

Efficient Method using Multi-Sensors for Smart Agriculture using IoT

S. G. Rameshkumar
Assistant Professor, Electrical Engineering
FEAT, Annamalai University
Annamalai Nagar, Tamilnadu, India

Abstract— Internet of Things (IoT) becomes a major role in the field of ever technologies. India's major occupation is agriculture. To make smart farming we are utilizing sensors in the IoT field. This IoT sensor helps to monitor the nature and gives the information about their framing fields. In this technology, we are coming up with a technology which helps to monitor the environmental surroundings using wireless technology based on MQTT protocol. By utilizing these sensors, we can able to monitor in real time by using web server. With the help of this server we can able to monitor the level of water, temperature, humidity and soil moisture.

Keywords— IoT; web server; MQTT protocol; DHT11; water level sensor; soil moisture sensor

I. INTRODUCTION

Traditional farming is been done in our nation. Since, technology is being changing everyday with the internet. But in the field of agriculture it is not developed. Internet is the biggest factor in this generation to monitor and gather information. Internet of Things (IoT) which helps to store the data frequently in the cloud service and helps the monitor the data in real time. From review of United Nations – Food and Farming Organizations, the overall nourishment generation ought to be expanded by 70% out in 2050 for advancing population [2]. Farming is the major occupation in our nation and cultivated food are been widely used. It additionally gives extensive sufficient work chances to the general population.

Traditional methods which always give a result in low farming of fruits and crops. Which makes the crop yield can be enhanced by utilizing programmed machines [1]. There is have to execute modern science and innovation in the agriculture for expanding the yield. By utilizing IoT, we can anticipate the expansion production with minimal effort by observing the effectiveness of the soil, temperature furthermore, humidity checking in farming zones [3]. The mix of traditional methods with most recent advances as IoT and wireless Sensor Networks can prompt to farming modernization [4, 5]. The Wireless Sensor Network which gathers the information from various kinds of sensors and send it to the primary server utilizing wireless protocol. There are numerous different variables that influence the productivity to incredible extent.

This IoT helps to improve the cultivation rate as well as the efficiency of the agriculture, which makes the farming people to check the soil conditions frequently and can able to improve the cultivation as well as technology is improved.

II. PROPOSED SYSTEM DESIGN

To overcome the problems occurred from the traditional problem, we are coming up with a latest technology by utilizing the IoT sensors. Left part of the proposed system consists of sensors to calculate the soil moisture, temperature, humidity. Farmers can monitor the value through sensors which helps them to plan for cultivate according to their needs. This monitoring can be done with the help of cloud services.

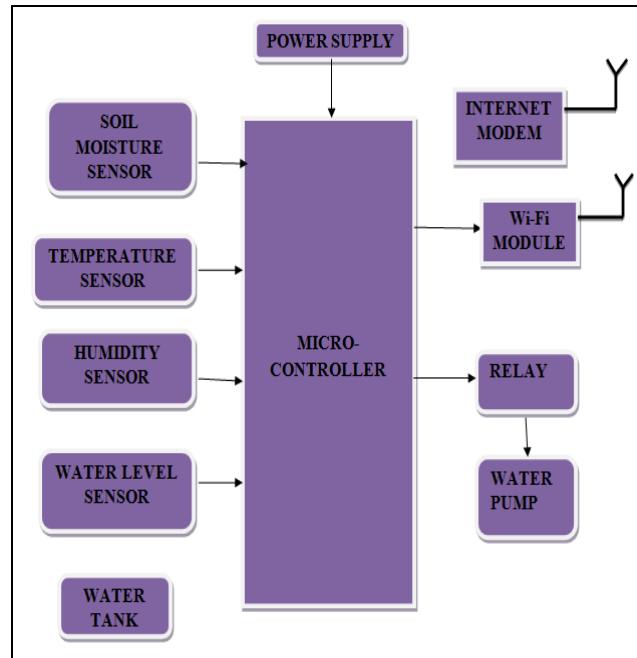


Fig. 1. Proposed system model.

Water tank is been available near the farming area. Farmers have to look every day whether water is good enough to do farming. To overcome this problem, we are installing water level sensor which helps to fill the water in the tank automatically. If the water drop to the threshold value then controller will start the relay and the motor will start pumping the water. If the water exceeds threshold level, relay will switch off and the motor will start pumping the water.

In this work, we are using Arduino Uno which has a user friendly programming. With this new technology farmers can improve their cultivation rate. By utilizing this entire sensors one can able to know the condition of the soil, it will help them to cultivate the exact crop which can grow well in those conditions.

III. MECHANICAL SPECIFICATIONS

A. Arduino Uno

The Arduino Uno board is furnished with sets of analog and digital (I/O) pins that may be interfaced to various expansion boards and different circuits. The board features 6 Analog pins and 14 Digital pins. It is programmable with the Arduino IDE through a sort B USB link. Arduino Uno recognizes voltages some place in the range of 7 and 20 volts.

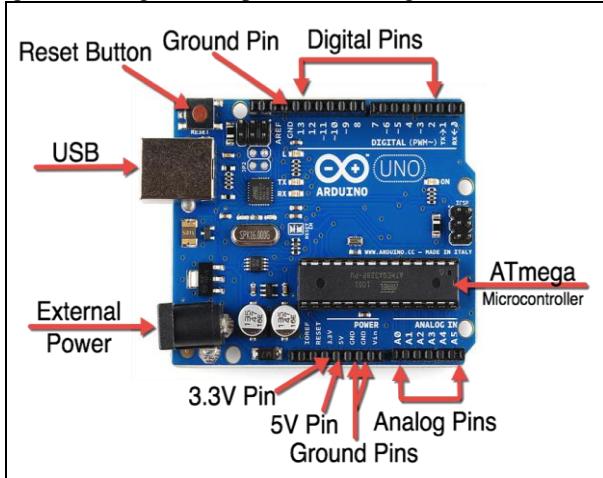


Fig. 2. Features of arduino uno

The Arduino Uno accompanies a claim programming language which comprise of set of libraries. It is an easy to understand programming language and power utilization is less compared with all boards. Power can be supplied either by outer source or USB. 6 are PWM pins out of 14 digital pins.

B. Temperature Sensor

LM35 can be act as a temperature integrated circuit sensor, used to measure temperature. LM35 is more efficient than thermistor. While compared with thermocouples, LM35 will produce high output voltage helps to eliminate the use of amplifier. Here the output voltage can be measured in Celsius temperature and the scale factor can be $0.1V/^{\circ}C$.

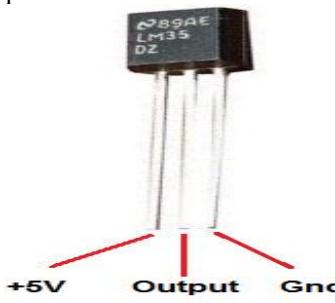


Fig. 3. LM35 Temperature sensor

C. Humidity Sensor

DHT-11 can be used for the humidity sensor. DHT-11 helps to detect the humidity in surroundings where it has been placed. Advantage of using this sensor is that it will measure both temperature as well as moisture in the air. This sensor which give the result in the form

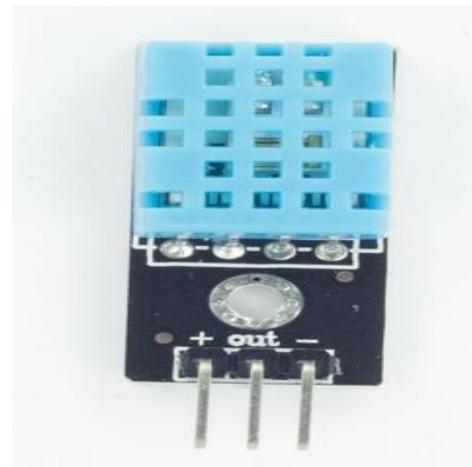


Fig. 4. DHT-11 humidity sensor

Of ratio that maximum amount of moisture in the air at the present temperature. If the air gets hotter, it has the high moisture. This makes relative humidity varies according to the temperature.

D. Soil Moisture Sensor

Soil moisture sensor helps to calculate the volumetric water content in soil. This will gives result of the content of moisture available in the soil. This sensor is mainly used in the Agriculture areas to calculate the moisture.



Fig. 5. Soil moisture sensor

For farming the soil should be warm depends on the crop we are going to cultivate. These calculated values can be varied according to the temperature, humidity and electrical conductivity. This results you to calculate the soil frequently to know the conditions of the moisture in the soil frequently.

E. Water Level Sensor

Water level sensor is been used to monitor the level of water in the tank. Here the threshold value is been fixed in the controller. Sensor senses the level of the water in the tank and passes the value to the controller.

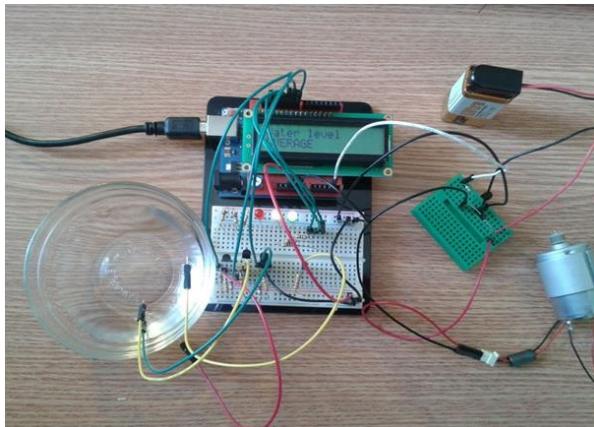


Fig. 6. Water level sensor with arduino uno

Controller checks the value with its threshold value. if the value reaches the threshold , then the controller switch ON the relay, relay will start ON the motor. Motor will start pump the water to the tank. When the sensor value exceeds the threshold value then the relay is turned OFF and motor stops pumping the water.

IV. RESULT

In this paper, we can able to monitor the temperature and humidity frequently. Depends on the water level we can use the water level sensor to pump the water automatically.



Fig. 7. Soil moisture sensors giving live data of temperature and moisture



Fig. 8. Live Data of Soil Moisture



Fig. 9. Live Data of Temperature

With the help of this, farmers can improve the cultivation rate as well as, they can choose the proper cultivation crop. The Fig. 8 and Fig. 9 give the real time monitoring of temperature as well as the humidity.

V. CONCLUSION

In this Paper, a Smart Farming is been Enabled. IoT Based sensors are utilized for Monitoring of Soil Moisture and Temperature implemented using Arduino and IoT. The IoT Sensors has high effectiveness and exactness in getting the live information of soil moisture and temperature. The IoT sensors with water level indicator being proposed by means of this paper will help farmers in expanding the agriculture production. This IoT sensor will always helps farmers for increasing the food production as well as helps them to get the live news of environmental surrounding soil moisture as well as temperature helps them to increase the results better than traditional methods.

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