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IOT based Automatic Farm Monitoring

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ABSTRACT

The aim this project is to monitoring farm by using IOT. Emergence of Controlled Environment Agriculture (CEA) ranging from computer-controlled water irrigation system to lightning and ventilation has changed the conventional scenario of farming. This project proposes and demonstrate an economical and easy to use arduino based controlled irrigation system. The designed system deals with various environmental factors such as moisture, temperature and amount of water required by the crops using sensors like water flow sensor, temperature sensor and soil moisture sensor. Datas are collected and received by arduino which can be linked to an interactive website which show the real time values along with the standard values of different factor required by a crop. This allows user to control irrigation pumps from far distance through a website and to meet the standard values which would help the farmer to yield maximum and quality crops. In India, farming is done by traditional method, farmer's plant crops traditionally without knowing the content of soil and quality of that soil. As a result farmers will not gain sufficient profit from there farming. Due to human intervention there are chances of human errors so farmers may receive incorrect report. So there is need of automated process for soil testing and crop prediction.

Keywords : IOT (Internet of Things), Arduino, Temperature, Sensor, Soil Moisture Sensor.

I. INTRODUCTION

Latest technology using various sensors for precision agriculture has become a popular research. Monitoring parameters of pH and humidity is an important means for obtaining high quality environment. The traditional way of analyze the soil parameters is doing an on-the-spot evaluation, which is always requires additional labor which is very inconvenient method. In order to overcome these problems, we designed a monitoring system which is Arduino based. Irrigation is the process of artificially watering the plants which helps for its growth. Soil pH is the most commonly measured agricultural parameters. Because pH of the soil is related to its fertility and plant growth, hence it is essential and edifying soil parameters. The wireless sensor monitoring system for drought was capable monitoring for extended periods on real–time basis and also capable of identify drought conditions at the earliest as possible and therefore we can take corrective measures accordingly. For every two seconds the data collected from base station are uploaded to the cloud for study purposes. This smart irrigation industry where water waste is minimised and is no longer sustainable socially, economically and conventionally as well. The idea and development of smart irrigation is basically focused onto reduce human efforts as well as reduce resources (water) and power consumption (electricity).

Although smart irrigation has developed but so far no solution is obtained to measure accurate flow of water along with availability of datas over website which could be fetched from anywhere in the world. Further another advantage of the designed irrigation system is that it would keep the farmer up to date and also aware before any adverse situation come in. Thus helping the farmer to have control on the field 24x7 We can check the temperature of the crops because crops are temperature sensitive too and if the smart system awares the farmer before then farmer can use sprinklers in order to cool down temperature of the crops it would save both crop and farmer. Our approach is to make this system accessible from even far distance so that farmer have the information and control on the field 24x7 throughout a year. The whole setup is controlled by an arduino which is a microcontroller and the data is sent and received by a wifi module i. e ESP8266.

II. LITERATURE SURVEY

Primary investigation is carried out under these stages, such as Understanding the requirements, build up an abstract for the system.

In this paper, soil moisture sensor, temperature and humidity sensors placed in root area of plant and transmit data to android mobile. Threshold value of soil moisture sensor that was programmed into a microcontroller to control the water level quantity. Temperature, humidity and soil moisture values are displayed on the android application.

This paper on “A wireless application of drip irrigation automation supported by soil moisture sensors” the farm monitoring is carried out using soil moisture values but extend to this system displays temperature and humidity values. [18]

"Automatic Irrigation System on Sensing Soil Moisture Content". In this paper to create an automatic farm monitoring which turns the pumping motor ON and OFF on detecting the dryness content of the earth. In this paper, only soil moisture vale is considered but in this project temperature and humidity value is considered. [2].

“Irrigation Control System Using Android and GSM for Efficient Use of Water and Power”. In this paper, GSM is used to control the system which may cost more so to overcome that system used arduino board which already consist of in build wifi module[13].

“Remote Monitoring in Agricultural Free house Using Wireless Sensor and Short Message Service (SMS)”. In this paper they are sending data with the help of sms but in this system sends the value to the android mobiles . [5]

BLOCK DIAGRAM:

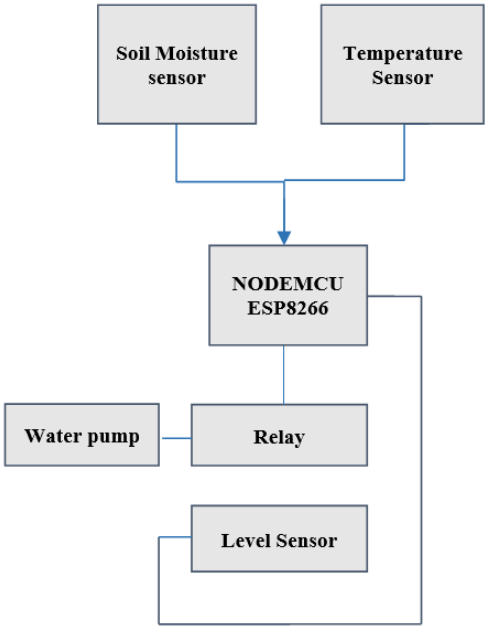


Figure 1

WORKING

The block diagram of farm monitoring system with IoT. Farmers start to utilize various monitoring and controlled system in order to increase the yield qualities with the help of automation of an agricultural parameters like temperature, humidity and soil moisture are monitored and control the system which can help the farmers to improve the yield qualities. This proposed work includes an embedded system for automatic control of farm monitoring. This project has wireless sensor network for real-time sensing of an irrigation system. This system provides required level of water for the agricultural farm and it avoids wastage of water. System automatically switch ON the motor when the moisture level in the soil reaches below threshold value. The motor automatically switch OFF When the water level reaches normal level. The sensed parameters and current status of the motor will be displayed on user's android application.

Arduino Uno and Arduino ide

Arduino Uno is a microcontroller board based on the ATmega328p which is a datasheet. It has 14 digital I/O pins. Out of 14 digital I/O pins , 6 can be used as PWM outputs, another 6 pins used as a analog inputs. Arduino has needed to support the microcontroller . Any one can program then connecting it with the computer by a USB cable. It accepts or supports 9V to 20V DC. It controls the whole System actions.

Figure 2 : ATmega328

Node MCU

NodeMCU is an open source Io Ti. e. Internet of Things platform. It includes firmware which runs on the ESP8266 Wi-Fi Syste-on-Chip (SoC) from Espressif Systems, and hardware which is based on the ESP-12 module. The term "NodeMCU" by default refers to the firmware. It uses many open source projects.

Figure 3 : ESP8266

SOIL MOISTURE SENSOR

The Soil Moisture Sensor uses capacitance to measure dielectric permittivity of the surrounding medium. In soil, dielectric permittivity is a function of the water content. The sensor creates a voltage proportional to the dielectric permittivity, and therefore the water content of the soil. Moisture Sensor measures the soil moisture and sends it to the Arduino in the form of data.

TEMPERATURE/HUMIDITY SENSOR

The DS18B20 Digital Thermometer provides 9 to 12-bit (configurable) temperature readings which indicate the temperature of the device. The DS18B20 communicates over a 1-Wire bus that by definition requires only one data line (and ground) for communication with a central microprocessor. This sensor is waterproof sensor. This sensor connected with the Arduino and it provides the data to the Arduino from the soil.

Power supply range is 3. 0V to 5. 5V

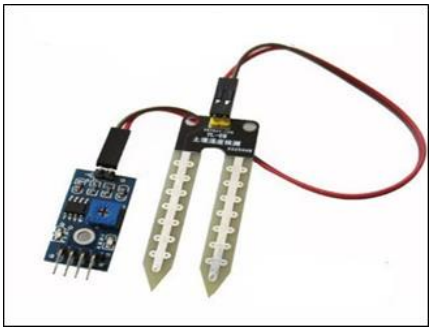


Figure 4. Soil Moisture Sensor

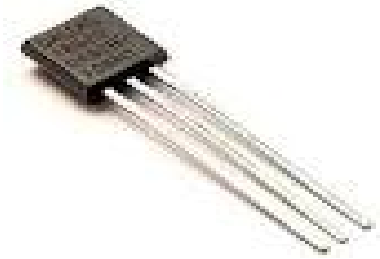


Figure 5 : Temperature/Humidity Sensor

GSM SIM 800L

Mini GSM / GPRS breakout board is based on SIM800L module, supports quad-band GSM/GPRS network, available for GPRS and SMS message data remote transmission. The board features compact size and low current consumption. With power saving technique, the current consumption is as low as 1mA in sleep mode.

Features

Send and receive SMS messages
Send and receive GPRS data
Scan and receive FM radio broadcasts
Connect any global GSM network with any 2G SIM

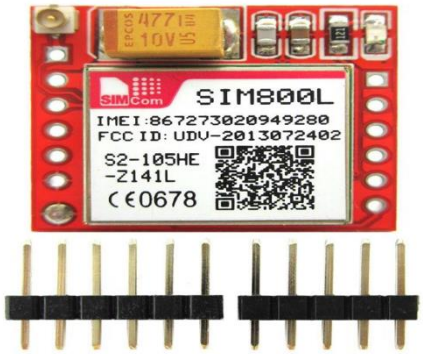


Figure 6 : GSM SIM 800L

RELAY

A relay is an electrically operated switch. Relay is used to run a pumping motor in automatic farm monitoring. Arduino operates at 5V current. It is not able to control higher voltage devices directly. Arduino will be corrupted if higher voltage device is attached with it. Relay has three high voltage terminals. They are: NC, COM, NO. These terminals connect to the device which we want to control. Relay has three low voltage pins. They are: GND, VCC, IN. These pins connect to the Arduino directly.

Figure 7 : 5V Relay

DC MOTOR

Motor is the main part of the automatic farm monitoring. Moisture sensor measures the moisture of the soil . If the moisture value of the soil is low then soil needs water. To give the water we used this DC pumping motor. If the temperature is so high for crops to survive, the temperature sensor sends the data to the Arduino and Arduino turn on the DC motor.

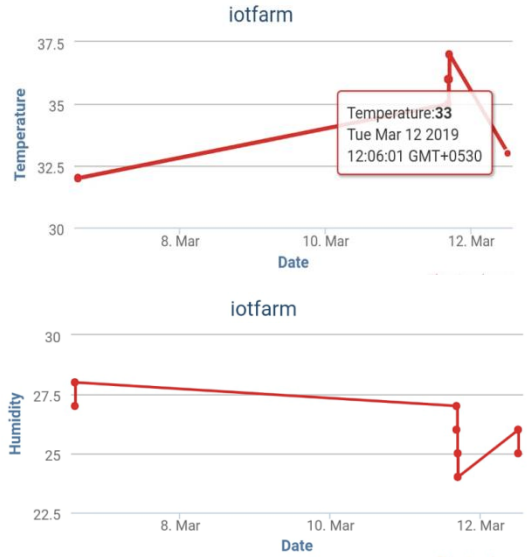
Operating : 3v to 6v DC
Power consumption: 0. 4W to 1. 5W
Rate of flow: 80 - 120L/hr

Figure 8 : DC Motor

THINGSPEAK

THINGSPEAK is an open source Internet of Things (IoT) application and API to store and retrieve data from things using the HTTP protocol over the Internet or via a Local Area Network. ThingSpeak enables the creation of sensor logging applications, location tracking applications, and a social network of things with status updates.

RESULTS



These are the results which shown in thingspeak site.

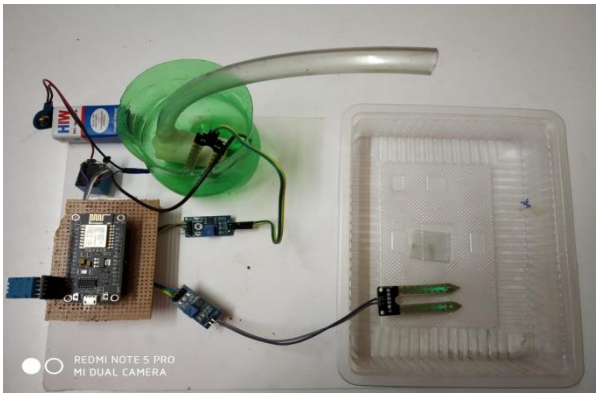
III. CONCLUSION

During the implementation, number of conclusions has been considered based on the practical results Obtained from the model. The system designed cost is very much effective when compared with other approaches to systems. The purpose of designing of Automatic Farm Monitoring System is successfully achieved and fulfills the desired objectives. The hardware and software used performed their function properly to produce desired result which is the required for the farmers in the irrigation field. The system, which is designed, will help the farmers to do the irrigation process in night also. The system designed do not requires the physical presence of the farmers during irrigation in the fields. The system is automatically monitored and controls the pump on and off.

IV. FUTURE SCOPE

- The IOT is related to cloud computing in a way that IOT obtains powerful computing tools through cloud computing and it finds the best practicing channel based on IOT.
- Large amount of data obtained by using radio frequency, identification, wireless, communication, automatic control, information sensing techniques of IOT are handled with agricultural information cloud, truly realizing smart agriculture.

ACTUAL MODEL



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