Automatic Irrigation System

A PROJECT REPORT

Submitted by

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in partial fulfilment for the award of the degree of

BACHELOR OF ENGINEERING

IN

ELECTRONICS AND COMMUNICATION ENGINEERING

Chandigarh University

MAY 2022

BONAFIDE CERTIFICATE

Certified that this project report **"Automatic Irrigation System"** is the bonafide work of **"Satish Kumar Yadav & Ajit Kumar Jha"** who carried out the project work under my/our supervision.

SIGNATURE **SIGNATURE**

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Submitted for the project viva-voce examination held on 23/052022

INTERNAL EXAMINER **EXTERNAL EXAMINER**

ACKNOWLEDGEMENT

I appreciate that I have such an opportunity to express my great gratitude and respect to the people who helped me when I prepared my B.E. project. Without their support and encouragement, I cannot go so far.

It is difficult to overstate my greatest gratitude to my project mentor **Dr. Lipika Gupta**, Professor ECE Department, **Dr. O Jeba Shiney** and **Dr. Ashutosh Tripathi**, HOD ECE Department. First, I would like to thank them for their patient guidance and inspiration throughout my study period. Secondly, I highly appreciate their support and encouragement in my project work, which helped me build confidence and courage to overcome difficulties. Finally, I am grateful for their great insight and suggestions and for sharing so much time in project completion. I would have been lost without their support.

Special thanks to all faculties for their interest and time.

I would also like to express our gratitude and appreciation to our friends on the project and those willing to help us reach our full potential.

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ABSTRACT

This automatic irrigation system project is to create an automatic irrigation mechanism that detects the moisture/moisture content of the ground and turns the pump motor on and off with the ground. In agriculture, it is very important to use the appropriate means of irrigation. The benefit of using this method is to reduce human interference and provide adequate irrigation.

The proposed model consists of three steps. First, it is a determination of soil moisture levels. The second stage is the determination of dry or wet conditions. The last and the third step is pump control.

This project proposes the development of an Automatic Irrigation System (AIS) capable of detecting loss of moisture in soil using the soil moisture sensor. Specifically, AIS utilizes the Soil Moisture Sensor to detect moisture content levels in soil and give appropriate responses to the system based on detected conditions. Using this response, AIS determines whether or not the land needs to be irrigated. In the current version, AIS is capable of detecting and irrigating a small area that can be considered to be under a single pump's coverage. Implemented Arduino UNO Micro-controller, AIS uses live input data to determine the conditions. AIS represents the most basic step toward automated agriculture to increase turnover while reducing the impact of losses from irrigation problems.

CHAPTER 1

INTRODUCTION

1.1 OVERVIEW

India is an agriculture-based country. The main occupation of the people is farming and thus dependent on the ambient weather conditions. Agriculture is the main source of employment for most of the Indians and plays an important role in the economy of the country. Irrigating fields is one of the most important tasks in raising a crop. A lot of water gets wasted due to over-irrigation of the crops get an insufficient supply of water in dry areas or in case insufficient rainfall. Therefore, there is a need for automation for proper watering systems that can be handled remotely by the farmer. For this reason, we developed an Automatic Irrigation System which is very useful in all climatic conditions. In this project we have used a soil moisture detector sensor, when the soil goes dry, the pump will start watering and when soil maintains a particular moisture level, the pump will automatically stop. We are also using a Soil pH measurement sensor so that users can able to know which crop is better for that particular soil. Accordingly, the farmer can add the required elements to maintain the pH. Our main aim is to reduce water wastage and automation can be used to save time and low power monitor device.

1.2 AIM

The motivation for this project comes from a country whose economy is based on agriculture and where climatic conditions lead to insufficient rainfall and water scarcity. Our country is mainly dependent on agriculture. Farmers working in the fields rely entirely on rainfall and well drilling to irrigate the land. Even if the farmland has a water pump, the farmer needs manual intervention to turn the pump on and off when needed.

The project aims to use sensors to determine how dry the soil is and to properly water plants. This project will help us to maintain plants very easily. In this project, we determine soil moisture and irrigation requirements.

Our project aims to minimize this manual intervention by the farmer. The automated Irrigation system will serve the following purposes:

1. Because there is no unplanned water use, a lot of wasted water is saved.
2. Irrigation occurs only when there is not enough moisture in the soil, and a sensor determines when to turn the pump on and off. This saves farmers a lot of time. It also gives farmers the rest they need because they don't have to manually turn the pump on and off.

1.3 PROBLEM STATEMENT

Despite being an agricultural country today, the number of people dying of hunger is still quite high. Access to food appears to be difficult as the price and quantity of foods continue to exceed the carrying capacity of the lower and middle classes. Irrigation due to crop failure is the leading cause of annual crop losses, and in times of water crisis, this problem has reached a staggering level. To keep up with growing demand, farmers must improve crop efficiency through rapid technological advances.

This system was developed and implemented to solve the problem of irrigation. In general, farmers require a lot of labour to irrigate a large area at the same time. However, the Automatic Irrigation System (AIS) is an automatic system that provides simultaneous automatic irrigation of lands when needed.

CHAPTER 2

LITERATURE SURVEY

1. GSM Based Automatic Irrigation System

In this project, the authors reported a GSM-based automatic Irrigation System to get the updated status of the operation carried out in the agricultural fields via SMS with the help of a GSM modem. The authors can also add other systems such as LCDs, webcams and other smart controlled devices.

In this project, the author has used a soil moisture sensor which is to sense the moisture level of the soil - to know whether it is dry or wet. The moisture sensor is interfaced with the microcontroller. The input data signals from the moisture sensor are sent to the microcontroller and based on that it activates the DC Motor and switches the motor on with the help of a motor driver. After the soil gets wet, the Motor gets switched off automatically. The status of the agricultural fields can be known from the indication of the LED or through the message sent to the GSM modem placed at the field.

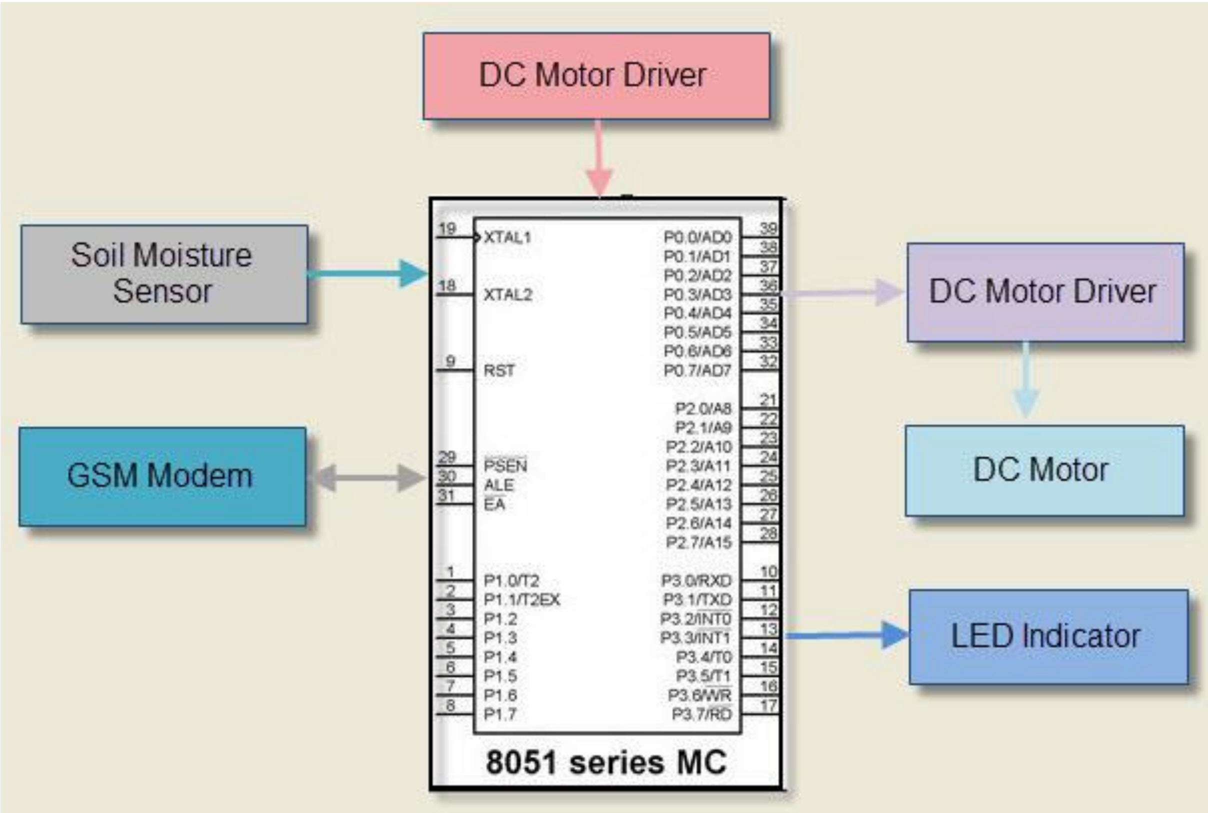


Fig 2.1: GSM Based Automatic Irrigation System

2. Solar Powered Auto Irrigation System

This system uses solar panels to power the circuit. In this irrigation system, solar energy generated from the solar panels is used for operating the irrigation pump. The circuit comprises moisture sensors built by using OP-AMP IC to know whether the soil is wet or dry. A charge controller circuit is used to charge the photovoltaic cells for supplying solar energy to the whole circuit.

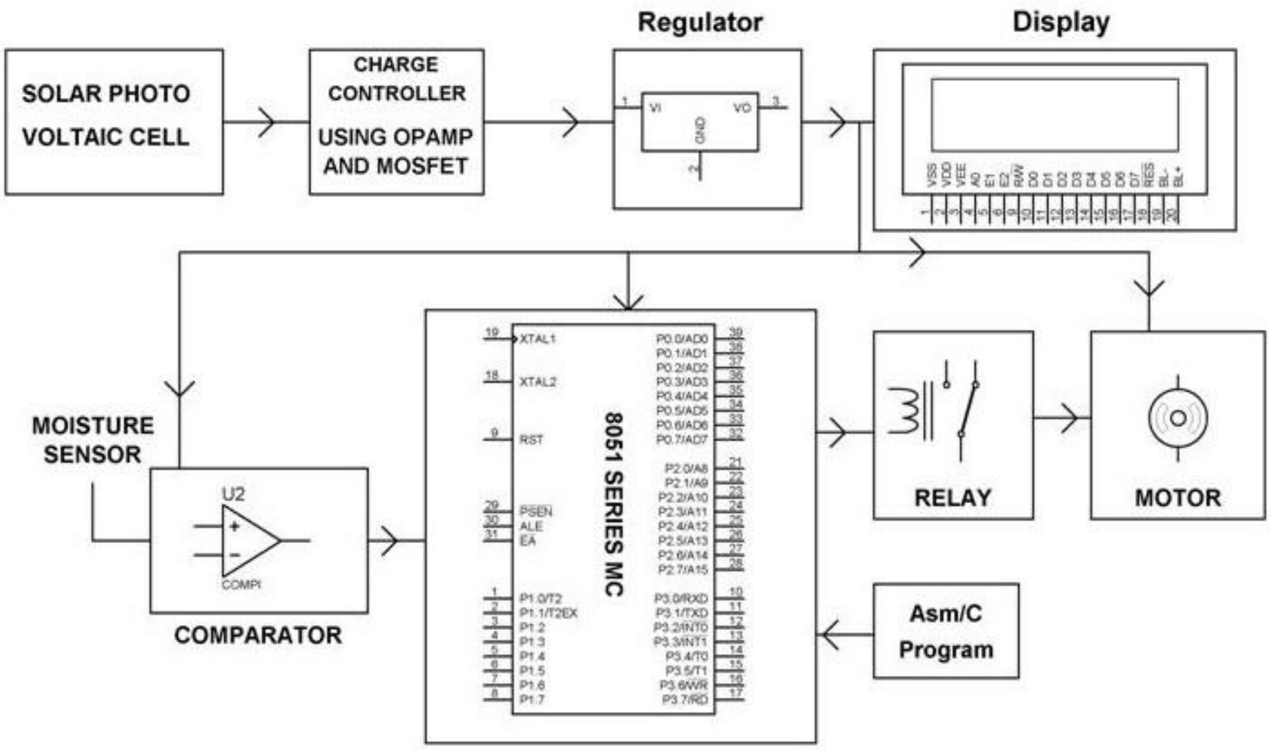


Fig 2.2: Solar Powered Auto Irrigation System

3. Automatic Irrigation System using Microcontroller

The main advantage of using this irrigation system is to reduce human interference and ensure proper irrigation of the fields. The Microcontroller acts as a major block of the entire project, and a power supply block is used for supplying power of 5V to the whole circuit with the help of a transformer, a bridge rectifier circuit and a voltage regulator.

The 8051 microcontrollers are programmed in such a way that it receives the input signal from the sensing material which consists of a comparator to know the varying conditions of the moisture in the soil.

Fig 2.3: Automatic Irrigation System using Microcontroller

4. Arduino-Based Smart Irrigation Using Sensors and ESP8266 Wi-Fi Module

This paper gives a smart irrigation system which is the least expensive and offers automation on the farm. The proposed device detects the moisture content in the soil, PH level of Soil and temperature, by using the soil moisture sensor, PH sensor and the temperature sensor. The moisture level of the soil is sensed and according to that irrigation can be performed.

If the extent of moisture is below a minimum level, the moisture sensor sends the signal to the Arduino board and a notification is sent through the IoT platform. Arduino collects the records from all the sensors and links those records with the cloud. The main advantage of the system is that the owner of the farm can remotely monitor their farm on IoT.

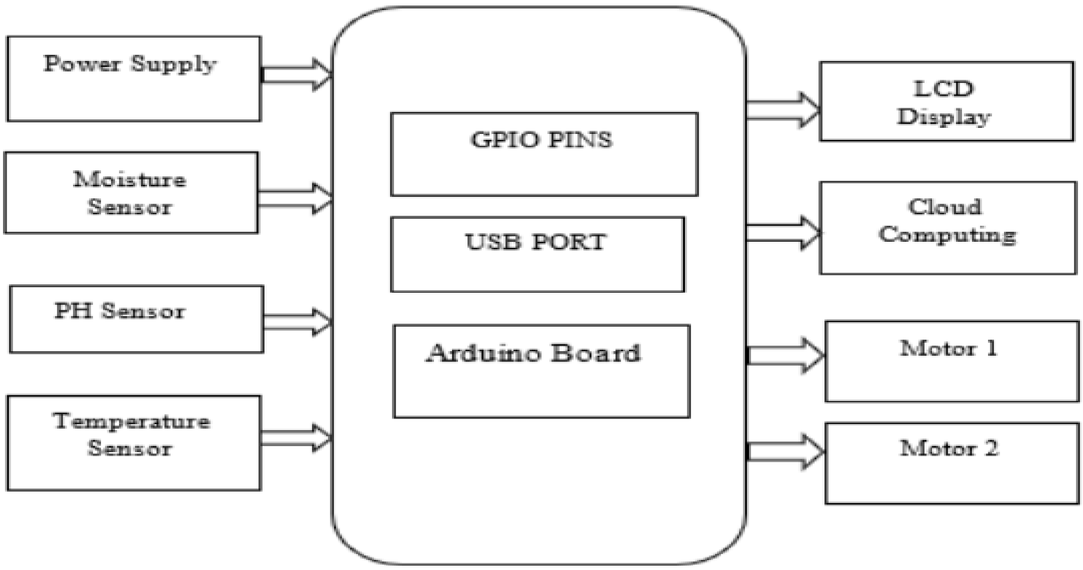


Fig 2.4: Arduino-Based Smart Irrigation Using Sensors and ESP8266 Wi-Fi Module

5. Smart Irrigation System using IoT

This paper offers the Smart Irrigation System using the internet of things (IoT) through the Arduino Mega 2560. The objectives of this paper are to investigate the concept of a smart irrigation system using IoT, to design a device that uses an Arduino Mega 2560 that records the data from the soil sensor which routinely water the plant and to analyse the real-time circumstance of soil through the smartphone that is linked to the internet. The scope of the take a look is focused on farming plants and gardening.

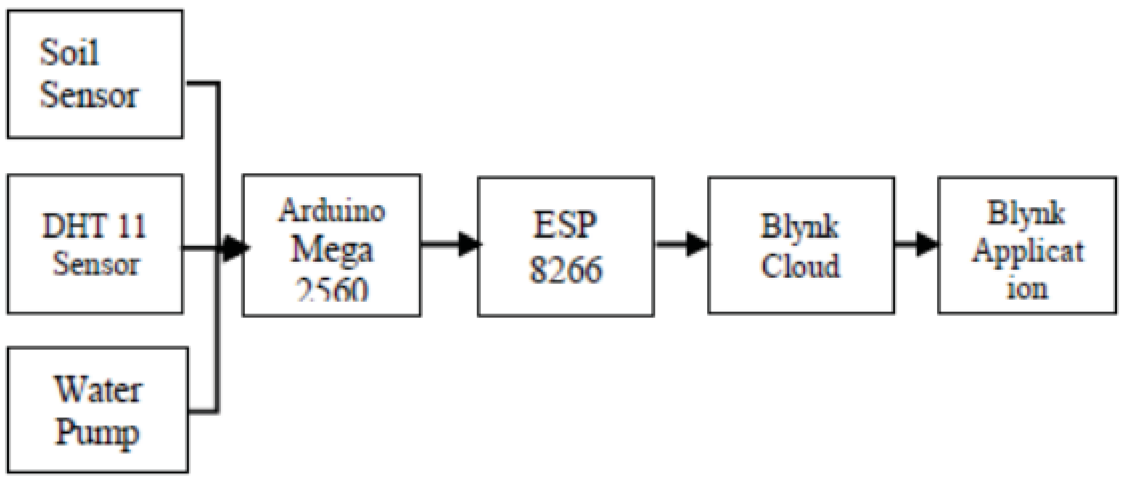


Fig 2.5: Smart Irrigation System using IoT

6. Design of an Internet of Things (IoT) Based Smart Irrigation and Fertilization System Using Fuzzy Logic for Chili Plant

This project is to design a smart irrigation system and plant fertilizer system using Fuzzy Logic. In this project, Internet of Things (IoT) implementation was also included when a Wi-Fi node was used for connection methods. Fuzzy Logic was used as a controller in this system to control the flow of water, alkaline and acid solutions in the soil to maintain its humidity and pH level.

There are 2 memberships provided as a non-specific input of moisture and pH value while the output has 3 members which are the alkaline, neutral and acid solution. The mysterious rules were arranged in Arduino so that control the water pump and valve opening. The program was able to store data and display it on mobile phones through Blynk mobile application.

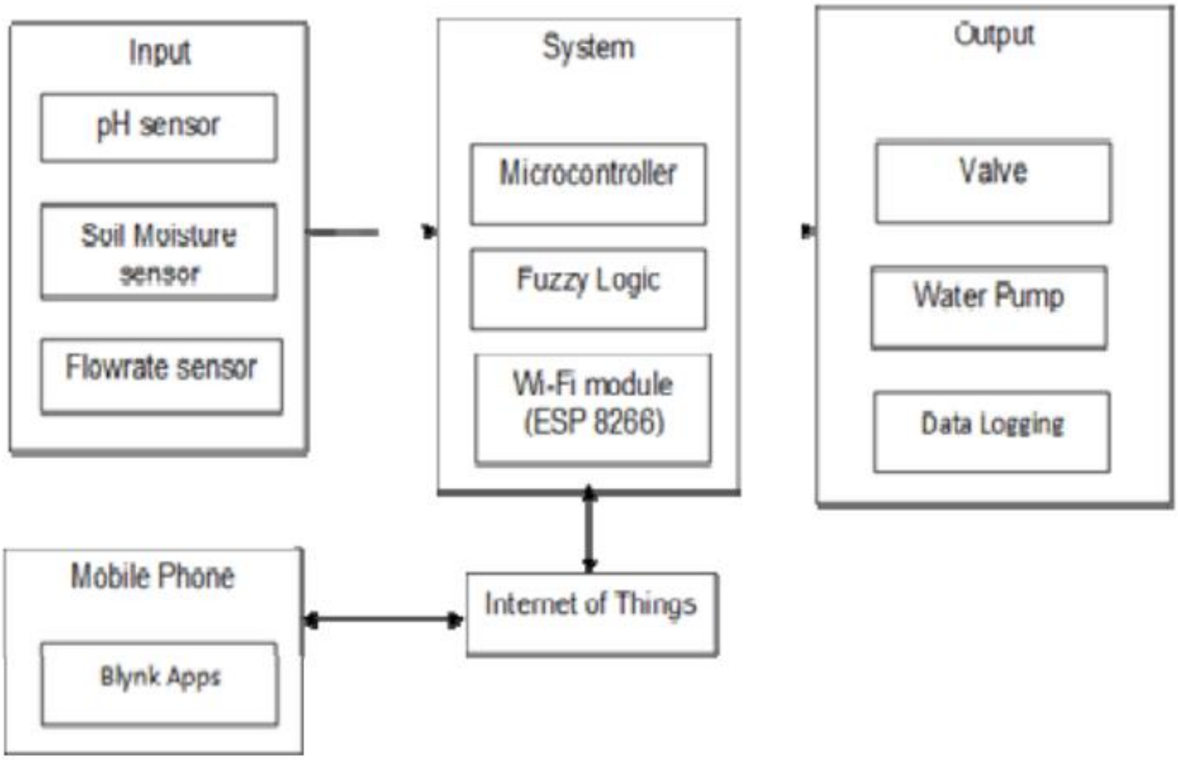


Fig 2.6: Smart Irrigation and Fertilization System Using Fuzzy Logic for Chili Plant

7. Internet of Things based Smart Irrigation Control System for Paddy Field

In this paper, the author aims to develop a water-saving method based on Smart Field Cultivation Server (SFCS) for paddy field irrigation using information and communication technology. SFCS development is considered here for the requirement of rice growth, pest development, and wildlife management.

The proposed SFCS states were fitted with a solar power system and included sensors including light, air temperature, air humidity, water level, soil moisture, and soil temperature. The smartphone-based app (APP) is designed for users to monitor the field with tabular, dashboard, and whisker chart boxes, providing multiple ways to display data for a variety of purposes.

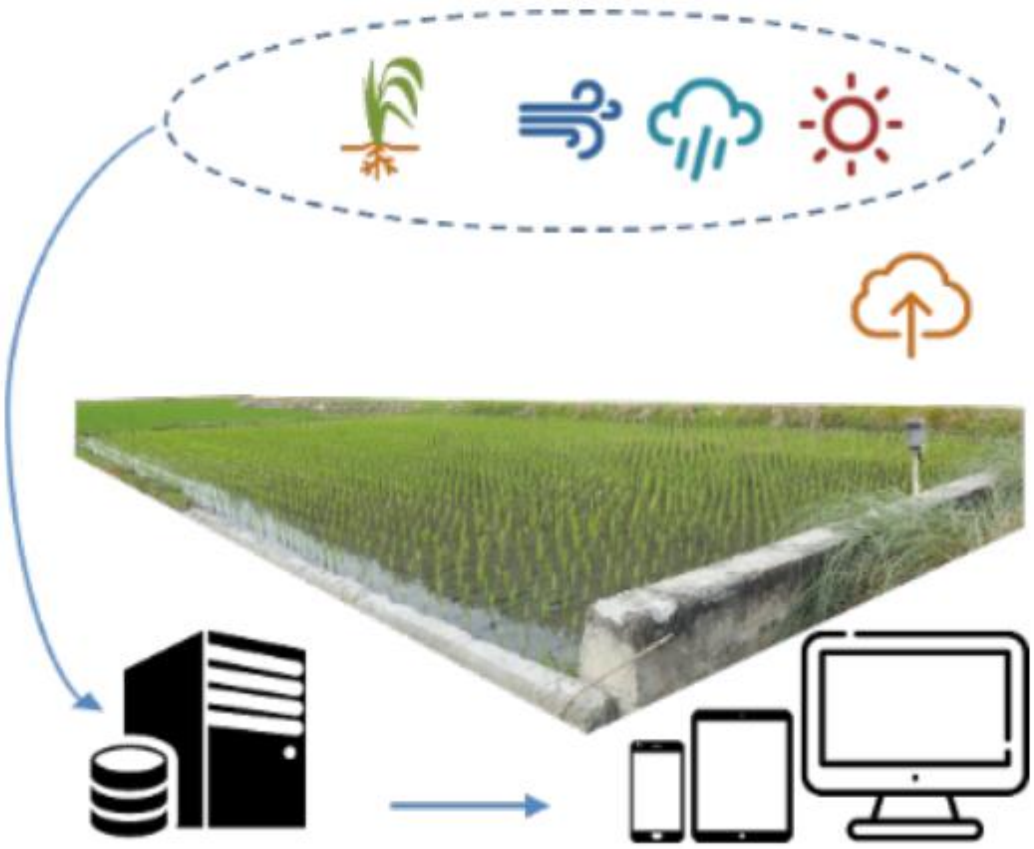


Fig 2.7: Internet of Things based Smart Irrigation Control System for Paddy Field

8. A Cloud-Based Application for Smart Irrigation Management System

In this paper, the authors provide a cloud-based software system integrated with Internet of Things (IoT) equipment that can create an automatic irrigation schedule based on information obtained from agricultural experts and environmental data collected in the field using sensory technology.

The application can be easily extended to compost automatically and provide weed and pest control recommendations.

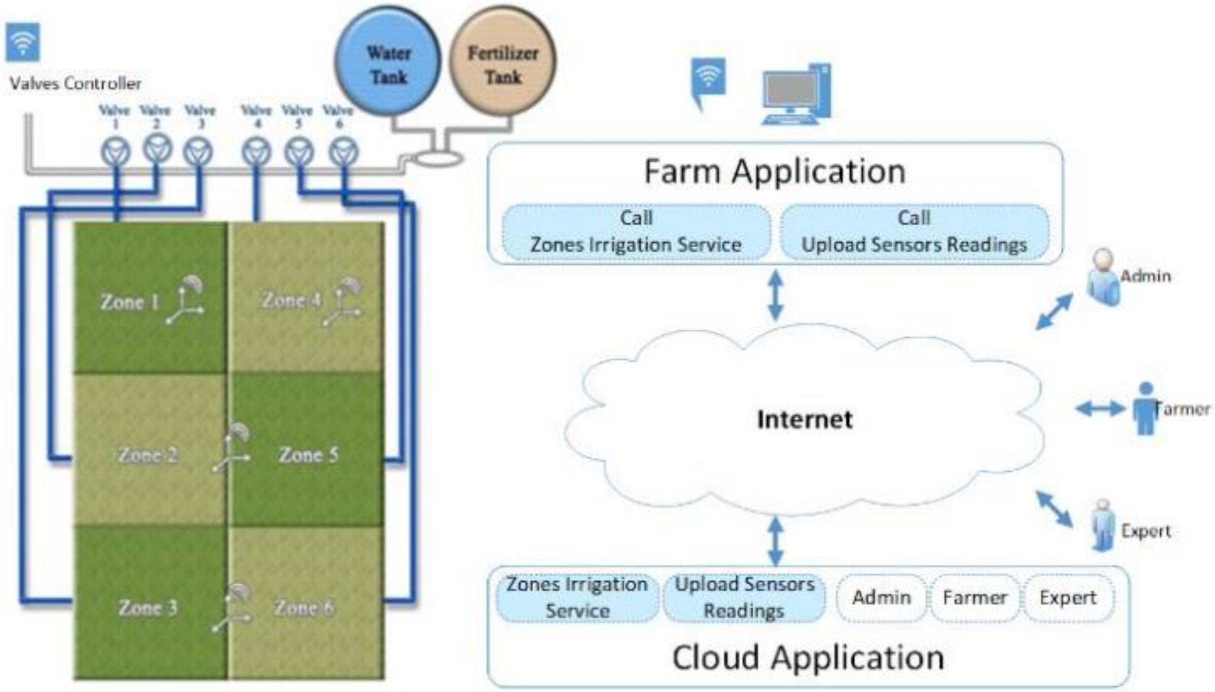


Fig 2.8: A Cloud-Based Application for Smart Irrigation Management System

9. Intelligent and Smart Irrigation System Using Edge Computing and IoT

This proposed design system is focused on system reliability if the sensor for some reason is not working for a certain period and has been working for an hour before, then the value measured before the hour will be used by our trained model to produce the result because no major change can occur in other parameters per hour. It makes our system easier to operate and more efficient.

The proposed approach is designed to overcome the problems of inefficient irrigation systems smartly.

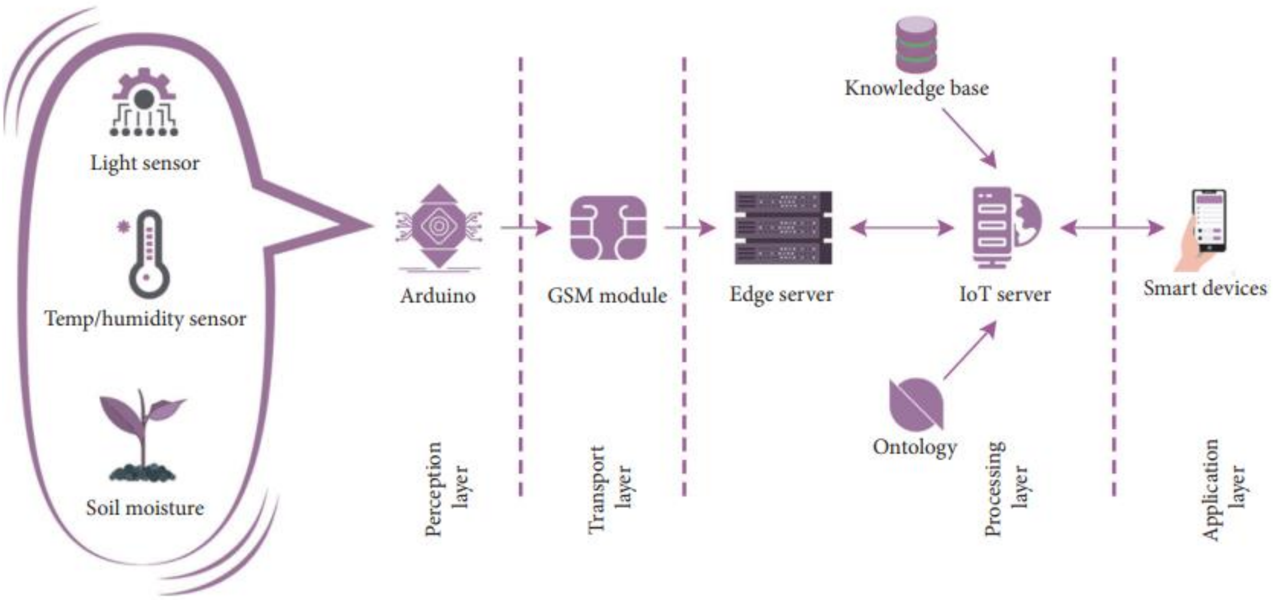


Fig 2.9: Intelligent and Smart Irrigation System Using Edge Computing and IoT

10.Implementation of an Automated Irrigation System

In this paper, the authors developed an automated irrigation system based on sensors connected to a microcontroller unit. The sensors used in this paper are the heat and humidity sensor DHT11 and ground VH400. These sensors are connected to a small control unit and the entire unit is placed under the root zone of the plant.

The main reason for using a microcontroller is to send an SMS to the cell phone of a remote owner. SMS sending is done using the SIM900A module which is also connected to a small control unit. The irrigation system is tested under different temperatures and humidity of different plants below normal and wet conditions.

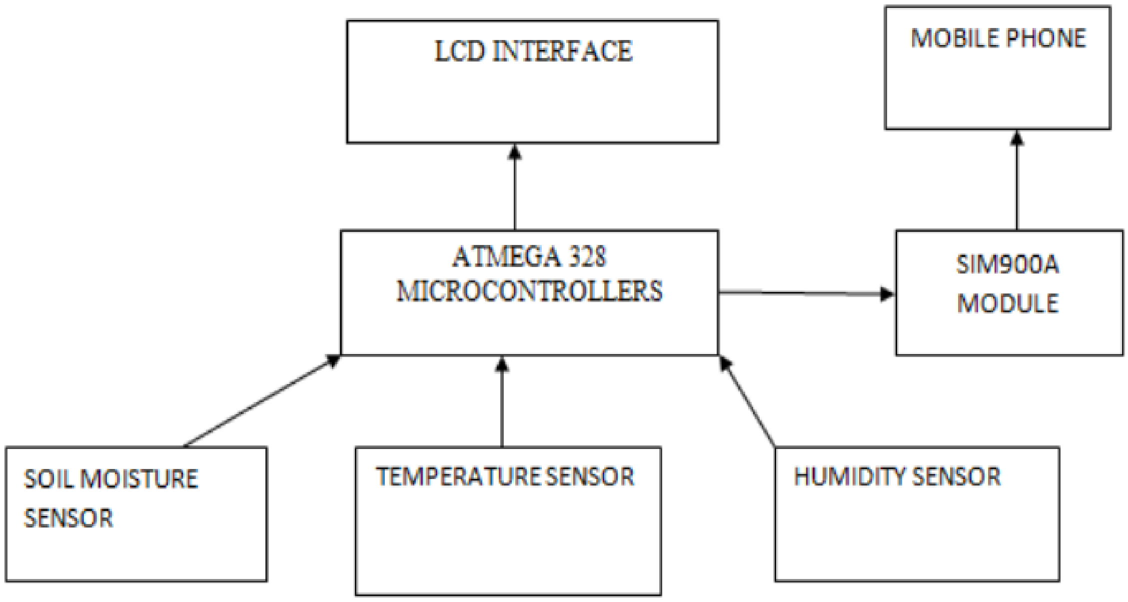


Fig 2.10: Implementation of an Automated Irrigation System

CHAPTER 3

DESIGN FLOW/PROCESS

3.1.1 CONCEPT GENERATION

As the demand for food increases day by day, the rapid development of food production technology is required. In countries like India, where the economy is mainly agricultural-based and the climatic conditions are isotropic, we still do not fully utilize agricultural resources.

The main reasons are the lack of rain and the lack of water in surface reservoirs. Continuous extraction of water from the land lowers the water level, moving the land slowly into an area where rainwater is supplied. Another very important reason for this is due to unplanned water use where large amounts of water are wasted.

Existing manual irrigation systems are very inefficient in solving these problems. The great advantage of modern drip irrigation systems is that they can save a lot of water by supplying water drop by drop to the root of the plant. Currently, farmers in India use manual irrigation methods in which the farmers regularly water the land. This process sometimes consumes more water and sometimes the water arrives late, drying the crop.

Lack of water can harm plants before visible wilting occurs. Slow growing, light fruit weight follows a slight lack of moisture. This problem can be completely solved by using an automatic irrigation system that only waters when water is urgently needed.

3.1.2 DESIGN CONSTRAINTS

- The system requires two different power supplies. Implemented in wide fields, it is possible to start the engine with industrial power. In a small garden, this can seem like a huge waste.
- Very large irrigation areas require a large amount of sensor equipment.
- The system is not 100% reliable. Errors can occur due to unforeseen factors and, in some cases, losses. It's nice, but it has to be checked manually and maintained times every few weeks.

3.1.3 DESIGN FLOW

1. IoT Based Automatic Irrigation System

This automatic irrigation is built with pump motor support. The motor turns on or off automatically. Signals received from the microcontroller and soil moisture are used to turn on the water pump. When the process starts, power is applied to the microcontroller. Humidity and humidity levels are displayed. Water is supplied depending on the humidity. If the measured value is less than the fixed value, the irrigation motor is turned on. This can be controlled through an app or system using an internet connection. Used to overcome unnecessary water flow.

2. **Automatic Irrigation System using Micro-controller**

   The logic of this system is very simple. In this system, a moisture sensor detects the soil moisture level and when the sensor detects a low moisture level, a microcontroller is used to automatically switch the water pump and irrigate the plants. After sufficient watering, the soil retains moisture and automatically stops the pump.

3.1.4 BEST DESIGN SELECTION

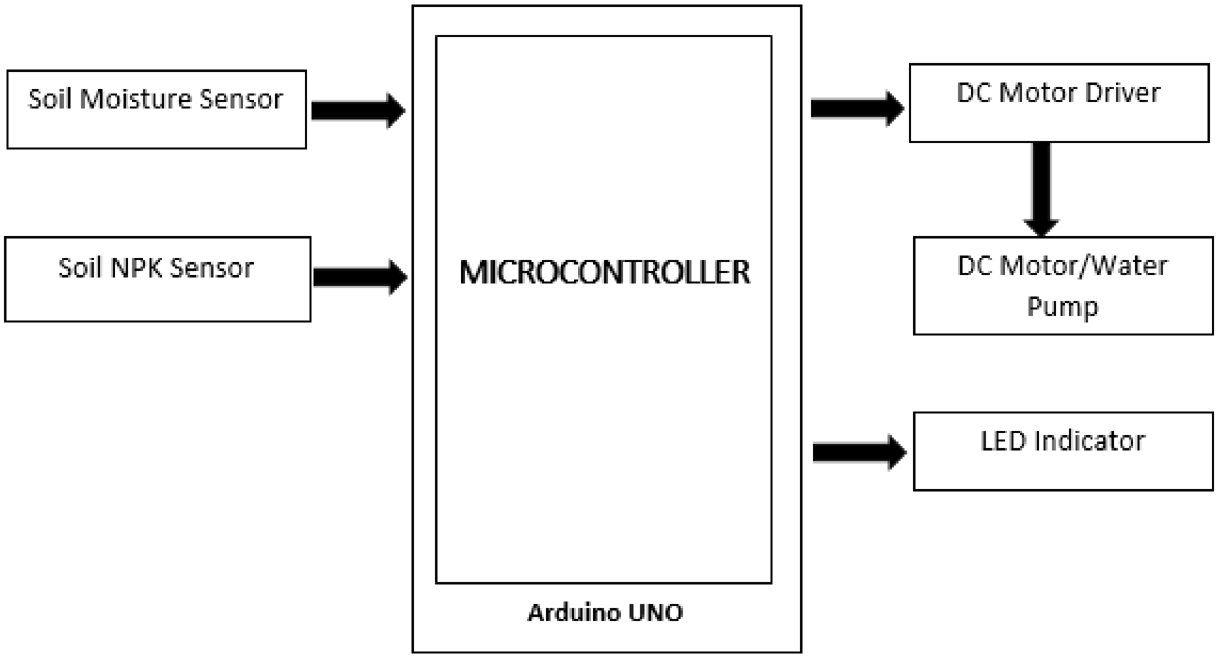
In determining the best system, we will need to consider the following factors:

- The cost of a smart water supply system is a little more expensive. Depending on the size of the asset, more systems will be required. Of course, saving on your water bill will save you money.
- Backup System Maintenance: - You should always find a backup system maintenance plan when needed to avoid time delays during irrigation.
- What is the best system for a site and irrigation plan? : - If you plan to use this system to water your lawn, we recommend anchoring it to the ground before planting. Because part of the grass is damaged by the hole

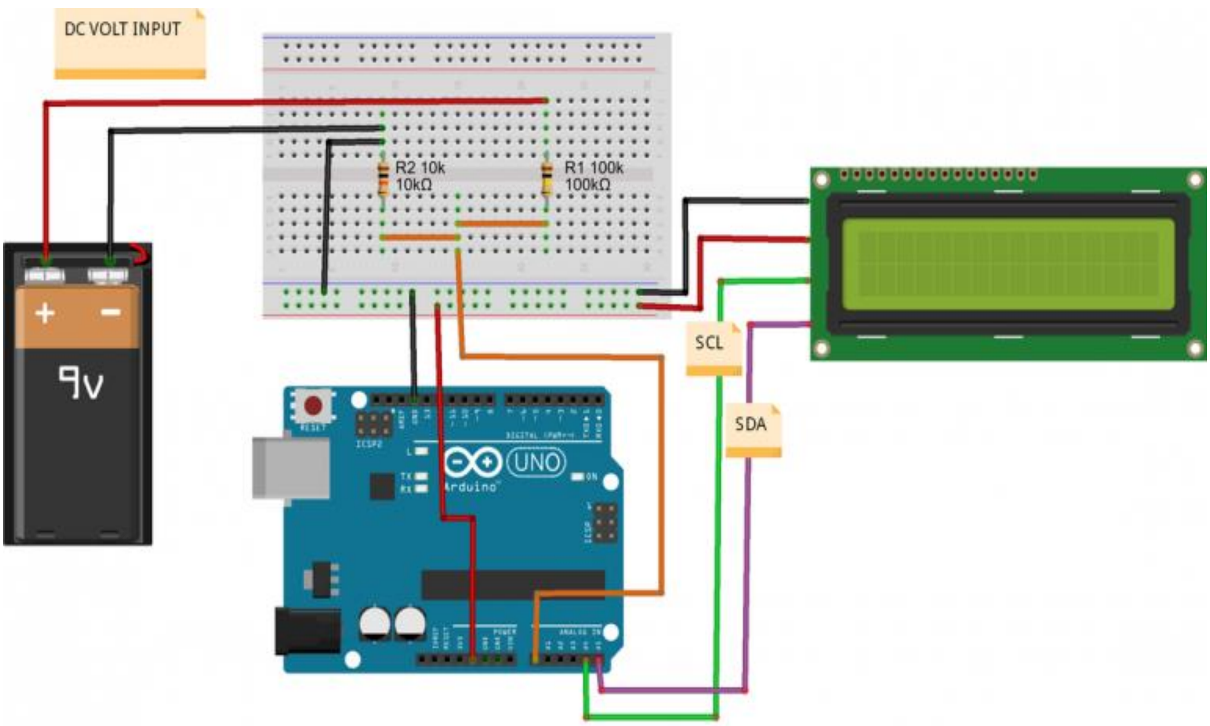
After analysing all the parameters stated above, I think 2nd design would be perfect for our final project model.

IMPLEMENTATION

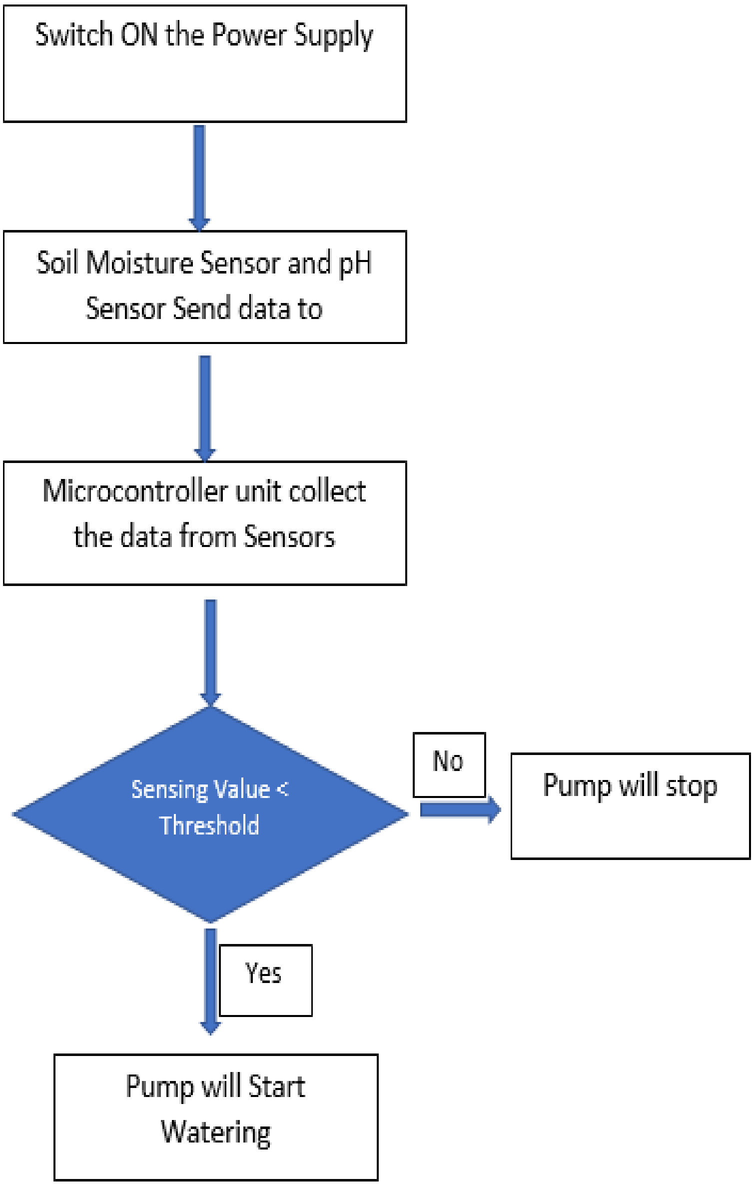
3.2.1 BLOCK DIAGRAM



3.2.2 CIRCUIT DIAGRAM



3.2.3 ALGORITHM



3.3 COMPONENTS USED IN DESIGNING

3.3.1 HARDWARE REQUIREMENT

S.NO.	Component Type	Component	Description
1.	Micro-controller	Arduino UNO	-
2.	Sensor	Soil Moisture Sensor	-
3.	Display	LCD 16*2	5V supply
4.	Motor	DC Motor Pump	12V supply
5.	Power Supply	DC Power Supply	-

Table 1: Components Used

1. Arduino UNO

The Arduino UNO is a popular open-source development board that allows engineers and manufacturers to easily develop electronic projects. There are analog and digital contacts. It consists of a physical programmable development board and software or IDE that runs on a computer and is used to write and upload code to the microcontroller board.

The Arduino Uno includes a set of analog and digital pins, which are input and output pins used to connect the board to other components. The board has a total of 14 I/O pins, 6 of which are analog input pins. The board has a USB connector that can be used to power the board.

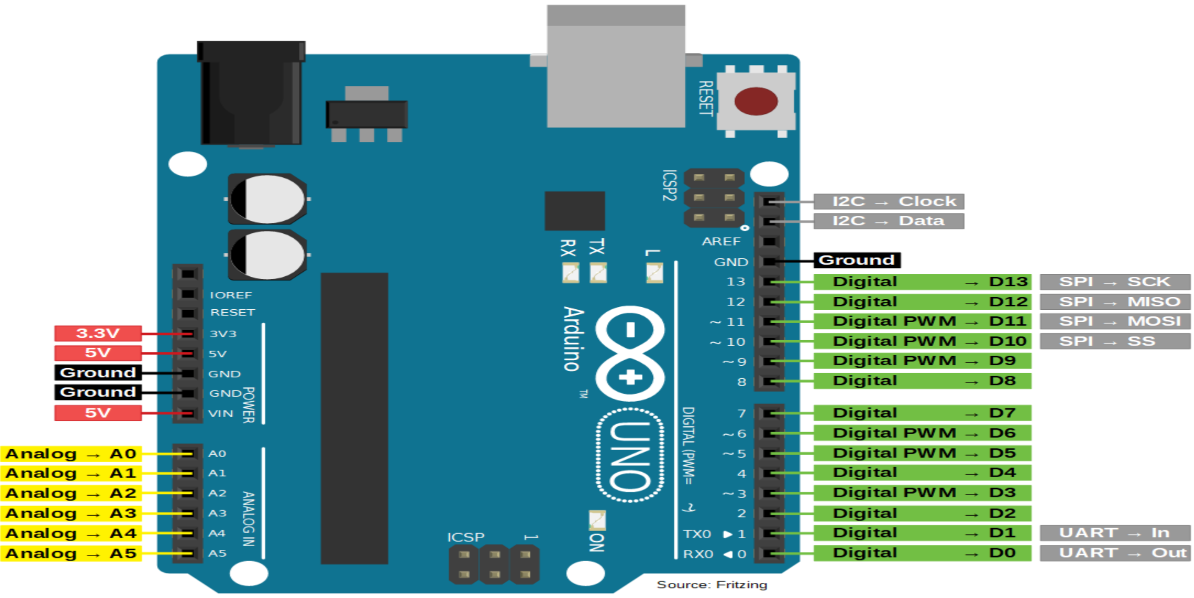


Fig 3.3.1.1: Arduino UNO Board

2. Soil Moisture Sensor

A soil moisture sensor is a kind of low-cost electronic sensor used to detect soil moisture. This sensor can measure the volumetric moisture content in the soil. This sensor has two main parts. One is a touch sensor and the other is a sensor module. The probe allows an electric current to pass through the soil and then obtains a resistance value based on the moisture value of the soil. The sensor module reads data from the sensor, processes it and converts it into a digital/analog output signal. So soil moisture sensors can have both a digital output (DO) and an analog output (AO).

Pin Number	Pin Name	Description
1	**VCC**	+5 v power supply
2	**GND**	Ground (-) power supply
3	**DO**	Digital Output (0 or 1)
4	**AO**	Analog Output (range 0 to 1023)

Table 2: Pins Description of Sensor Module

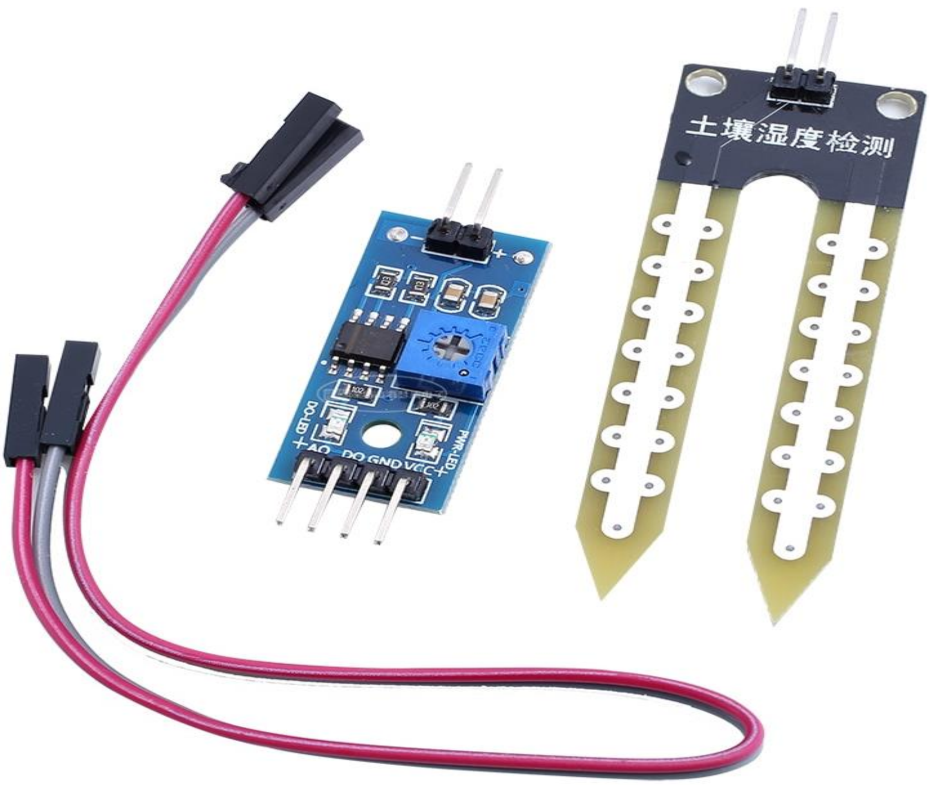


Fig 3.3.1.2: Soil Moisture Sensor and Module

3. LCD 16*2

LCD screens (liquid crystal displays) are electronic display modules that find a wide variety of applications. The 16x2 LCD is a very simple module and is very often used in a variety of devices and circuits. Here we connected 2 and 15 of Vcc and pins numbered 1, 3,5,16 ground pins. A 16x2 LCD means 16 characters can be displayed on lines, and there are 2 of these lines.

Pin Configuration of LCD 16*2

- Pin1 (Ground): This pin connects the ground terminal.
- Pin2 (+5 Volt): This pin provides a +5V supply to the LCD
- Pin3 (VE): This pin selects the contrast of the LCD.
- Pin4 (Register Select): This pin is used to connect a data pin of an MCU & gets either 1 or 0. Here, data mode = 0 and command mode =1.
- Pin5 (Read & Write): This pin is used to read/write data.
- Pin6 (Enable): This enables the pin must be high to perform the Read/Write procedure. This pin is connected to the data pin of the microcontroller to be held high constantly.
- Pin7 (Data Pin): The data pins are from 0-7 which are connected through the microcontroller for data transmission. The LCD module can also work on the 4-bit mode by working on pins 1, 2, 3 and other pins are free.
- Pin8 – Data Pin 1
- Pin9 – Data Pin 2
- Pin10 – Data Pin 3
- Pin11 – Data Pin 4
- Pin12 – Data Pin 5
- Pin13 – Data Pin 6
- Pin14 – Data Pin 7
- Pin15 (LED Positive): This is a +Ve terminal of the backlight LED of the display & it is connected to +5V to activate the LED backlight.
- Pin16 (LED Negative): This is a -Ve terminal of a backlight LED of the display & it is connected to the GND terminal to activate the LED backlight.

Fig 3.3.1.3: LCD 16*2 Screen

4. DC Motor Pump

A DC motor is any kind of rotating electric machine that converts DC electrical energy into mechanical energy. The most common type relies on the force generated by a magnetic field. Almost all types of DC motors have some sort of internal mechanisms, such as electromechanical or electronic, that periodically reverses the direction of current in some part of the motor.

A DC motor pump is essentially a DC motor used to circulate water. The internal structure is the same. The DC motor is housed in a waterproof plastic case and a shaft is used to drive the external arm that pumps water. The pump requires a 5V power supply and can be easily supplied by battery or AC power.

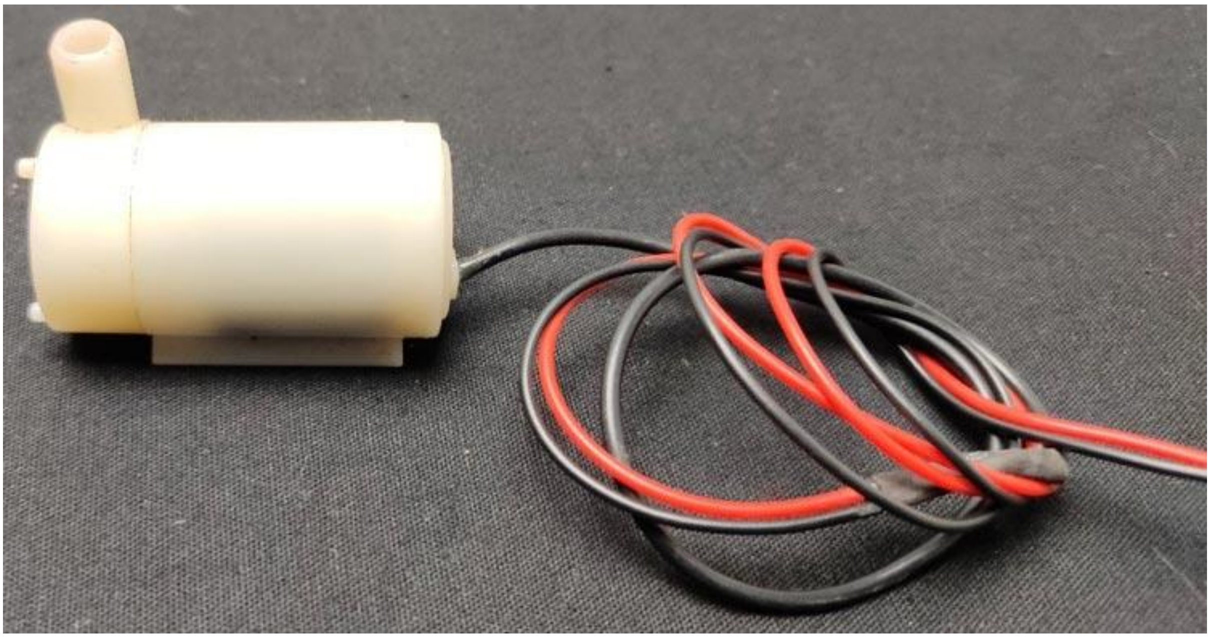


Fig 3.3.1.4: DC Motor Pump

5. Power Supply

A power supply is an electrical device that provides power to the electrical load. The main function of the power supply is to convert the Current to the correct voltage, current and frequency to power the load. As a result, the power supply is sometimes referred to as a power converter. Some power supplies are standalone units while others are built into the load that supplies them.

Fig 3.3.1.5: DC Power Adaptor

3.3.2 SOFTWARE REQUIREMENT

Arduino IDE

The Arduino Integrated Development Environment, or Arduino Software (IDE), contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions, and a set of menus. It connects to the Arduino hardware to download programs and communicate. Programs written using the Arduino software (IDE) are called sketches. These sketches are created in a text editor and saved with a .ino file extension. The editor has cut/paste and search/replace text functions. The message area provides feedback on saving and exporting and displays errors. The console displays text output from the Arduino software (IDE), including full error messages and other information. The lower-right corner of the window shows the configured boards and serial ports. The toolbar buttons allow you to view and load programs, create, open and save sketches, and open the serial monitor.

Fig 3.3.2.1: Arduino IDE

Arduino IDE Coding for Automatic Irrigation System

```
#include <LiquidCrystal.h>
LiquidCrystal lcd(7, 6, 5, 4, 3, 2);

#include <DHT.h>
#define DHTPIN 8
#define DHTTYPE DHT22
DHT dht(DHTPIN, DHTTYPE);
float humidity;

void setup()
{
  lcd.begin(16, 2);
  pinMode(11, OUTPUT);
 }

void loop()
{
  delay(2000);
  humidity = dht.readHumidity();
  lcd.setCursor(0, 0);

  lcd.write(" C");

  lcd.setCursor(0, 1);
  lcd.write("Humidity: ");
```

```
  lcd.print(humidity );
  lcd.write(" %");

if (humidity >= 75)
   {
   digitalWrite(11, HIGH);
   Serial.write("ON");

    }
else
   {
      digitalWrite(11, LOW);
      Serial.write("OFF");
   }
   }
```

3.4 ADVANTAGES

- The main advantage of this project is that it runs faster compared to the running the process manually.
- It is simple, portable and gives high performance.
- Consumes less energy.
- It is easy to detect the dryness of the soil. Increase productivity and increase efficiency to increase productivity.
- Save time when performing specific tasks.
- This system ensures that plants do not tolerate strains or stresses under and over-irrigation.
- The system saves labour and water by up to 70%. The operation of this irrigation system covers more than 40 crops on an area of 500 acres.

3.5 APPLICATIONS

We provide an application that determines the moisture deficit of the soil based solely on the data provided by the sensor. The most important benefit of an automated irrigation system is that it only waters when the soil moisture falls below a predetermined threshold.

- This system can be used in rooftop gardens in densely populated areas as the land is expensive and roof gardening is the only viable option.
- This system can provide lawns in homes and public buildings, reducing the need for human supervision.
- Its greatest use is to benefit farmers a lot in agricultural land. The presence of the farmer during operation is not required.
- Gardens that need to be monitored in the absence of the landlord need a system like AIS. Home gardens that are maintained with a large effort by homeowners require proper observation and maintenance. It can be provided by AIS.
- 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-wide scale.
- The presence of technology in all aspects of life has enabled solutions to real-life problems that were either difficult or unfeasible.

CHAPTER 4

RESULT ANALYSIS AND VALIDATION

4.1 METHODOLOGY

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

The extensive implementation of automated systems in agriculture has proven to successfully reduce costs. The operation of an 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 no expert system based method of field monitoring for detecting dryness & treatment of the field.

The prototype system food and beverage industry has 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.

4.2 PROJECT PLAN

The goal of project planning is to create a framework within which owners can make reasonable estimates of resources, costs, and schedules. The project head is responsible for designing the system exactly the requirements specified by the owner/customer. He is also responsible for maintaining the system for some time since in most cases the cost of maintaining it is much higher than the cost of developing the system. Therefore, proper system planning is essential to reduce development and maintenance costs and deliver systems on schedule.

4.3 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 the 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 the candidate system to meet user requirements.

The first step in the system development life cycle is the identification of needs. 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 goal is to ensure that the request is valid and actionable before recommending doing anything, improving or changing an existing system, or creating a new one. Therefore, the development of AIS is essential for effective testing and written confirmation of data obtained as a result of various situations.

4.4 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 can detect resistance and provide input to the IC.

When the soil becomes dry, it produces a 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 the closed condition – The relay becomes on.

When the relay is turned on, the valve opens and water through the pipes rushes to the crops. As the moisture content of the soil increases, the resistance of the soil decreases and the sensor transmission causes the op-amp to start to stop the relay. Finally, the valve connected to the relay stops.

The op-amp here is configured as a comparator. The comparator controls the sensor and the project turns on the motor when the sensor detects the dry condition and turns off the motor when the sensor is wet. The comparator does the above and receives the signal from the sensor.

The transistor is used to drive the relay when the soil is wet. 5V Double Pole - A double through the relay is used to control the water pump. LED indication is for visual identification of relay/load status. A switching diode is connected to the relay to neutralize the back EMF.

This project works with a 5V regulated power supply for the indoor unit and uses a 12V regulated power supply for the relay board. Power LED attached for visual identification of power status.

First, the sensor probes are inserted in the soil at specific locations in the field, at a depth of 5cm from the soil surface at regular intervals in the field. The wiring is made with a 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 is energized and the motor is turned on. The LED also lights up as an indicator. The soil begins to be watered and soil moisture increases.

When the soil moisture content increases and reaches a threshold, the soil moisture sensor output is lowered and the engine is shut down. This prevents the occurrence of overwatering.

WORKING MODEL

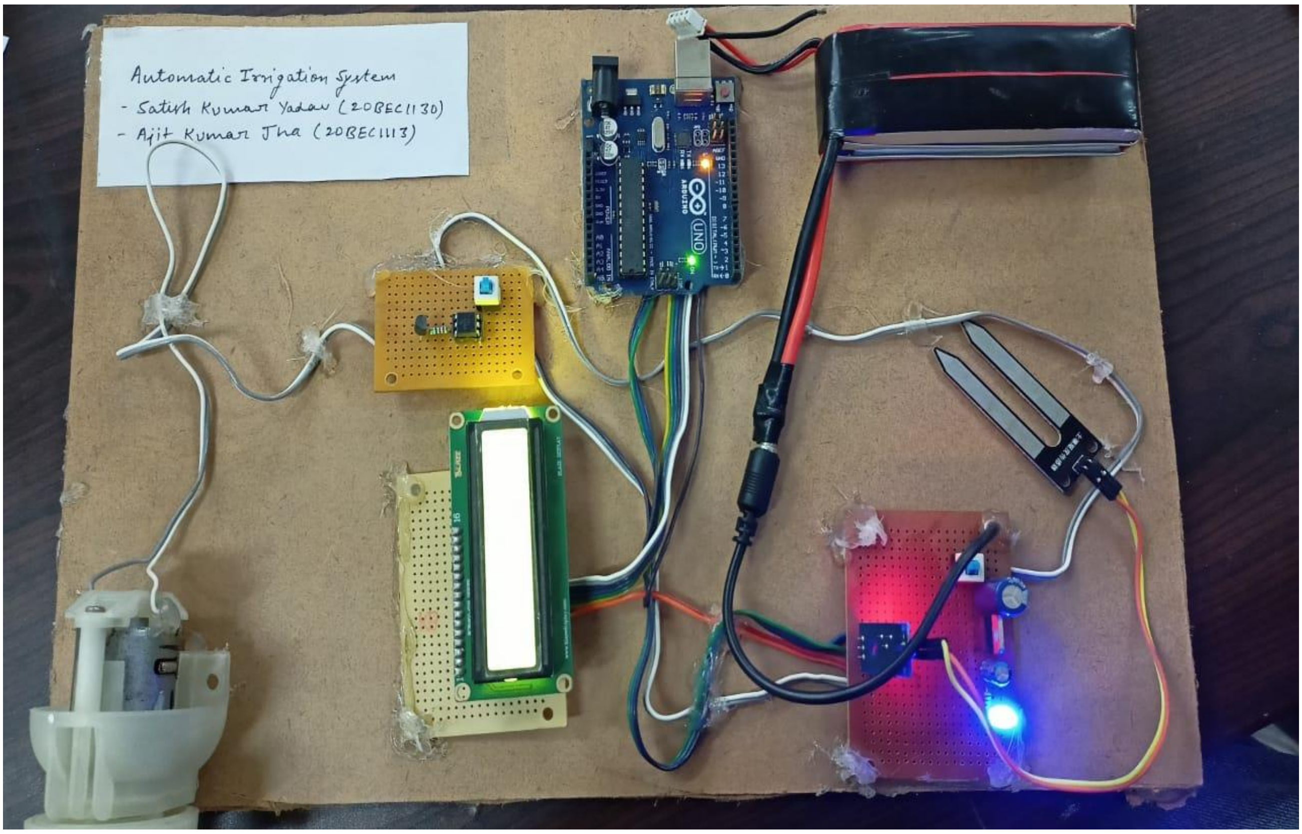


Fig 4.4.1: Automatic Irrigation System Model

CHAPTER 5

CONCLUSION AND FUTURE WORK

5.1 CONCLUSION

Thanks to the above ideas, irrigation has become simple, accurate and practical, and can be implemented in the agricultural sector of the future to take agriculture to the next level. The output signal of the humidity sensor and the level system plays an important role in obtaining the result. The primary applications for this project are for farmers and gardeners who do not have enough time to water their crops/plants. It also covers those farmers who are wasteful of water during irrigation.

As water supplies become scarce and polluted, more efficient irrigation is needed to minimize water use and chemical leaching. Recent advances in soil moisture sensing have commercialized this technology, making it possible to automate irrigation management in vegetable production. However, studies have shown that different types of sensors work in all conditions without negatively affecting yields, and the range of water use is reduced by 70% compared to conventional methods.

Therefore, an “automated irrigation system” (AIS) was developed and successfully tested. It has been developed incorporating all functions of all hardware components used. The presence of each module has been considered above and has been carefully placed to contribute to the best possible performance of the device. The system has been tested to operate as automatically as possible. Humidity sensors measure the moisture level (water content) of various plants. When it detects that the humidity level is below the desired level, the humidity sensor signals the op-amp and starts a DC motor pump to supply water to the appropriate area of the field. When the desired humidity level is reached, the system will automatically stop and the DC motor pump will turn off. Therefore, the functionality of the entire system has been extensively tested and is believed to work successfully.

5.2 FUTURE SCOPE

Apps are much more profitable than manual systems. There is no bias in the area and delays are minimal.

- The operator does not require any previous training because of its user-friendliness.
- The operator is free from any technical issues. The extremely simple design makes the circuit easy to implement and maintain.
- Alterations in the system can be done easily if the process of working changes in future.
- In future according to the user's requirement, it can be updated to meet the user requirements.
- Smart Wi-Fi Irrigation Controllers are next-generation controllers that adjust your irrigation system automatically using real-time weather information. Moreover, you can control it from anywhere, anytime.

Screens can be connected to display the current state of soil moisture levels, the percentage of water used to water the plants, how long the water pump is on, and more. You can also graphically display soil moisture levels. To improve the efficiency and effectiveness of your system, you can consider the following recommendations: A farmer may be given the ability to control a water pump. Farmers can stop growing crops or bad weather can damage crops. In these cases, the farmer may need to shut down the system remotely. The idea of using IoT for irrigation can be extended to other agricultural activities such as livestock management, fire detection and climate control. This will minimize human intervention in agricultural activities.

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5.4 User Manual

Step 1: Get an Arduino board and USB cable.

Step 2: Download the Arduino environment: from (https://www.arduino.cc/en/Main/Software)

Step 3: Connect the Arduino board: The Arduino Uno automatically draws power from a USB or external power source connected to the computer. Connect the Arduino board to your computer using the USB cable.

Step 4: Install the drivers.

Step 5: Launch the Arduino application: Double-click the Arduino application.

Step 6: Open the blink example: Open the LED blink example sketch: File > Open > file_name.ino

Step 7: Select your board: Tools > Board

Step 8: Select your serial port: Select the serial device of the Arduino board from the Tools | Serial Port menu.

Step 9: Upload the program: Click the "Upload" button in the environment.

Step 10: Switch on the Power Button to start the device.