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IOT BASED AGRICULTURAL SYSTEM

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Abstract - *Agriculture plays vital role in the development of agricultural country like India. Issues concerning agriculture have been always hindering the development of the country. The only solution to this problem is smart agriculture by modernizing the current traditional methods of agriculture. Hence the proposed method aims at making agriculture smart using automation and IOT technologies. The main aim of this work tends to crop development at low quantity water consumption. In order to focus on water available to the plants at the required time most of the farmers are wasting lot of time in the fields. The proposed system is developed based on the information sent from the sensors and then calculate the required water quantity for irrigation. The major advantage of the system is implementing of Precision Agriculture (PA) with cloud computing, that will optimize the usage of water fertilizers while maximizing the yield of the crops and also will help in analyzing the weather conditions of the field.*

Key Words: Internet of Things, Precision Agriculture

1. INTRODUCTION

Agriculture is considered as the basis of life for the human species as it is the main source of food grains and other raw materials. It plays vital role in the growth of country's economy. Unfortunately, many farmers still use the traditional methods of farming which results in low yielding of crops and fruits. But wherever automation had been implemented and human beings had been replaced by automatic machineries, the yield has been improved. Hence there is need to implement modern science and technology in the agriculture sector for increasing the yield.

There are number of other factors that affect the productivity to great extent. Secondly, attack of wild animals and birds when the crop grows up. Even after harvesting, farmers also face problems in storage of harvested crop. So, in order to provide solutions to all such problems, it is necessary to develop integrated system which will take care of all factors affecting the productivity in every stages like; cultivation, harvesting and post harvesting storage.

This project therefore proposes a system which is useful in monitoring the field data as well as controlling the field operations which provides the flexibility. The project aims at making agriculture smart using automation and IoT technologies. The highlighting features of this project includes Wi-Fi-module based remote controlled robot system. Secondly, it includes smart irrigation with smart control based on real time field data. Controlling of all these operations will be through any remote smart device connected to Internet and the operations will be performed by interfacing sensors, Wi-Fi modules and actuators with micro-controller.

2. OBJECTIVE

The main aim of this project is to provide automated application in crop field. As the world is trending towards new technologies and implementations it is a necessary goal to trend up in agriculture too. Many researches are done in the field of agriculture and most of them signify the use of wireless sensor network that collect data from different sensors deployed at various nodes and send it through the wireless protocol. The collected data provide the information about the various environmental factors.

3. PROBLEM STATEMENT

In the existing system, there is no IoT application system included, the authority has to go and check the fields whether the field(Crops) has require amount of water supplied or not.

4. BRIEF DESCRIPTION OF THE PROJECT

4.1. PROPOSED SYSTEM

The proposed system is an IoT based agricultural system, where the system is associated with the Wi-Fi module and android application. This system provides information about the current water content level in fields based on the sensor values. When the water level increased in the fields more than require amount then the system stops watering the field. The system will start watering the fields when the threshold level of water in the soil reduced.

4.2. METHODOLOGY

IOT BASED AGRICULTURAL SYSTEM is a system in which initially we need to make the connections according to the circuit diagram. The code is very important in making the whole equipment work. Agriculture sector being the backbone of the Indian economy deserves security. Security not in terms of resources only but also agricultural products

needs security and protection at very initial stage, like protection from attacks of rodents or insects, in fields or grain stores.

Security systems which are being used now a days are not smart enough to provide real time notification after sensing the problem. Automation of farm activities can transform agricultural domain from being manual and static to intelligent and dynamic leading to higher production with lesser human supervision. This paper proposes an automated irrigation system which monitors and maintains the desired soil moisture content via automatic watering.

Microcontroller ATMEGA328 on Arduino Uno platform is used to implement the control unit. The setup uses soil moisture sensors which measure the exact moisture level in soil. This value enables the system to use appropriate quantity of water which avoids over/under irrigation. IOT is used to keep the farmers updated about the status of sprinklers. Information from the sensors is regularly updated on a webpage using Wi-Fi module modem through which a farmer can check whether the water pump is ON/OFF at any given time.

The entire project is divided into five major sections listed below:

- MICROCONTROLLER
- DHT 11
- Wi-Fi MODULE
- SOIL MOISTURE SENSOR
- SUBMERSIBLE MOTOR
- RELAY

The above sections are briefly described as follows:

MICROCONTROLLER

Arduino UNO is the microcontroller used in this project, it is based on ATmega328. It is open source electronic platform based on easy to use software and hardware. It reads input-light on sensor, finger on a button, etc. it has 14 input/output and 6 analog pins. The software used in this microcontroller is ARDUINO IDE.

Wi-Fi MODULE

ESP8266 Wi-Fi module gives access to Wi-Fi or internet. It can communicate with any microcontroller. We can directly program it by using a desktop. It is Wi-Fi enabled (system on chip). It is flexible in terms of programming, has inbuilt USB and is easily connected.

FEATURES

1. 3.3V operated, can be USB powered.
2. Uses wireless protocol 802.11b/g/n.
3. Built-in-PCB antenna on the ESP-12E chip.
4. Uses CP2102 USB Serial communication interface module.

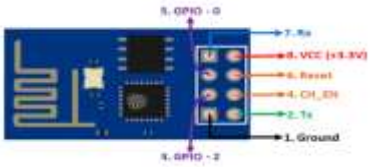

Fig-1: Wi-Fi MODULE

SOIL MOISTURE SENSOR

This Soil Moisture Sensor Module can be used to detect the moisture of soil or judge if there is water around the sensor, let the plants in your garden reach out for human help. Insert this module into the soil and then adjust the on-board potentiometer to adjust the sensitivity. The sensor would output logic HIGH/LOW when the moisture is higher/lower than the threshold set by the potentiometer. With help of this sensor, it will be realizable to make the plant remind you: Hey, I am thirsty now, please give me some water.

Fig-2: SOIL MOISTURE SENSOR

DHT 11

The DHT11 is a basic, ultra-low-cost digital temperature and humidity sensor. It uses a capacitive humidity sensor and a thermistor to measure the surrounding air, and spits out a digital signal on the data pin (no analog input pins needed). It's fairly simple to use, but requires careful timing to grab data.

Fig-3: DHT 11

RELAY

A relay is an electromechanical switch, which perform ON and OFF operations without any human interaction. General representation of double contact relay is shown in fig. Relays are used where it is necessary to control a circuit by a low-

power signal (with complete electrical isolation between control and controlled circuits), or where several circuits must be controlled by one signal.

Fig-4: RELAY

SUBMERSIBLE PUMP

Micro DC 3-6V Micro Submersible Pump Mini water pump for Fountain Garden Mini water circulation System DIY project. This is a low cost, small size Submersible Pump Motor which can be operated from a 3 ~ 6V power supply. It can take up to 120 liters per hour with very low current consumption of 220mA. Just connect tube pipe to the motor outlet, submerge it in water and power it. Make sure that the water level is always higher than the motor. Dry run may damage the motor due to heating and it will also produce noise.

Fig-5: SUBMERSIBLE PUMP

4.3. IMPLEMENTATION OF PROJECT

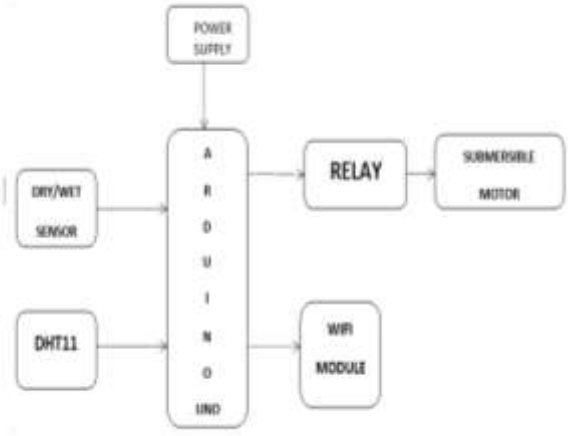

Fig-4: BLOCK DIAGRAM OF IMPLEMENTED PROJECT

First sensor measures the Agriculture Field Temperature, Humidity using sensors. Sensor send the measured data to IoT cloud using Arduino Board and Wi-Fi module.

Monitor the measured data (humidity, temperature) of agriculture crops then accurate necessary controls relays from motor pump switch.

CONNECTION DIAGRAM

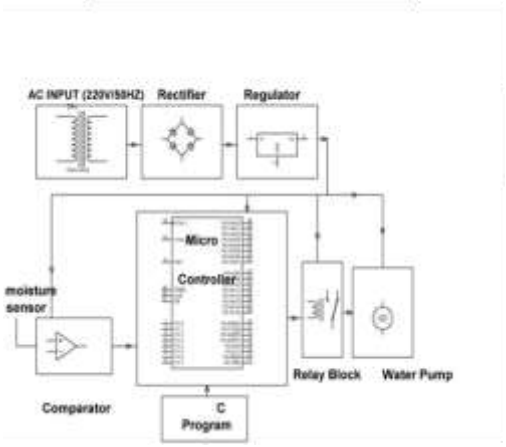

Fig-6: Connection Diagram

The connection diagram of agricultural system over IOT platform. It consists of power supply section, WIFI Module (ESP8266), Relay, Submersible motor, Soil moisture sensor, Arduino Uno board.

- A 5V Power Supply is given to the Arduino through DC Jack.

- The Soil moisture sensor is connected to the digital pins of Arduino Uno. With the help of this sensor we get input to the Arduino board.

- Relay gets the input from Arduino when the soil moisture send input to the Arduino. So that the relay switches on the submersible motor.

- WIFI Module (ESP8266) is connected to the Pins of Arduino RX (0) and TX(1).so that the we can ON or OFF the pump according to our recruitment.

5. RESULT

Fig-7: When water pump is OFF

Fig-8: When water pump is ON

6. CONCLUSION

The sensors are successfully interfaced with Arduino and wireless communication is achieved. All observations and experimental tests prove that this project is a complete solution to the field activities irrigation problems. Implementation of such a system in the field can definitely help to improve the yield of the crops and aids to manage the water resources effectively reducing the wastage.

The proposed system can be used to switch on/off the water sprinkler depending on the soil moisture level sensor, temperature sensor etc., and also there by making the process simpler to use.

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