

IoT Based Plant Monitoring System

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ABSTRACT

As we can see in today's world only some devices like PC's and mobiles are connected to internet. Now-a-days world is fully overtaken by the internet and internet of things. Internet is use for basic need of all human beings. The Internet of Things (IOT) is the network of physical objects. It simply means to monitor a physical device or machine or it is inter-networking of physical devices which is embedded with electronics, sensors, software and network connectivity to enable it to achieve greater value and services by exchanging data with the manufacturer

IOT permits objects to be sensed or controlled remotely across the network infrastructure. The result improves accuracy, economic benefits, efficiency and reduces intervention of human.

In this paper we are going to deal with basic and important concepts of IOT and its scope in upcoming future. This paper studies the need of IOT in day to day life for different applications and gives brief information about IOT. IOT contributes significantly toward revolutionary farming methods. So we are trying to demonstrate IOT in Automatic watering system. Automatic watering system monitors and maintain the approximate moisture content in soil. Arduino UNO is used as microcontroller to implement the control unit. The set up uses the temperature sensor, moisture sensor and humidity sensor which measure the approximate temperature, moisture and humidity in the soil. This value enables the system to use appropriate quantity of water which avoids over/under irrigation.

Keywords: *IOT, Moisture, Temperature, Humidity*

1. INTRODUCTION

The concept of a network of smart devices was introduced in 1982, with modified coke machine that becomes the first internet connected appliance. Between 1982 to 1999 many companies are working on IOT. But in 1999 IOT is introduced by British technology pioneer Kevin Ashton coined the term in his work at Procter and gamble. But the term IOT did not step up till 2011 later in 2014 it reached mass market. IOT allow the objects that will connect through the internet with RFID (Radio Frequency Identification) communication method that include wireless technology and sensors which can identify themselves uniquely. In the world of internet information play important role in everyone life. Agriculture is speedily becoming a data intensive industry, where farmers can collect and evaluate a large amount of information from a different device (i.e sensors) in order to become more efficient in production.

In India 83% of water is consumed by agriculture. If there are no plan for the usage of water in farms, then it causes wastage of water. So we need a system which will efficiently supply water.

Arduino Uno is a microcontroller along with the moisture, temperature and humidity sensor can monitor soil content and accordingly it irrigates the field as when needed. The proposed system uses microcontroller ATMEGA328P on Arduino Uno and IOT which enable farmers to remotely monitor the status of motor installed on the farm by getting approximate information from sensor thereby, making the farmers' work much easier as they can do other farm activities. And mostly this technique is driven by electrical power and on/off scheduling controlled.

2. LITERATURE SURVEY

In India about 35% of land was under reliably irrigated. And the 2/3rd part of land is depending on monsoon for the water. Irrigation reduces dependency on monsoon, improves food security and improves productivity of agriculture and it offers more opportunities for jobs in rural areas. Farmers are facing problems related to watering system that how much water has to supply and at what time? Sometimes overwatering causes the damage to crops and as well as waste of water. Hence for avoid such damage we need to maintain approximate water level in soil.

In this paper, humidity sensor, moisture sensor, temperature sensors placed in root zone of plant and gateway unit (ESP8266) handles the sensor information and transmit data to a android application. This application is developed for measure approximate values of temperature sensor, humidity sensor and moisture sensor that was programmed into a microcontroller to control water quantity.

3. EXISTING SYSTEM

The system is developed for irrigation is on two ways:

- I) System Software
- II) System hardware

Software is web page designed by using PHP and hardware consists of embedded system which monitors soil content. In this system open source Arduino boards along with moisture sensors, it is applicable to create devices that can monitor the soil moisture content and accordingly irrigating the fields as when needed.

This system introduced a GSM-SMS remote measurement and control system for farms based on PC-based database system connected with base station, which is developed by using a microcontroller, GSM module, actuators and sensors.

It informs users about many conditions like status of electricity, dry running motor, increased /decreased temperature, water content in soil via SMS on GSM network or by Bluetooth. In practical the central station receives and sends messages through GSM module Values of temperature, air humidity and moisture which are set by central station are measure in every base station information is exchanged between far end and designed system via SMS on GSM network.

A SIM with 3G data pack inserted into system which provide IOT features to the system. This system sets the irrigation time depending on reading from sensors and type of crop and it can automatically irrigate the field when needed, by using GSM-GPRS SIM900A parameter from sensor regularly updated on a webpage. This application makes use of the GPRS feature of mobile phone as a solution for irrigation control system. This system was used to cover lower range of land and not economically affordable.

4. PROPOSED SYSTEM:

The system is combination of hardware and software components.

- I) Hardware components:

- 1) Sensors (Moisture, DHT22, Ultrasonic)
- 2) ESP8266 Wi-Fi module
- 3) Arduino Uno
- 4) Water pump

- II) Software components:

- 1) Android application

4.1 Sensor Section

4.1.1 Moisture sensor

Soil moisture sensor is used to detect the moisture of the soil. This sensor is made up of two pieces: the electronic board at the right, and the probe with two pads, that detects the moisture content of soil.

How does it work?

The voltage of the sensor outputs changes accordingly to the moisture level in the soil.

When the soil is:

Wet: The output voltage decrease

Dry: The output voltage increase

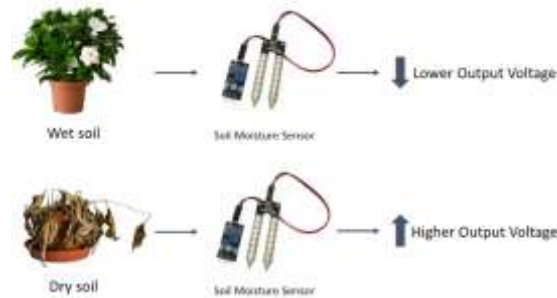


Fig (1).Moisture sensor

4.1.2 DHT 11 (Temperature and Humidity)

DHT11 consist of both humidity and temperature sensor. For measuring humidity there are two electrodes with moisture holding substrate between them. So when the humidity changes, the resistance between these electrodes changes and conductivity of the substrate changes. This change in resistance are measured and processed by the IC which makes it ready to be read by a microcontroller.

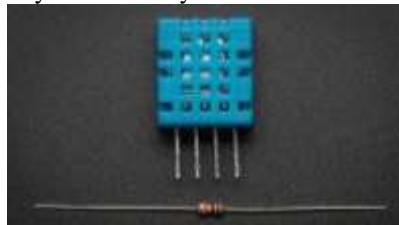


Fig (2). DHT 11

On the other side for measuring temperature DHT11 sensor use a NTC temperature sensor or a thermistor. A thermistor changes its resistance with change of the temperature because it is variable resistor. These sensors are made by sintering of semi-conductive materials (ceramic and polymers), which provide large changes in the resistance with just small changes in temperature. The term “NTC” means “Negative Temperature Coefficient”, which means that the resistance decreases with increase of the temperature

4.2Control Section

4.2.1 ESP 8266 Wi-Fi module

The ESP8266 Wi-Fi Module is used to give any microcontroller access to your Wi-Fi network. The ESP8266 is capable of hosting an application or it also offloads all Wi-Fi network functions from another application processor. Each ESP8266 module comes pre-programmed with an AT command set so you can simply hook this up to your Arduino device and get about Wi-Fi-ability. The ESP8266 Wi-Fi module is used to transfer the data from Arduino to dummy sever and from server to Arduino.



Fig(3). ESP 8266 Wi-Fi module

4.2.2 Arduino Uno

Arduino board designs use a variety of microprocessors and controllers. The boards are equipped with sets of digital and Analog I/O pins that may be interfaced to various shields and other circuits. The boards feature serial communications interfaces, including Universal Serial Bus(USB) on some models, which are also used for loading programs from personal computers.

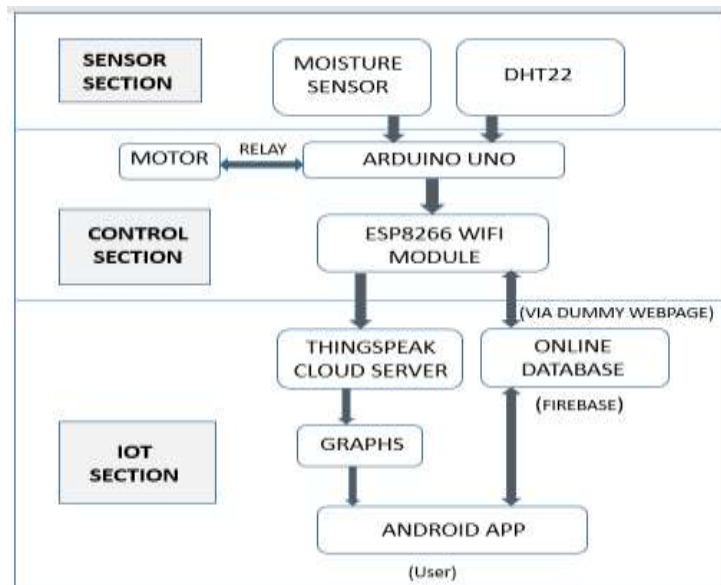
4.3 IOT Section

Table 1: AT Commands

AT	This will check that module is connected properly and is it functioning, the module gives acknowledgment.
AT+RST	This will reset the Wi-Fi module
AT+CWLAP	This will detect the Access points and their signal strengths available nearby.
AT+CWJAP	”SSID”,”PASSWORD” This connects the ESP8266 to the specified SSID
AT+CWMODE=1	This sets the Wi-Fi mode. It should be always set to Mode 1.

5. METHODOLOGY

Fig 4. Shows the block diagram of Automatic Plant Watering System with IOT. Farmer monitors and control system in order to improve the efficiency with help of sensor parameters like temperature, humidity, soil moisture.



Fig(4). Block Diagram

- 1) When power supply is ON, the input module of three sensors (DHT22, moisture) start to activate.
- 2) When sensors get ON it will read the data from soil and from surrounding.
- 3) According to the values that are detected by sensors motor will turn ON/OFF.
- 4) If Moisture below threshold value, then the motor is turn ON.
- 5) If moisture level is high, then it will stop the motor and water supply will also stop.
- 4) If Water level is low in tank, then it will also have detected by the ultrasonic sensor.
- 6) All the values that are collected from sensor is send via ESP8266 Wi-Fi module to Thing speak cloud server and it store in online database(firebase) via dummy server.
- 7) Thing speak will create the graph for the data received by WI-FI module.
- 8) And, then whole information will show on the Android app.
- 9) User can easily control the motor manually by using Android app.

6. CONCLUSION

A system to monitor temperature, humidity, moisture levels in the soil was designed and the project provides an opportunity to study the existing systems, along with their features and drawbacks. Agriculture is one of the most water-consuming activities. The proposed system can be used to switch the motor (on/off) depending on favourable condition of plants i.e sensor values, thereby automating the process of irrigation. which is one of the most time efficient activities in farming, which helps to prevent over irrigation or under irrigation of soil thereby avoiding crop damage. The farm owner can monitor the process online through a android App. Though this project can be concluded that there can be considerable development in farming with the use of IOT and automation.

7. REFERENCE

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