

# AUTOMATIC PLANT WATERING AND MONITORING SYSTEM

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## ABSTRACT

*In the present era, food scarcity and water scarcity occurs due to the increase in population. And to avoid this problem we have to promote the agriculture sector. So there should be a proper usage of watering system, and it is very necessary because the main reason is shortage of water because of less rainfall and also excess usage of water leads to wastage of water. Therefore automatic plant irrigation system has to be designed for the proper water supply in the fields. This paper deals with automatic plant watering system which automatically senses the moisture content of the soil and decide whether irrigation is needed or not and how much water is needed for soil. These help to reduce the wastage of water and thus, helps the plants for good health condition.*

**KEYWORDS :** *Watering, Monitoring, Soil, Sensors, Wireless Fidelity*

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## 1. INTRODUCTION

The Internet of Things (IoT) is an arrangement of interrelated figuring gadgets, mechanical, computerized machines, articles, creatures or individuals that are given novel identifiers (UIDs) and the capacity to move information over a system without expecting human-to-human or human-to-PC interaction. The Internet of Things is basically "A system of Internet associated objects ready to gather and trade information." It is ordinarily curtailed as IoT. In a straightforward word it is an approach to put it, You have "things" that sense and gather information and send it to the web. The meaning of the Internet of Things has developed because of assembly of various advances, ongoing investigation, AI, item sensors and inserted frameworks. The customary fields of installed frameworks, remote sensor systems, control frameworks mechanization and others all add to empowering the Internet of Things. There are number of genuine worries about in the risks of IoT, particularly in the regions of protection and security, and subsequently industry and legislative moves to address these worries have started.

In this project we are trying to develop automatic plant watering and monitoring system with the help of Internet of Things, by using micro-controller boards and some of the hardware devices. This automatic irrigation system senses the moisture content of the soil and automatically switches the pump when the power is on. A proper usage of irrigation system is very necessary because the main reason is the shortage of land reserved water due to lack of rain, spontaneous use of water as a result large amounts of water goes waste. For this reason, it is an automatic plant watering and soil moisture monitoring system and it is very useful in all climatic condition. The paper deals with an automatic plant watering system which automatically senses the moisture content of the soil and decide whether watering is needed or not and how much water is needed for soil. When the moisture content is less than the limit which is predefined, then it will start supplying the desired amount of water with mixed fertilizer till it reaches the limit and when the soil is wet the pump will automatically switch off. This can be monitored using a mobile application, there by eradicate the need of manpower and conserve the time.

## 2. LITERATURE REVIEW

There is existing venture on plant water system utilizing 8051 microcontroller. This venture has a burden that it employs 8051 whose sign preparing capacity and working rate is not great as PIC 16F877. Likewise it has impediment on memory, this controller has just a single sequential port accordingly interfacing more sensors

become troublesome [1]. There is another undertaking by name programmed plant water system it is very like our task yet it has detriment that it doesn't show any parameter esteems remotely, however just controls the siphon activity [2]. At that point one venture examines Automation System for watering plants that they have utilized two wires for dampness detecting. This sort of game plan doesn't give precise outcome contrasted with soil hygrometer moistness recognition module [3]. There are parcel of other little scope demo ventures for showing programmed plant water system framework utilizing Arduino, however they are not able and sufficiently achievable to be actualized essentially as they all have either minor issues, for example, deficient siphon driver power, restricted repository limit, and so on. [4]. Yandog Zhao has inquired about on water sparing water system programmed control framework in light of web things. The paper examines that client can utilize cell phones or remote PDA to control ranch water system. Be that as it may, in INDIA numerous ranchers are unskilled and have no entrance to advance innovation.

### 3. PROBLEM STATEMENT

During everyday exercises numerous individuals frequently neglect to water their plants and along these lines it gets trying for them to keep their plants solid and alive. Also, it is a challenge for farmers to maintain their fields and manage watering of plants during shortage of water. Based on the above background, it is necessary to implement the automated system which will take care of plants considering all the different aspects of home gardening system as well as larger landscapes and helps them to grow healthy. The main aim of this project was to provide water to the plants or gardening automatically using micro-controller. It can automatically water the plants when people are going on vacation or don't we have to bother their neighbors. Sometimes the neighbors do too much of watering and the plants end up dying anyway. There are some devices in India which are time based that waters the soil on set interval. But they do not sense the moisture content of the soil or its temperature to water the fields. Therefore, the aim of the project is to implement a simple system, using automatic irrigation, watering a small potted plant or crop with minimal human intervention.

### 4. PROPOSED SYSTEM

The proposed system is the Automatic plant watering and monitoring system is an IoT based system which automatically pumps water to the fields.

The main aim of this project is to reduce the intervention of the farmer which detects the level of moisture content of the soil and to pump the fields. The level of the moisture content will be predefined through the program. If the level of moisture content is less than the limit which is predefined, then the pump will automatically water the fields with the addition of fertilizer for the plant's healthy condition.

If the level of moisture content is equal or more than the predefined limit then the pump will stop watering the fields. All these process are monitored using a mobile application which is developed using android. The mobile application is connected with the wireless network which gets the data from the database which notifies the user about the process of water flow.

This paper deals with automatic plant watering system which automatically senses the moisture content of the soil and decide whether irrigation is needed or not and how much water is needed for soil. The automatic plant watering system allows you to:

- Automatically water the fields.
- Adds fertilizer to the plants.
- Detects the moisture content of the soil.
- Monitored using a mobile application.

### 5. WORKING MODULE

#### 5.1 SENSING THE MOISTURE CONTENT

The first step of this project is to sense the moisture content of the soil in the agriculture fields. It uses a sensor called soil moisture sensor to sense the moisture content. Soil moisture sensor is one kind of sensor used to detect the moisture content of the soil. This sensor has two outputs like the analog output as well as the digital output. The digital output is a permanent and the analog output threshold can be changed. The working principle of soil moisture sensor is open and short circuit concept. The LED gives an indication when the output is high or low. When the condition of the soil is dried up, the flow of current will not flow through it. So, it works like an open circuit. And therefore, the output will be zero. The sensor is coated with platinum and

anti-rust to make higher efficiency as well as longer life.

In this system the soil moisture sensor is connected with the Node MCU board which senses the moisture content and decides whether watering is required for the field or not. The sensed data will be stored in the Node MCU board which is responsible for the function of water.

## 5.2 FUNCTIONING OF MOTOR

There are two dc motors used in automatic plant watering, and monitoring system, one is for the fertilizer whereas the other is for the flow of water. Both the motors are connected with the Node MCU microcontroller. The time limit will be set for each of the motors through programming, and it flow the water and fertilizer accordingly. For these two motors a relay module is been used to produce a stabilized current for both the motors.

### 5.2.1 Use of Relay module

The relay module is being used to produce stabilized current supply for the motors. And this is also connected with the Node MCU board and with the dc motors. It is present in between the Node MCU board and the dc motors.

## 5.3 IMPLEMENTING FIREBASE

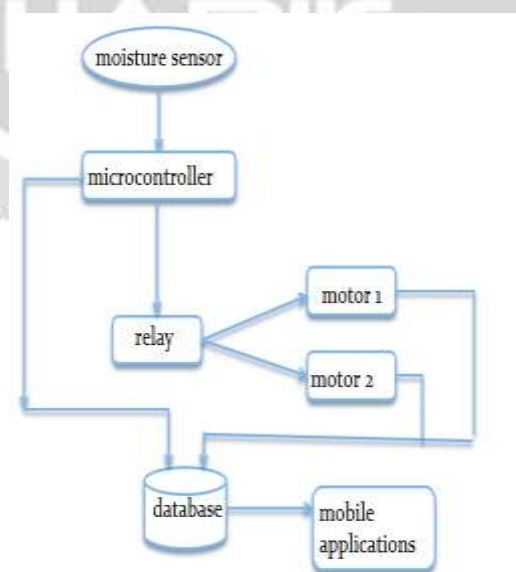
The status of the motor that is to know whether the motor is in the on state or off state will be stored in the Firebase through Wi-Fi connection from the Node MCU board.

## 5.4 MOBILE APPLICATION

The processing and functionalities of motor can be monitored using the mobile application. This application denotes the status of the motor. It also allows the user to switch on or off the motors. This feature is enabled for the users to handle and monitor the automatic plant watering, and monitoring system.

## 5.5 FLOW OF AUTOMATIC WATERING

The soil moisture sensor is connected with the Node MCU microcontroller to know the moisture content of the soil. The microcontroller is further connected with the relay module to produce a stabilized current to two different dc motors and those two motors are responsible for the flow of water and fertilizer to the plants. The Microcontroller and the motors have a link with database and all the data are stored in the database which is linked with the mobile application. The mobile application is much responsible for recognizing the state of the motor that is to check whether the motor is switched on/off.



**Fig. 5.1**Flow of automatic watering

## 6. CONCLUSION

In present days, especially farmers are facing major problems in watering their agriculture fields, it's because they don't have any proper idea about when the power is available so that they can pump water. Even after that they have to wait until the field is properly watered which makes them to stop other activities. Here is an idea which helps not only the farmers even for watering gardens also, which senses the soil moisture and switches the valve automatically when the power is ON. Thus, this project automatic plant watering system which automatically senses the moisture content of the soil and decides whether watering is needed or not and how much water is needed for the soil. When the moisture content is less than the limit which is predefined, then it will start supplying the desired amount of water with mixed fertilizer till it reaches the limit and when the soil is wet the pump will automatically switch off. This can be monitored using a mobile application, there by eradicate the need of manpower and conserve the time.

## 7. FUTURE ENHANCEMENTS

This project is focused on automatic watering of plants. The future enhancement can be done using a repeater which is used to extend the transmissions so that the signal can cover longer distances without any distractions

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