A

Project Report on

Fully Automated Irrigation System for Efficient use of Water and Electricity

Submitted

In partial fulfillment of the requirements for the degree of

Bachelor of Technology in

Electrical Engineering

Submitted by

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2022-2023

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CERTIFICATE

This is to certify that the project entitled, **"Fully Automated Irrigation System for Efficient use of Water and Electricity",** has been carried out and is submitted by **Mr. Aditya A. Desai (1908058), Mr. Shreyas R. Patil (1908057), Miss. Aishwarya A. Nagargoje (2058003) and Miss. Devika S. Desai (2058010)** in the partial fulfilment for the award of the degree of Bachelor of Technology in Electrical Engineering, during the year 2022-23 under my supervision and guidance within the four walls of the institute and the same has not been submitted elsewhere for the award of any degree.

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DECLARATION

We declare that this report reflects our thoughts about the subject in our own words. We have sufficiently cited and referenced the original sources, referred or considered in this work. We have not misrepresented or fabricated or falsified any idea/data/fact/source in this submission. We understand that any violation of the above will be cause for disciplinary action by the institute.

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ACKNOWLEDGEMENT

At the outset, we think ourselves fortunate enough to have the pleasure of working under the supervision of Prof. R. A. Metri, Assistant Professor, Department of Electrical Engineering. He stood by our side for this work and his worthwhile guidance, support & reassurance throughout our project made our work possible. We would like to convey our deep regards and deep sense of thankfulness to him. We divulge our warm gratitude to faculties and supporting staff of the department of electrical engineering, and all our close friends and classmates to cite a few apparitions that helped us to overcome the labyrinth of hardships that come as the mark of vicissitude. We would like to extent our thanks to the head of electrical engineering department Dr. V. N. Kalkhambkar for his support throughout this work. We would like to sincerely acknowledge Director, RIT, Dr. Mrs. Sushma S. Kulkarni, for her support and encouragement. Finally, we express our self that working on this subject was throughout the pleasant learning understanding. We truly hope that this work with its assumption will reflect the best work put into it. It also has been a wonderful pleasure to relate to the Rajarambapu Institute of Technology, Islampur.

ABSTRACT

Our project is a fully automated irrigation system that highlights the optimum solution for the efficient use of water and electricity for agricultural purposes. There are some existing systems who come up with two solutions, one is timer-based and another one is moisture-based atomization. The timer-based system has demerits like being semi automated i.e., timer needs to be changed manually according to climate. Similarly, in moisture-based systems, reliability is the issue. So the main objectives of the paper are to overcome the demerits of the present systems by integrating both the systems, to develop a fully automated irrigation system, to manage the use of water, electricity, and to add a remote controlling system. The paper includes the integration of moisture and timer-based system which provides the optimum efficiency on the water use and the use of solenoidal valve and siphon technology decreases the use of electricity while our third idea to prepare a smartphone application gives us the advantage to continuous monitoring over the system and provides control over irrigation from anywhere.

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Chapter 1

1.1 Introduction

Our project is a fully automated irrigation system that highlights the optimum solution for the efficient use of water and electricity for agricultural purposes. There are some existing systems who come up with two solutions, one is timer-based and another one is moisture-based atomization. The timer-based system has demerits like being semi-automated i.e., timer needs to be changed manually according to climate. Similarly, in moisture-based systems, reliability is the issue. So the main objectives of the paper are to overcome the demerits of the present systems by integrating both the systems, to develop a fully automated irrigation system, to manage the use of water, electricity, and to add a remote controlling system. The paper includes the integration of moisture and timer-based system which provides the optimum efficiency on the water use and the use of solenoidal valve and siphon technology decreases the use of electricity while our third idea to prepare a smartphone application gives us the advantage to continuous monitoring over the system and provides control over irrigation from anywhere.

1.2 Research Motivation

India's ground water levels are critically low and present irrigation systems are poor in efficient water and energy management. So there is definite need of developing the efficient system for irrigation of water. Our project is a fully automated irrigation system that highlights the optimum solution for the efficient use of water and electricity for agricultural purposes. The existing systems come up with two solutions, one is timer-based and another one is moisture-based. The time-based system has demerits like being semiautomated i.e. timer needs to be changed manually according to climate. Similarly, in moisture-based systems, reliability is the issue. So our main objectives are to overcome the demerits of the present systems, to develop a fully automated irrigation system, to manage the use of water, electricity, and to add a remote controlling system. Our idea includes the integration of moisture and timer-based system which provides the optimum efficiency of water and the use of solenoidal valve and siphon technology decreases the use of electricity while our future idea is to prepare a smartphone application that gives us the advantage to continuous monitoring over the system and provides control over irrigation from anywhere.

1.3 Problem Statement

Water and electricity are two factors that play a major role in human life. Looking India's current ground water levels it has decreased around 8.8 crore acre-feet in last decade. And whose major chunk is swallowed by the agriculture sector only. In the electrical sector 20 to 22 % of the total electricity produced is consumed by the agriculture sector. Current poor infrastructure of irrigation sector is leading to increase these numbers. To encounter that there is definite need of an efficient and automated solution for agriculture irrigation. So the problem statement is to build an automatic irrigation system for efficient use of water and electricity.

1.4 Objective of project

- To develop an fully automated irrigation system with integration of timer and moisture based system.
- To analyze the data by comparing it with the present system and modifying system for efficiency.
- Providing various watering scheduled program for particular crop.

1.5 Scope of project

This project is an attempt to make the fully automated and efficient irrigation system.The systems early model is being implemented in Tulip Farms green houses. which is a new portable green house project. In addition to that we can easily insure that this system is capable of handling the load of open field systems with vast geographical area. Also the system is compactability makes it easy option for garden irrigation. Peeking into recent trends people are enjoying the organic lifestyle for that in many cities the peoples are growing their vegetables on their terrace called as balcony farming where with minimum use of electricity lots of human efforts can be reduced. If collected data is used to train an AI model then this could be revolution in irrigation sector for exactly suggesting the proper amount of water sourcing for particular crop.

1.6 Organization of Report

Chapter 1 Gives the brief information about the institution of project including introduction, importance of the problem, problem statement, objective, and scope of the project.

Chapter 2 Represents literature survey from different research papers. Also gives overview of different experiments done for simulating the project.

Chapter 3 Talks about the behaviour of timer based system and moisture based system.

Chapter 4 Contains the Description of system and detail information regarding block diagram and flow diagram and the circuit diagram and its components.

Chapter 5 Contains the overall result of the project and hardware results.

Chapter 6 Contains Conclusion of the project.

Chapter 7 Contains References used for the project.

Chapter 2

2.Literature Review

For understanding the working of existing irrigation systems and for calculation of minimal amount of water requirement of particular plant many research paper were studied. Few of them are mentioned below

Mohamed Ahmed Abdurrahman (2015) Sensor Based Automatic Irrigation Management System: International Journal of Computer and Information Technology (ICIT) In the present review, an attempt has made to make an automatic irrigation system using PIC 16F877A, moisture sensor and induction valve. The sensors are used to measure the moisture level of an soil and control the valve according to the level of moisture.

Bishnu Deo Kumar, Prachi Shrivasthay, Reetika Agrawal and Vanya Tiwari (2017) Microcontroller based automatic plant irrigation system: International Research Journal of Engineering and Technology (IRJET):In the present review, an attempt has been made to provide Information about the automated irrigation system using microcontroller (ATMEGA 328). The efforts are made to provide continuous readings of the temperature of atmosphere along with humidity content of soil with an Automated control over irrigation based on ATMEGA 328 and GSM module.

Raja. G. Abhiraj. R. Arunkrishnan, Febin Malik. Jesu Jorof Divin. J and Rajarathinum (2018) Smart Polyhouse Farming Using lot Environment: International Journal Of Trend in Scientific Research and Development IJTSRV)In this paper some essential sensors, Relay and Power supplies used in (polyhouse are discussed in brief. The sensors which have been discussed are Temperature, Humidity, Moisture and ultrasonic sensors. By implementing automation inside the polyhouse all things are monitored through mobile.

R.Nageswara Rao,B.Sridhar (2018)IOT Based Crop Filed Monitoring And Automation Irrigation System: second international conference on inventive system and control(ICISC)This system is used for controlling and monitoring of crop field and this research paper describe the block diagram of IOT based automatic crop field monitoring.

G.K.Banerjee,Rahul Singhal (2010)Microcontroller based polyhouse automation controller :International symposium on electronic system design.

Chapter 3

3.Behaviour of Existing system

There are two systems available in the market timer based and moisture based. Both of them have their advantages and disadvantages those are discussed below.

3.1 Timer Based System:

This system is based on time delay based control. This system can be applied for mega open fields and also for micro farms. The system is totally based on timer. We have to set ON time in the system. When the setted time arises motor turns on and after some pre setted delay motor goes off. This system does not incorporate any type of feedback. So is the soil is actually irrigated or not is unknown for the system. In addition to that this system is not fully automated we have to provide manual input to set the date daily.

For further understanding we have visited one automated irrigation system. Which comes under SUMAN AGRO IDUSTRIES, ITKARE. The system is provided by JAIN solutions. And it costed approximately 90 lack rupees to suman agro. Here they have implemented the timer based irrigation system for open fields. They have managed to automate the area of 80 acres. The irrigation system is used by both the water transmission system and also the nutrition transmission system. The Fig. 3.1 Shows the control unit which is used to control the timer. The Fig. 3.2 shows the control centre of the systems. The White tanks are being used for filtering purpose. While in blue tanks the injection of nutrition into water takes place. The Fig. 3.3 Shows the actual field on which dripper lines are laid.

Fig. 3.1 Control Unit

Fig. 3.2 Control Centre

Fig. 3.3 The open field

After completing visit and analysing the data from various research paper we came across some of the de merits of the system. Like this system is not fully automated human efforts are still needed to set the timer and confirm that is the field is watered or not. Since no sensors are involved, The system is unable to collect data of the present weather and moisture conditions.

3.2 Moisture Based System

This system is mainly depending on input from moisture sensor. If moisture sensor detects lack of moisture in soil, then motor is turned on and water is directed to irrigate the field as soon as moisture sensor detects sufficient water then it gives signal to controller which turns off the motor.

Though this approach seems ideal but it is not that much practical. The system can be only implemented for small field area or green houses. If we tried to implement it in large open field then cost of sensors and efforts to maintain them are cancel out its advantages.

The disadvantage of both can be only overcome by integrating both of the systems which we are representing in this project.

Chapter 4

Description of the System

4.1 Block Diagram :

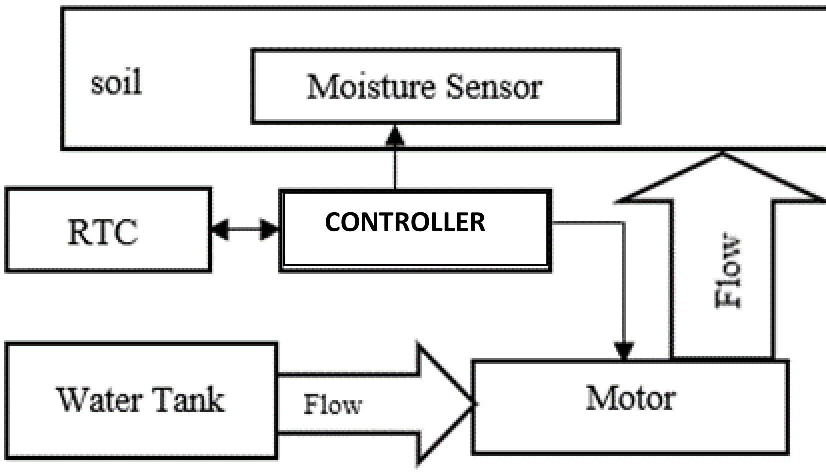

Fig. 4.1 : Block Diagram of the System

Fig 4.1 shows the block diagram of the system where the flow of water is shown, A controller is connected with RTC module and with moisture sensor which are two major inputs for controlling.

4.1.1 Actual Working of the System

The overall control of water is done by the following way. The water is stored in upper tank and supplied to each rack independently. Then each rack has its own 12 V motor for individual flow control. Motor is actuated by relay while signal for each really is given by PIC 18f877A microcontroller.

The decision of keeping motor on and off is decided by two factors. One is by the schedule provided by the farmer and the moisture sensor. The main control is provided using schedule but if there is some extreme condition happens and moisture content in soil goes extremely low then moisture sensor can overwrite it and send signal to turn on the motor.

The schedule of watering for particular plant is planned such as it could yield maximum outcome in minimum use of water. To get real-time control over water DS3231 RTC (Real Time Clock) module is integrated with it. Which provides present time and date to the microcontroller and it is compared with planned schedule and when the real time matches with presetted time it gives signal to relay to turn on motor and motor is turned on and water is supplied to the crops. After pre-setted another signal is given to relay indicating turning off of the motor.

During summer due to extreme temperature or by any other means if the moisture content of soil decreases than pre-setted minimum value then it is addressed by the moisture sensor and given to microcontroller now moisture sensor gives immediate instruction to the relay to turn the motor and necessary changes are made in the schedule to keep system running in original state.

4.2 Plan of Installation.

Fig 4.2.1: Making of test bench

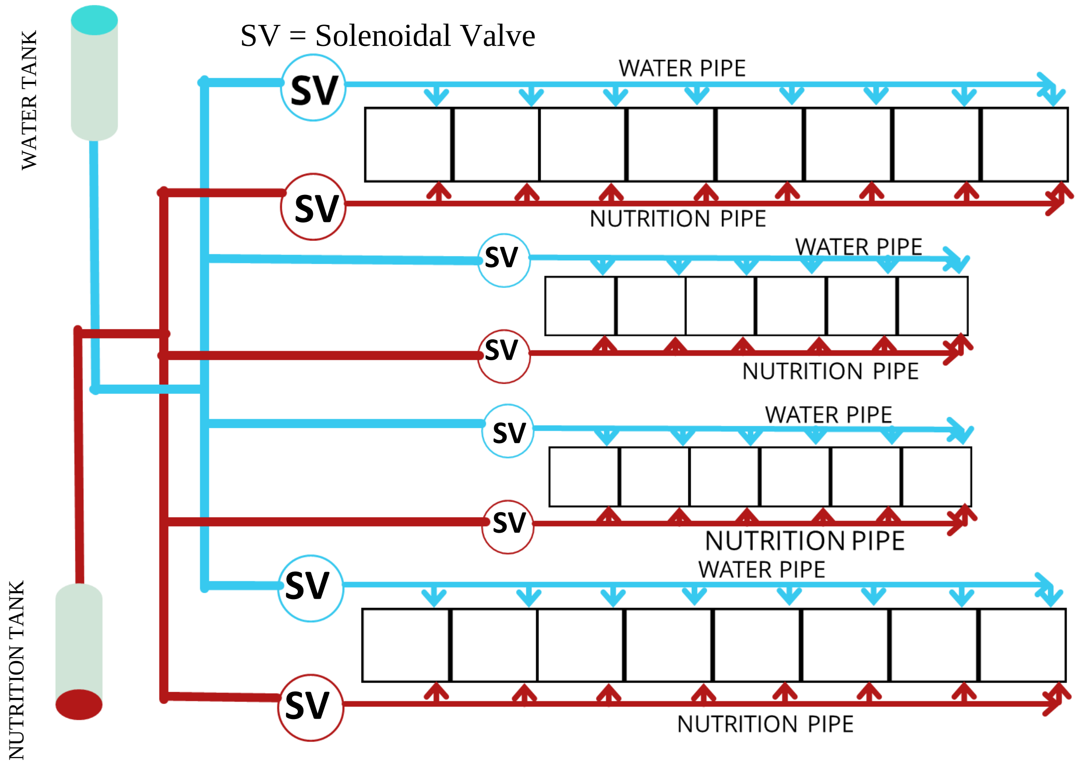

Fig 4.2.2: Actual Plan of Installation

The fig. 4.2.2 shows the actual plan for installation of this project in tulip farms green house. While fig 4.2.1 is the picture while we were building this greenhouse. The project is sponsored project which is sponsored by external organization TULIP FARM. As per their requirement we have designed one greenhouse by using Transparent, tight, cheap, and flexible polyhouse and Ultraviolet plastic Sheet and iron pipes or GI pipes. The size of greenhouse is 15ft*11ft*9ft. In that greenhouse 4 racks are mounted. Each rack contains 3 layes on which 7 to 8 trays are placed. Each layer has different types of vegetables. So as per their requirement, the irrigation of every crop is controlled at different timing. The plan of installing of tank is such that, there are two tanks available in greenhouse. One tank contains water and other tank contains nutrition. Every rack has different pipeline of water and nutrition. And whose flow will be controlled either by solenoidal valve or small 12 v dc pumps according to requirement.

4.3 Flow Chart

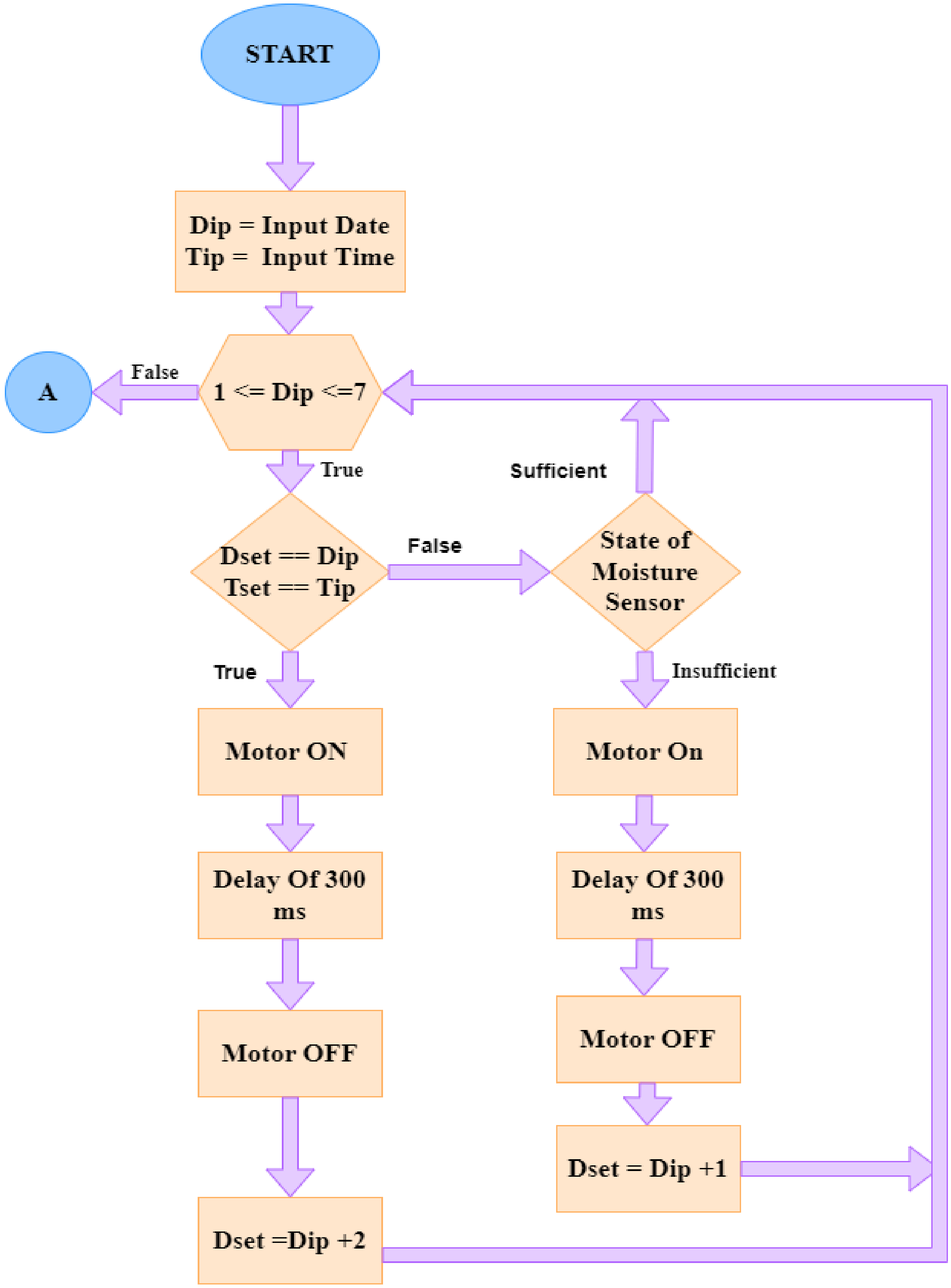

Fig 4.3.1 Flowchart for 1st week

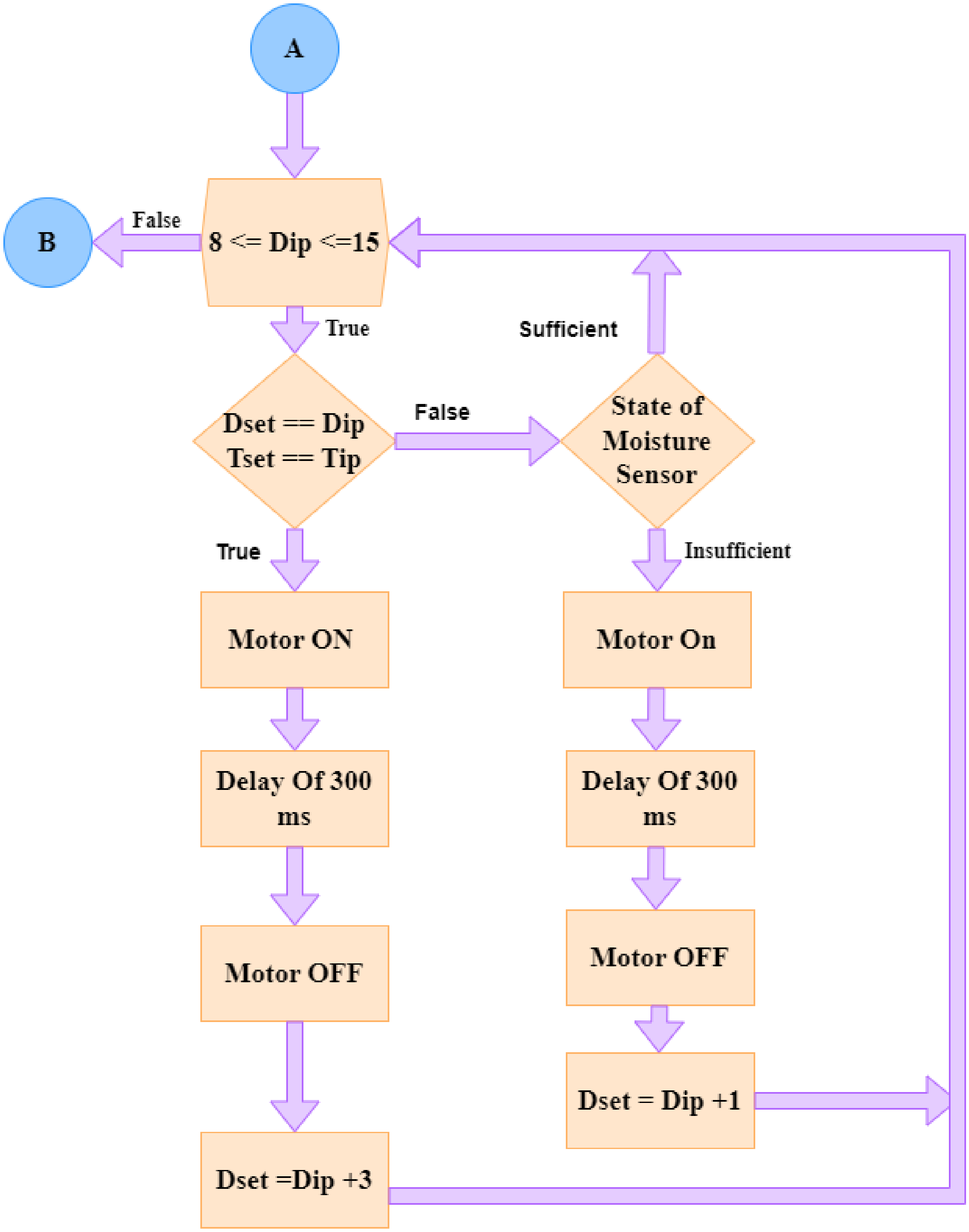

Fig 4.3.2 Flowchart for 2nd week

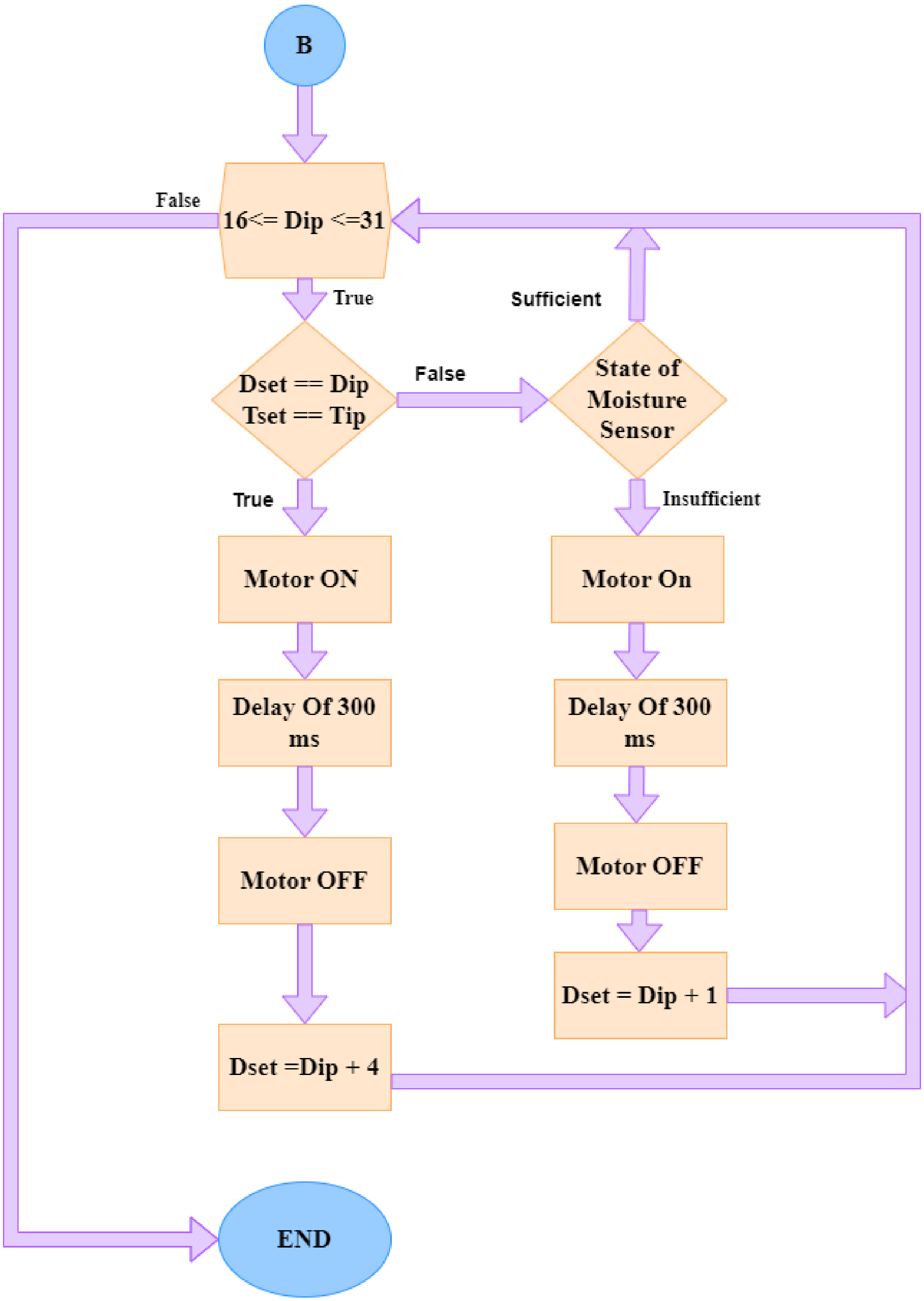

Fig 4.3.3 Flowchart for 3rd week

To understand the working of the system we will take some dummy data for watering crops

For 1st week:

The microcontroller does write operation on the RTC module then the continuous time and date are transferred to the microcontroller and value of date and time are copied into Dip=Tip variables. Now if Dip (input date is less than 7 then the loop for week 1 got executed. now if input date and input time are matched with the set date and set time then the motor turned ON. After that proper delay it applicable to keep motor turned on for few minutes after that signal is provided so that motor turns OFF. Then Dset (set date) is increased by 2 days (Dset=Dset) And it again jump to weak condition check unless date is not move than 7 it stay in some loop. Now if the set date and set time are not equal to input date and input time then sufficient then again jumped to week check in condition if it is motor turn off. again Dset is changed to (Dset T1) and jumped weak check condition if date is grater than 7 and less than 15 it enter into second loop.

For 2nd Week

Now if Dip (input date is less than 15)then the loop for week 2 got executed. now if input date and input time are matched with the set date and set time then the motor turned ON. Then proper delay it applicable to keep motor turned on for few minute after that signal is provided so that motor turns OFF. Then Dset (set date)is increased by 3 days(Dset=Dset)And it again jump to weak condition check unless date is not move than 15 it stay in some loop. Now if the set date and set time are not equal to input date and input time then moisture comes into play.it checks the moisture level of soil. if sufficient then again jumped to week check in condition if it is insufficient. then it bypasses timer and turn on the motor. After delay motor turn off. again Dset is changed to (Dset T1) and jumped weak check condition if date is grater than 15 and less than 30 it enter into third loop.

For 3rd week:

Now if Dip (input date is less than 30)then the loop for week 3 got executed. now if input date and input time are matched with the set date and set time then the motor turned ON. Then proper delay it applicable to keep motor turned on for few minute after that signal is provided so that motor turns OFF. Then Dset (set date)is increased by 4 days(Dset=Dset t)And it again jump to weak condition check unless date is not move than 30 it stay in some loop. Now if the set date and set time are not equal to input date and input time then moisture comes into play.it checks the moisture level of soil. if sufficient then again jumped to week check in condition if it is insufficient. then it bypasses timer and turn on the motor.after delay motor turn off. again Dset is changed to (Dset T1) and jumped weak check condition if date is grater than 30 .it enter into first loop.

4.4 Program

Program is written in appendix.

4.5 Simulation Model

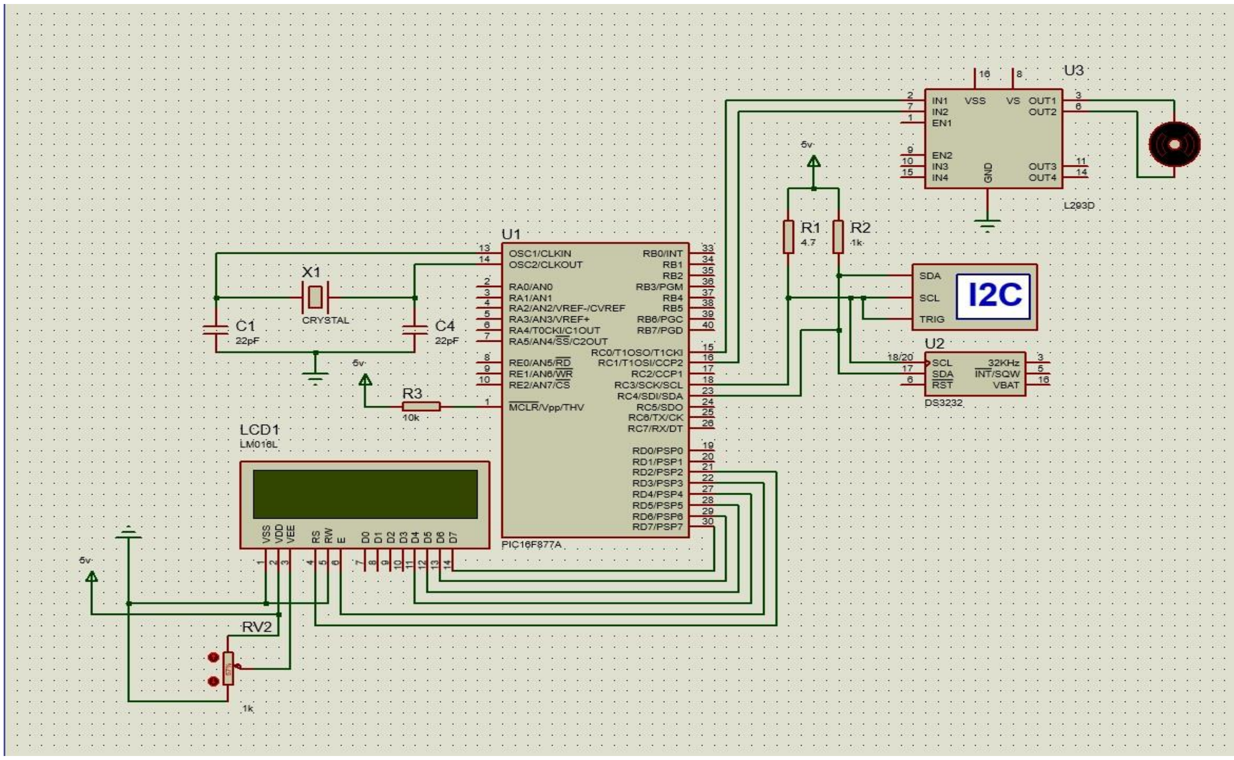

Fig 4.5 Proteus Simulation

The Fig 4.2 shows the proteus simulation of our system. The overall system is controlled by a PIC microcontroller. The DS3231 is the RTC module connected through an I2C protocol to the pin no. 18 and 23 of the microcontroller which provides the real time date and time to the microcontroller. The relay is connected between pins 15 and 16. Who controls the turning on and off of the motor view the signal given by microcontroller. The resister of 10K ohm is added to simulate the effect of the moisture sensor, while a crystal oscillator is used to give the clock pulse to the microcontroller. The 16*2 LCD Display is connected to microcontroller to show the date time and motor current state. Where pin no. 27 to 30 are connected to data pins D4 to D7 of LCD. And the Pin no. 21 and 22 are connected to Read/Write and enable pin to control flow of data and commands to the LCD from microcontroller.

4.6 Components

1. PIC 18f(4520)

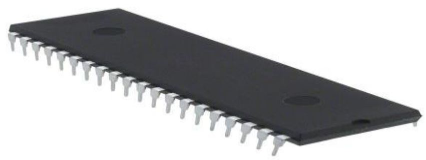

Fig. 4.6.1 PIC 18f(4520)

PIC 18f is a 8 bit microcontroller which is at low cost and also power consumption is low. It has 32k program memory and also it has 256 byte EPROM data memory. Operating voltage of 18F microcontroller at a range of 4.2 V to 5.5V and it has operating temperature in between -40°c to 85°c. There are 40 pins are available in PIC 18f microcontroller and it's operating frequency is 40 MHZ.

2. LCD16x2

Fig. 4.6.2 LCD 16x2

The LCD means liquid crystal display. The display module used in a various applications such as phones, calculator, computer, TV, etc. These displays are mainly used for its multi-segment light emitting diodes. The advantage of using the LCD is that it is inexpensive and simple to program.

- LCD 16×2 operates from a 4.7V to 5.3V.
- The current consumption by the LCD module is upto 1mA.
- LCD module easily operate on 8 and 4 bit mode.
- LCD 16×2 has total 16 no of pins.
- It has 2 no of rows and 16 no of columns.
- LCD 16×2 has 32 characters.
- Green and blue colours are available in market for blacklight.

3. DS3231 RTC Module

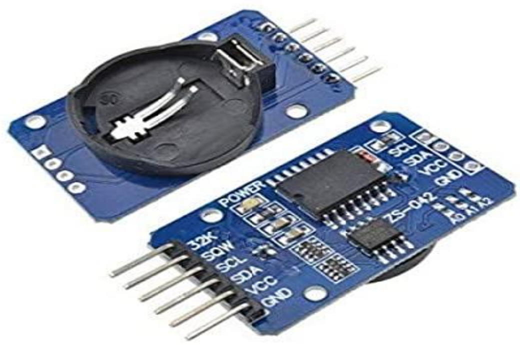

Fig. 4.6.3 DS3231 RTC Module

RTC stands for Real Time Clock. RTC module is nothing but the system which remember the Time and Date. The RTC module have its own battery setup which helps in keep the module on during the external power outage. In short RTC is used to provide real date and time and it is also used to count second, minutes, hours , months and year's.

- The operating voltage of RTC DS3231 module is at a range of 2.7 to 5.5 V.
- RTC DS3231 module has frequency range upto 400 KHZ.
- The module has operating temperature between -45°c to 80°c.
- It has 38×22×14 mm size of module.
- It has 32k memory chip.
- There are 2 time of day alarm available in RTC DS3231.

4. 12V DC relay

Fig. 4.6.4 12V DC relay

12V DC relay circuit is the best solution for switching device in electronics. It is used in automation of home, in safety circuit as it can disconnect the load as if there is any event of failure is happened. The relay requires 12V DC as a triggering voltage and 100 mA as a triggering current.

5. 5V DC pump motor

Fig. 4.6.5 Pump Motor

The 5V DC water pump is low cost, small size. It is submersible pump just connect pipe to outlet, submerge the pump in the water and give power to it.

- The operating voltage of the pump is ranges between the 2.5V to 6V.
- The operating current of the pump is in between 130 mA to 220mA.
- The flow rate of the water from the pump is 80 to 120 liters per hour.
- Outlet outer diameter of pump is 7.5 mm and inner diameter is 5 mm.

6. Soil Moisture Sensor

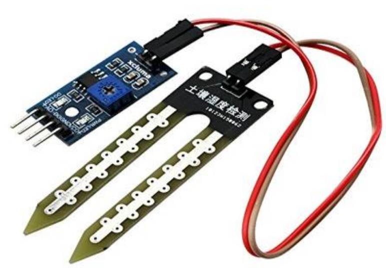

Fig. 4.6.6 Soil Moisture Sensor

- Operating voltage of soil moisture sensor at a range of 3.3 to 5V dc.
- It's operating current is upto 15 mA.
- Moisture sensor has the current consumption rate is 32mA.

- The working temperature of soil moisture sensor is from 10°c to 30°c.
- The dimensions of soil moisture sensor are 8.9×1.8×0.7cm.

7. AVR (Atmega 328p)

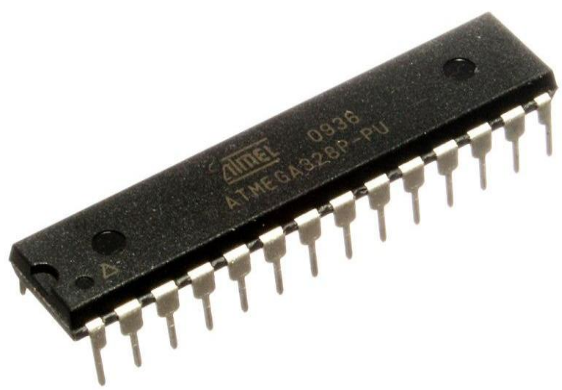

Fig. 4.6.7 AVR (Atmega 328p)

- AVR Atmega 328p is 8 bit microcontroller.
- It has supply voltage in between 1.8 to 5.5V.
- AVR Atmega 328p has frequency upto 20MHZ.
- Its operating temperature varies between -40°c to 85°c.
- It has program memory size of 32 KB and it has RAM of 2KB.
- There are 23 no of inputs and outputs and it has 3 no of timer and counters pins.

8. Connecting Wires

Fig. 4.6.8 Connecting Wires

Connecting wires are simple wires that have connector pins at both the end. These wires allows to connect two points to each other without soldering. Jumper wires are mainly used in breadboards and other prototyping tools which make it easy to change a circuit as required. It doesn't get much more basic than jumper wires.

9. Adapter

Fig. 4.6.9 Adapter

It allows high-power 5-Volt DC items to operate on 110 to 240 Volt AC power. It makes it ideal for traveling also.

4.7 Hardware Model

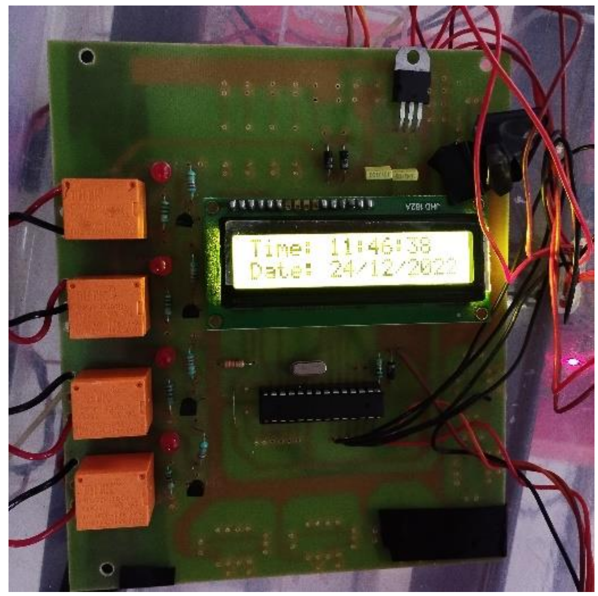

Fig 4.7.1 Model D

Fig 4.7.2 Control Unit

Fig. 4.7.1 is the model D of tulip farms project where one rack is shown which is containing 3 layers each layer has different placed in it which has different need of need for independent irrigation control. The each layer is provided with the different moisture sensors and different motors for controlling flow of water. Fig 4.7.2 is the our controlling unit which has controller LCD relay and RTC placed on it Each relay is connected to different motors of different layers while connections of moisture sensor is connected to different pins of controller.

Chapter 5

5.1 Hardware Results and Discussion

In this chapter the results acquired by hardware model are compared with the conventional model. The first comparison is based on the power usage the second is on the water usage and the third comparison is based on the human efforts required for conventional system and the our system.

5.1.1 The Power Usage:

The following stats is the comparison between the power usage of our system against the power usage of conventional system.

Our system:

Electricity used by 1 microcontroller kit	: 1 Watt per hour
Electricity used by 12 Volt Motor	: 60 Watt per hour
Electricity used by 12 Volt Motor	: 60+1 = 61 W
For Green House Containing 6 Racks	: 61*6 = 366 W per hour Maximum motor on for 30 mins
Total electricity usage in a day	: 183 watts
Total usage of the month	: 183*30 = 5490W
Total Units consumed	: 5.490 Units
total running cost of the month	: 5.36*5.490 = 29.42 Rs.

Conventional System:

Power consumption by motor per hour	: 746 watt per hour
Power consumption by motor per day	: 373 watt in each day
Power consumption by motor for month	: 373*30 = 11190W
For a month (units)	: 373*30 = 11190Whr :11.19 units
Cost of running (Rs.)	: 223.5*5.36 = 59.97 Rs per month

5.1.2 Water Usage:

The following stats is the comparison between the water usage of our system against the power usage of conventional system.

Conventional System:

For a Conventional System (half Hp motor)	: 1960 litre per hour
for a per day 30 mins of use	: 1960/2 = 980 litre
for a month	: 980*30 = 29400 litre

our system

12V 110psi motor	: avg 200 litre per hour
for a per day 30 mins of use	: 100 litre per day
for 6 motor	: 100*6=600 litre per day
for a 30 days	: 600*30 = 18000 litre

5.1.3 Human Efforts:

In conventional system no matter what you have to put one person for monitoring and control of motor in our case these human are eliminated by incorporating automation for sake of convenience we have considered half hour of human efforts in entire month .

Fig. 5.1 shows the entire difference in both systems in terms of electricity usage , water usage and human efforts. In all of these aspects our systems comes out as the best. In the case of electricity usage we save around 50 percent of money spend on electricity. The graph also shows the total water usage of the system which is comparatively lot lower than conventional system. We can easily save 40 percent of water by implementing our system. Looking towards human efforts column we can easily say our systems eliminates conventional systems in this case with saving around 90 percent of human efforts.

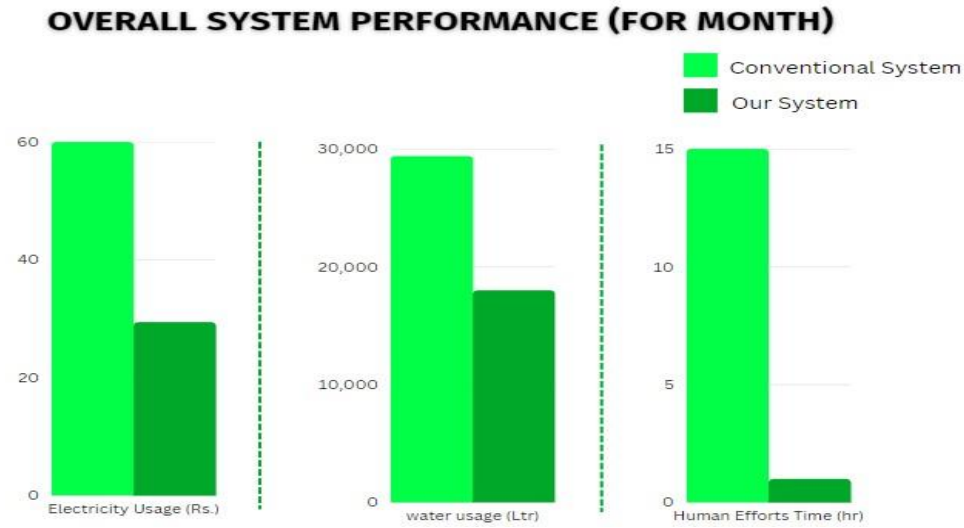

Table 5.1: Comparison of conventional system and our system

Chapter 6

Conclusion and Future scope

6.1 Conclusion

The automated system is constructed separately for RTC-based control and moisture sensor-based control. After successful operation, Both the systems are integrated together. The schedule program for few crops are generated. System is modified to give maximum efficiency.

After comparing this system with existing system we came up with results which indicate that this system proves itself best alternative for current systems by giving better efficiency in terms of electricity and water usage. Also human efforts are negligible when compared to conventional system.

6.2 Future scope

- Artificial Intelligence and machine learning can be implemented to provide optimum watering schedule according to given condition.
- Remote Monitoring and control can be achieved through smart phone application.
- Scheduling part of the system can be used to automate the auto switch of the water pump in the fields.

Appendix

```
#include "ACS712.h" /* ----- C Program for Arduino based Alarm Clock ---- */

#include <Wire.h>

#include<EEPROM.h>

#include <RTClib.h>

#include <LiquidCrystal.h>

LiquidCrystal lcd(7, 6, 5, 4, 3, 2);

RTC_DS3231 RTC;

int temp,inc,hours1,minut,add=11;

#define buzzer 13

#define relay1 12

#define relay2 11

#define relay3 10

#define mois1 A0

#define mois2 A1

#define mois3 A2

#define mois4 A3


int HOUR,MINUT,SECOND;

int h=0;

int m=0;

int d=0;
```

```
void setup()
{
Serial.begin(9600);
 Wire.begin();
 RTC.begin();
 lcd.begin(16,2);
pinMode(buzzer, OUTPUT);
pinMode(relay1, OUTPUT);
pinMode(relay2, OUTPUT);
pinMode(relay3, OUTPUT);
pinMode(mois1, INPUT);
pinMode(mois2, INPUT);
pinMode(mois3, INPUT);
pinMode(mois4, INPUT);
   lcd.setCursor(0,0);
   lcd.print("Real Time Clock");
   lcd.setCursor(0,1);
   lcd.print("Circuit Digest ");
    delay(2000);
   // RTC.adjust(DateTime(F(_DATE),F(TIME_)));
// if(!RTC.isrunning())
```

```
 //{

 //RTC.adjust(DateTime(_DATE,TIME_));
// }
}
void loop()
{
  checkmois();
   int temp=0,val=1,temp4;
   DateTime now = RTC.now();
   lcd.clear();
 lcd.setCursor(0,0);
 lcd.print("Time:");
 lcd.setCursor(6,0);
 lcd.print(HOUR=now.hour(),DEC);
// Serial.print(HOUR=now.hour(),DEC);
  Serial.print(HOUR);
 lcd.print(":");
 Serial.print(":");
 lcd.print(MINUT=now.minute(),DEC);
// Serial.print(MINUT=now.minute(),DEC);
```

```
Serial.print(MINUT);
 lcd.print(":");
 Serial.print(":");
 lcd.print(SECOND=now.second(),DEC);
 Serial.print(SECOND=now.second(),DEC);
 Serial.println(" ");
 lcd.setCursor(0,1);
 lcd.print("Date: ");
 lcd.print(d=now.day(),DEC);
 //Serial.println(now.day(),DEC);
 Serial.println(d);
 lcd.print("/");
 lcd.print(now.month(),DEC);
 lcd.print("/");
 lcd.print(now.year(),DEC);
 match();
 delay(200);
}
/Function to set alarm time and feed time into Internal eeprom/
/* Function to chack medication time */
```

```
void match()
{
 if((HOUR == 16) && (MINUT == 00) && (d == 1) )
  {
  motoron();
  }
 if((HOUR == 16) && (MINUT == 00) && (d == 3) )
  {
  motoron();
 }
 if((HOUR == 16) && (MINUT == 00) && (d == 5) )
  {
  motoron();
 }
 if((HOUR == 16) && (MINUT == 00) && (d == 7) )
  {
  motoron();
 }
 if((HOUR == 16) && (MINUT == 00) && (d == 10) )
  {
  motoron();
```

```
}
if((HOUR == 16) && (MINUT == 00) && (d == 11) )
 {
 motoron();
}
if((HOUR == 16) && (MINUT == 00) && (d == 13) )
 {
 motoron();
}
if((HOUR == 16) && (MINUT == 00) && (d == 14) )
 {
 motoron();
}
if((HOUR == 16) && (MINUT == 00) && (d == 16) )
 {
 motoron();
}
if((HOUR == 16) && (MINUT == 00) && (d == 17) )
 {
 motoron();
}
if((HOUR == 16) && (MINUT == 00) && (d == 20) )
```

```
 {
 motoron();
}
if((HOUR == 16) && (MINUT == 00) && (d == 21) )
 {
 motoron();
}
if((HOUR == 16) && (MINUT == 00) && (d == 24) )
 {
 motoron();
}
if((HOUR == 16) && (MINUT == 00) && (d == 25) )
 {
 motoron();
}
if((HOUR == 16) && (MINUT == 00) && (d == 28) )
 {
 motoron();
}
if((HOUR == 16) && (MINUT == 00) && (d == 30) )
 {
 motoron();
```

```
}
}
void motoron(){
Serial.print("alarm on");
  beep();
 }
void beep()
{
  digitalWrite(buzzer,HIGH);
  digitalWrite(relay1,HIGH);
  digitalWrite(relay2,HIGH);
  digitalWrite(relay3,HIGH);
 // delay(60000);
   checkmois();
   delay(5000);
   checkmois();
   delay(5000);
   checkmois();
   delay(5000);
   checkmois();
   delay(5000);
   checkmois();
```

```
    delay(5000);
    checkmois();
    delay(5000);
    checkmois();
    delay(5000);
    checkmois();
    delay(5000);
    checkmois();
    delay(5000);
    checkmois();
    delay(5000);
    checkmois();
    delay(5000);
    checkmois();
    delay(5000);
  digitalWrite(buzzer, LOW);
  digitalWrite(relay1, LOW);
  digitalWrite(relay2, LOW);
  digitalWrite(relay3, LOW);
   delay(500);
}
void checkmois(){
```

```
int key1= digitalRead(mois1);
int key2= digitalRead(mois2);
int key3= digitalRead(mois3);
int key4= digitalRead(mois4);
if (key1==LOW){
  digitalWrite(relay1, LOW);
}
if (key2==LOW){
  digitalWrite(relay2, LOW);
}
if (key3==LOW){
  digitalWrite(relay3, LOW);
}
if (key4==LOW){
  digitalWrite(buzzer, LOW);
}


}
```

Chapter 7

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