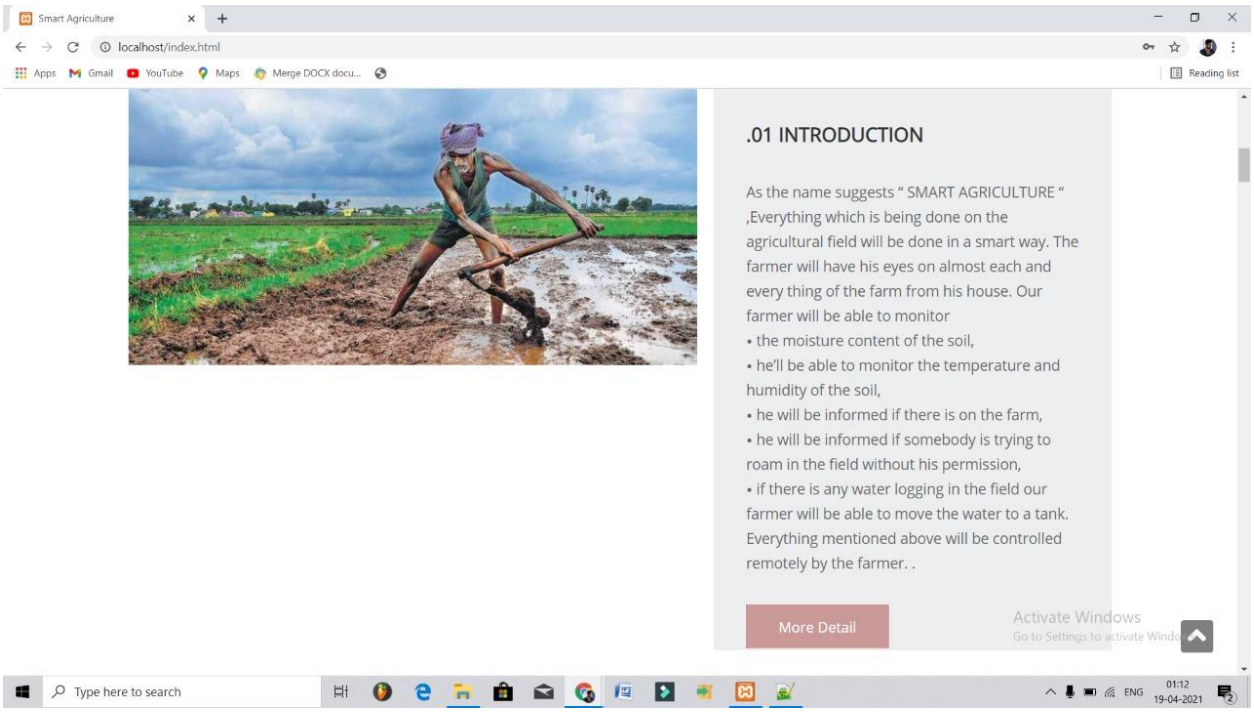

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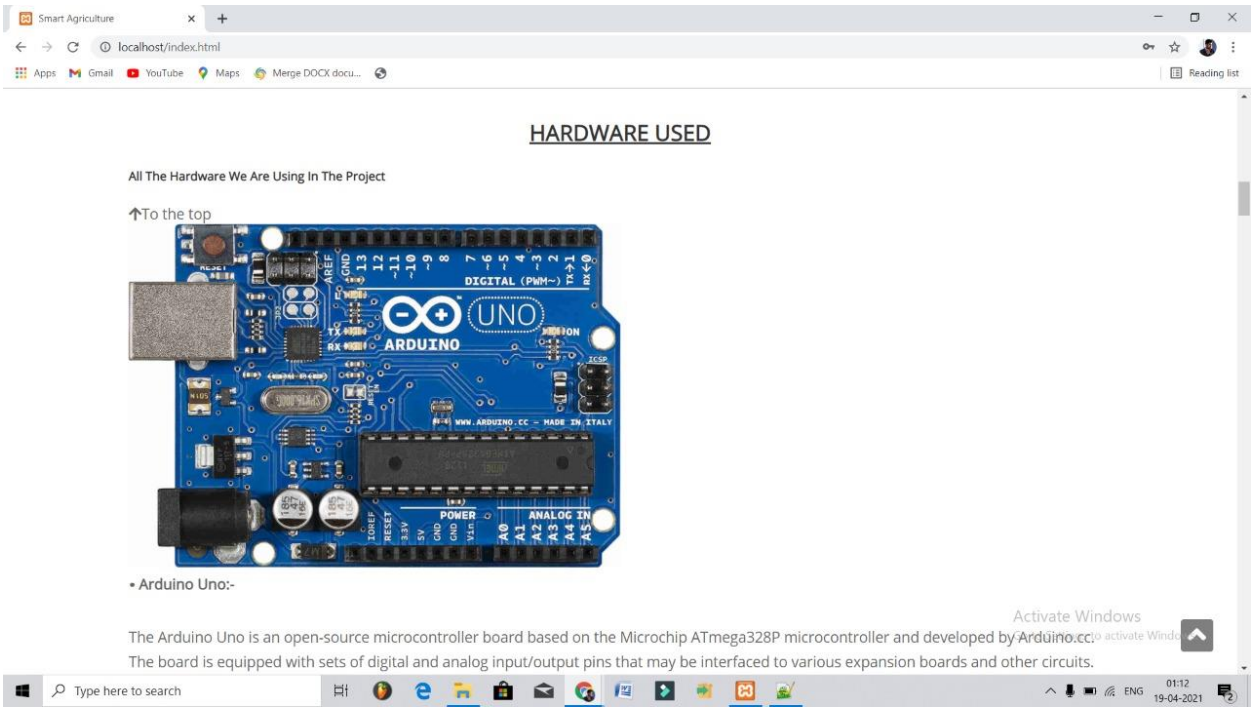

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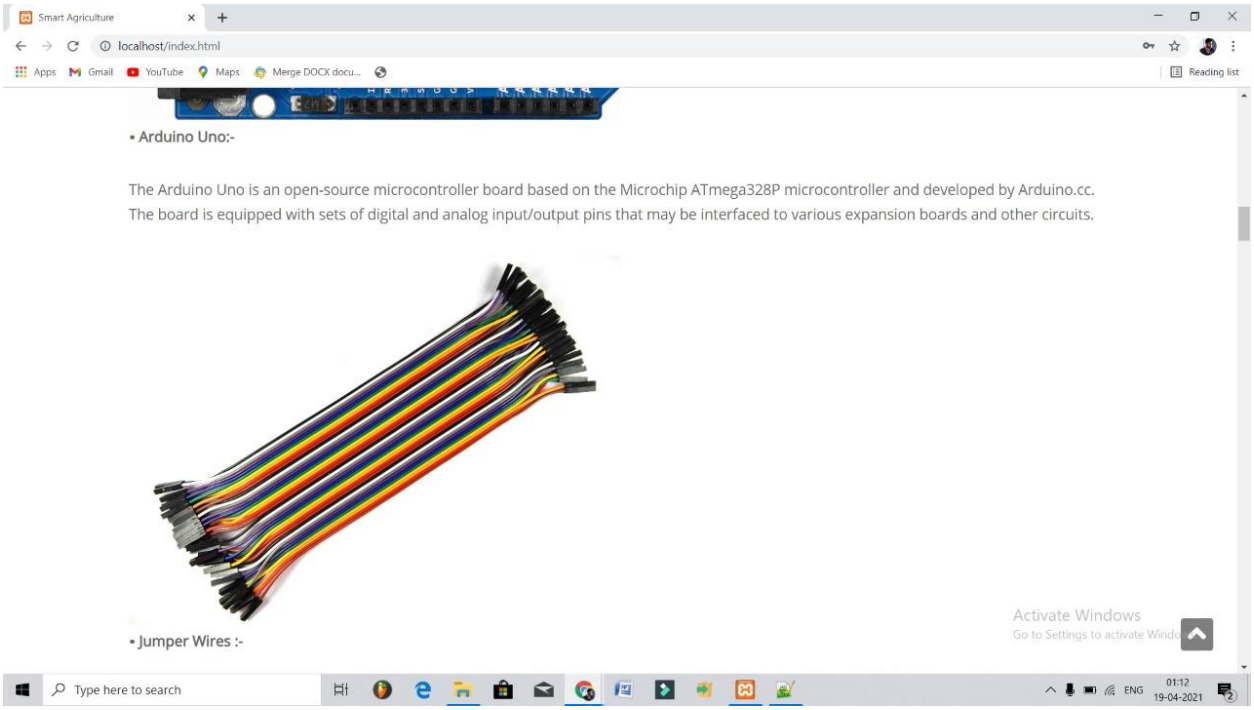

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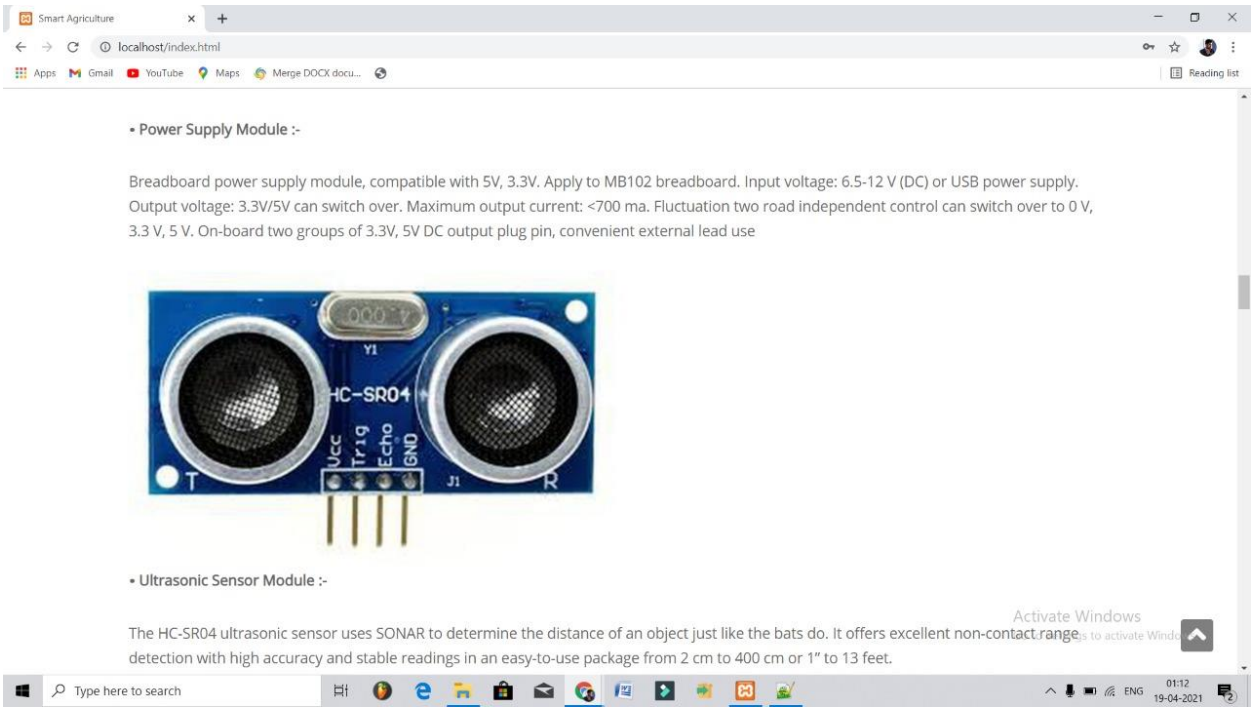

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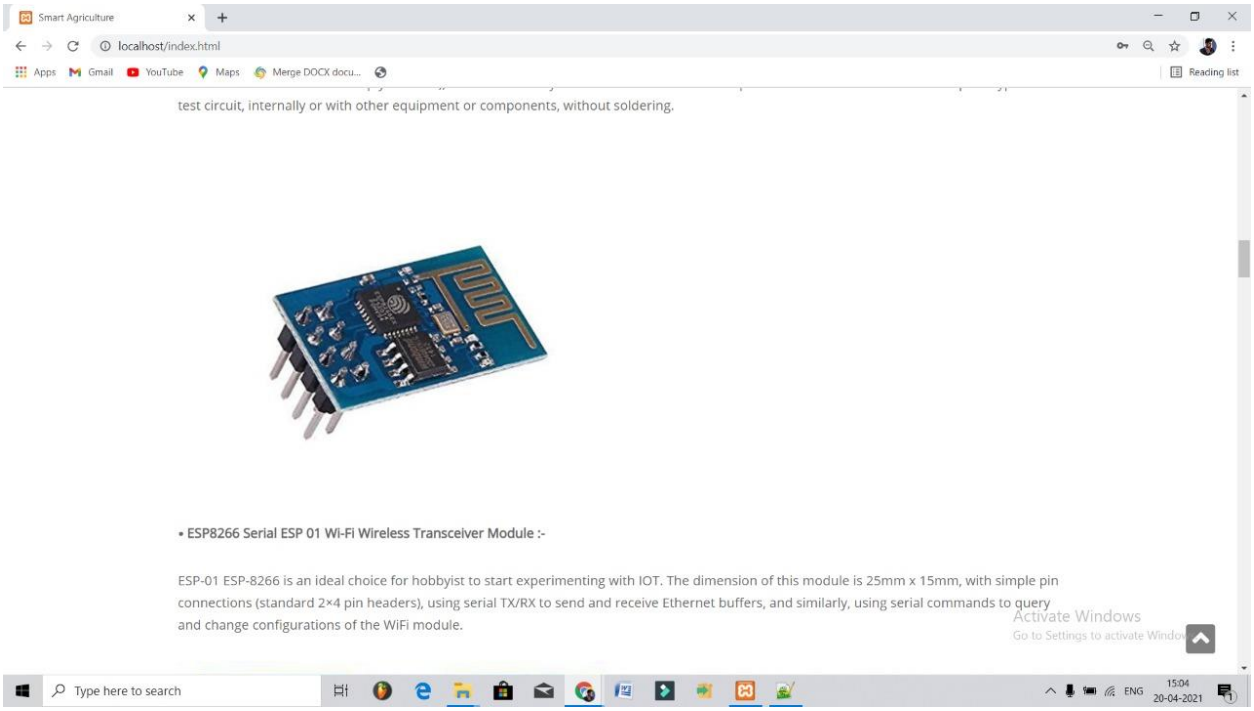

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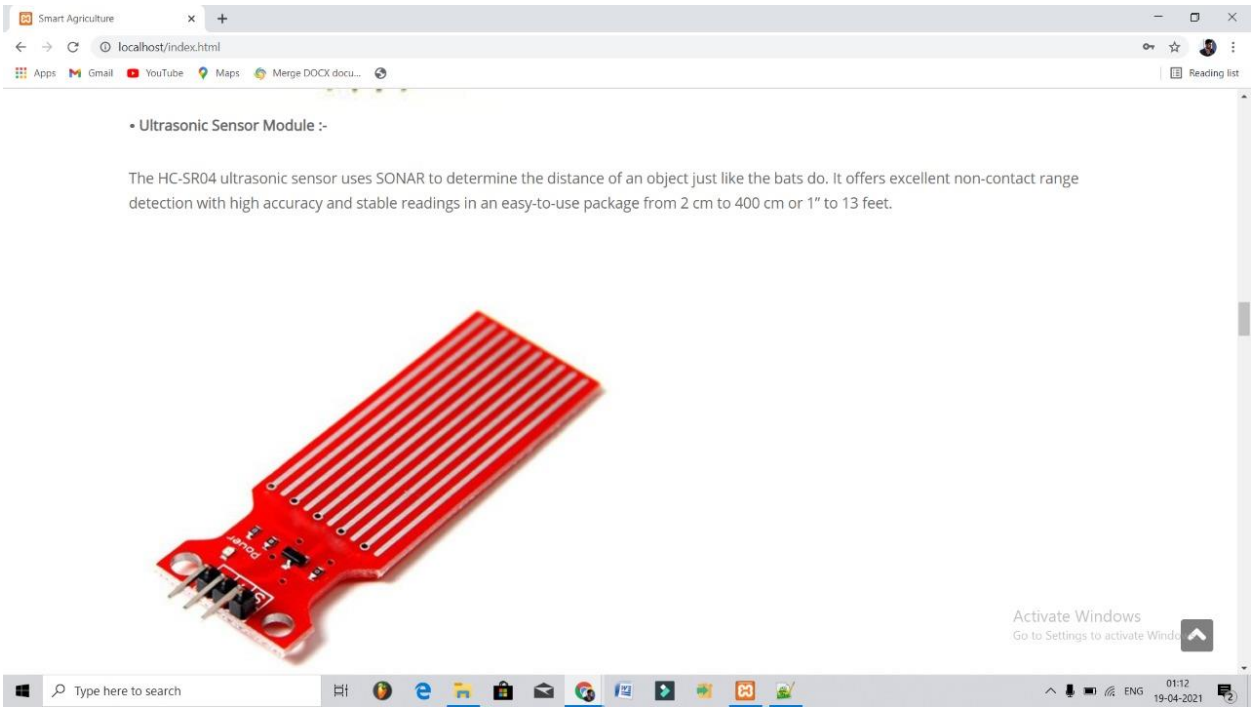

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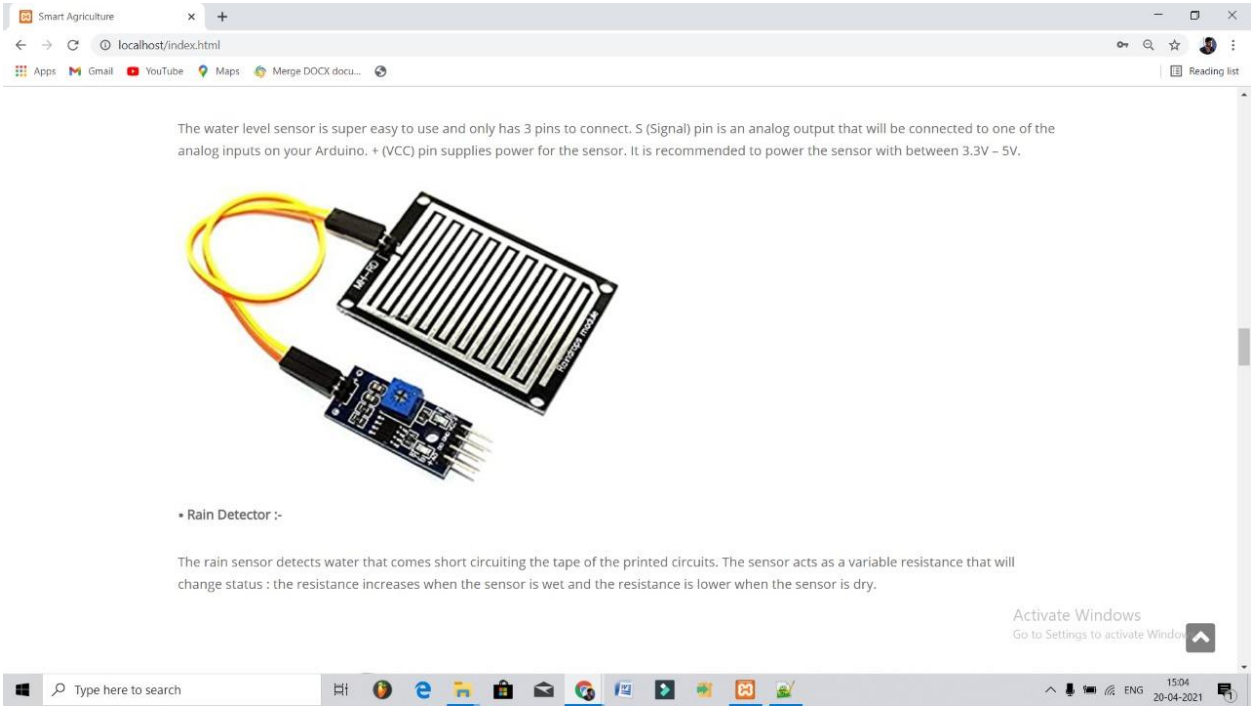

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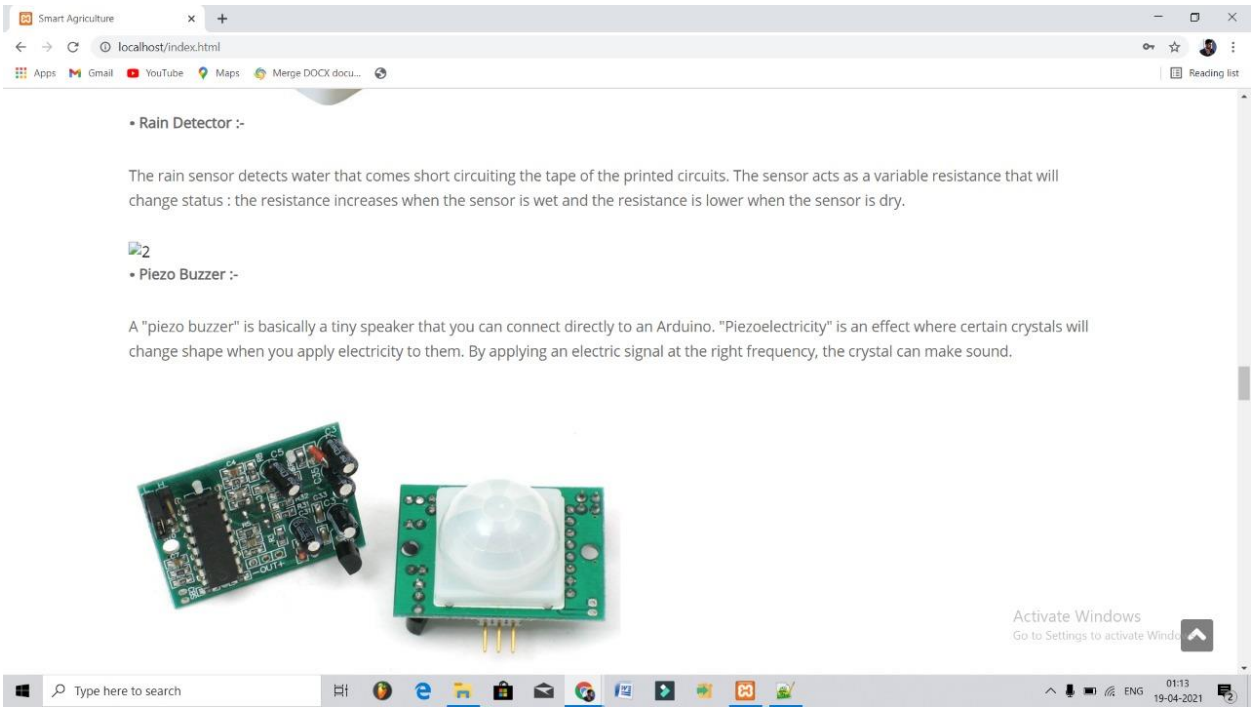

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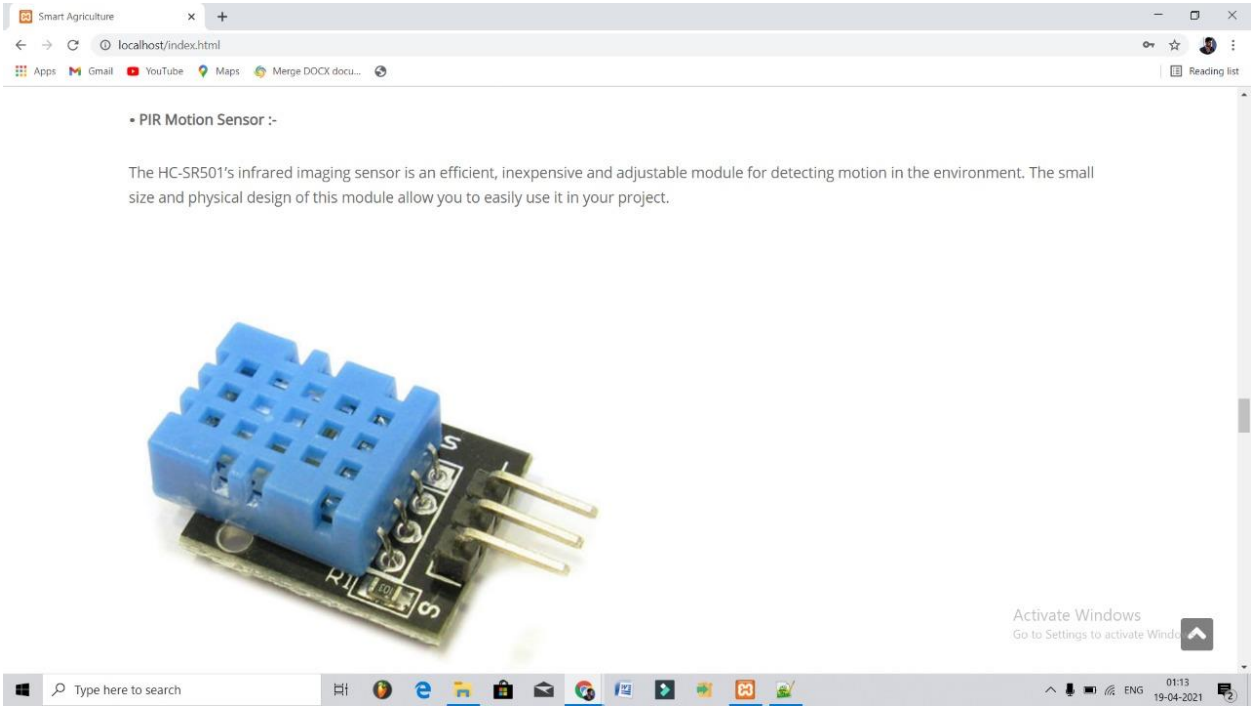

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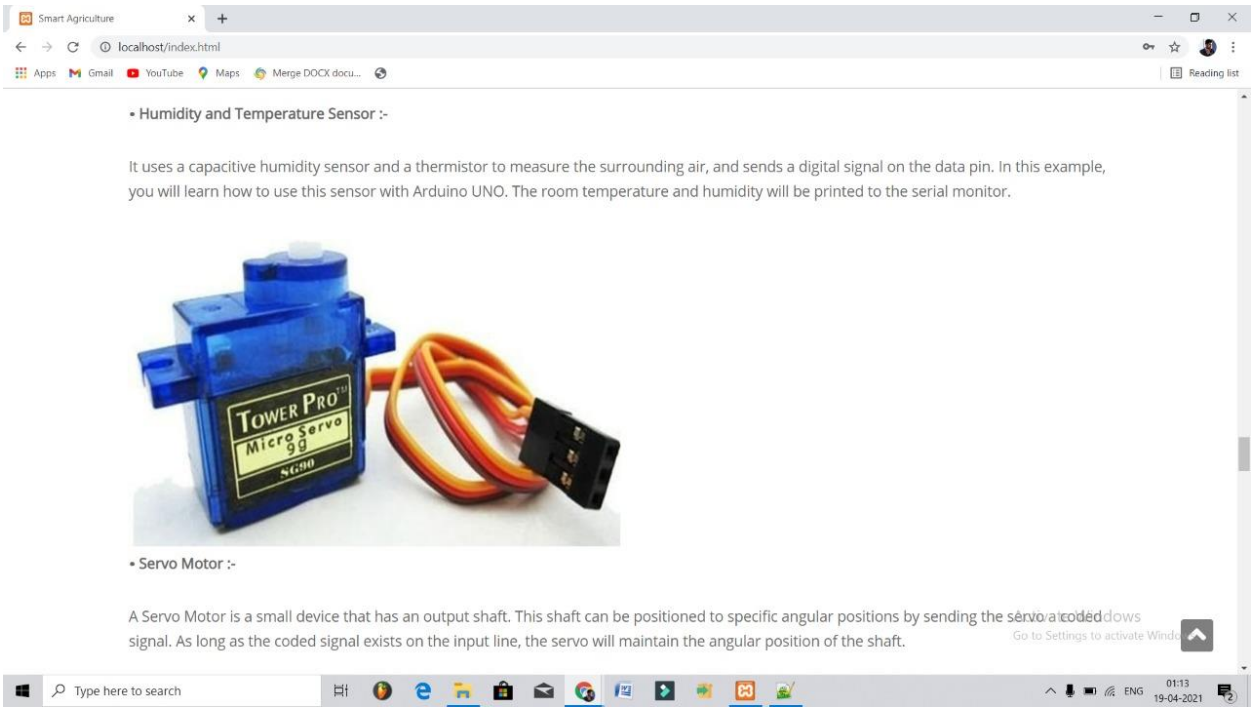

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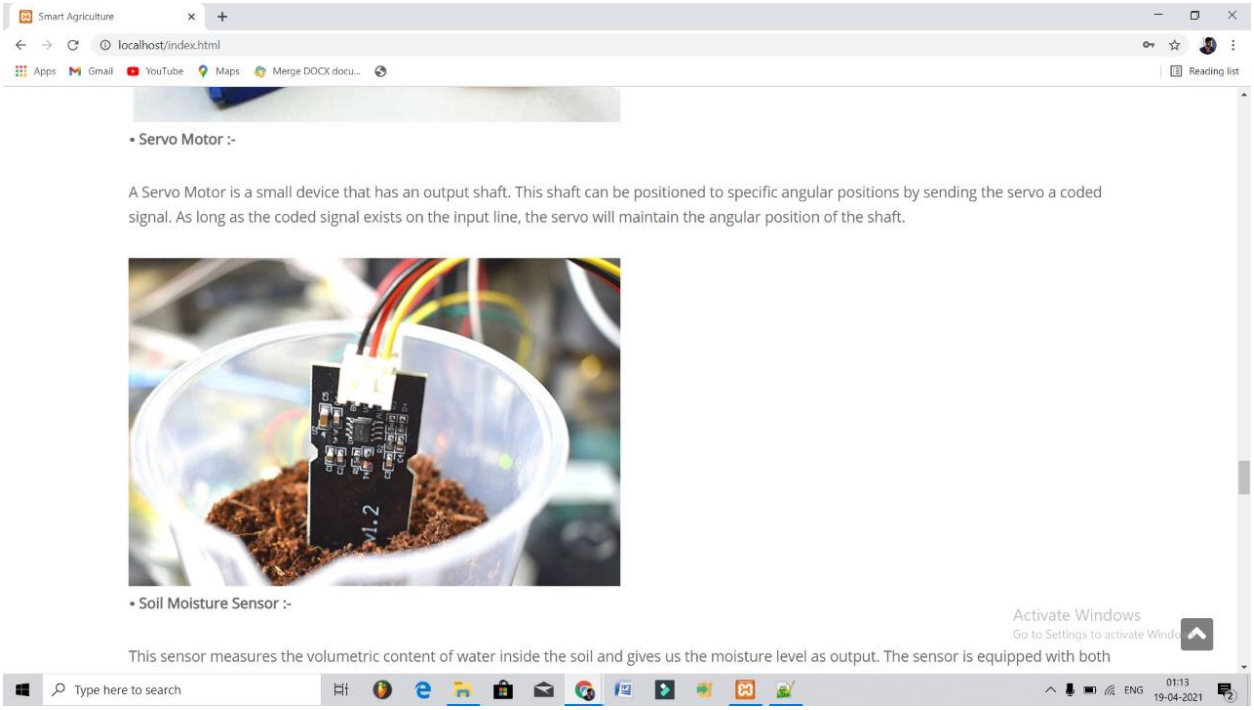

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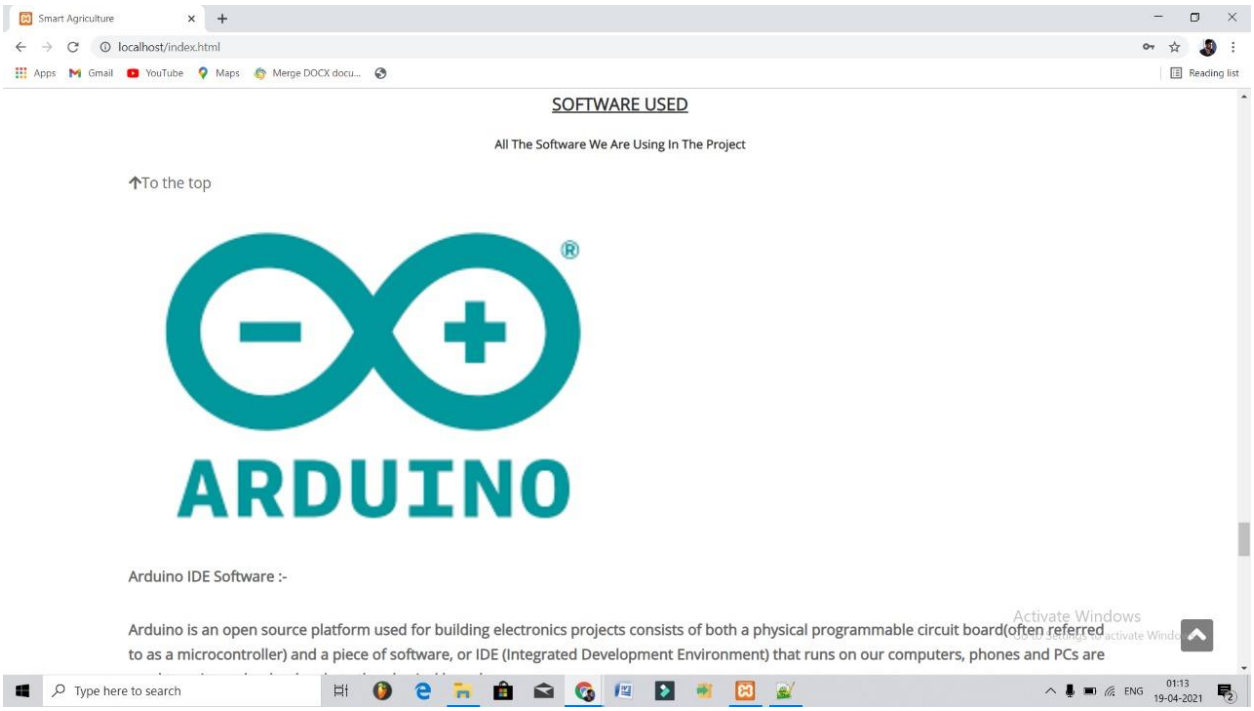

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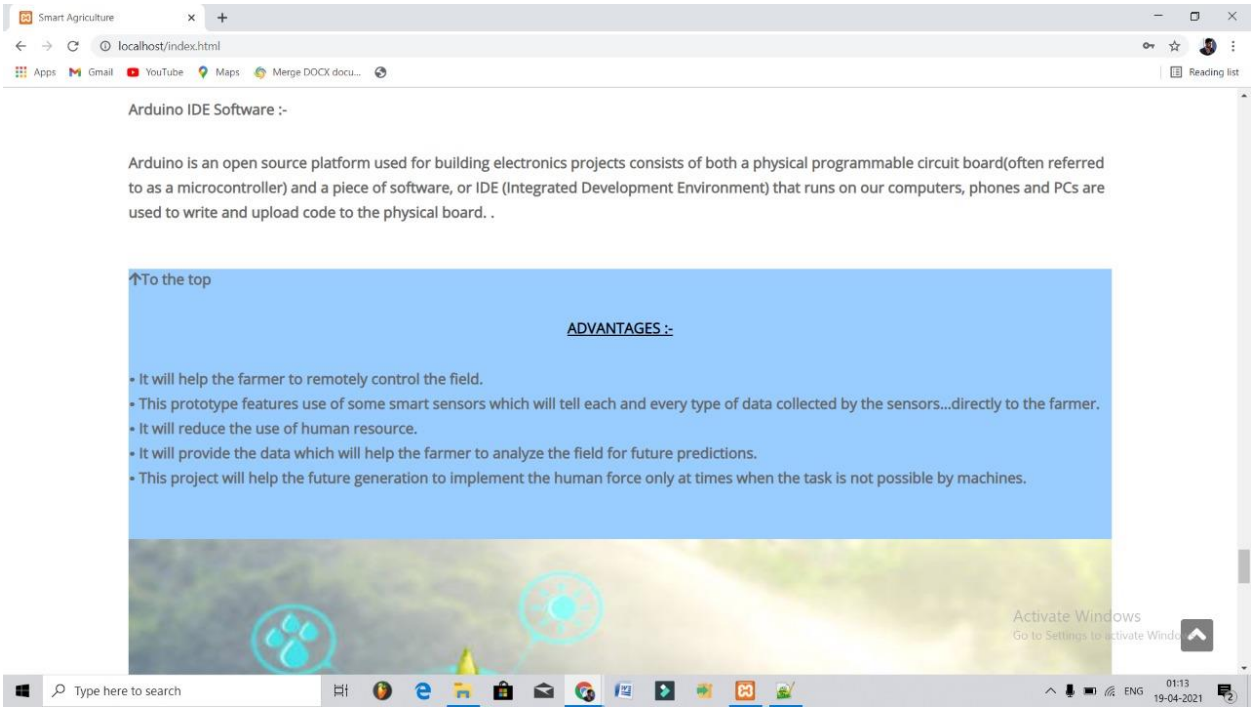

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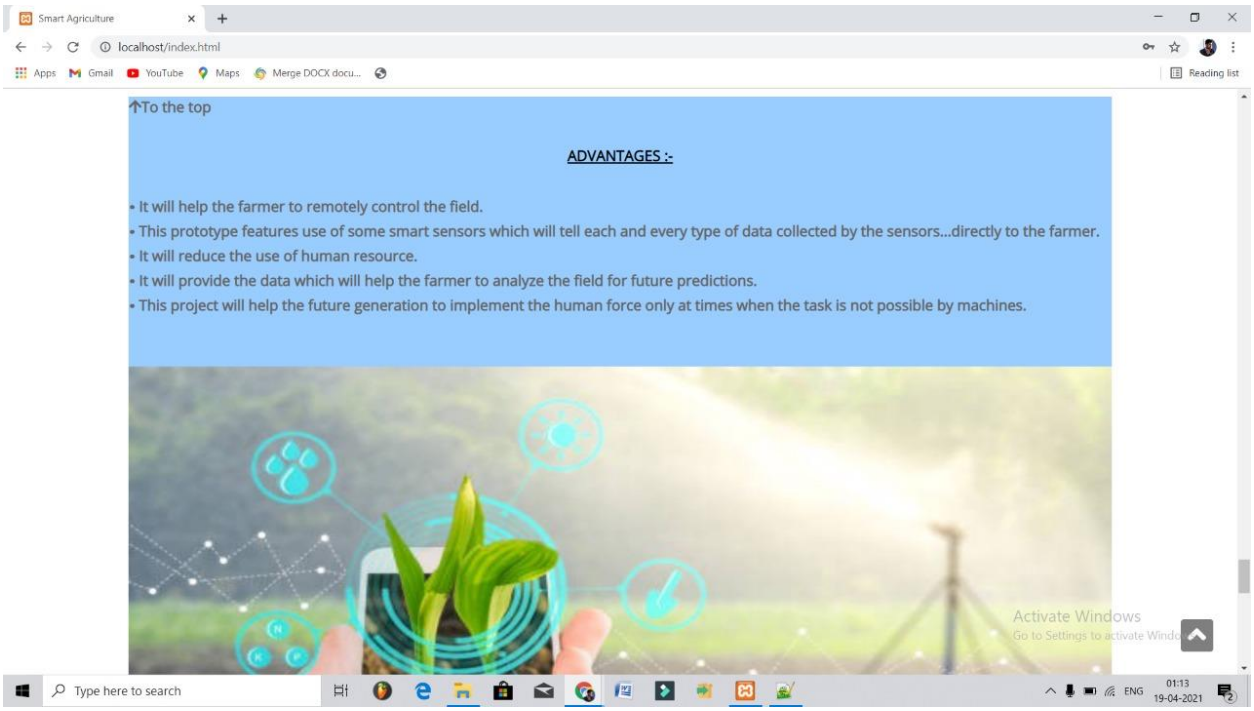

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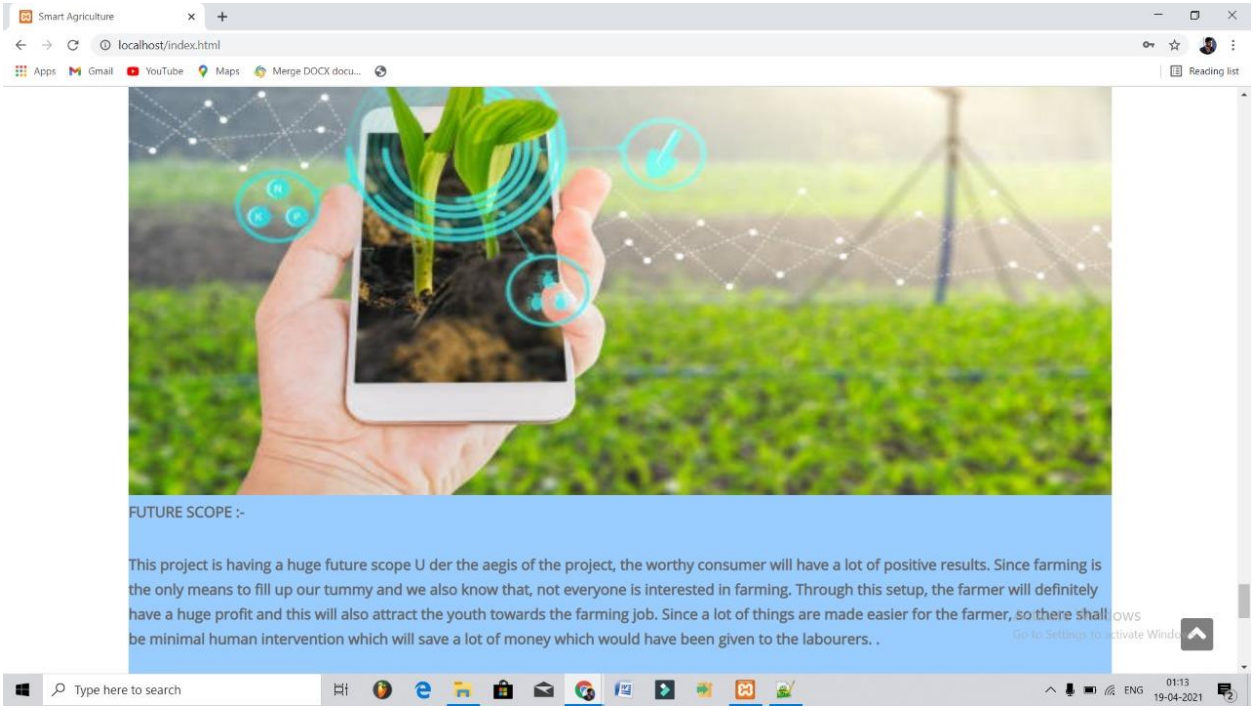

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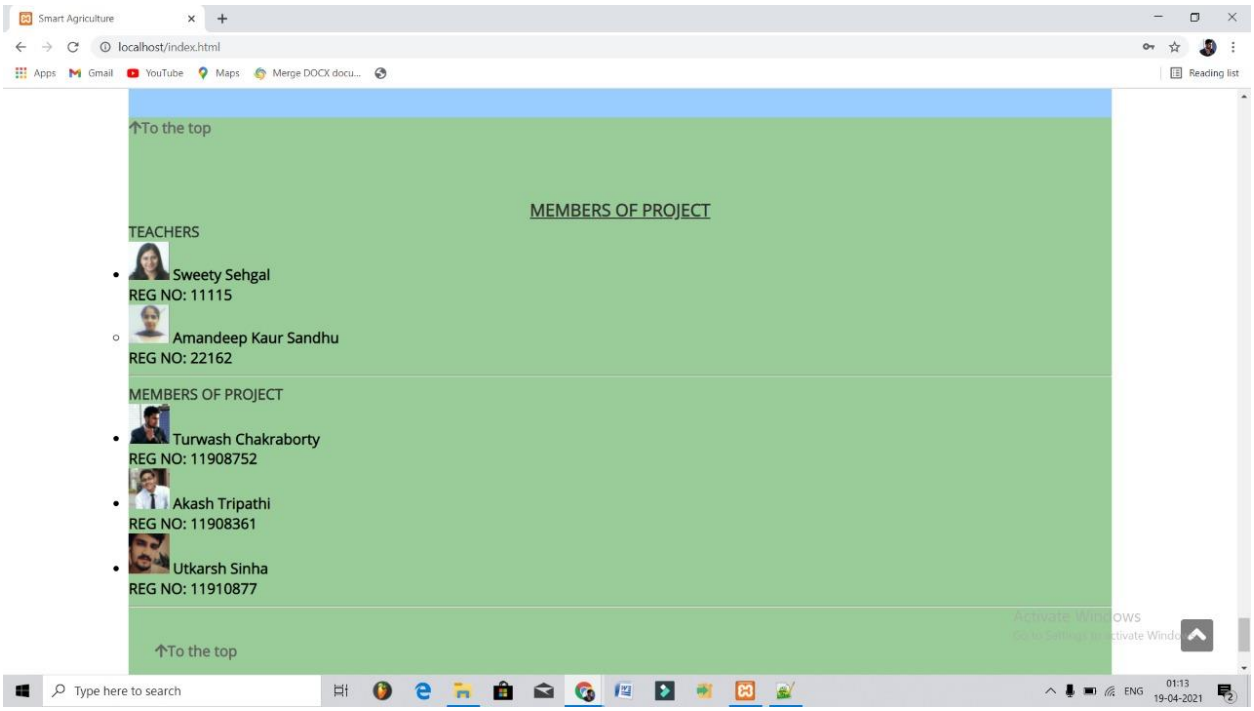

Fig. 39 website

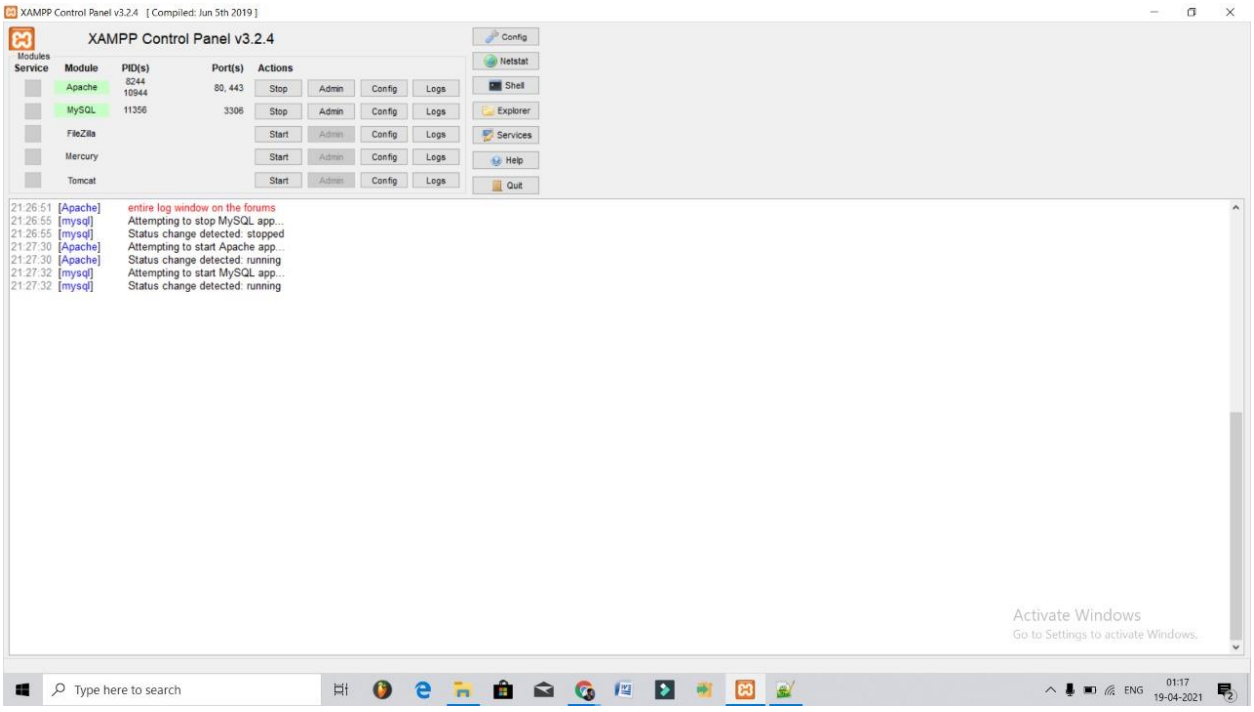

Fig. 40 XAMMP server

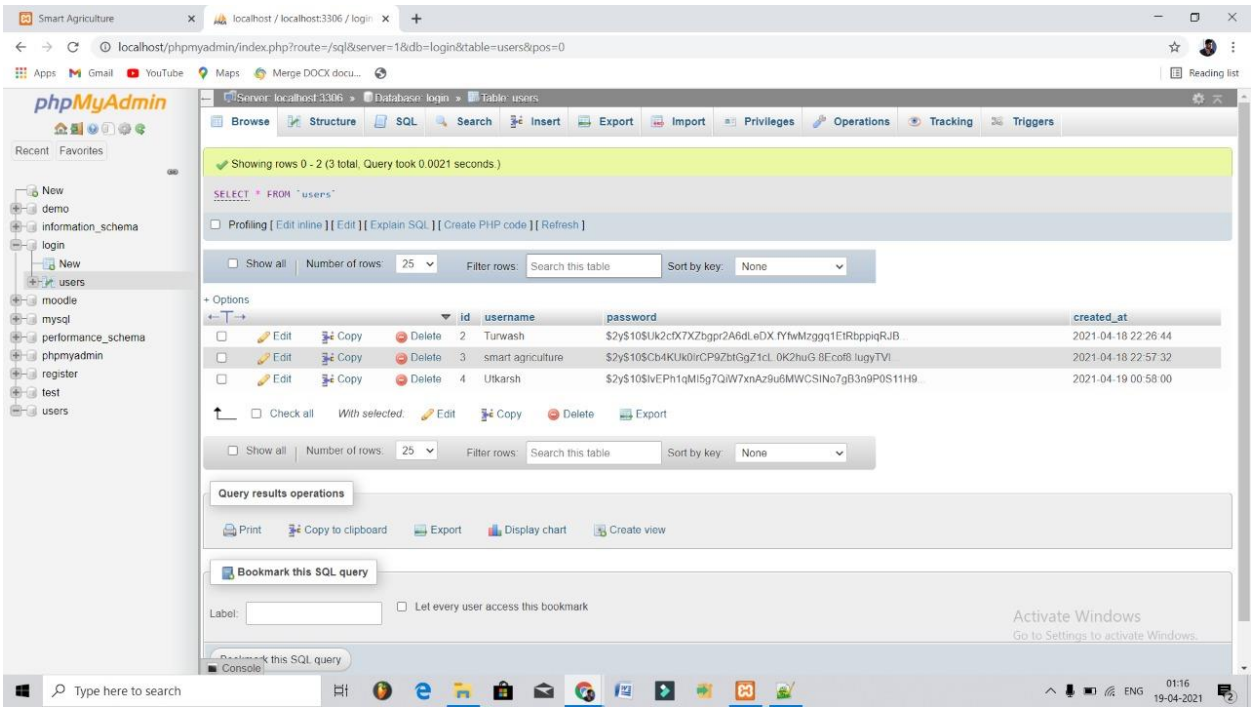

Fig. 41 Php Database

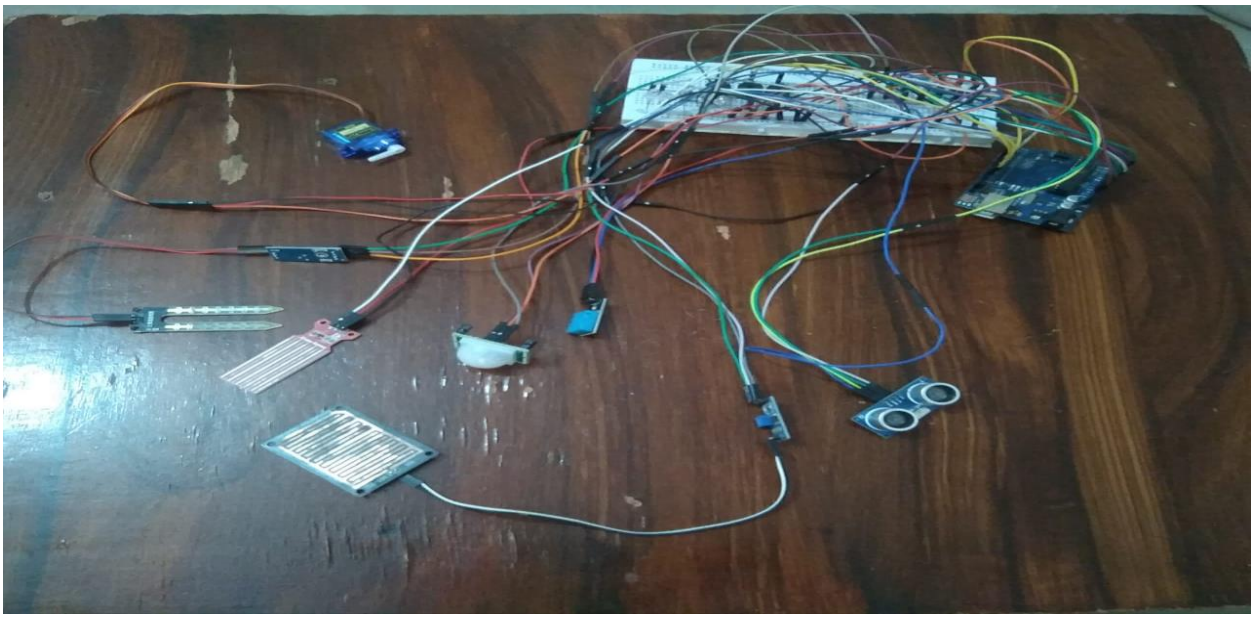

Fig. 42 All IOT devices

Fig. 43 Final setup of IOT devices on agricultural field

CONCLUSION

The final approach for making this hardware modules is to give a easy way of farming

We tried to fulfill almost all the missing requirement for these types of platform make this hardware modules as much as:

- Flexible
- User friendly
- User interactive
- Latest use of technology

After all this feature there is lot more scope left in this platform so the development will continue.

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