Smart Farming Remote Surveillance System using IoT

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***Abstract*—India is a land of Agriculture. It pays an important role in Indian economy. The agriculture sector in India is witnessing losing ground every day that has affected the Production capacity of the ecosystem. There is an emerging need to solve the problem in the said domain to restore vibrancy and put it back on higher growth. Smart farming remote surveillance system uses IoT technology. This system increases the quantity and quality of agricultural products. IoT devices provide information about all natural parameter like soil moisture, temperature pH etc. and then take action depending on the farmer input. In this paper, an IoT based advanced solution for monitoring the soil conditions and atmosphere for efficient crop growth is presented. The developed system is capable of monitoring temperature, humidity, soil moisture level using ESP32 and pH sensors connected to it.**

***Index Terms*—IoT, Arduino, ESP32, Soil Moisture Sensor, DHT11 Sensor, pH Sensor.**

I. INTRODUCTION

Agriculture is an oldest occupation in India and play an important role in economic growth of the country. Now a days it is very difficult to maintain productivity and fertility of soil due to climate change.In farming the basic need of the farmer is to test the soil for the better yield of the crop and to avoid the harmful effects. Human effort is required in conventional method of farming to visit the place and collect the soil samples from the field and send it for testing in laboratory for checking of all nutrients. This method is time consuming and needs lot of time to carry out the work.In India, we have Rabi and Kharip crop which has different requirement for their growth. Proposed system provide a single platform for both crop using IoT with soil fertility sensors. In addition to this proposed system provide Real time value like temperature, soil moisture, pH. IoT is a system that Combines sensors and software within these items connected to the internetto enable authorized people easy to access and interaction with them. From new technology IoT, farmers can be monitoring their farm in everywhere every time [6].
In practical, to realize a smart irrigation system, it is not easy to cover the plant need. There are many factors affected to plant photosynthesis. The humidity and temperature sensor sense the both water vapor content and temperature around the plant, if water content is below minimum requirement then water will supply as per requirement from water reservoir by using relay and soil moisture sensor which measures the moisture of soil after that sends the data to IoT based controller [4].

II. THE PROPOSED SYSTEM

To use the internet of thing (IoT) for improving the agriculture area, we need to understand the IoT .The main concept of IoT environment is to provide a solution based on the real-time data Basically, the IoT environment would consists of four parts: connected devices, cloud technology, user interface and data analytics. The connected devices can be both connected sensors and connected control device. Sensors would be the input part of the IoT system. The cloud technology acts as the real-time data distributor. The user interface can be either mobile application or web application.

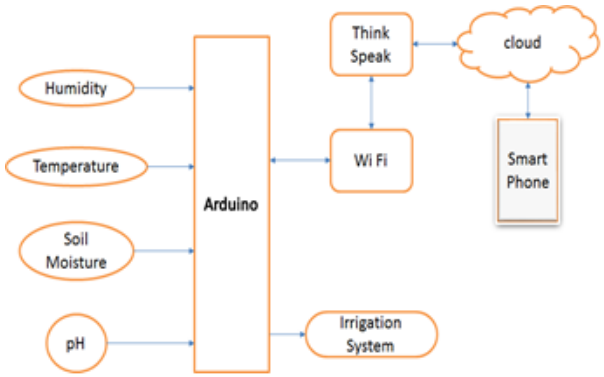

Fig. 1. Block Diagram of Proposed System.

The proposed system monitors the soil characteristics like soil moisture, pH and soil temperature and control irrigation system in real-time using various electronic sensors and software components. The proposed system provide real time field data to increased fertility of soil and control irrigation system with the help of soil moisture sensor. This system assist farmers for better crop production by helping them to make the right decision in applying the fertilizers and ensure optimum crop growth.

A. Electronic Sensors used for proposed system

pH Sensor:-

Fig. 2. pH Sensor.

pH sensors get value from soil and help to select proper crop for field and help former to find additional nutrient for crop.

DHT-11:-

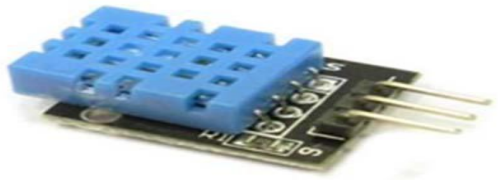

Fig. 3 DHT-11

DHT11 can measure temperature from 0°C to 50°C with ±2.0°C accuracy, and humidity from 20 to 80% with 5% accuracy.The sampling rate of the DHT11 is 1Hz, meaning you can get new data from it once every second.

Soil moisture sensor:-

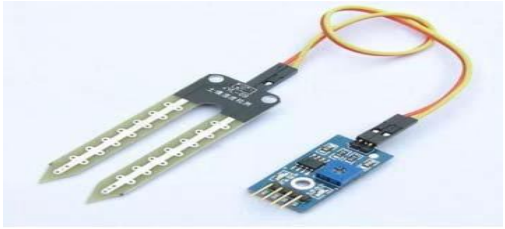

Fig. 4 Soil moisture sensor

This can be used to monitor the moisture level in the crop. It is based on Ohm's law and uses resistance between the poles in order to calculate the moisture of the soil.

B. Arduino Uno.

Arduino Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator (CSTCE16M0V53-R0), a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started.

III. RESULT

The developed system was tested in garden pot and provide satisfactory result. After taking several reading of sensors improvement is made accordingly. Soil sensor is calibrated depending upon degree of wetness. Fig 5. Shows voltages obtained for different moisture measurement.

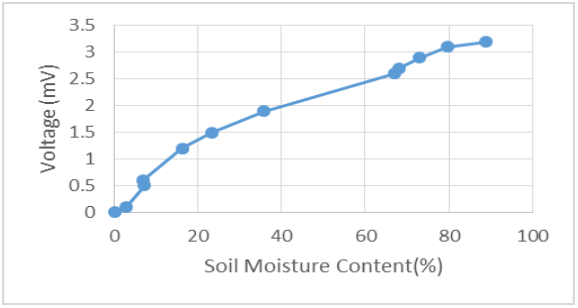

Fig. 5. Soil moisture-voltage curve

IV. FUTURE SCOPE

More sensors like PIR sensor, leaf wetness sensor, etc. can be added for additional functionalities. The crop maturity level system can be integrated with a simple drone having a camera to cover a large agricultural field and to know how much of it is ready to be harvested. Machine learning algorithms can be used for predictive analysis running in the backed for farmers to know about the climatic conditions in advance. All these improvements will lead to an increased crop production and will reduce the amount of crop failure compared to the traditional methods.

V. CONCLUSION

In this paper, for crop cultivation we are trying to give a real time optimistic solution which used IoT technology to sense & analyze the different parameters and provide optimistic solution on same cloud platform through Think Speak. The proposed system was effective for soil fertility and water saving, also farmer can monitoring and adjust some value in the system through the application

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