



IoT-BASED SMART AGRICULTURE MONITORING SYSTEM

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Abstract: In every country, agriculture is done for ages which are considered to be a science and also the art of cultivating plants. In day-to-day life, technology is updating and it is also necessary to trend up agriculture too. IoT plays a key role in smart agriculture. Internets of Things (IoT) sensors are used to provide necessary information about agriculture fields. The main advantage of IoT is to monitor agriculture by using wireless sensor networks and collect data from different sensors which are deployed at various nodes and sent by wireless protocol. By using IoT system smart agriculture is powered by NodeMCU. It includes the humidity sensor, temperature sensor, moisture sensor and DC motor. This system starts to check the humidity and moisture level. The sensors are used to sense the level of water and if the level is below the range, then the system automatically starts watering. According to the change in temperature level the sensor does its job. IoT also shows information on humidity, and moisture levels by including date and time. The temperature level based on the type of crops cultivated can also be adjusted.

Keywords: IoT, Soil, Moisture and Temperature Sensors, Relay.

I. INTRODUCTION

Internet of Things (IoT) is a term that enables us to utilize technologies, work together, communicate with each other, provide real-time data from sensors wirelessly for processing, and provide more valuable information for efficient decision-making in the corresponding research field. IoT is dramatically a developing technology in application areas like health care, defence, industry, agriculture and so on the features of IoT are unlimited in such a way that it can be utilized for the development of civilization to make and lead a better life. To implement IoT one needs to have knowledge of the research area with the hardware equipment and possibilities with connection to the internet for accessing the devices.

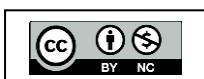
Introduction to IoT

Internet of Things (IoT) is the interconnection or network of physical devices that is interrelated computing devices, digital and mechanical machines, people or animals, and objects that can sense, accumulate and transfer data over the web without any human involvement. Everything is provided with a unique identifier. It is a progressed examination and mechanized framework which uses detecting, organizing, enormous information and man-made consciousness innovation to convey a total framework for an administration. Basically, IoT is about extending the power of the internet beyond smartphones and computers.

II. LITERATURE REVIEW

A brief overview of existing work in various papers, which have been referred for implementation.

1. Anand Nayyar and Er. Vikram Puri, "IoT-based smart sensors agriculture"; This paper describes Internet of Things (IoT) technology has brought a revolution to each and every field of the common man's life by making everything smart and intelligent. IoT refers to a network of things which make a self-configuring



network. The development of Intelligent Smart Farming IoT-based devices is day by day turning the face of agriculture production by not only enhancing it but also making it cost-effective and reducing wastage. The aim/objective of this paper is to propose a Novel Smart IOT based Agriculture assisting farmers in getting Live Data (Temperature, Soil Moisture) for efficient environment monitoring which will enable them to do smart farming and increase their overall yield and quality of products [1].

2. Sushanth & G. Sujatha, "IoT Based Smart Agriculture"; The paper aims at making use of evolving technology i.e., IOT and smart agriculture using automation. Monitoring environmental conditions is the major factor to improve the yield of efficient crops. The feature of this paper includes the development of a system which can monitor temperature, humidity, moisture and even the movement of animals which may destroy the crops in agricultural fields through sensors using an Arduino board [2].
3. M. K. Gayatri & J. Jayasakthi, "Providing Smart Agriculture Solutions to Farmers for Better Yielding Using IoT"; The cloud computing devices that can create a whole computing system from sensors to tools that observe data from agricultural field images and from human actors on the ground and accurately feed the data into the repositories along with the location as GPS coordinates [3].
4. Chetan Dwarkani Met. al, "Design and Development of Precision Agriculture System Using Wireless Sensor Network"; This idea proposes a novel methodology for smart farming by linking a smart sensing system and smart irrigator system through wireless communication technology [4].
5. Dr V. Vidya Devi & G. Meena Kumari, "Real Time Automation and Monitoring System for Modernized Agriculture"; proposes an idea about how an automated irrigation system was developed to optimize water use for agricultural crops. In addition, a gateway unit handles sensor information [5].
6. S. R. Nandurkar et. al, "Agricultural Protection System Based on IoT"; It is designed for an IoT-based monitoring system to analyze crop environments and the method to improve the efficiency of decision-making by analyzing harvest statistics [6].
7. Monika Jhuria et. al, "Image Processing for Smart Farming: Detection of Disease and Fruit Grading"; In this paper image processing is used as a tool to monitor the diseases on fruits during farming, right from plantation to harvesting. The variations are seen in colour, texture and morphology [7].

III. HARDWARE AND SOFTWARE REQUIREMENTS

Hardware Requirements

1. Node MCU
2. IoT Base LCD Display
3. Voltage Regulator (7805)
4. Transformer
5. Relay
6. Humidity Sensor (DHT 11)
7. Moisture Sensor
8. Motor

Software Requirements:

Connected devices around the world are increasing by billions every year. The Arduino IoT Cloud is a platform that allows anyone to create IoT projects, with a user-friendly interface, and an all-in-one solution for configuration, writing code, uploading and visualization.



Figure 1: Arduino IoT Cloud

IV. IMPLEMENTATION

There are two main modules. These are as follows:

Automatic Module:

In our project automatic module plays an important role to reduce the work of the farmer and automate the work of our system. In the automatic module there are two buttons: shifting button and the motor button, which is displayed in our app. When the farmer turns on the shifting button, then the motor will turn on when the temperature is greater than 38. Otherwise, soil moisture sensor will detect the moisture in the soil, and when it comes to the set value or greater than the set value of moisture, the sprinkler is turned on, water will be provided to our farm.

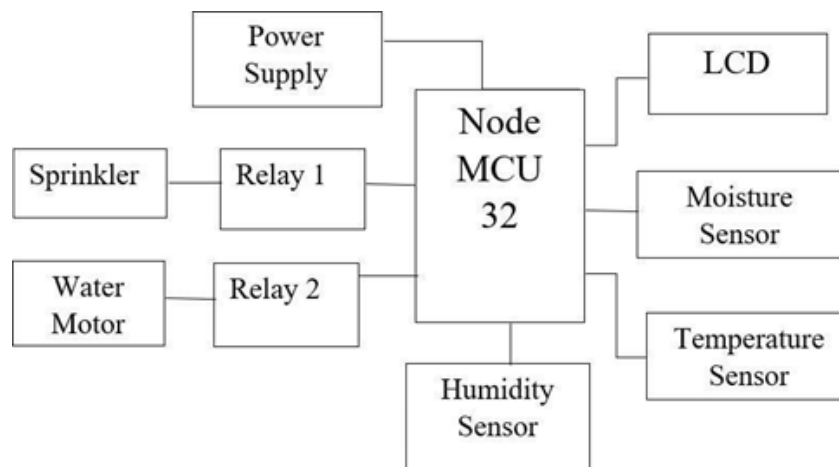


Figure 2: Block diagram of the Mode

Manual Module:

In the manual module when the farmer turns on the motor button then the water pump will turn on and provide water to our farm. When there is a condition of climate change or cloudy weather in that situation temperature and humidity are low but still, we need to provide water to our farm so overcome this type of situation farmer will use this motor button or use the manual mode.

Block Diagram:

The basic building blocks of an IoT System are Sensors, Processors and applications. So, the block diagram below is the proposed model of our project which shows the interconnection of these blocks. The sensors are interfaced with Microcontroller data from the sensor is displayed on the mobile app of the user. Mobile app provides access to continuous data from sensors and accordingly helps the farmer to take action to fulfil the requirements of the soil.

Flowchart:

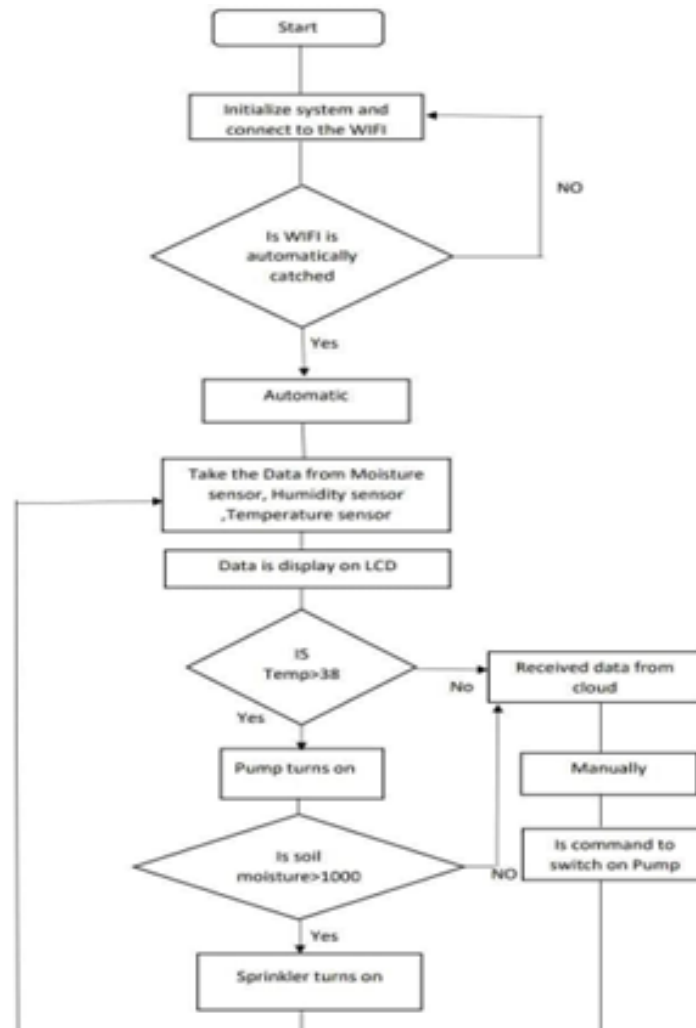
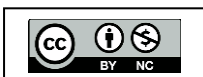
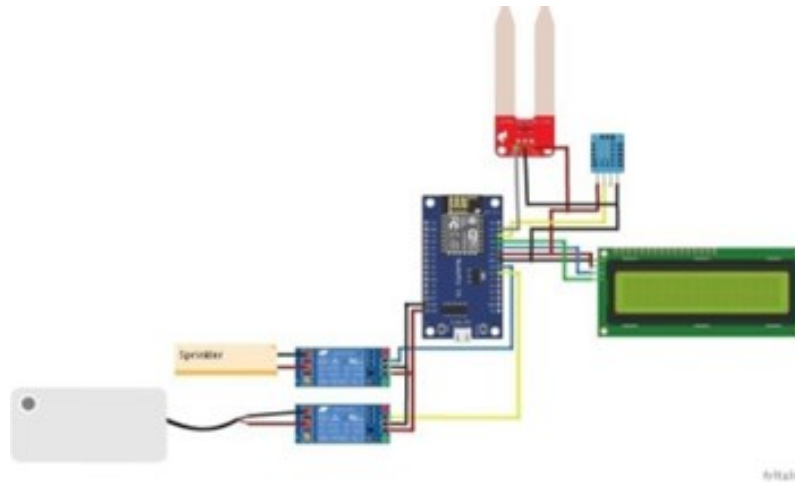


Figure 3: Flow Chart of the System



Circuit Diagram:**Figure 4:** Circuit Diagram of the System**V. FUTURE SCOPE**

The project has vast scope in developing the system and making it more user friendly and the additional features of the system like:

- In future, Smart agriculture use drones and robots which helps in many ways. These improve the data collection process and helps in wireless monitoring and control.
- In the smart agriculture system using the PIC family microcontrollers and motion sensors will detect wild animals near the field and sensors signals the microcontroller to take action
- By installing a webcam in the system, photos of the crops can be captured and the data can be sent to the database.
- Speech-based option can be implemented in the system for people who are less literate.

VI. CONCLUSION

The work provides information on various soil parameters that includes soil temperature, soil moisture and atmospheric temperature to predict irrigation suitability. This system helps to analyze the soil parameters thereby ensuring a better system of irrigation for agriculture. The application is also created to control the motors and sprinkles in the farms. There are two main objectives automated and manual, based on that the sensors, motors, and sprinkles all are operated. The framers can easily manage and control the farms accordingly. Implementing an IoT-based smart agriculture system helps in obtaining quality crops and it also reduces human involvement in agricultural activities.

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