

# Real Time Plant Watering System

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*Abstract— Real Time Plant Watering system with embedded control is a user friendly system where the user just has to set the time of the day and the duration during which he wants to water his plants .He can set these parameters on the touchscreen display.This system is also available on the app for the ease of the user where he can get the indication when the system is running as the message will be sent on the app when system is started and stopped. Hence the daily status of the system can be tracked and through the regular updates of the system he can also spot any disruption in system through the android application [1].Real Time Plant Watering system with embedded control uses the 8051 micro controller.Real time Clock (RTC) is interfaced with 8051 to water plants on proper time . According to the time set, the micro controller enables the water pump to water the plants.This system is the most convenient way to monitor the watering of plants regularly so as to keep the plants in good condition.*

**Index Terms—embedded , touchscreen , app , regular updates, microcontroller, RTC**

## I. INTRODUCTION

As water is essential for the survival of human , it is also essential for plants to survive. Rainfall is the natural source by which plants are watered. Hence , in the rainy season , plants can solely rely on rainwater but they cannot completely rely on rainfall every time as during other seasons , there is no rainfall . Also in drought prone region , there is less rainfall even during the rainy season. Hence in such cases , irrigation which is the artificial way of watering plants is used .Irrigation is done to ensure that plants are regularly watered. [2] Our system provides adequate irrigation to the plants which is supervised by microcontroller. As the system waters the plant during a particular time and for specified duration , there is no wastage of water. Thus , we can save the water using the system. [6] Also , overcoming the problem of natural watering of plants Real Time Plant Watering System waters the plants regularly irrespective of the surrounding conditions.

Our system can be implemented on a big scale in a farm as well as in backyards,gardens,rooftops on a small scale where regular watering of plants is required.At home , people tend to forget to water their plants regularly or are too lazy. In this fast paced world of advanced electronics ,everyone wants things automated, hence we developed Real Time Plant Watering System to help millions of people with water facilities. [4]

Our system uses the Real Time Clock with microcontroller which starts the system at a particular time and duration set by user only once at the time of system initiation. The user enters these details on a touchscreen display. Once the system is started , the message is sent on the app. Also when the system shuts down , the duration system worked everything is notified in the app. Also a message will be displayed on the app quoting Problem Occured !. Thus , the user can track the daily status as well as he is notified during disruption.

## II. OBJECTIVES

### A. Regularity -

Real time plant watering system waters the plant regularly at specific time provided by the user.

### B. Saving plants from drying out -

Our system waters the plants everyday according to time and duration specified by user thus saving them from drying out.

### C. Notifying during disruption -

As the system gets ON and OFF, it is recorded in the android app. Hence in case of any disruption, a message is displayed on the app notifying the disruption.

### D. User friendly -

Enables the user to enter parameters on touch screen with ease during initiation of system . Also the android application provides the user to track status of system even if hes away from it.

## III. SYSTEM DESIGN

### A. 8051 Microcontroller

8051 Microcontroller is an 8 bit microcontroller designed by Intel. It has 40 pins DIP (dual inline package),4 kB ROM , 128 bytes ROM storage and 2 16 bit timers.It has 4 ports each having 8 bits which are addressable as well as programmable. It has system oscillator of 12 MHz crystal frequency.



Fig. 1. Real Time Plant Watering system

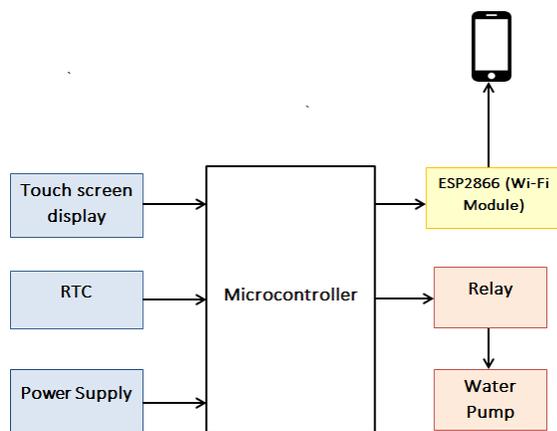


Fig. 2. System Block Diagram

### B. Real Time Clock (RTC)

DS1307 is a low power RTC which uses I2C serial interface. It counts the seconds, minutes, hours, day, date, month, and year. The clock can operate in 24 hour or 12 hour format using AM/PM. It keeps on tracking time hence Smart Plant Watering System starts working according to time provided by user.

### C. DC Submersible Water Pump

A submersible water pump has sealed motor close to pump body. This entire assembly is submerged in the fluid. The water pump pushes the water to the surface [3]. Real Time Plant Watering system uses 12V DC water pump. It is built by brushless motor which is quiet and durable.

### D. Touchscreen display

We use TFT Lcd touchscreen display for our system where the user will enter the time and duration during initiation for which system will work. We can get bright graphics, rich

colours on display using this TFT Lcd. Also it adds to the ease to operate the system using this display.

### E. ESP8266 Wifi module

ESP8266 is System on Chip (SoC) WiFi enabled module which is used for IoT applications. It is a low cost module and hence we use it to transfer data to android application.

## IV. SOFTWARE REQUIREMENTS

### A. Keil Vision IDE

It is easy to use and accelerates the embedded software development. We used it in our system for compiling and debugging the program. It also creates hex files of the program. In simulator mode, we can test the code on real hardware.

### B. Flash Magic

It is an application which allows us to easily access all the ISP features of our microcontroller. These features include reading, erasing, programming the flash memory.

### C. Android Studio IDE

We used Android studio which is Google's Android operating system is an open source software. [?] Real Time Plant Watering Systems application was developed using this IDE.

## V. METHODOLOGY

### A. Acquiring input from the user

The user enters the time at which he wishes to water his plants and also the duration in minutes based through a 3.5 touchscreen TFT LCD display. The user can also reset the time and duration according to his needs. The duration of watering the plants should be more if there are more number of plants or else the plants will not receive the required amount of water and if there are less number of plants the duration can be adjusted accordingly by the user.

### B. Turning ON the water pump

The Real Time clock provides us with the current date and time. RTC has a separate power source (3v battery) because of which it continues to operate even if the system power is turned off. The value entered by the user is compared with the time provided by the RTC. If both the values match the water pump is turned ON. We then need to keep track of the time (in minutes) for which the pump is ON and when that value becomes equal to the duration as specified by the user the pump is turned OFF. This system does not require everyday initiation and any kind of special attention by the user.

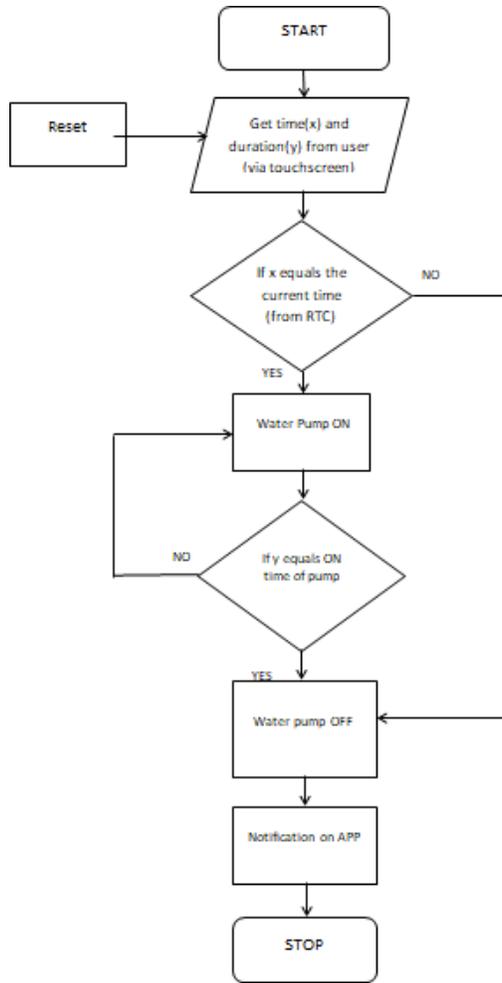


Fig. 3. Flowchart of System

### C. Notifying through application

After successful watering of plants, the user is notified through a mobile application. This includes the date, time and duration for which the plants were watered. Thus user can keep a track on the system whether its working properly or not. In case the system stops in between and the plants are not watered due to some fault, the user is again notified through the application.

### VI. CONCLUSION

Real Time Plant Watering system enables users to set the time and duration for which he wants to water his plants. These details would be set by the user only at the time of initiation, thus reducing his manual efforts. Also, he can keep a track 24\*7 as to when his plants are watered through android application on his phone. In case of disruption, he will be notified with a message on the application.



Fig. 4. Android application displaying the daily status of system which includes the day, date, time when plants are watered. Also showing notification during disruption

### VII. FUTURE SCOPE

The future scope of this project would be to implement this on a large scale on large acres of land. The study of crop growth can be made and accordingly machine learning algorithms can be made which would make the system learn and understand the crop requirements during growth. It will thus activate the sensors, motors etc thus making the system completely automated.

### VIII. ACKNOWLEDGEMENT

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