Visvesvaraya Technological University

Belgaum, Karnataka-590 018

A Project Report on

"Design And Development Of Transducer- Actuator-Transceiver Module For Agriculture Automation"

Project Report submitted in partial fulfillment of the requirement for the award of the degree of

Bachelor of Engineering
In
Electrical & Electronics Engineering

Submitted by

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CMR INSTITUTE OF TECHNOLOGY

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

AECS Layout, Bengaluru-560 037

Certificate

Certified that the project work entitled **"Design And Development Of Transducer-Actuator-Transceiver Module For Agriculture Automation"** carried out by Babu MG **(1CR18EE402**), Santhosh PJ **(1CR18EE413),**Suchithra BS (**1CR18EE416),** Vanishree A **(1CR18EE418)**; are bonafied students of CMR Institute of Technology, Bengaluru, in partial fulfillment for the award of Bachelor of Engineering in Electrical & Electronics Engineering of the Visvesvaraya Technological University, Belgaum, during the year 2020-2021. It is certified that all corrections/suggestions indicated for Internal Assessment have been incorporated in the Report deposited in the departmental library.

The project report has been approved as it satisfies the academic requirements in respect of Project work prescribed for the said Degree.

Signature of the Guide	*Signature of the HOD*	*Signature of the Principal*
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Dr. Shailendra B **Associate professor** EEE Department CMRIT, Bengaluru	Dr. K. Chitra Professor & HOD EEE Department CMRIT, Bengaluru	Dr. Sanjay Jain Principal, CMRIT, Bengaluru

External Viva

Name of the Examiners	Signature & Date
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DECLARATION

We, [BABU MG **(1CR18EE402),** SANTHOSH PJ **(1CR18EE413),** SUCHITHRA BS **(1CR18EE416),** VANISHREE A **(1CR18EE418)],** hereby declare that the report entitled **"Design And Development Of Transducer- Actuator-Transceiver Module For Agriculture Automation"** has been carried out by us under the guidance of **Dr. Shailendra,** Associate professor , Department of Electrical & Electronics Engineering, CMR Institute of Technology, Bengaluru, in partial fulfillment of the requirement for the degree of **BACHELOR OF ENGINEERING in ELECTRICAL & ELECTRONICS ENGINEERING**, of Visveswaraya Technological University, Belagavi during the academic year 2020-21. The work done in this report is original and it has not been submitted for any other degree in any university.

Place: Bengaluru

Date:

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Abstract

This project on " **Design and development of transducer-actuator-transceiver module for agriculture automation** " is intended to create an automated irrigation mechanism which turns the pumping motor ON and OFF by detecting the dampness/moisture content of the earth. In the domain of farming, utilization of appropriate means of irrigation is significant. The benefit of employing these techniques is to decrease human interference and still make certain appropriate irrigation. The proposed model consists of three stages: Firstly, sensing the land's moisture levels. Second stage is the determination of its status: dry or wet. The last and third stage is Motor control. This project proposes the development of Automatic Plant Irrigation System (APIS) capable of detecting loss of moisture in soil using the soil moisture sensor. Specifically, APIS utilizes theSoil Moisture Sensor to detect water content level in soil and give appropriate responses to the system based on detected condition. Using this response, APIS determines whether or not the land needs to be irrigated. In the current version, APIS is capable of detecting and irrigating a small area that can be considered to be under a single pump's coverage. Implemented using Operational Amplifier LM358, APIS uses live input data to determine the conditions.
APIS represents our most basic step towards automated farming to improve turnover and reduce the impact of draught or loss due to irrigation issues.

Acknowladgement

The satisfaction and euphoria that accompany the successful completion of any task would be incomplete without the mention of people, who are responsible for the completion of the project and who made it possible, because success is outcome of hard work and perseverance, but stead fast of all is encouraging guidance. So with gratitude we acknowledge all those whose guidance and encouragement served us to motivate towards the success of the project work.

We take great pleasure in expressing our sincere thanks to ***Dr. Sanjay Jain****,* ***Principal, CMR Institute of Technology, Bengaluru*** *for providing an excellent academic environment in the college and for his continuous motivation towards a dynamic career. We would like to profoundly thank* ***Dr. B Narasimha Murthy****, Vice-principal of CMR Institute of Technology and the whole* ***Management*** *for providing such a healthy environment for the successful completion of the project work.*

We would like to convey our sincere gratitude to ***Dr. K Chitra****,* ***Head of Electrical and Electronics Engineering Department, CMR Institute of Technology, Bengaluru*** *for her invaluable guidance and encouragement and for providing good facilities to carry out this project work.*

We would like to express our deep sense of gratitude to ***Dr.Shailendra, Associate Professor, Electrical and Electronics Engineering, CMR Institute of Technology, Bengaluru*** *for his/her exemplary guidance, valuable suggestions, expert advice and encouragement to pursue this project work.*

We are thankful to all the faculties and laboratory staffs of ***Electrical and Electronics Engineering Department, CMR Institute of Technology, Bengaluru*** *for helping us in all possible manners during the entire period.*

Finally, we acknowledge the peop o mean a lot to us, our parents, for their inspiration, unconditional love, support, ana faith for carrying out this work to the finishing line. We want to give special thanks to all our friends who went through hard times together, cheered us on, helped us a lot, and celebrated each accomplishmen Lastly, to the ***Almighty****, for showering His Blessings and to many more, whom we didn't mention here.*

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CHAPTER 1

INTRODUCTION

1.1 OVERVIEW

The greatest crisis in modern day and age is a great disparity in the agricultural sector turnover. The great losses incurrence agriculture material losses or financial losses – most of them are attributed to crop health and quality. If the crops are determined to be not up to par, this may result in a loss. In order to prevent this, we need to maintain the quality of crops and keep them at maximum health. On a practical basis, this is nearly impossible for a farmer who has large lands to observe and maintain. However, this is currently being managed manually. There is a danger in this; many of the laborer's are preferring to work at white collar jobs, and as a result, there is a large deficiency in manpower. This makes automated farming a necessary part of the future. The greatest cause for the crops being not on par is improper irrigation (other than natural calamities). If the irrigation issues are resolved, most of the problem is solved. Hence this is the pinnacle point that needs to be renovated with technology. Automating this part of the process will be extremely beneficial to farmers The automated plant irrigation system will help to reduce the work load on farmers, and help keep the farmlands well irrigated at all times. Most of the farmers allover the world suffer to maintain the irreps with proper watering methods, but find themselves helpless. This system will help farmers irrigate their lands even single-handedly, without the need of additional manpower. Its user friendly simple circuitry will make the user feel the pump to the circuit and its complete. The system will start functioning upon power-up, and will need no trigger to keep it running.

.1.1 WHAT IS DROUGHT? DANGERS OF AN ARTIFICIAL DROUGHT BROUGHT ABOUT BYMAN

A drought is a period of below-average precipitation in a given region, resulting in prolonged shortages in its water supply, whether atmospheric, surface water or ground water. A drought can last for months or years, or may be declared after as few as 15 days. It can have a substantial impact on the ecosystem and agriculture of the affected region and harm to the local economy. Annual dry seasons in the tropics significantly increase the chances of a drought developing and subsequent bush fires. Periods of heat can significantly worsen drought conditions by hastening evaporation of water vapour.

Researchers for the study, published in the journal Nature, found that drought and extreme heat reduced crop yields by as much as 10% between 1964 and 2007. Extreme cold and floods did not result in a significant reduction in crop production, according to the study.

The research provides key insight on the effects of climate on agriculture as policymakers prepare for the number of extreme weather events to spike in the coming decades due to global warming. The study, which evaluated the effect of 2,800 weather disasters on cereal crops like corn, rice and wheat, suggests that the effects of drought worsened after 1985 and are expected to continue to deteriorate in the coming decades. The study speculates that's because of more intense droughts driven by climate change, increased vulnerability to drought and changed reporting methods, but couldn't confirm any individual factor with certainty.

Developedcountriesexperiencedsomeofthemostseverecroplossduetodrought and heat, according to the research. Crop production in North America, Europe and Australia faced nearly A 20% decline thanks to drought and extreme heat, compared to less than 10% in Africa and Latin America. Research reattributed the disparity to a difference between the agricultural methods employed in the different areas. Farmers in developed countries tend to grow crops uniformly across large areas. Water shortage affects those crops uniformly. Growing a wide variety of crops in a given region in the developing world mitigates the risk that all crops will be wiped out thanks to a given weather event.

The impact of water shortage and extreme heat on food production has been a hot button topic in development circles as the scientific understanding of climate change has grown. One recent study found that climate change could drive an 11% decrease in crop yields and a 20% increase in price by 2050 if countries do not stem their greenhouse gas emissions.

And while developed countries have the resources to adapt, the prior counterparts are often left hard hit when they cannot produce adequate food during extreme weather events. This year's El Niño, for instance, has left millions in need of food assistance in places like Ethiopia where the majority of the population depends on agriculture to make ends meet. Funding for efforts to adapt to climate change, including by preparing farmers, has been a key focus of groups focused on the issue

It can be observed that the turnover is only half the amount planted. This loss was dueto inefficient irrigation.[6]

.2 AIM OF THEPROJECT

The motivation for this project came from the countries where economy is based on agriculture and the climatic conditions lead to lack of rains & scarcity of water. Our country mostly depends on agriculture. The farmers working in the farm lands are solely dependent on the rains and bore wells for irrigation of the land. Even if the farm land has a water-pump, manual intervention by farmers is required to turn the pump on/off whenever needed.

The project aim is to detect the dryness in soil using sensors and provide water to the plants appropriately. This project helps to maintain the plants quite easily. In this project we are detecting soil moisture and need for Irrigation.

The Aim of our project is to minimize this manual intervention by the farmer. Automated Irrigation system will serve the following purposes:

1 As there is no un-planned usage of water, a lot of water is saved from being wasted.

2 The irrigation is done only when there is not enough moisture in the soil and the sensors decide when the pump should be turned on/off. This saves a lot time for the farmers. This also gives much needed rest to the farmers, as they don’t have to go and turn the pump on/off manually.

3 This Project is for the academic year 2016-2017 in partial fulfilment of the requirement for the VII th semester mini-project in ECE.

.3 PROBLEM STATEMENT

Nowadays, despite being an agricultural country, the number of people who die of hunger is still quite high. Access to food seems to be difficult, as price and quantity of food is still beyond the capability of the lower middle class and lower class. Irrigation induced Crop failure is a major cause of crop loss every year, and in the age of water crises, this has been elevated to great levels. In order to keep up with increasing demand, farmers are required to increase crop efficiency, by rapidly advancing technologies. In order to handle Irrigation issues, this system has been devised and implemented. Usually farmers need large scale manpower to irrigate large lands simultaneously. However Automatic Plant Irrigation System (APIS) is an automatic system that facilitates automated irrigation of lands simultaneously, upon need.

CHAPTER 2

BACKGROUND

2.1 EXISTING SYSTEM

The continuous increasing demand of food requires the rapid improvement in food production technology. In a country like India, where the economy is mainly based on agriculture and the climatic conditions are isotropic, still we are not able to make full use of agricultural resources.

The main reason is the lack of rains & scarcity of land reservoir water. The continuous extraction of water from earth is reducing the water level due to which lot of land is coming slowly in the zones of un-irrigated land. Another very important reason of this is due to unplanned use of water due to which a significant amount of water goes to waste.

The existing system of manual irrigation is very inefficient in regard to solving these issues. In modern drip irrigation systems, the most significant advantage is that water is supplied near the root zone of the plants drip by drip due to which a large quantity of water is saved. At the present era, the farmers have been using irrigation techniques in India through manual control in which farmer irrigate the land at the regular intervals, This process sometimes consumes more water or sometimes the water reaches late due to which crops get dried. Water deficiency can be detrimental to plants before visible wilting occurs. Slowed growth rate, lighter weight fruit follows slight water deficiency. This problem can be perfectly rectified if we use automatic irrigation system in which the irrigation will take place only when there will be acute requirement of water.

2.2 PROPOSEDSYSTEM

All the lands to be irrigated manually are automatically irrigated by this system. When compared to the previous system where farmers need to frequently and constantly keep monitoring the field for signs of dryness, this system will reduce the time needed to be spent on monitoring the field. It greatly diminishes the need for manpower by a great value. This system will be able to function even when the owner is unavailable for a small period of time, hence ensuring proper irrigation even in the absence of people. Also water will not be wasted during traversal.

In recent times, the farmers have been using irrigation technique through the manual control in which the farmers irrigate the land at regular intervals by turning the water-pump on/off when required. This process sometimes consumes more water and sometimes the water supply to the land is delayed due to which the crops dry out. Water deficiency deteriorates plants growth before visible wilting occurs. In addition to this slowed growth rate, lighter weight fruit follows water deficiency. This problem can be perfectly rectified if we use Automated Irrigation System in which the irrigation will take place only when there will be intense requirement of water, as suggested by the moisture in the soil.

Agriculture

CHAPTER 3

PROJECT DEVELOPMENT

3.1 HARDWAREREQUIREMENTS

The hardware components required for the project are listed as follows:

--

S.NO.	COMPONENT TYPE	COMPONENT	DESCRIPTION
1.	IC	LM358	Operational amplifier
2.	Sensor	Soil moisture , Rain &temperature sensor	-
3.	Switch	Relay board	12V supply
4.	Motor	DC motor pump	5V supply
5.	Sensor	PIR motion sensor	-

3.1.1 OPERATIONAL AMPLIFIER -LM358

- It can handle a supply of 3-32VDC and source up to 20mA per channel. This Operational amplifier is great if you need to operate two individual Operational amplifiers from a single power supply. Comes in an 8-pin DIP package.
- The LM358 is a great, easy-to-use dual-channel Operational amplifier.
- LM358 applications include transducer amplifiers, DC gain blocks and all the conventional Operational amplifier circuits.

3.1.1.1 FEATURES

- Wide Supply Ranges
  - Single Supply: 3 V to 32 V (26 V forLM2904)

- Dual Supplies: ±1.5 V to ±16V
  (±13 V forLM2904)

- Low Supply-Current Drain, Independent of Supply Voltage: 0.7 mA Typical

- Wide Unity Gain Bandwidth: 0.7MHz

- Common-Mode Input Voltage Range Includes Ground, Allowing Direct Sensing Near Ground

- Low Input Bias and Offset Parameters

  - Input Offset Voltage: 3 mV Typical
    A Versions: 2 mv Typical

  - Input Offset Current: 2 n A Typical

  - Input Bias Current: 20 n A
    Typical A Versions: 15 n Typical

- Differential Input Voltage Range Equal to Maximum-Rated Supply Voltage:32 V
  (26 V for LM2904)

- Open-Loop Differential Voltage Gain:
  100 dB Typical

- Internal Frequency Compensation

- On Products Compliant toMIL-PRF-38535,
  All Parameters are Tested Unless Otherwise Noted. On All Other Products, Production Processing Does Not Necessarily Include Testing of All Parameters.

3.1 PINDIAGRAM:

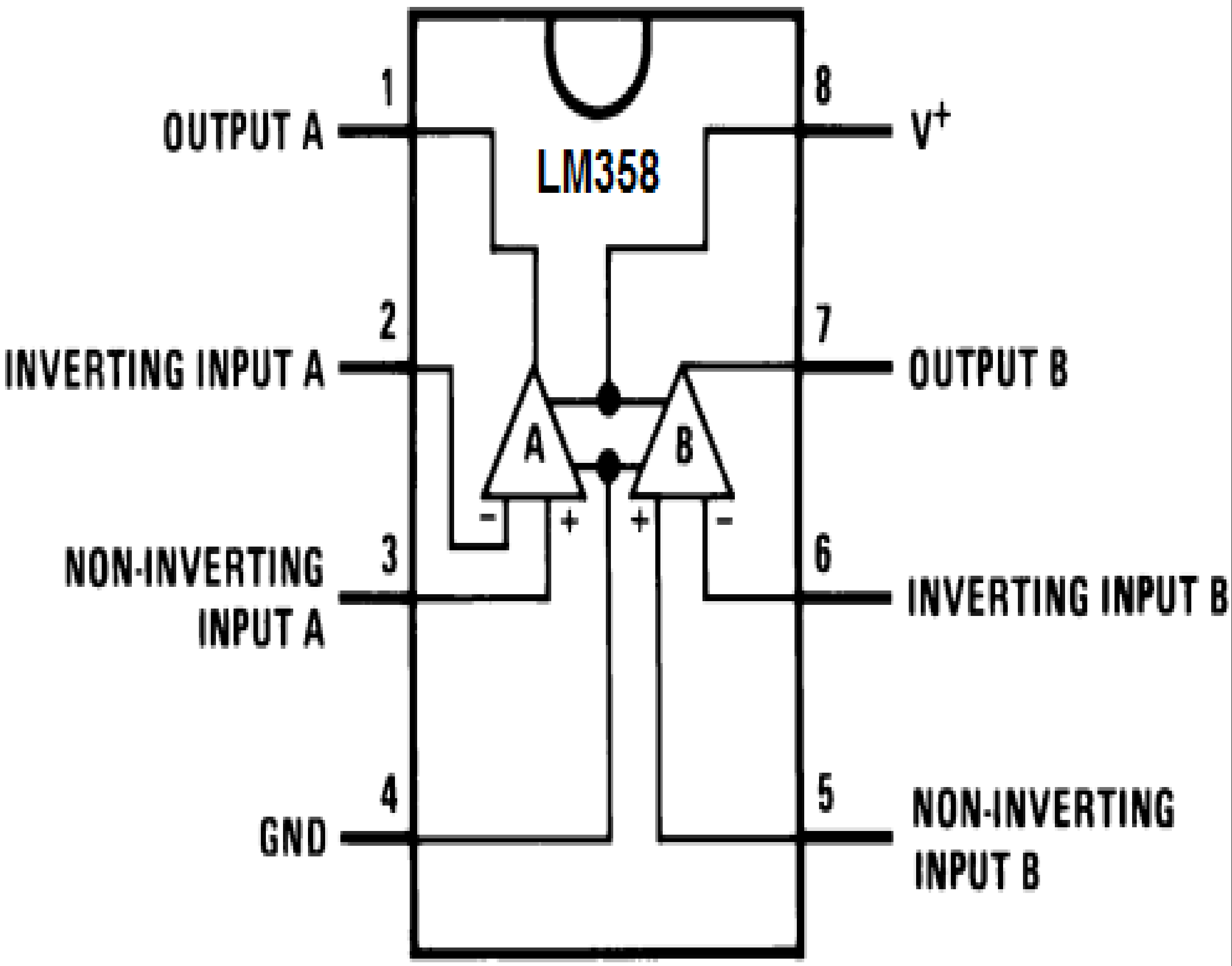


fig.3.1 pin diagram of LM358

3.1.1. CHIP DIAGRAM:

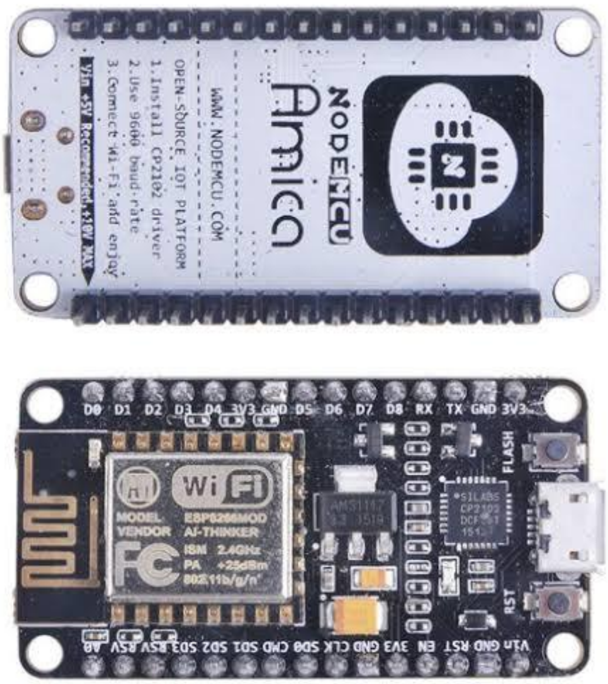


fig.3.1.1. LM358 IC

3.1.2 SOIL MOISTURESENSOR

Soil moisture sensors measure the volumetric water content in soil.[1] Since the direct gravimetric measurement of free soil moisture requires removing, drying, and weighting of a sample, soil moisture sensors measure the volumetric water content indirectly by using some other property of the soil, such as electrical resistance, dielectric constant, or interaction with neutrons, as a proxy for the moisture content. The relation between the measured property and soil moisture must be calibrated and may vary depending on environmental factors such as soil type, temperature, or electric conductivity. Reflected microwave radiation is affected by the soil moisture and is used for remote sensing in hydrology and agriculture. Portable probe instruments can be used by farmers or gardeners.

- **SENSOR BOARD ANDPROBE:**

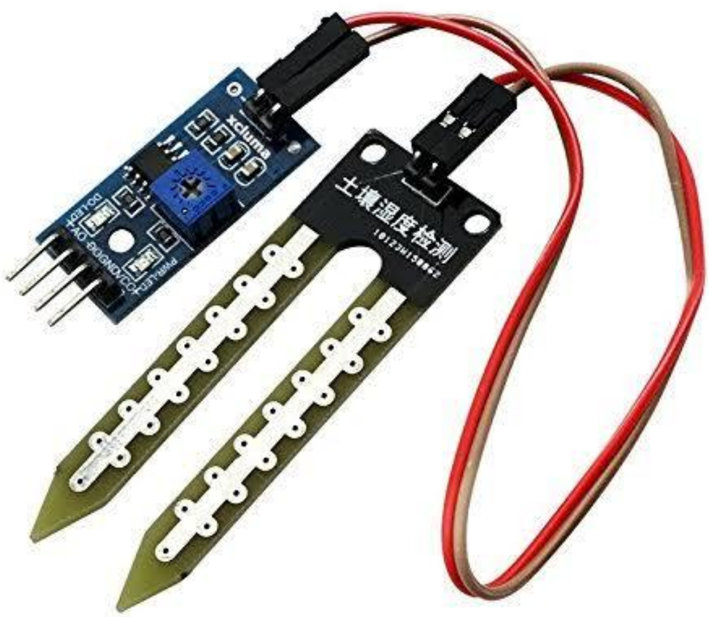


fig.3.1.2soil moisture sensor

3.1..2.1 COMPONENT:

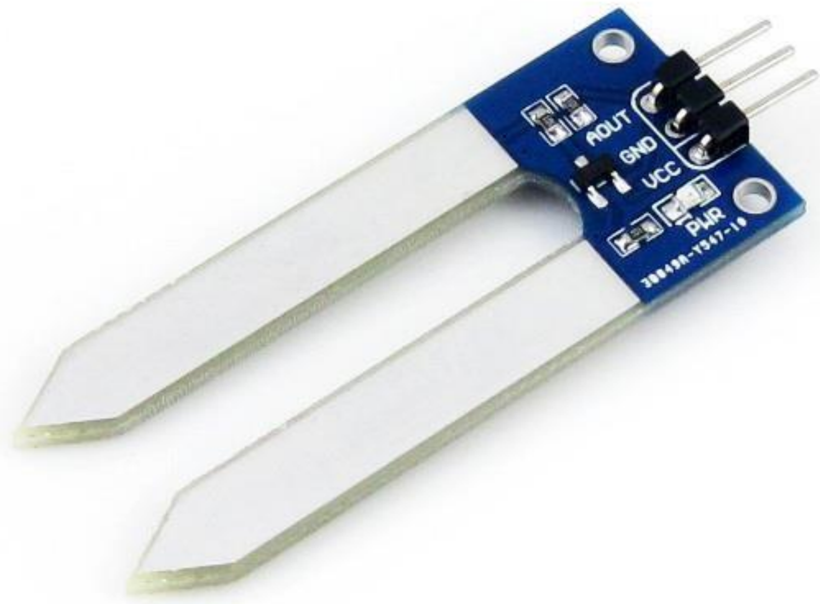


fig.3.1.2.1 sensor

RELAYBOARD

A relay is an electrically operated switch. Many relays use an electromagnet to mechanically operate a switch, but other operating principles are also used, such as solid- state relays. Relays are used where it is necessary to control a circuit by a separate low- power signal, or where several circuits must be controlled by one signal. The first relays were used in long distance telegraph circuits as amplifiers: they repeated the signal coming in from one circuit and re-transmitted it on another circuit. Relays were used extensively in telephone exchanges and early computers to perform logical operations.

Electromagnetic relays are those relays which are operated by electromagnetic action. Modern electrical protection relays are mainly micro-processor based, but still electromagnetic relay holds its place. It will take much longer time to be replaced the all electromagnetic relays by micro-processor based static relays.

3.1.3 COMPONENT INTERNALSTRUCTURE:

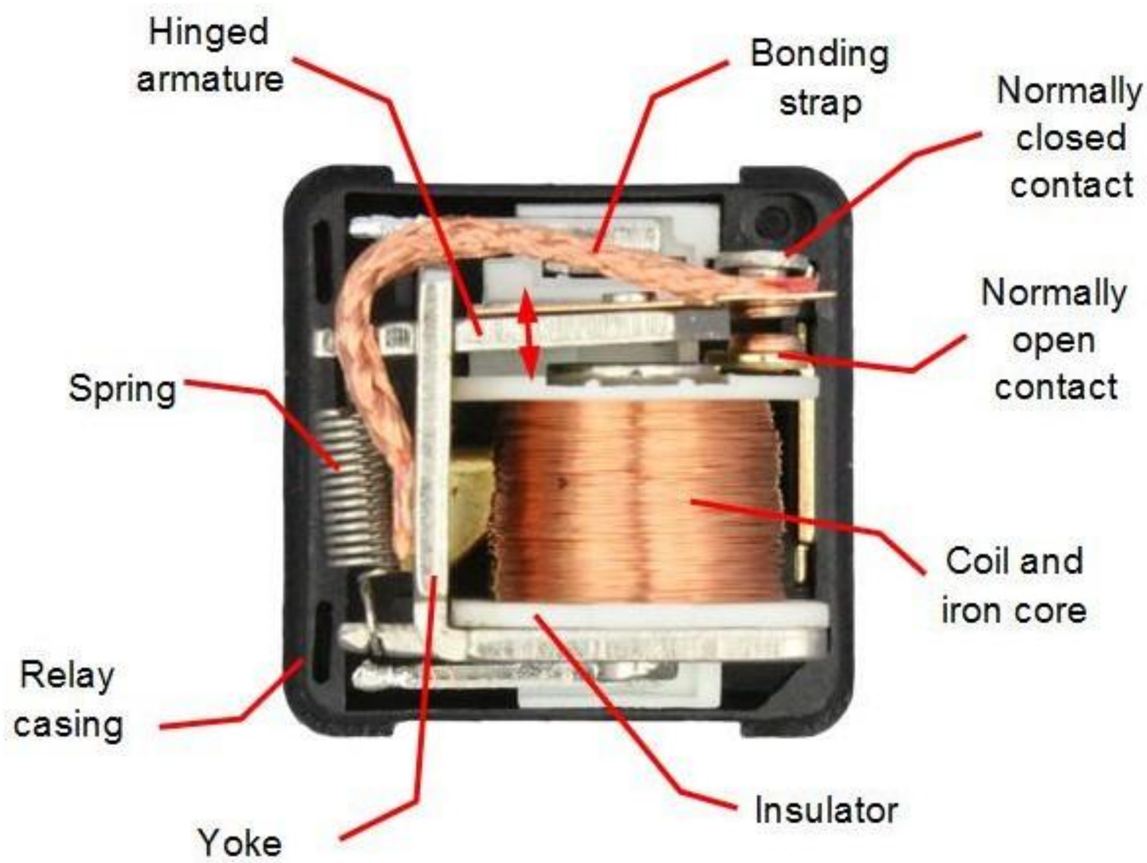


fig.3.1.3. Relay internal structure

3.1.3.1 COMPONENT EXTERNAL STRUCTURE:

s

3.1.3.2 OPERATIONALDIAGRAM:

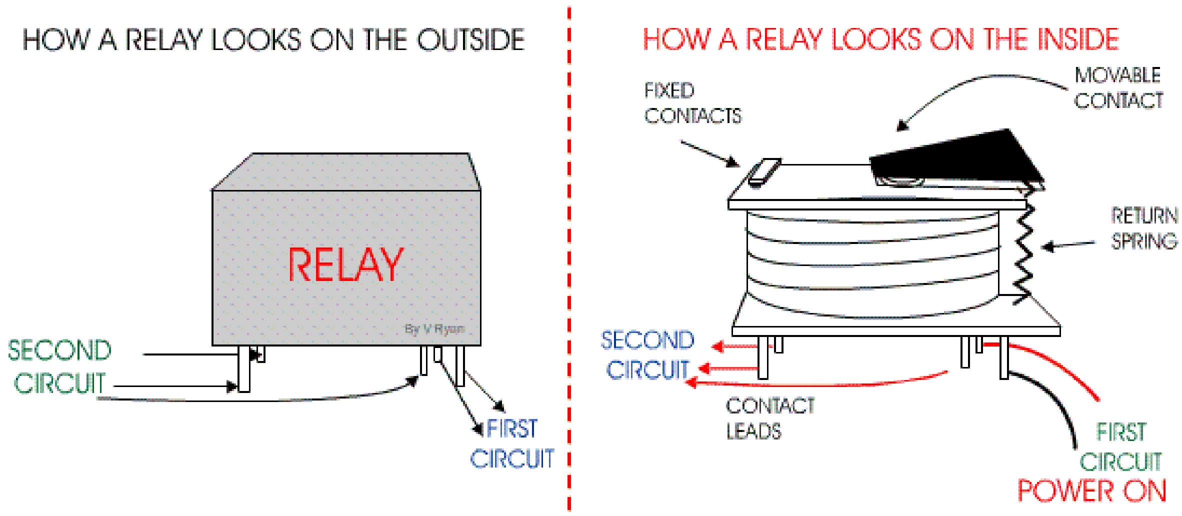


fig.3.1.4. Relay operational diagram

3.1.4 DC MOTOR PUMP

A DC motor is any of a class of rotary electrical machines that converts direct current electrical power into mechanical power. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current flow in part of the motor.

DC motors were the first type widely used, since they could be powered from existing direct-current lighting power distribution systems. A DC motor's speed can be controlled over wide range, using either a variable supply voltage or by changing the strength of current in its field windings.

A DC motor pump is essentially a DC Motor that is used to circulate water. The internal structure is the same. The DC motor is encased in a waterproof plastic casing and the shaft is used to drive an external arm that pumps water.

The Pump requires a 5V supply, which can be easily provided by batteries or AC supply.

3.1.4.1 COMPONENT STRUCTURE:

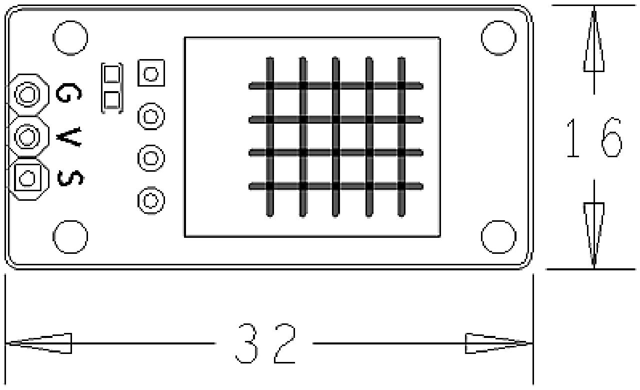
fig.3.1.4. DC MOTOR PUMP

3.1.5 TEMPARETURE SENSOR

- The Matrix-Temperature and Humidity Sensor module is used to detect temperature and humidity.
- It utilizes the DHT11 temperature and humidity sensor. Its humidity range is 20% - 80% and the accuracy is 5%. Its temperature range is 0℃ - 50℃ and the accuracy is ±2℃.

3.1.5.1FEATURES

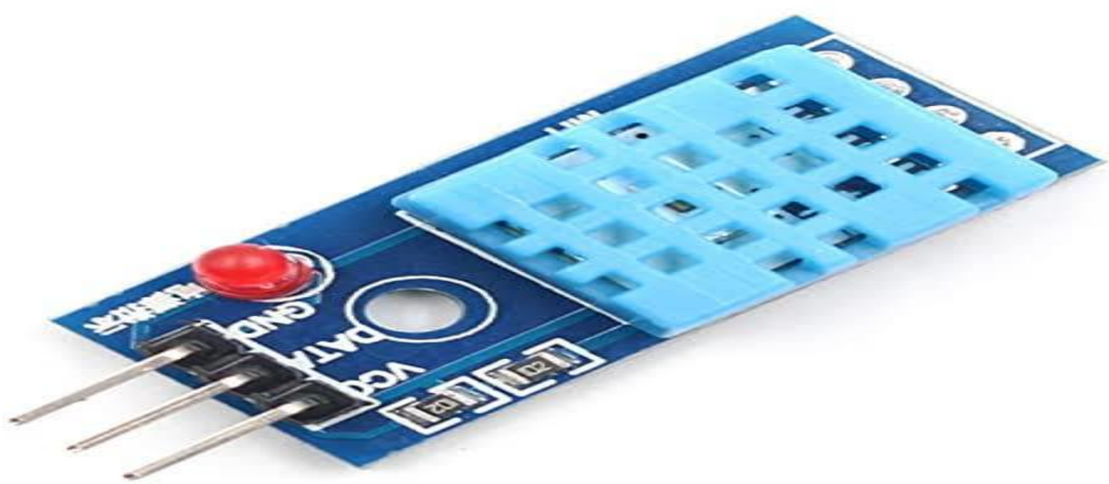
- Humidity range: 20 - 80%RH, Temperature range 0 ~ 50℃
- Accuracy of humidity: +-5%RH, accuracy of temperature: +-2℃
- One wire communication
- 2.54 mm spacing pin
- PCB dimension (mm): 16 x 32



3.1.5.2 BASIC OPERATION

The DHT11 module uses a simplified single-bus serial communication. DATA controls communication and synchronization between the microprocessor and DHT11. A data transfer takes 4ms. The data format contains an integer part and a decimal part. The basic operation is as follows:

- a transmission of 40 data, the high first-out
- data format: 8bit humidity integer data + 8bit the Humidity decimal data
- 8bit temperature integer data + 8bit fractional temperature data
- 8 bit parity bit
- If a transmission is successful the “8bit humidity integer data + 8bit humidity decimal data +8 bit temperature integer data + 8bit temperature fractional data” 8bit checksum is equal to the results of the last eight.
- After the user host (MCU) sends a signal DHT11 is converted from low-power mode to high-speed mode, until the host begins to signal the end. Then DHT11 sends a response signal to send 40bit data, and trigger a letter collection. If DHT11 doesn't receive a signal from the host it will not begin a letter collection. After the letter collection is done DHT11 will turn to low power mode.



3.1.6 PIR MOTION SENSOR

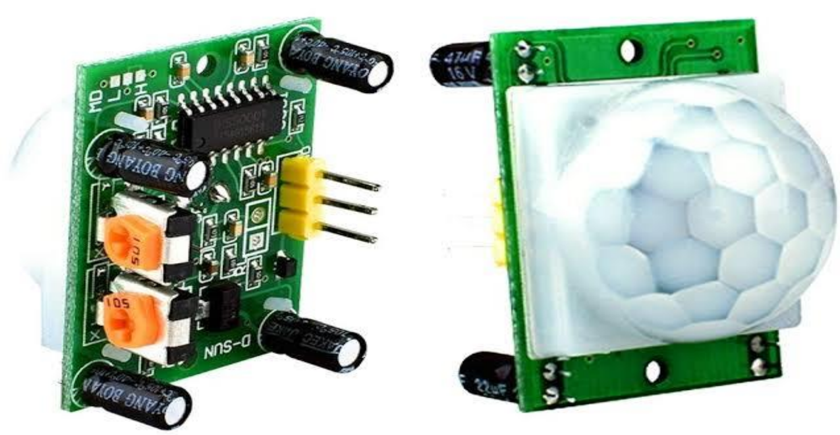
PIR sensors often referred to as, "Passive Infrared" or "IR motion" sensors, enable you to sense motion. Everything emits a small amount of infrared radiation (IR), and the hotter something is, the more radiation it emits. PIR sensors are able to detect a change in average IR levels of their detection zone (e.g. when a human enters a room, that room will increase in temperature slightly) and hence sense motion.

This one's great, as it can be powered via the Raspberry Pi's 5V output, and be read directly from the Raspberry Pi's GPIO input (as the sensor has a digital 3.3V output!)This PIR includes an adjustable delay before firing (approx 0.5 - 200 seconds), has adjustable sensitivity and two M2 mounting holes!

It runs on 4.5V-20V power (or 3V by bypassing the regulator with a bit of soldering) and has a digital signal output (3.3V) high, 0V low. Its sensing range is up to 7 meters in a 100-degree cone.

3.1.6.1 FEATURES

- Input Voltage: 4.5V - 20V
- Current Draw: <50µA
- Digital Output: 3.3V (High)
- Digital Output: 0V (Low)
- Working Temperature: -15°C to 70°C
- Delay Time: 0.5 - 200 Seconds
- Sensing Angle: 100° Cone
- Range 5m - 7m
- Dimensions
- Sensor Lens Diameter: 23mm
- Length: 24.03mm
- Width: 32.34mm
- Height (with lens): 24.66mm
- Centre screw hole distance: 28mm
- Screw hole diameter: 2mm (M2)



3.1.7 BATTERY

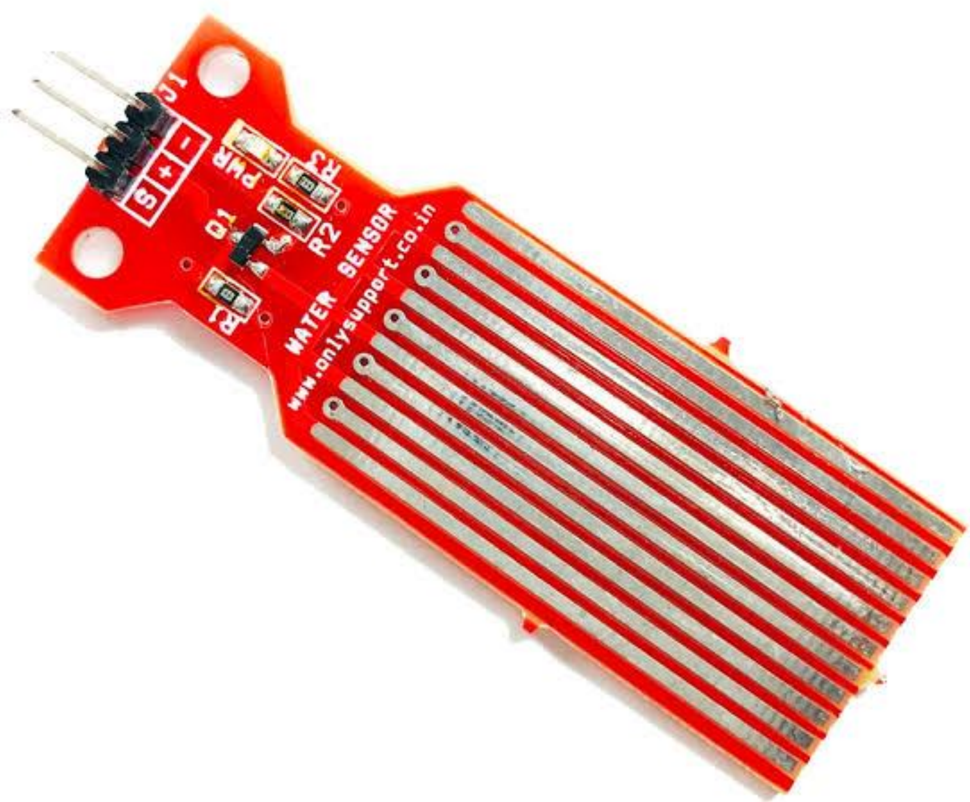
The most common form of nine-volt battery is commonly called the transistor battery.
These were introduced for the early transistor radios. This is a rectangular prism shape with rounded edges and a polarized snap connector at the top. This type is commonly used in pocket radios, smoke detectors, carbon monoxide detectors, guitar effect units, electro-acoustic guitars and radio-controlled vehicle controllers. They are also used as backup power to keep the time in certain electronic clocks.
This format is commonly available in primary carbon-zinc and alkaline chemistry, in primary lithium iron disulfide, and in rechargeable form in nickel-cadmium, nickel-metal hydride and lithium-ion. Mercury oxide batteries in this form have not been manufactured in many years due to their mercury content. The most common form of nine-volt battery is commonly called the transistor battery, introduced for the early transistor radios. This is a rectangular prism shape with rounded edges and a polarized snap connector at the top. This type is commonly used in pocket radios,smoke detectors, carbon monoxide detectors, guitar effect units, electro-acoustic guitars and radio-controlled vehicle controllers. They are also used as backup power to keep the time in certain electronic clocks. This format is commonly available in primary carbon-zinc and alkaline chemistry, in primary lithium iron disulfide, and in rechargeable form in nickel-cadmium, nickel-metal hydride and lithium-ion. Mercury oxide batteries in this form have not been manufactured in many years due to their mercury content.

3.1.8 WATER SENSOR

The Water Level Depth Detection Sensor for Arduino has Operating voltage DC3-5V and Operating current less than 20mA. The Sensor is the Analog type which produces analog output signals according to the water pressure with its Detection Area of 40x16mm.

Water Level Sensor Description

- Operating voltage: DC3-5V
- Operating current: less than 20mA
- Sensor Type: Analog
- Detection Area: 40mmx16mm
- Operating temperature: 10℃-30℃
- Humidity: 10% -90% non-condensing



CHAPTER 4

SYSTEM DESIGN

4.1 FLOW CHART

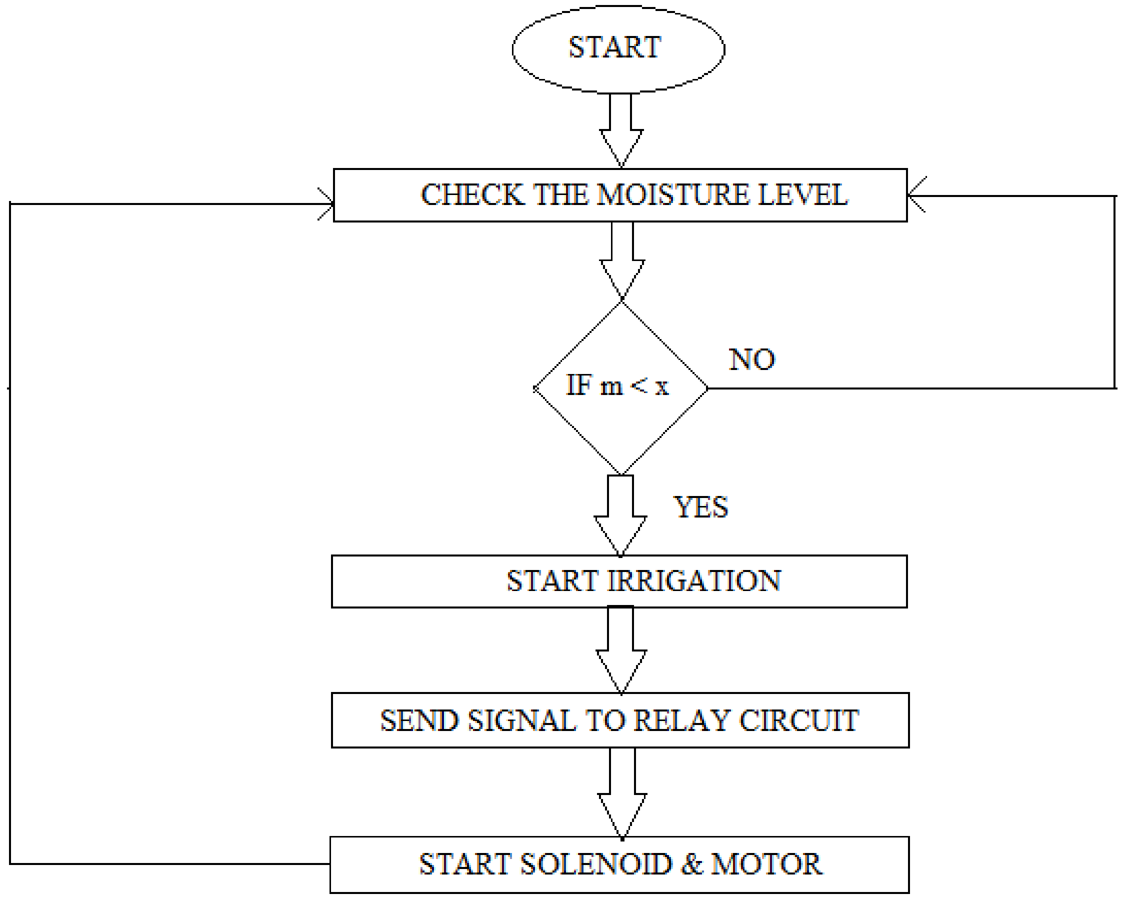


fig.4.1. flow chart of the circuit

where m – detected moisture level.

x – threshold moisture level.

4.2. FLOW DIAGRAM

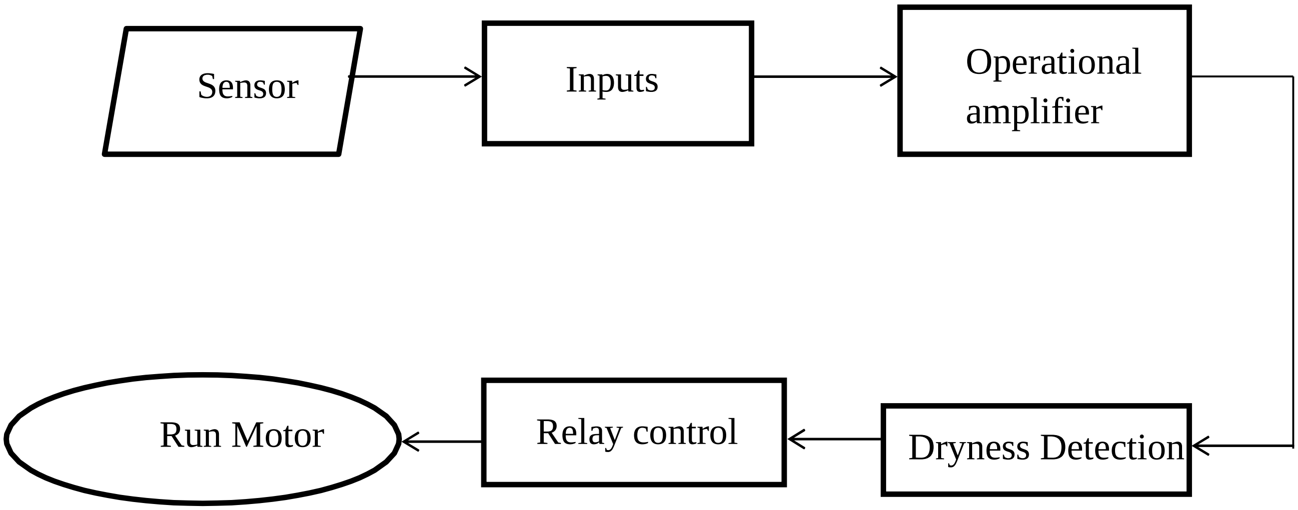


fig.4.2. Flow diagram of the circuit

4.3 CIRCUIT MODEL

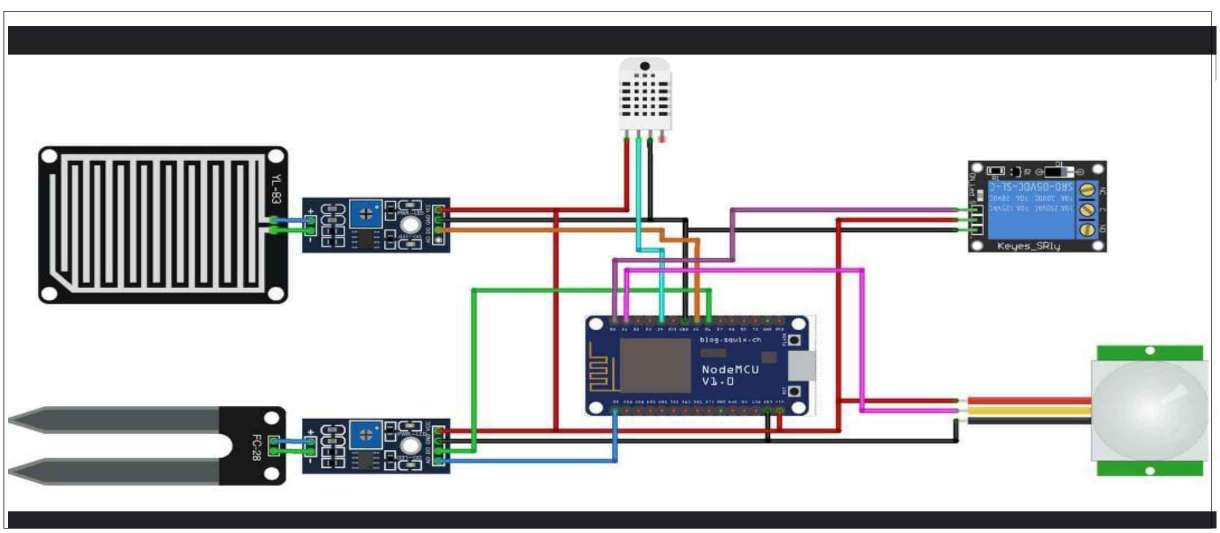


fig.4.3. circuit model

4.4. PROGRAMMING FOR SYSTEM

```
//Project Done by BABU MG, SANTHOSH PJ, SUCHITHRA BS, VANISHREE A

#define BLYNK_PRINT Serial
#include <SPI.h>
#include <ESP8266WiFi.h>
#include <BlynkSimpleEsp8266.h>
#include <DHT.h>
#define BLYNK_PRINT Serial
#include <OneWire.h>
#define ONE_WIRE_BUS D2
#include <DallasTemperature.h>
OneWire oneWire(ONE_WIRE_BUS);
DallasTemperature sensors(&oneWire);

char auth[] = "AB57xT5LdN_ra1GrJ4l8Gto-bcRsNle8"; //Authentication code sent by Blynk
char ssid[] = "smartplant";                    //WiFi SSID
char pass[] = "smartirrigation";               //WiFi Password


#define pirPin D1
int pirValue;
int pinValue;

#define sensorPin D6
#define rainPin D5
int sensorState = 0;
int rainState = 0;
int lastState = 0;
int lastRainState = 0;
#define DHTPIN 2
#define DHTTYPE DHT11
DHT dht(DHTPIN, DHTTYPE);
SimpleTimer timer;

BLYNK_WRITE(V0)
{
 pinValue = param.asInt();
}

void sendSensor()
{
  float h = dht.readHumidity();
  float t = dht.readTemperature();

  if (isnan(h) || isnan(t)) {
    Serial.println("Failed to read from DHT sensor!");
    return;
```

```
  }

  Blynk.virtualWrite(V5, h);  //V5 is for Humidity
  Blynk.virtualWrite(V6, t);  //V6 is for Temperature
}
void setup()
{
  Serial.begin(9600);
  Blynk.begin(auth, ssid, pass);
   pinMode(sensorPin, INPUT);
   pinMode(rainPin, INPUT);
   pinMode(pirPin, INPUT);
  dht.begin();

  timer.setInterval(1000L, sendSensor);
  Serial.begin(115200);
  Blynk.begin(auth, ssid, pass);
   sensors.begin();
}
int sensor=0;
void sendTemps()
{
sensor=analogRead(A0);
sensors.requestTemperatures();
float temp = sensors.getTempCByIndex(0);
Serial.println(temp);
Serial.println(sensor);
Blynk.virtualWrite(V1, temp);
Blynk.virtualWrite(V2,sensor);
delay(1000);
}

void getPirValue(void)        //Get PIR Data
  {
   pirValue = digitalRead(pirPin);
    if (pirValue)
     {
       Serial.println("Motion detected");
       Blynk.notify("Motion detected");
     }
  }

void loop()
{
  Blynk.run();
  timer.run();
  sendTemps();
sensorState = digitalRead(sensorPin);
Serial.println(sensorState);

if (sensorState == 1 && lastState == 0) {
  Serial.println("needs water, send notification");
  Blynk.notify("Water your plants");
```

```
  lastState = 1;
  delay(1000);
//send notification

  }
  else if (sensorState == 1 && lastState == 1) {
    //do nothing, has not been watered yet
  Serial.println("has not been watered yet");
  delay(1000);
  }
  else {
    //st
    Serial.println("does not need water");
    lastState = 0;
    delay(1000);
  }



rainState = digitalRead(rainPin);
Serial.println(rainState);

  if (rainState == 0 && lastRainState == 0) {
  Serial.println("Its Raining!");
  Blynk.notify("Its Raining!");
  lastRainState = 1;
  delay(1000);
//send notification

  }
  else if (rainState == 0 && lastRainState == 1) {
  delay(1000);
  }
  else {
    Serial.println("No Rains");
    lastRainState = 0;
    delay(1000);
  }


  if (pinValue == HIGH)
      {
        getPirValue();
      }
      Blynk.run();
  delay(100);
}
```

4.4 ADVANTAGES:

- The main advantage of this project is that it has faster execution when compared to manual execution of the process.
- It is simple, portable and provides high performance.
- It consumes less power
- Dryness can be easily detected in soil.
- Permits a non- expert to do the work of an expert.
- Improves productivity by increasing work output and improving efficiency.
- Saves time in accomplishing specific objective.
- This system ensures that the plants do not endure from the strain or stress of less and overwatering.
- This system saves labour cost and water up to 70%. The working of this irrigation system covers over 40 crops spanning across 500acres.

4.5 APPLICATIONS OF PROJECT

We propose an application to detect water deficiency state in soil based exclusively on sensor-provided data.

In an Automated Irrigation System, the most significant advantage is that water is supplied only when the moisture in soil goes below a pre-set threshold value.

- This system can be used in roof gardens in highly populated areas where
- land is expensive and gardening on rooftops seems like the only viable option left.
- The lawns of houses and public buildings can be maintained by these
- systems, thereby reducing the need for human monitoring.

- The greatest application is in agricultural lands, where farmers are assisted greatly by this. There is no need for the farmer to actually be present during operation.
- Gardens that need to be monitored in the absence of home owners require systems like APIS. Home gardens that are maintained with large effort by home owners require proper observation and maintenance. It can be provided by APIS.
- This system can be used in the field of pisciculture. Fish farming or pisciculture involves raising fish commercially in tanks or enclosures, usually for food. It Is the principal form of aquaculture while other methods may fall under mariculture. The fishes need to be in a depth of 1m in the aquarium and this depth is maintained with the help of APIS. The appropriate threshold value is assigned and the circuit is operated.
- Irrigation in parks needs to be done even when people are not there to maintain the grass or trees.
- Detection in this manner is cheap, non-invasive and can be applied on a population-widescale.
- Thepresenceoftechnologyinallaspectsoflifehasenabledsolutionstoreal life problem that were either difficult or unfeasible.

.4 FUTURE ENHANCEMENT

- The application certainly is much more advantages than the manual system. There will be no bias in the regions being covered and the delay is kept as minimal as it can be.
- The operator does not require any previous training because of its user-friendliness.
- The operator is free from any technical issues. Extremely simple design makes the circuit easy to implement and maintain.
- Alterations in the system can be done easily if the process of the working changes in future.
  - In future according to the user’s requirement it can be updated to meet the user requirements.
- Smart WIFI Irrigation Controllers are next generation controllers that adjust your irrigation system automatically using real-time weather information. Moreover, you can control it from anywhere any time.

4.7 LIMITATIONS

- The system requires two different power supplies. While implementing in large fields, industrial supply can be used to run the motor. In small gardens this may seem like a large wastage.
- Needs a large amount of sensing equipment for very large irrigation areas.
- The system is not 100% reliable. Unexpected factors can cause errors, and it may in some cases cause loss. Despite being good, it needs to be manually checked and maintained once every few weeks.

CHAPTER 5

SYSTEM IMPLEMENTATION

5.1 METHODOLOGY

Implementation of the project required the design of the system developed in the design phase of the project to be carefully implemented.

The extensive implementation of automated systems in agriculture has proven to successfully reduce cost. The operation of automated agricultural system could potentially revolutionize the irrigation process and the way it has impacted the commercial & industrial sectors. Thus, this project has been an expert or non-expert-system-based method of field monitoring for detecting dryness & treatment of the field. The prototype system food and beverage industry have the potential to be useful for the industry, seeking ways to make agriculture cost effective. Furthermore, the ultimate beneficiaries of the project are the farmers who are the backbone of an agricultural economy.

5.2 PROJECTPLAN

The Objective of the project planning is to provide a framework that enables an owner to make reasonable estimate of the resources, cost and schedule. The project leader is responsible for designing the system precisely according to the requirement specified by the owner/ customer. He is also responsible for maintenance of the system for certain period of time, since in most cases, cost of maintenance is much higher than cost of developing the system. Thus to reduce development and maintenance cost and to provide the system within planned time, proper planning of system is necessary.

5.2.1 Initial Investigation of design:

The most crucial phase of managing system projects is planning to launch a system investigation, we need a master plan detailing the steps to be taken, the people to be questioned, and outcome expected. The initial investigation has the objective of determining whether the user's request has potential merits the major steps are defining user requirements, studying the present system and defining the performance expected by candidate system to meet user requirements. The first step in the system development life cycle is the identification of need. There may be a user request to change, improve or enhance an existing system. The initial investigation is one way of handling these needs. The objective is to determine whether there quest is valid and feasible before a recommendation is reached to do nothing, improve or modify the existing system, are to build a new one.

Thus for an effective test and written paper follow-up data resulting from different circumstances, it is vital to design the AP

5.3 WORKING

This project consists of two sections: the external sensor unit, and the inbuilt processing unit. In the external sensor unit, the basic requirement of sensing the moistness of the sand or soil through capacitive reactance is performed, the arms of the sensor are able to detect resistance and provide input to the IC.

When the soil becomes dry, it produces large voltage drop due to high resistance, and this is sensed by the soil moisture sensor, and this resistance causes the operational amplifier to produce an output that is above the threshold value required. This causes the relay to change from normally open to closed condition – The relay becomes on.

When the relay is turned on, the valve opens and water through the pipes rushes to the crops. When the water content in the soil increases, the soil resistance gets decreases and the transmission of the probes gets starts to make the operational amplifier stop the triggering of the relay. Finally, the valve which is connected to the relay is stopped.

Op-amp is configured here as a comparator. The comparator monitors the sensors and when sensors sense the dry condition then the project will switch on the motor and it will switch off the motor when the sensors are in wet. The comparator does the above job it receives the signals from the sensors.

A transistor is used to drive the relay during the soil wet condition. 5V double pole – double through relay is used to control the water pump. LED indication is provided for visual identification of the relay / load status. A switching diode is connected across the relay to neutralize the reverse EMF.

This project works with 5V regulated power supply for the internal blocks and uses regulated 12V power supply for the relay board. Power on LED is connected for visual identification of power status.

First, the sensor probes are inserted in the soil at specific locations in the field, at depth of 5cm from the soil surface at regular intervals in the field. The wiring is made with protective covering so that it is not harmed by any unexpected factors like rocks in the field.

Since wet soil is more conductive than dry soil, the soil moisture sensor module has a comparator in it. The voltage from the prongs and the predefined voltage are compared and the output of the comparator is high only when the soil condition is dry.

When the moisture in the soil is above the threshold, the relay will be turned on. The relay coil gets energized and turns on the motor. The LED is also turned on as an indicator. The soil begins to get supplied with water, and the water content of the soil increases.

When the moisture content of the soil increases and reaches the threshold value, the output of the soil moisture sensor is low and the motor is turned off. This prevents a case of over-watering.

DHT11 sensor consists of a capacitive humidity sensing element and a thermistor for sensing temperature. The humidity sensing capacitor has two electrodes with a moisture holding substrate as a dielectric between them. Change in the capacitance value occurs with the change in humidity levels. The IC measure, process this changed resistance values and change them into digital form.

Passive infrared (PIR) sensors use a pair of pyroelectric sensors to detect heat energy in the surrounding environment. These two sensors sit beside each other, and when the signal differential Between the two sensors changes (if a person enters the room, for example), the sensor will engage.

5.3.1 WORKING MODEL STRUCTURE

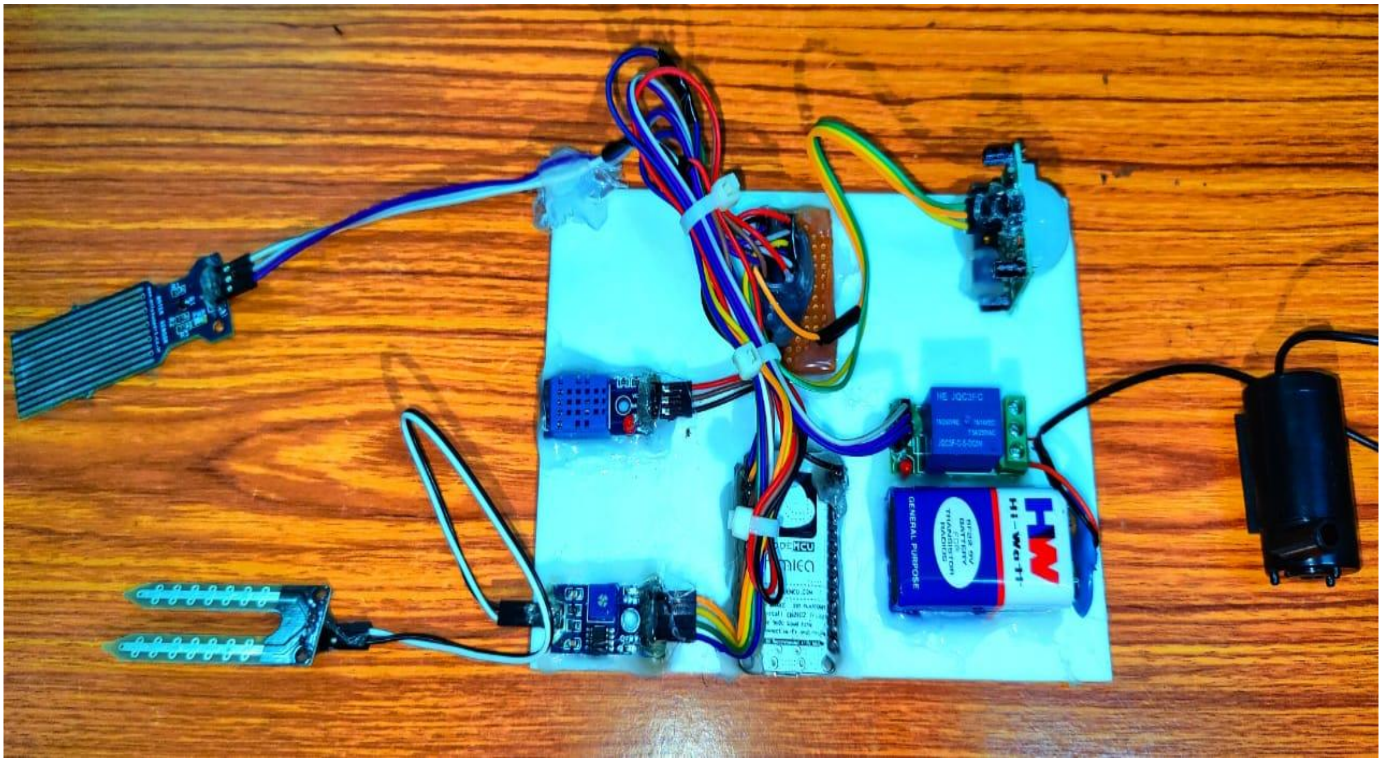


fig.5.3.1. Working model

PLANING SYSTEM

Overall view point in Agricultural field of Drip irrigation system

CHAPTER 6

CONCLUSION

Irrigation becomes easy, accurate and practical with the idea above shared and can be implemented in agricultural fields in future to promote agriculture to next level. The output from moisture sensor and level system plays major role in producing the output.

Thus the "**Design and Development of Transducer- Actuator-Transceiver Module For Agriculture Automation** "has been designed and tested successfully. It has been developed by integrating all the features of all the hardware components used. Presence of every module has been reasoned above and placed carefully in order to contribute to the best working of the unit. The system has been tested to function automatically, and to the best of its ability. 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 operational amplifier which triggers the DC Motor pump to turn ON and supply the water to respective field area. When the desired moisture level is reached, the system Watsontown and the DC Motor pump is turned OFF. Thus, the functionality of the entire system has been tested thoroughly and it is said to function successfully.

REFERENCE

[1] Kluthe, A. (ed.), 1986: Methods of Soil Analysis, Part 1: Physical a Nd Mineralogical Methods. American Society of Agronomy, Madison, Wisconsin, United States, 1188pp.

[2] Knight, J.H., 1992: Sensitivity of time domain reflectometry measurements to lateral variations in soil water content. Water Resources Research, 28, pp.2345–2352.

[3] Maggi, R.D., Kerr, Y.H., 1997. Retrieval of soil moisture and vegetation characteristics by use of ERS-1 wind scatter meter over arid and semi-arid areas. Journal of Hydrology 188-189,361–384.

[4] Marshaled, H.P., W. Vogelsinger, F. Richard and J.P. Wierenga,1983: A pressure transducer for field tensiometers. Soil Science Society of America Journal, 47, pp. 624– 627.

[5] Attia, Evert, Pierre Barreling, Peter Edwards, Guido Levine, Steinboks, Ludwig Moeller, BottleRock-Tell, et al 2007. Sentinel-1 - the radar mission for GMES operational land and sea services. ESA Bulletin 131:10-17.

[6] Bircher, S., Sekou, N., Jensen, K.H., Walker, J.P., & Rasmussen, L.(2011). A soil moisture and temperature network foremost validation in Western Denmark. Hydro. Earth Syst. Sci. Discuss.,8,9961-10006.

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http://ageconsearch.umn.edu/bitstream/27974/1/02010009.pdf

[7] How Drought and Extreme Heat Are Killing the World's Crops - JustinWorlan

http://time.com/4170029/crop-production-extreme-heat-climate-change/