

Automated Plant Watering System using Internet of Things Technology

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Abstract

Agriculture plays a vital role in developing countries. In India, most of the population depends on agricultural farming. Many issues have been postulated in the period of yield. Hence the project aims at making agriculture smart using automation and IOT technology. The highlighting feature of this project includes irrigation with smart control and intelligent decision making based on accurate real time field data. Next thing is monitoring the operation via android application in smart phones. In this project three sensors such as soil moisture sensor, temperature and humidity sensor, level sensor has been used. The moisture sensors measure the moisture level (water content) of different plants. If the moisture level is below the desired level the moisture sensor sends signal to the Arduino board which triggers the Water Pump2 to turn ON and supplies water to the plant. When the desired moisture level is reached the system halts on its own and the Water Pump2 is turned OFF. The main aspect of this project is water level sensor. It senses the water level in the tank and sends the information to the microcontroller. If the water level is low water pump1 will operate and pumps water to the tank. The whole information about the agriculture field is send to android application

Keywords: *Arduino Node MCU, Android, Soil Moisture Sensor, Ultrasonic Sensor, Temperature And Humidity Sensor, ESP8266 Module.*

INTRODUCTION

The automated irrigation system with IOT is feasible and cost effective for optimizing water resources for agricultural production. Using the automated irrigation system we can prove that the use of water can be reduced for different agricultural usage. The irrigation system provide only required amount of water to crop field.

This automated irrigation system with IOT allows it to be scaled up for larger open fields. An automated irrigation system was developed to minimize water use for agricultural crops. The system has distributed wireless networks of soil moisture and temperature sensor placed in the root zone of the plants and water level sensor is placed in tank for monitoring the water level in tank.

An algorithm was developed with threshold value of temperature, soil moisture and water level that was programmed into a micro-controller based on that motor is operated with the help of Arduino node MCU

DETAILED STUDY

In previous system, the major drawback is if water level is low in the tank the motor gets damaged, due to excess heat. To overcome this ultrasonic sensor and

temperature sensor is used. The ultrasonic sensor is used to detect the level of water in the tank and also temperature sensor to detect the temperature of motor. When the temperature of motor reaches above threshold value the whole system is automatically turned off [1]. The moisture sensor measures the moisture level of the plants. If the moisture level is below the desired level the moisture sensor sends the signal to the Arduino board which triggers the Water Pump2 to turn ON and supply the water to the plant [2].

In the previous system GSM is used but in proposed system, android application for monitoring the water level, temperature and humidity, moisture sensors are used [3]. Also Cloud computing and IOT is included in this project. Cloud computing is also known as on-demand computing, is a kind of Internet-based computing, where shared resources, data and information are provided to computers and other devices on-demand [1]. It is a model for enabling ubiquitous on-demand access to a shared pool of configurable computing resources Cloud Computing is the use of hardware and software to deliver a service over a network (typically the Internet). The IOT needs standard protocols for proper operation .For small devices MQTT and COAP are used.

Both MQTT and COAP are open standards and are better suited to constrained environments than HTTP. MQTT gives flexibility in communication patterns and acts purely as a pipe for binary data. COAP is designed for interoperability with the web [5].

the field side connected to arduino node Mcu and output device is at the user side to view the action that performed by arduino based automatic plant watering system. Block diagram of the system is shown in figure 1.

PROPOSED SYSTEM

In this proposed architecture, we are using microcontroller (ESP 8266) and it also has WIFI router that is attached with it (i.e.) moisture sensor, ultrasonic sensor, temperature sensor and humidity sensor at

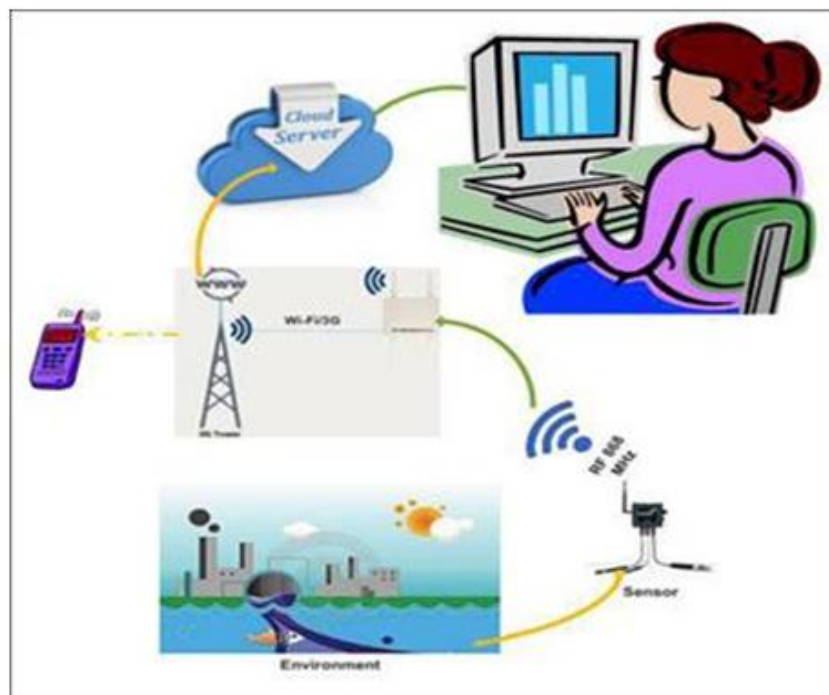


Fig. 1 Proposed view [1]

As shown in fig 1 sensor is connected as input to the Arduino node MCU and it output to the field. The Arduino node Mcu

is a microcontroller board based on the ESP8266. It has 14 digital input/output pins (of which 6 can be used as PWM

outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset

button. And in this system we are used to control the two motor based on the sensor information via by arduino node MCU.

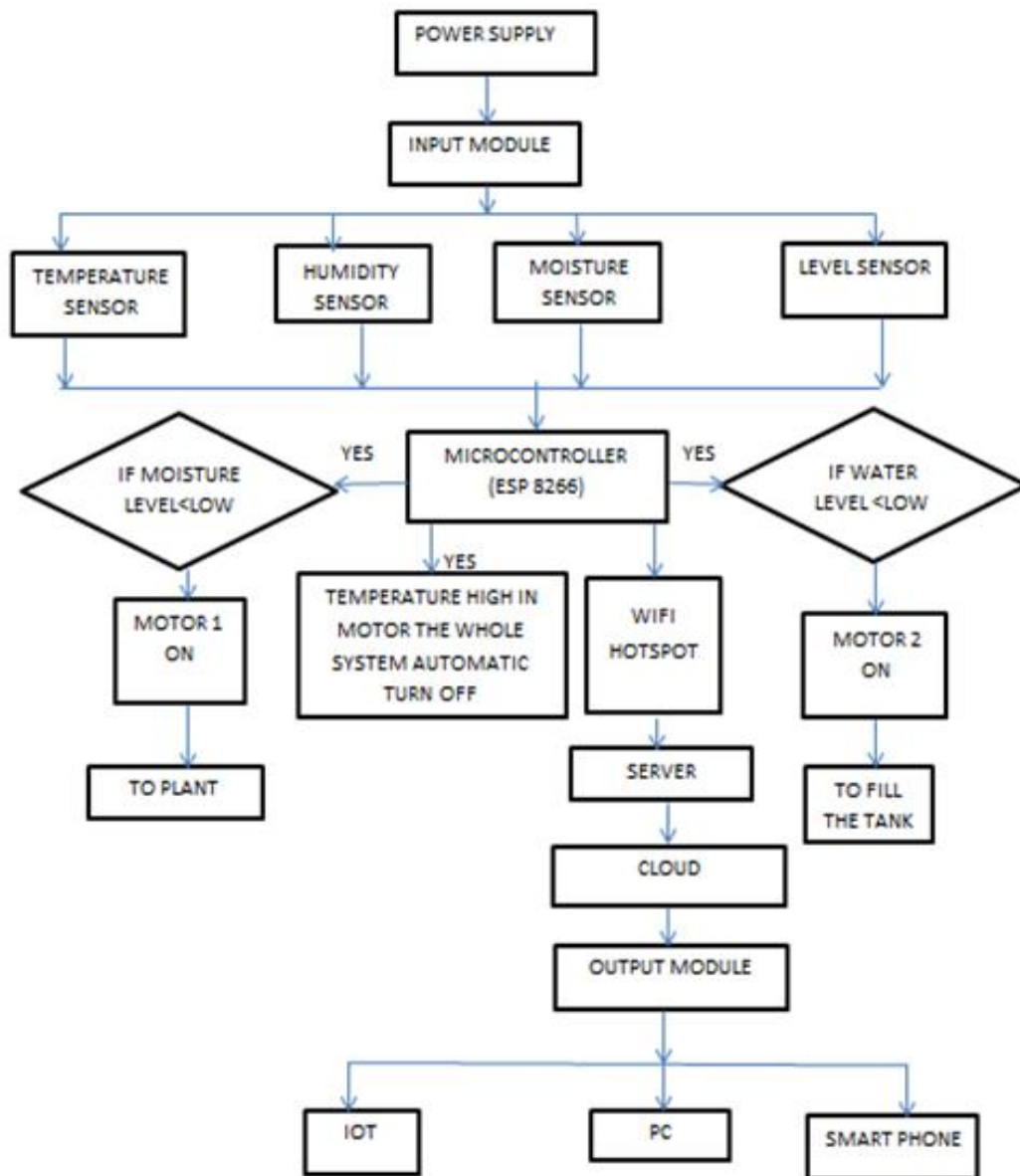


Fig. 2 Flowchart

Steps

1) When power supply is ON, the input module of three sensors starts to activate.

2) When sensors get ON, the Arduino module will activate.

- 3) If Moisture level is low, the motor 1 is operated and it water the plant
- 4) If Water level is low in tank, motor 2 is turn on and temperature sensor sense the motor temperature and it turn off the whole system.
- 5) All the information is send via by wifi hotspot through server and it store in cloud
- 6) User can see the information from their smart phone

SIMULATION AND HARDWARE

From the programming side first we have to configure the Arduino node MCU in communication mode for communication purpose and that is common part for all Arduino node MCU for communication. After the compilation program is in the online simulation mode. Online simulation is used to check that how program is running step by step.

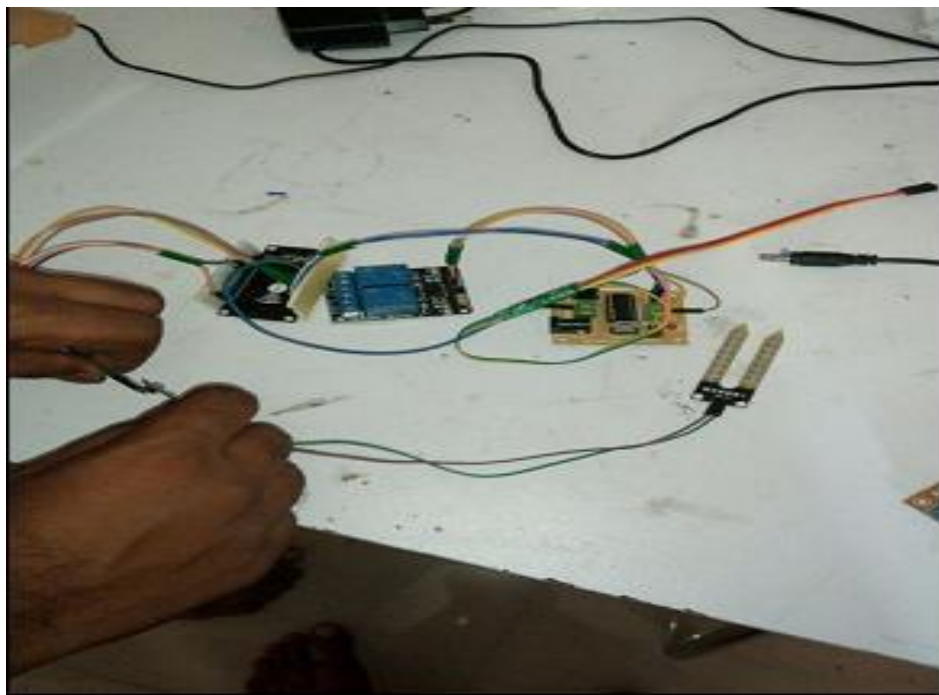


Fig. 3 Hardware Setup – 1

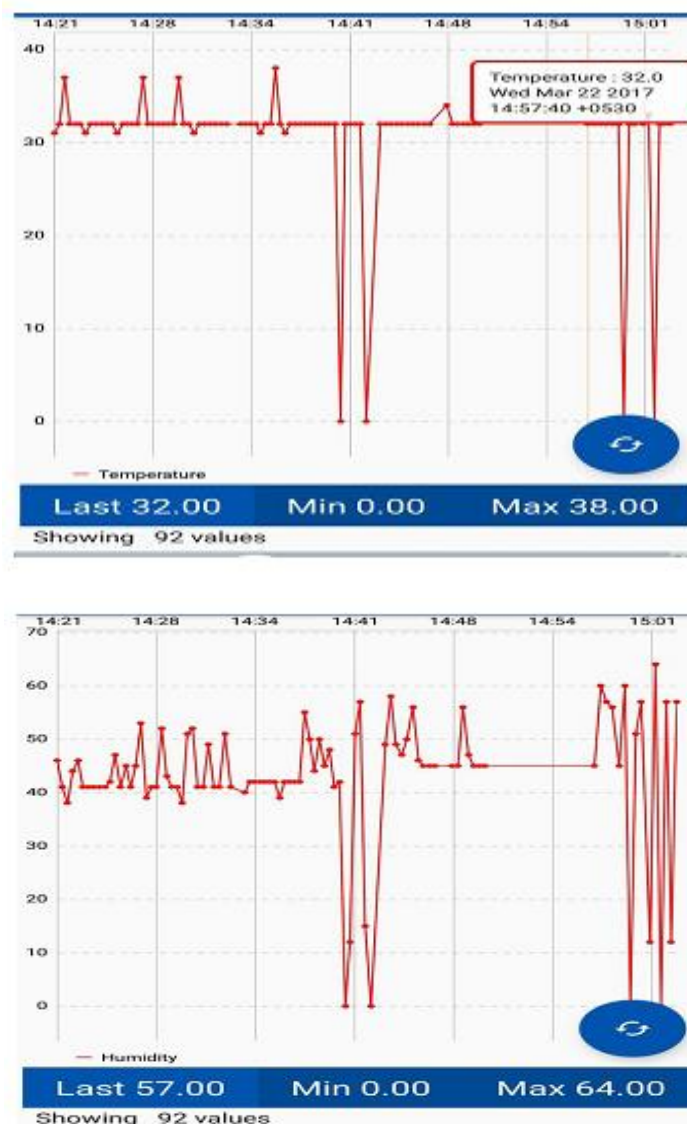


Fig. 4 Detection of Moisture Level Using Things view Software

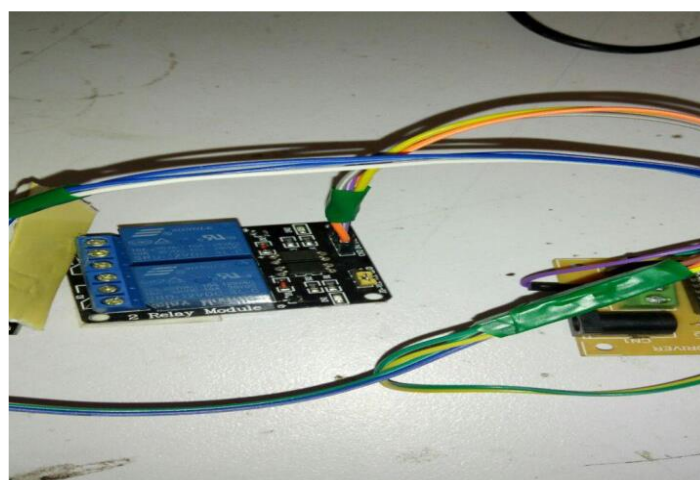


Fig. 5 Complete Hardware Setup

CONCLUSION AND FUTURE SCOPE

This project creates awareness about the automation in agricultural field. Here the manual intervention can be reduced by irrigating the plants automatically and the whole information about the agricultural field can be viewed in android application.

- 1) The project scope involves ARM-controller with a video capturing and sending it to user as MMS about the total crop position or to know the total crop condition.
- 2) We can connect to the nearer weather station to know the up-coming weather changes.

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