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Situation Based Notifier IOT System for Soil Moisturization

P Archana[1], K R Sumana[2]

[1]PG Student, Department of MCA, NIE, Mysuru, India
[2]Assistant Professor, Department of MCA, NIE, Mysuru, India

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Abstract - *The Internet of Things (IoT) is converting the agriculture industry and solving the immense problems or the major challenges faced by the farmers today's in the field. The proposed system utilized Bidirectional communication using MQTT and Socket.io platform in sync. For all thing connections MQTT is being used due to its less resource consumption and Socket.io for android due its mature framework. We are utilizing ESP8266 as a base communication chip with soil moisture sensor as a test case. When the situation arises, i.e. when the threshold set are crossed, the system notifies the user via push notification to act upon the situation.*

Key Words: **Arduino Node MCU, Soil Moisture Sensor, Ultrasonic Sensor, Temperature and Humidity Sensor, ESP8266 Module.**

1. 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 minimizes water use for agricultural crops. The system has a 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. In addition a gateway unit handles sensor information, triggers actuators, and transmits data to a web application. 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.

The Internet of Things (IoT) is playing vital role in present world specially, the Internet of Things (IoT) is transforming the agriculture industry and enabling farmers to contend with the enormous challenges they face.

The industry must overcome increasing water shortages, limited availability of lands, difficult to manage costs, while meeting the increasing consumption needs of a global population that is expected to grow by 70% by 2050.

This paper uses concept of IoT for monitoring and controlling the system using a public server called MQTT server. It uses an android app called My MQTT. In this app, one has to subscribe a topic and publish a message of specific function. The server will call-back to perform the function. MQTT stands for Message Queue Telemetry Transport. It is publish/subscribe, extremely simple and lightweight messaging protocol, designed for constrained devices and low-bandwidth, high-latency or unreliable networks. These principles also turn out to make the protocol ideal of the emerging "machine-to-machine" (M2M) or "Internet of Things" world of connected devices, and for mobile applications where bandwidth and battery power are at a premium.

2. DETAILED STUDY

The moisture sensors measure the moisture level (water content) of the different plants. If the moisture level is found to be below the desired level the moisture sensor sends the signal to the Arduino board which triggers the Water Pump to turn ON and supply the water to the plant[1]. We are using android application and website for monitoring the water level, temperature and humditiy , moisture[2]. And also we included Cloud computing and IOT 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. Cloud Computing is the use of hardware and software to deliver a service over a network (typically the Internet).

With cloud computing, users can access files and use applications from any device that can access the Internet [3]. The IOT needs standard protocols .For small devices MQTT used. MQTT is open standards and is better suited to constrained environments than HTTP.

MQTT gives flexibility in communication patterns and acts purely as a pipe for binary data. We also use Scoket.io for sending the data to the website and android applications. In this proposed architecture ,we are using micro controller (ESP 8266) and it also has Wi-Fi router that is attached with it i.e moisture sensor, ultrasonic sensor and humidity sensor at 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.

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.

Socket.IO enables real-time bidirectional event-based communication. It works on every platform, browser or device, focusing equally on reliability and speed.

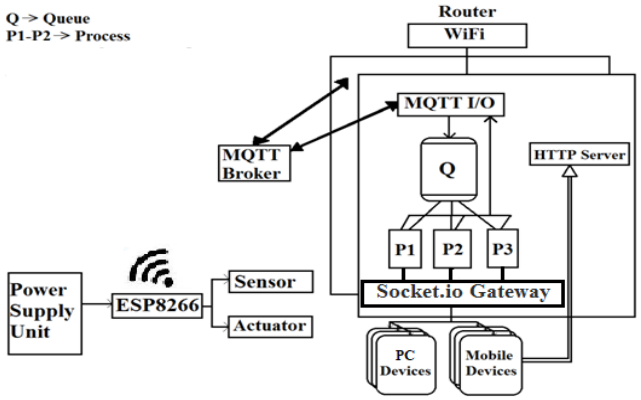
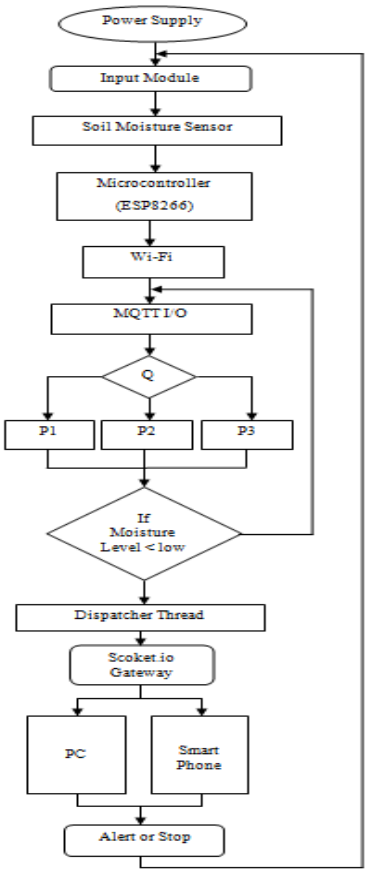


Fig – 1: Block diagram of soil monitoring system

3. SMULATION 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.

4. FLOW CHART OF THE PROCESS



4.1 Steps of the Process

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. All the information is send via by wifi hotspot through server and it store in cloud (Socket.io).
5. User can see the information from their smart phone and also admin can see the information from their website.

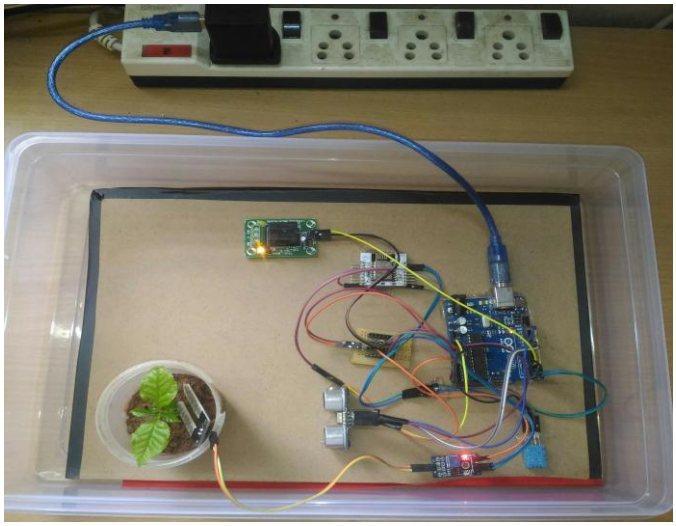


Fig -2: Flow chart

5. CONCLUSION

In this paper, the agriculture field is being monitored and controlled by MQTT, Socket.io, website and android app at user end and website at admin end. The ESP8266 is the device at field end which receives the messages from broker network and manipulates it and will perform the function mentioned in message. After it will send the messages to broker network and in turn it will be published to the Client (user end). The ESP8266 is the best device for IoT projects. Since it is small, compact, lightweight, easily programmable, and easily installable and have enough GPIO pins to use them. Thus our project creates an 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.

FUTURE SCOPE

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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