A Major Project Report

on

IoT BASED DISASTER MONITORING AND MANAGEMENT SYSTEM FOR DAMS(IDMMSD)

Submitted in partial fulfillment of the requirements

For the award of the degree

of

BACHELOR OF TECHNOLOGY

IN

ELECTRONICS & COMMUNICATION ENGINEERING

By

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GURU NANAK INSTITUTE OF TECHNOLOGY

(Approved by All India Council for Technical Education, New Delhi, NBA Accredited, NAAC A+, & Affiliated to JNTU Hyderabad)

Campus: Ibrahimpatnam, R.R. District

2020-2021

C E R T I F I C A T E

This is to certify that the Project report entitled "***IoT BASED DISASTER MONITORING AND MANAGEMENT SYSTEM FOR DAMS(IDMMSD)***" is being submitted by ***NAGELLI PAVAN KALYAN (17831A0465), YAMINI P (17831A0473), VYDA SUMANA (17831A04B4)*** in partial fulfillment for the award of the Degree of Bachelor of Technology in ***ELECTRONICS AND COMMUNICATION ENGINEERING*** of Jawaharlal Nehru Technological University during the year 2020-2021 .The Project report has been approved as it satisfies the academic requirements in respect of Project work prescribed for Bachelor Degree.

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DECLARATION

We, hereby certify that the work which is being presented in the thesis entitled "***IoT BASED DISASTER MONITORING AND MANAGEMENT SYSTEM FOR DAMS(IDMMSD)***" by "***NAGELLI PAVAN KALYAN (17831A0465), YAMINI P(17831A0473), VYDA SUMANA (17831A04B4)"*** in partial fulfillment of requirements for the award of degree of ***B.Tech. (ELECTRONICS AND COMMUNICATION ENGINEERING)*** submitted in the ***Department of ECE*** is an authentic record of our own work carried out during a period from ***March 2021 to June 2021***. The matter presented in this thesis has not been submitted by us in any other University/ Institute for the award of any degree.

Signature of the Students

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This is certifying that the above statement made by the candidates is correct to the best of my knowledge.

Signature of the internal guide

The B.Tech Viva-Voce Examination of ***Mr. NAGELLI PAVAN KALYAN, Ms. YAMINI P, Ms. VYDA SUMANA*** has been held on _____ and it is accepted.

Signature of HOD **Signature of External Examiner**

ACKNOWLEDGEMENT

The project entitled "***IoT BASED DISASTER MONITORING AND MANAGEMENT SYSTEM FOR DAMS(IDMMSD)***" has seen the light of the day because the success of this project is attributed to the intensity, drive and technical competence of many individuals who contributed to make this project a reality despite all odds. So, we express heartfelt pleasure for the people who helped us in this project and gave a never-ending support right from the stage the idea was conceived.

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Last but not least, we would like to thank our parents for their support and also, we would like to thank God for all good deeds.

In All Sincerity,

Mr. NAGELLI PAVAN KALYAN (17831A0465)
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VISION AND MISSION OF INSTITUTE

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To be a World-class Educational and Research Institution in the service of humanity by promoting high quality Engineering and Management education.

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M4: Promote research, innovation and product development in collaboration with reputable Foreign Universities.

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GNIT is committed to provide quality education through dedicated and talented faculty, world class infrastructure, labs and advanced research center to the students.

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To be recognized as a leading Electronics & Communication Engineering department in the region by students and employers and be known for leadership and commitment to foster quality teaching, learning, research and

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1. Nurture young individuals into knowledgeable, skillful and ethical professionals in their pursuit of Electronics and Communication Engineering.
2. Nurture the faculty to expose them to world-class infrastructure.
3. Sustain high performance by excellence in teaching, research and innovations.
4. Extensive partnerships and collaborations with foreign universities for technology up gradation.
5. Develop Industry-Interaction for innovation and product development.

PROGRAM EDUCATIONAL OBJECTIVES (PEO's):

- **PEO-1**: Graduates shall have the ability to apply knowledge and technical skills in emerging areas of Electronics and Communication Engineering for higher studies, research, employability, product development and handle realistic problems.

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1. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

A. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics natural science, and engineering sciences.

B. **Design / development of solutions:** Design solutions for complex engineering problems and design system components or process that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, society and environmental consideration.

C. **Conduct Investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

D. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

E. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

F. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

G. **Ethics:** Apply ethics principles and commit to professional ethics and responsibilities and norms of the engineering practice.

H. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

I. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

J. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

K. **Life-long learning:** Recognize the need for, and have the preparation.

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LIST OF FIGURES

LIST OF TABLES

ACRONYMS

GSM	-	Global System for Mobile communication
IDE	-	Integrated Development Environment
I/O	-	Input / Output
LED	-	Light Emitting Diode
USB	-	Universal Serial Bus
DC	-	Direct Current
AC	-	Alternating Current
GND	-	Ground
IC	-	Integrated Circuit
SCK	-	Serial Clock
SPI	-	Serial Peripheral Interface

ABSTRACT

Dams are of major importance, primarily because of their use for generating hydroelectricity and irrigation purposes. Mismanagement of dams can lead to manmade disasters. Currently dams in our state are being monitored and controlled manually. This manual intervention can increase the probability of error and also results in time lag in decision making. The aim of this project is to design and implement an IoT based Disaster Monitoring and Management System for Dams (IDMMSD). The proposed system involves real-time monitoring of water levels of a group of dams under study. Water levels may vary due to drastic changes in water levels of connected rivers or lakes, or due to excessive rainfall in the catchment area. The proposed project includes a mechatronics system to open the shutters at the heights pre calculated. The system comprises of sensor nodes, smart controller and communication system. The proposed system is an app based IoT system which will monitor and send real time parameters related to Dam and weather conditions.

IoT BASED DISASTER MONITORING AND MANAGEMENT SYSTEM FOR DAMS(IDMMSD)

CHAPTER 1

INTRODUCTION

1.1 What is the project ?

IoT based Disaster Monitoring and Management System for Dams (IDMMSD) is an app based IoT system which will monitor and send the real time parameters related to dam like, gate position, water level and weather conditions like, rainfall, temperature. So, we can make real time monitoring of the parameters and manage the dams. In this way we can do disaster monitoring and have a management system for dams based on IoT.

1.2 Why we have chosen this project ?

Dams are of major importance, primarily because of their use for generating hydroelectricity and irrigation purposes. This has resulted in the construction of a number of dams in potential areas over the years.

As there are a lot of risk factors associated with the existence of these dams, it has become the need of the hour to develop a proper monitoring and regarding the opening of the shutters thereby management system for maintaining a safe water level in dams.

Mismanagement of dams can lead to manmade disasters. Currently dams in our state are being monitored and controlled manually.

This manual intervention can increase the probability of error and also results in time lag in decision making. The aim of this project is to design and implement an IoT based Disaster Monitoring and Management System for Dams (IDMMSD).

The proposed system involves real-time monitoring of water levels of a group of dams under study. Water levels may vary due to drastic changes in water levels of connected rivers or lakes, or due to excessive rainfall in the catchment area.

The proposed project includes a mechatronics system to open the shutters at the heights pre calculated. The system comprises of sensor nodes, smart controller and communication system.

The proposed system is an app based IoT system which will monitor and send real time parameters related to Dam (gate position, water level) and weather conditions (rain fall, temperature). There will be two modes for operating the software i.e. Autopilot mode and Manual data mode.

In the earlier system the dam shutter can control by the keypad or manual operations only. We cannot control the dam shutter immediately in the existing system because if the water reached the abnormal level the shutter will damage. So we go for a new system to overcome this disadvantage.

In this system the dam shutter is connected to the microcontroller. The water level sensor is used to measure water level in the dam. The pump motor is used to pump the water from dam. The water level is measure continuously by the level sensor and the value is compared to the threshold value continuously.

IoT solution for water level monitoring processes supports two-way communication. This enables a Water Utility Provider to not even just get the real-time data from sensors but also to control the devices installed like motors etc.

This becomes a possibility as the IoT solutions come with a centralized dashboard on which one can follow all the important information required to carry out business operations without much hindrance.

1.3 Use to society

- By using this idea we can reduce the man power required at each and every dam. Since this is a fully automated project any kind of human activity can be avoided. So the possibility of faults has also decreased.

- During times of natural disaster like floods this method very helpful as we don't need any human to control near the actual site of the dam.

- The alarm given to the particular authorities can take the necessary steps and give instructions to the people.

- The chances of the water level dropping below the threshold level for water pumping purposes gets higher. If this continues, the pump motor may get damaged due to dry running. This calls in irreversible business expenditure and losses. Hence, timely water level monitoring can actually save fortunes for a business. There are various situations where water level monitoring becomes mandatory.

- The farmhands frequently travel to silos, tanker or/and a reservoir located in different areas of the farm and manually gauge the instrumentation for identifying the water level. In order to be in sync with the silo, tanker or/and a reservoir status, the workforce collects data from the silos several times each day. This can be really exhausting for the workforce, but the pressure of meeting job demands can still make them work. This is where human error comes into the picture.

CHAPTER-2

LITERATURE SURVEY

Table 2.1 : Literature Survey

S.No.	AUTHORS	TITLE	COMPONENTS USED
1.	Anita Gehlot, Rajesh Singh, Sushabhan Choudhury, Bhupendra Singh (2019)	Wireless Disaster Monitoring and Management System for Dams.	Level sensor, Discharge sensor, Rain sensor, 2.4 GHz modem, MAX232-USART , GSM module, Hooter, USB to Serial cable, DB9 (connector).
2.	S.Rajapriya, A.Abinaya, V.Subashini (2019).	IOT Based Dam Monitoring System.	waterflow sensor, ultrasonic sensor, vibration sensor, level converter, Driver, Relay, Motor, LCD display, Buzzer, Load cell, switches. The software used here is MPLab IDE, PIC16F877A.
3.	Dr.A.Kavitha, R. Jai Ganesh, Dr.S.Muralidharan (2020).	Automatic Dam Shutter Control using Wireless Sensor.	Sensors GSM warning system RF warning system, Gate control system, MCU
4.	Kavitha.R, Jayalakshmi.C, Senthilkumar(2018)	Dam Water Level Monitoring and Alerting System using IoT	Node mcu microcontroller, Ultrasonic Sensors, Esp8266 Wi-Fi module.
5.	S. Janani , J. Joy Sing, L. Mayuri , D. Mansur Ali (2020)	Water Level Monitoring and Management of Dams using IoT	Arduino Uno, Ultrasonic Sensor, Servo Motor, GSM Sim 800A.
6.	L RaviKumar, Jayalakshmi Rajeevan, Kavya Baiju, Manish Varghese, Nimmy Agnes, S. Gajendra Babu (2019)	Dam Automation and Application Using IOT	Ultra sonic sensors (SR04), Node MCUV2(ESP8266 MOD), Relay(5V), Buck converter, LED and Buzzer, motor.
7.	Suyash Sharma, Vinayak Sadanand, MD. Nouman Molla, Prof. S. G. Mohite(2018)	Dam Monitoring and Safety Protocol System.	Arduino module, Bluetooth module, Ultrasonic sensor, Servo motor, Water sensor, Water flow sensor.
8.	ShaikRoshan, Dr.M. Muthuvinayagam, S.Manivannam. (2020)	IoT Based Remote Monitoring and Controlling for Shutter Systems.	Arduino, gsm, rain sensor, lcd, iot, level sensor.

Table 2.1 : Literature Survey

S.No.	AUTHORS	TITLE	COMPONENTS USED
9.	J.Janet, S.Balakrishnan, S.Sheeba Rani(2019)	IOT Based Lake and Reservoir Management System.	Arduino Uno, ESP8266 Wi-Fi module, Moisture Sensor, Water Pump, Motor Driver.
10.	prof.Seema Idhate, Ashish Bilapatte, Avinash Rathod Hanuman Kalbande(2018)	Dam Monitoring System Using Wireless Sensor Networks.	LPC2138 micro controller, Temperature sensor, humidity sensor, water level, lcd, RF transmitter, rain drop sensor.

COMPARISION OF PROPOSED SYSTEM WITH THE EXISTING SYSTEM

1.

TITLE

Wireless Disaster Monitoring and Management System for Dams. (2019)

AUTHORS

- Anita Gehlot Rajesh Singh
- Sushabhan Choudhury
- Bhupendra Singh

COMPONENTS USED

- Level sensor
- Discharge sensor
- Rain sensor
- 2.4 GHz modem
- MAX232-USART
- GSM module
- Hooter
- USB to Serial cable
- DB9 (connector)

- The title of the existing system is “Wireless Disaster Monitoring and Management System for Dams.” where as title our proposed system is “IoT based Disaster Monitoring and Management System for Dams(IDMMSD).

- The components used in this existing system are Level sensor, Discharge sensor, Rain sensor, 2.4 GHz modem, MAX232- USART , GSM module, Hooter, USB to Serial cable, DB9 (connector) . where as components used in our proposed system are Sensors, Buzzer, Arduino UNO, LCD,Motor and motor driver.

- Main idea of the existing system is a disaster monitoring and management system for dams wirelessly whereas the main idea of our proposed system is to have a disaster monitoring and management system for dams using IoT.

- In the existing system it is using the hooter to alert the situation of water level when it is high whereas we use buzzer to alert the people when water levels reach high level.

- In the existing system temperature sensor is not used where as we use in the proposed system for the better performance of disaster monitoring and management system for dams.

- Here we are using Arduino UNO microcontroller board in the proposed system and in the existing system system propeller parallax is used as microcontroller.

- Here Data acquisition system has been developed by using sensors (water level, discharge and rainfall sensors).When the sensors gathers information about change in water level, then a relay node is activated , placed in between the nodes of transmission. Under flooding condition, if dam gets into the situation of heavy water flow, then water discharge is calibrated against number of gates to be opened under such high alert situations. Alert will help the control room for diverting stream for preventing breakage .In the proposed system if the water level are increased it automatically opens the dam gate and closes if the water level is low.

2.

TITLE

IOT Based Dam Monitoring System. (2019)

AUTHORS

- S.Rajapriya
- A.Abinaya
- V.Subashini

COMPONENTS USED

- waterflow sensor
- ultrasonic sensor
- vibration sensor
- level converter
- Driver, Relay
- Motor
- LCD display
- Buzzer
- Load cell
- Switches
- The software used here is MPLab IDE, PIC16F877A.

- The title of the existing system is "IOT Based Dam Monitoring System." where as title our proposed system is "IoT based Disaster Monitoring and Management System for Dams(IDMMSD).
- The components used in this existing system are waterflow sensor, ultrasonic sensor, vibration sensor, level converter, Driver, Relay, Motor, LCD display, Buzzer, Load cell, switches . where as components used in our proposed system are Sensors, Buzzer, Arduino UNO, LCD, Motor and motor driver.
- Main idea of the existing system is a dam monitoring using IoT whereas the main idea of our proposed system is to have a disaster monitoring and management system for dams using IoT.
- In the existing system it updates the sensor values and compare with the threshold values continuosly and give an alert to authorities when there is sudden change in water levels whereas we use buzzer to alert the authorities when the distance between water and dam gate is more than seven inches.
- In the existing system temperature sensor is not used where as we use in the proposed system for the better performance of disaster monitoring and management system for dams.
- Here we are using Arduino UNO microcontroller board in the proposed system and in the existing system system PIC16F877A is used as microcontroller.
- Here in existing system water level indicator designing is one of the technological advancement to transmit data and received by authority for controlling. If water level increases to dangerous level, the

systems also give an alert to authority to take immediate action.In the proposed system if the water level are increased it automatically opens the dam gate and closes if the water level is low.

- In the existing system software used is MPLab IDE and where as in the proposed system we use Arduino IDE software.

3.

TITLE

Automatic Dam Shutter Control using Wireless Sensor. (2020)

AUTHORS

- Dr.A.Kavitha
- R. Jai Ganesh
- Dr.S.Muralidharan

COMPONENTS USED

- Sensors
- GSM
- warning system
- RF warning system
- Gate control system
- MCU.

- The title of the existing system is "Automatic Dam Shutter Control using wireless sensor where as title our proposed system is "IoT based Disaster Monitoring and Management System for Dams(IDMMSD).
- The components used in this existing system are Sensors,GSM warning system RF warning system,Gate control system ,mcu where as components used in our proposed system are Sensors,Buzzer,Arduino UNO,LCD,Motor and motor driver.
- Main idea of the existing system is to create a Automatic dam shutter control using wireless sensor whereas the main idea of our proposed system is to have a disaster monitoring and management system for dams using IoT.
- In the existing system it is using the GSM based warning system and based on RF wave by sending message when the water level reached above normal level whereas we use buzzer to alert the people when water levels are raising.
- In the existing system ultrasonic sensor,rainfall sensor and temperature sensor are not used for the better performance of disaster monitoring and management system for dams.
- Here we are using Arduino UNO microcontroller board in the proposed system and in the existing system system node mcu is used as microcontroller.

4.

TITLE

Dam Water Level Monitoring and Alerting System using IoT. (2018)

AUTHORS

- Kavitha.R
- Jayalakshmi.C
- Senthilkumar

COMPONENTS USED

- Node mcu microcontroller
- Ultrasonic Sensors
- Esp8266 Wi-Fi module

- The title of the existing system is "Dam Water Level Monitoring and Alerting System using IoT" where as title our proposed system is "IoT based Disaster Monitoring and Management System for Dams(IDMMSD).
- The components used in this existing system are Node mcu microcontroller, Ultrasonic Sensors, Esp8266 Wi-Fi module where as components used in our proposed system are Sensors,Buzzer,Arduino UNO, LCD,Motor and motor driver.
- Main idea of the existing system is to create a system where do Dam Water Level Monitoring and alerting the authorities by updating the values in the server using IoT and public by sending sms through GSM whereas the main idea of our proposed system is to have a disaster monitoring and management system for dams using IoT.
- In the existing system it is using the GSM based warning system by sending message when the water level reached above normal level to the public whereas we use buzzer to alert the people when water levels are high.
- In the existing system ultra sonic sensor is only used for controlling the disaster effects and in the proposed system we use water level sensor,ultrasonic sensor,rainfall sensor and temperature sensor for the better performance of disaster monitoring and management system for dams.
- Here we are using Arduino UNO microcontroller board in the proposed system and in the existing system system node mcu is used as microcontroller.
- Here it gives alerts to the authorities and public in case of increasing water levels.But they have to deal with the things by comparing the values and decide to open or close the gates.In the proposed system if the water level are increased it automatically opens the dam gate and closes if the water level is low.

5.

TITLE

Water Level Monitoring and Management of Dams using IoT. (2020)

AUTHORS

- S. Janani
- J. Joy Sing
- L. Mayuri
- D. Mansur Ali

COMPONENTS USED

- Arduino UNO
- Ultrasonic Sensor
- Servo Motor
- GSM Sim 800A.

- The title of the existing system is "Water Level Monitoring and Alerting System using IoT" where as title our proposed system is "IoT based Disaster Monitoring and Management System for Dams(IDMMSD).
- The components used in the existing system are Arduino UNO, Ultra Sonic sensor, Servo Motor, GSM Sim 800A, the components used in the proposed system are Arduino UNO microcontroller, temperature sensor, Ultra Sonic sensor, water level sensor, lcd, DC motor, Motor Driver, rain drop sensor, IoT Module.
- In the existing system they are using servo motor where as we are using dc motor for better results.
- In the existing system they are using ultrasonic sensor for water level monitoring,where as in the proposed system we are using water level sensor for water level monitoring.
- In the proposed system we are using other sensors like rainfall sensor,temperature sensor for better management of dams.
- GSM module is used to send the alert messages when the water levels are increasing above normal levels, where as in the proposed system we are continuously monitoring the values so that we can prevent water levels to reaching more than the normal levels,even if water levels are suddenly increased buzzer is used to alert the authorities.

6.

TITLE

Dam Automation and Application Using IOT(2019).

AUTHORS

- L RaviKumar
- Jayalakshmi Rajeevan
- Kavya Baiju
- Manish Varghese
- Nimmy
- Agnes, S. Gajendra Babu

COMPONENTS USED

- Ultra sonic sensors (SR04)
- Node MCUV2(ESP8266 MOD)
- Relay(5V)
- Buck
- Converter
- LED and Buzzer
- motor.

- The title of the existing system is "Dam Automation and Application Using IOT" where as title our proposed system is "IoT based Disaster Monitoring and Management System for Dams(IDMMSD). The components used in this existing system are Ultra sonic sensors (SR04), Node MCUV2(ESP8266 MOD), Relay(5V), Buck converter, LED and Buzzer, motor. where as components used in our proposed system are Sensors,Buzzer,Arduino UNO,LCD,Motor and motor driver.
- Main idea of the existing system is to describe possibilities of IOT applications in dam monitoring and safety. Here sensor is used to sense the water level and then the dam gate are open when the water reaches the full reservoir level (FRL). whereas the main idea of our proposed system is to have a disaster monitoring and management system for dams using IoT.
- In the existing system it is using the indication of different lights to alert the situation of water level whereas we use buzzer to alert the people when water levels reach high level.
- In the existing system ultra sonic sensor is only used for controlling the disaster effects and in the proposed system we use water level sensor,ultrasonic sensor,rainfall sensor and temperature sensor for the better performance of disaster monitoring and management system for dams. Here we are using Arduino UNO microcontroller board in the proposed system and in the existing system system node mcu is used as microcontroller.
- Here when the water reaches the level 1 sensor, it gives a yellow alert to the authorities and it will be displayed in the application with an alerting sound. When it reaches the level 2 sensor, it gives an orange

alert which indicate the authorities to be cautious. When the water reaches above the full reservoir level, it gives a red alert to the authorities and by using the application they can open the gates automatically In the proposed system if the water level are increased it automatically opens the dam gate and closes if the water level is low.

7.

TITLE

Dam Monitoring and Safety Protocol System. (2018)

AUTHORS

- Suyash Sharma
- Vinayak Sadanand
- MD. Nouman Molla
- Prof. S. G. Mohite

COMPONENTS USED

- Arduino
- Bluetooth module
- Ultrasonic sensor
- Servo motor
- Water sensor
- Water flow sensor.

- The title is IOT based disaster management and monitoring system for dams and the title of existing system is Dam Monitoring and Safety Protocol System.
- The components used in our system are Arduino UNO ,Water level Indicator ,Rain fall sensor , Ultra Sonic sensor,Temperature sensor ,LCD ,Buzzer, IOT Module, L293D Motor Driver, DC Motor and the components used in the existing system are Arduino module, Bluetooth module, Ultrasonic sensor, Servo motor, Water sensor, Water flow sensor.
- In the existing system they are using servo motor where as we are using dc motor for better results.
- In the proposed system we are using other sensors like rainfall sensor,temperature sensor for better management of dams.
- The existing system uses Bluetooth .So in the existing system they are using bluetooth where we cannot monitor the sensed values continuously and is limited to only certain distance hence we cannot monitor from where ever we are and the sensors used in this project are very less when compare to our project where we used rainfall sensor and temperature sensor in addition to ultrasonic sensor.

8.

TITLE

IoT Based Remote Monitoring and Controlling for Shutter Systems. (2019)

AUTHORS

- J.Janet
- S.Balakrishnan
- S.Sheeba Rani

COMPONENTS USED

- Arduino
- GSM
- Rain sensor
- LCD
- level sensor.

- The title is "IOT based disaster management and monitoring system for dams" and the title of existing system is "IoT Based Remote Monitoring and Controlling for Shutter Systems".
- The components used in our system are Arduino UNO ,Water level Indicator ,Rain fall sensor , Ultra Sonic sensor,Temperature sensor ,LCD ,Buzzer, IOT Module, L293D Motor Driver, DC Motor and the components used in the existing system are Arduino, gsm, rain sensor, lcd, iot, level sensor.
- In the proposed system we are using other sensors like temperature sensor,ultra sonic sensor for better management of dams.
- GSM module is used to send the alert messages when the water levels are increasing above normal levels, where as in the proposed system we are continuously monitoring the values so that we can prevent water levels to reaching more than the normal levels,even if water levels are suddenly increased buzzer is used to alert the authorities.
- We are using motor driver in order to move the motors in required direction in the propsed system whereas in the existing system they are using solenoid valve controller.

9.

TITLE

IOT Based Lake and Reservoir Management System. (2019)

AUTHORS

- J.Janet
- S.Balakrishnan
- S.Sheeba Rani

COMPONENTS USED

- Arduino Uno
- ESP8266 Wi-Fi module
- Moisture Sensor
- Water Pump
- Motor Driver.

- The title is IOT based disaster management and monitoring system for dams and the title of existing system is IOT Based Lake and Reservoir Management System.
- The components used in our system are Arduino UNO ,Water level Indicator ,Rain fall sensor , Ultra Sonic sensor,Temperature sensor ,LCD ,Buzzer, IOT Module, L293D Motor Driver, DC Motor and the components used in the existing system are Arduino Uno,ESP8266 Wi-Fi module,Moisture Sensor, Water Pump,Motor Driver.
- In the proposed system we are using other sensors like temperature sensor,ultra sonic sensor,rain fall sensor for better management of dams.

10.

TITLE

Dam Monitoring System Using Wireless Sensor Networks(2018).

AUTHORS

- prof.Seema Idhate
- Ashish Bilapatte
- Avinash Rathod
- Hanuman Kalbande

COMPONENTS USED

- LPC2138 micro controller
- Temperature sensor
- humidity sensor
- water level
- lcd
- RF transmitter
- rain drop sensor.

- The title is IOT based disaster management and monitoring system for dams and the title of existing system is Dam Monitoring System Using Wireless Sensor Networks.
- The components used in our system are Arduino UNO, Water level Indicator ,Rain fall sensor , Ultra Sonic sensor,Temperature sensor ,LCD ,Buzzer, IOT Module, L293D Motor Driver, DC Motor and the components used in the existing system are LPC2138 microcontroller, temperature sensor, humidity sensor, water level, lcd, RF transmitter, rain drop sensor.
- The existing system uses LPC2138 microcontroller. The prime use of a microcontroller is to control the operation of a machine using a fixed program that is stored in ROM and that does not change over the lifetime of the system. Arduino, on the other hand, is a microcontroller board that comes with pre-tested software and hardware libraries and has its own integrated development environment (IDE). Arduino is a like a single component of a computer programmed to accomplish repetitive tasks and is used to develop electronics projects.

CHAPTER-3

BLOCK DIAGRAM & EXPLANATION

3.1 BLOCK DIAGRAM :

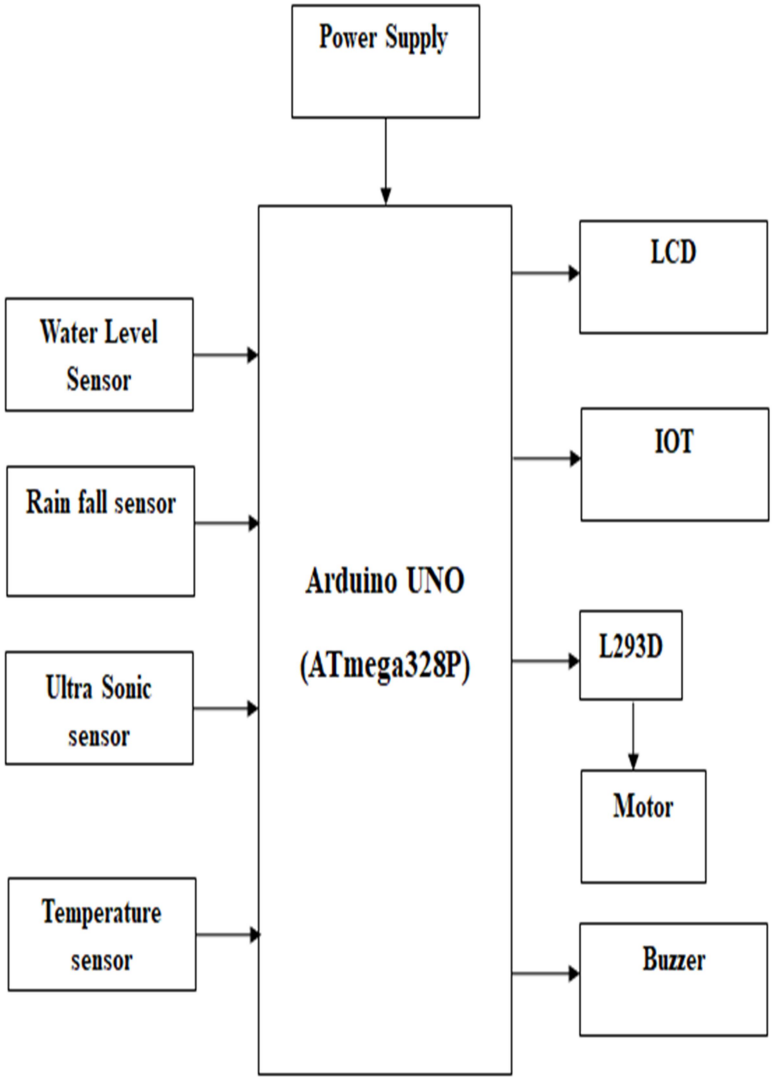


Fig 3.1 : Block Diagram

3.2 EXPLANATION

The above block diagram depicts about the project “IoT based Disaster Monitoring and Management System for Dams(IDMMSD). The block diagram consist of sensors like Rainfall sensor, Ultra sonic sensor, Temperature sensor. And it contains Lcd , Motor, Motor driver, Water level sensor, Buzzer, IoT module and Arduino Uno. Here Rain fall sensor, Ultra sonic sensor, Temperature sensor, Water level sensor work as inputs to the Arduino UNO. And Lcd, DC Motor, Motor driver, Buzzer, IoT module works as outputs to the Arduino.

Arduino is the main component of the above block diagram. It takes Analog output from the Rain fall sensor,Ultra sonic sensor,Temperature Sensor and convert them to digital form and give us as the output. Rainfall sensor senses if it is raining or not and gives its output in analog form to Arduino. Arduino converts into digital form and displays its information on lcd and in app through iot module.Ultra sonic sensor senses the distance between gate and water and gives its output in analog form to Arduino.Arduino converts into digital form and displays its information on lcd and in app through iot module.

Temperature sensor senses the temperature of water and gives its output in analog form to Arduino.Arduino converts into digital form and displays its information on lcd and in app through iot module.Water level indicator are connected to digital pins of arduino and checks which of the two digital pins is active continuously and decides gates position based on this automatically.

Buzzer acts as output ,it makes a sound to give an alarm when water level increase from normal level .IoT module connects to arduino as output ,it takes all the sensor values of Rain fall sensor ,Temperature sensor,Ultra sonic sensor and from water level indicator and sends the information to an app through wifi and displays information the app

Lcd acts as output ,it displays the information from the sensors of rain fall sensor, temperature sensor.motor connects to arduino through motor driver in between ,based on water levels it changes the motor direction.

If the water level is low the motor works in clock-wise direction and closes the gate of dam ,and if the water level is high the works in anti clock wise and opens the gate.

CHAPTER-4

HARDWARE COMPONENTS

4.1 POWER SUPPLY

The power supply section is the section which provide +5V for the components to work. IC LM7805 is used for providing a constant power of +5V.

The ac voltage, typically 220V, is connected to a transformer, which steps down that ac voltage down to the level of the desired dc output. A diode rectifier then provides a full-wave rectified voltage that is initially filtered by a simple capacitor filter to produce a dc voltage. This resulting dc voltage usually has some ripple or ac voltage variation.

A regulator circuit removes the ripples and also retains the same dc value even if the input dc voltage varies, or the load connected to the output dc voltage changes. This voltage regulation is usually obtained using one of the popular voltage regulator IC units.

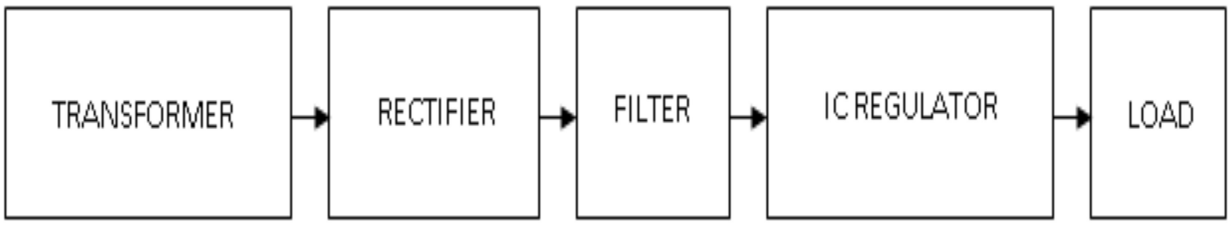


Figure 4.1 : Block Diagram of Power Supply

Transformer

Transformers convert AC electricity from one voltage to another with little loss of power. Transformers work only with AC and this is one of the reasons why mains electricity is AC.

Step-up transformers increase voltage, step-down transformers reduce voltage. Most power supplies use a step-down transformer to reduce the dangerously high mains voltage (230V in India) to a safer low voltage.

The input coil is called the primary and the output coil is called the secondary. There is no electrical connection between the two coils; instead they are linked by an alternating magnetic field created in the soft-iron core of the transformer. Transformers waste very little power so the power out is (almost) equal to the power in. Note that as voltage is stepped down current is stepped up. The transformer will step down the power supply voltage (0-230V) to (0- 6V) level. Then the secondary of the potential transformer will be connected to the bridge rectifier, which is constructed with the help of PN junction diodes. The advantages of using bridge rectifier are it will give peak voltage output as DC.

Rectifier

There are several ways of connecting diodes to make a rectifier to convert AC to DC. The bridge rectifier is the most important and it produces full-wave varying DC. A full-wave rectifier can also be made from just two diodes if a centre-tap transformer is used, but this method is rarely used now that diodes are cheaper. A single diode can be used as a rectifier but it only uses the positive (+) parts of the AC wave to produce half-wave varying DC

Bridge Rectifier

When four diodes are connected as shown in figure, the circuit is called as bridge rectifier. The input to the circuit is applied to the diagonally opposite corners of the network, and the output is taken from the remaining two corners. Let us assume that the transformer is working properly and there is a positive potential, at point A and a negative potential at point B. the positive potential at point A will forward bias D3 and reverse bias D4.

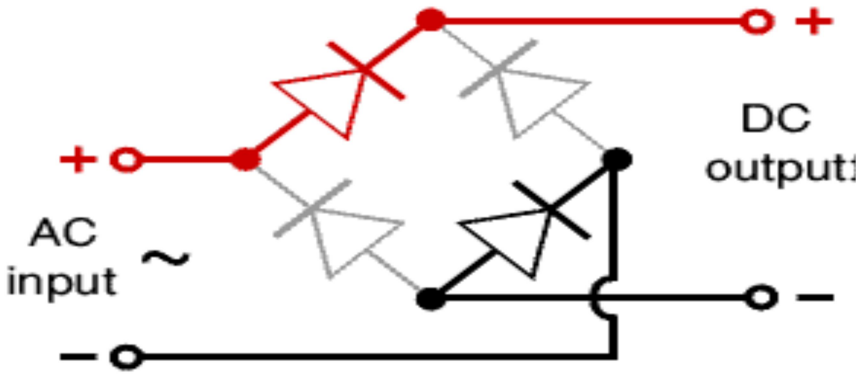


Figure 4.2 : Bridge Rectifier

The negative potential at point B will forward bias D1 and reverse D2. At this time D3 and D1 are forward biased and will allow current flow to pass through them; D4 and D2 are reverse biased and will block current flow.

One advantage of a bridge rectifier over a conventional full-wave rectifier is that with a given transformer the bridge rectifier produces a voltage output that is nearly twice that of the conventional full-wave circuit.

i. The main advantage of this bridge circuit is that it does not require a special centre tapped transformer, thereby reducing its size and cost.

ii. The single secondary winding is connected to one side of the diode bridge network and the load to the other side as shown below.

iii. The result is still a pulsating direct current but with double the frequency.

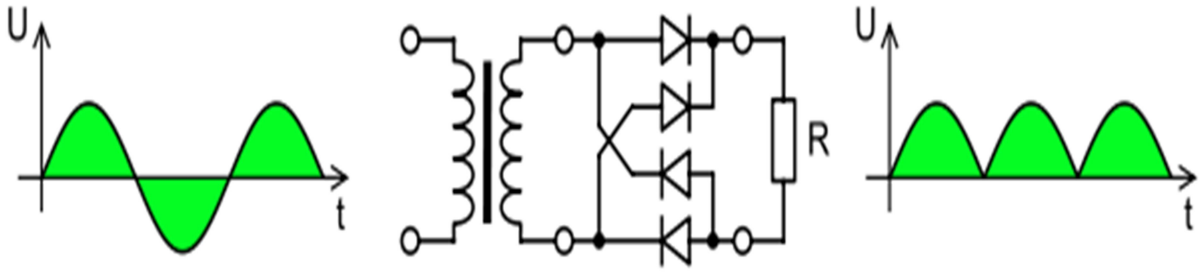


Figure 4.3 : Output Waveform of DC

Smoothing

Smoothing is performed by a large value electrolytic capacitor connected across the DC supply to act as a reservoir, supplying current to the output when the varying DC voltage from the rectifier is falling. The capacitor charges quickly near the peak of the varying DC, and then discharges as it supplies current to the output.

Voltage Regulators

Voltage regulators comprise a class of widely used ICs. Regulator IC units contain the circuitry for reference source, comparator amplifier, control device, and overload protection all in a single IC. IC units provide regulation of either a fixed positive voltage, a fixed negative voltage, or an adjustably set voltage. The regulators can be selected for operation with load currents from hundreds of milli amperes to tens of amperes, corresponding to power ratings from milli watts to Tens of watts.

A fixed three-terminal voltage regulator has an unregulated dc input voltage, Vi, applied to one input terminal, a regulated dc output voltage, Vo, from a second terminal, with the third terminal connected to ground.

The series 78 regulators provide fixed positive regulated voltages from 5 to 24 volts. Similarly, the series 79 regulators provide fixed negative regulated voltages from 5 to 24 volts. Voltage regulator ICs are available with fixed (typically 5, 12 and 15V) or variable output voltages.

They are also rated by the maximum current they can pass. Negative voltage regulators are available, mainly for use in dual supplies. Most regulators include some automatic protection from excessive current ('overload protection') and overheating ('thermal protection').

Many of the fixed voltage regulator ICs has 3 leads and look like power transistors, such as the 7805 +5V 1Amp regulator. They include a hole for attaching a heat sink if necessary.

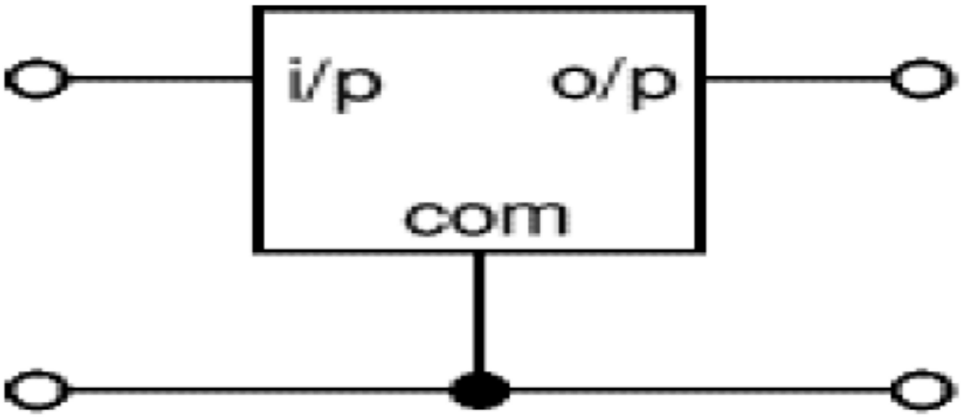


Figure 4.4 : Regulator

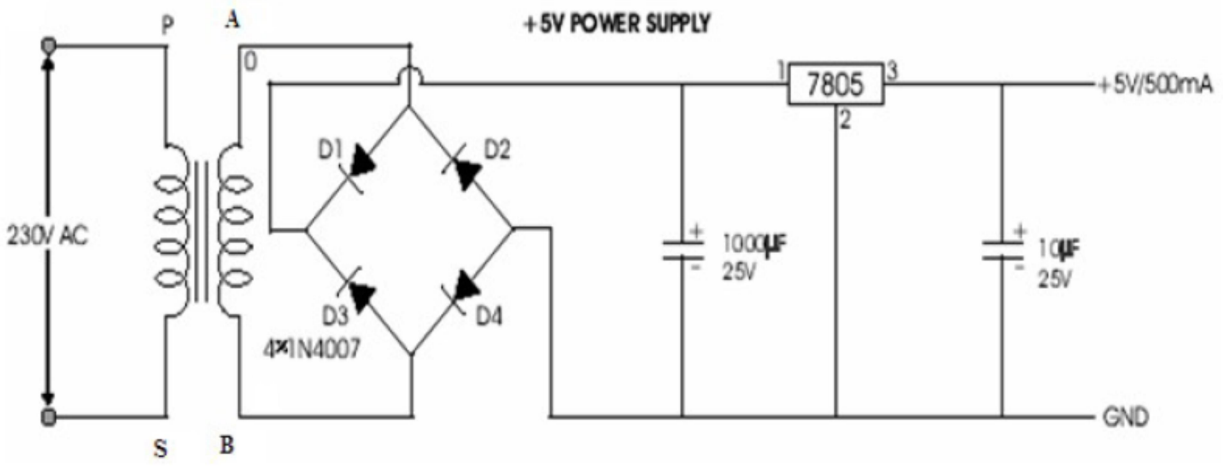


Figure 4.5 : Circuit Diagram of Power Supply

4.2 ARDUINO UNO

4.2.1 Introduction

Arduino/genuino uno is a microcontroller board based on the atmega328p (datasheet). It has 14 digital input/output pins (of which 6 can be used as pwm outputs), 6 analog inputs, a 16 mhz quartz crystal, a usb connection, a power jack, an icsp header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a usb cable or power it with a ac-to-dc adapter or battery to get started.. You can tinker with your uno without worrying too much about doing something wrong, worst case scenario you can replace the chip for a few dollars and start over again.

"Uno" means one in italian and was chosen to mark the release of arduino software (ide) 1.0. The uno board and version 1.0 of arduino software (ide) were the reference versions of arduino, now evolved to newer releases. The uno board is the first in a series of usb arduino boards, and the reference model for the arduino platform; for an extensive list of current, past or outdated boards see the arduino index of boards.

Figure 4.6 : Arduino UNO board

4.2.2 SPECIFICATIONS

➢ Microcontroller	Atmega328P
➢ Operating Voltage	5 V
➢ Input Voltage(recommended)	7-12 V
➢ Input Voltage(limit)	6-20 V
➢ Digital I/O pins	14(of which 6 provide PWM output)
➢ PWM Digital I/O pins	6
➢ Analog Input pins	6
➢ DC Current per I/O pin	20 mA
➢ DC Current for 3.3 V pin	50 mA
➢ Flash Memory	32 KB
➢ SRAM	2 KB
➢ EEPROM	1 KB
➢ Clock Speed	16 MHz
➢ Length	68.6 mm
➢ Width	53.4 mm
➢ Weight	25 g

4.2.3 How Arduino UNO is useful in the Project ?

Arduino uno is a microcontroller board based on the atmega328p, which acts as the heart of the project whose task includes, controlling the Input devices like sensors and Output devices like LCD, IOT module, DC motor and Buzzer. The data collected from the input devices is processed in the Arduino UNO microcontroller and it gives the control signals in accordance to the code in the programming part.

4.2.4 Why Arduino UNO only used in the Project ?

Arduino UNO is a microcontroller which contains six ADC pins which is the main necessity of the project. In the project, there are some sensors which collects the data in the form of analog and should be converted to the digital format to control the output devices. The Arduino uno differs from all preceding boards in that it does not use the usb-to-serial driver chip. Instead, it features the atmega16u2 (atmega8u2 up to version r2) programmed as a usb-to-serial converter. Some of the other reasons are :

- Inexpensive
- Open source in hardware
- Don't need to external programmer (Burner)
- Programming ease
- Open source in software
- IDE Software operate on any operating system

4.2.5 Atmega328P pin description

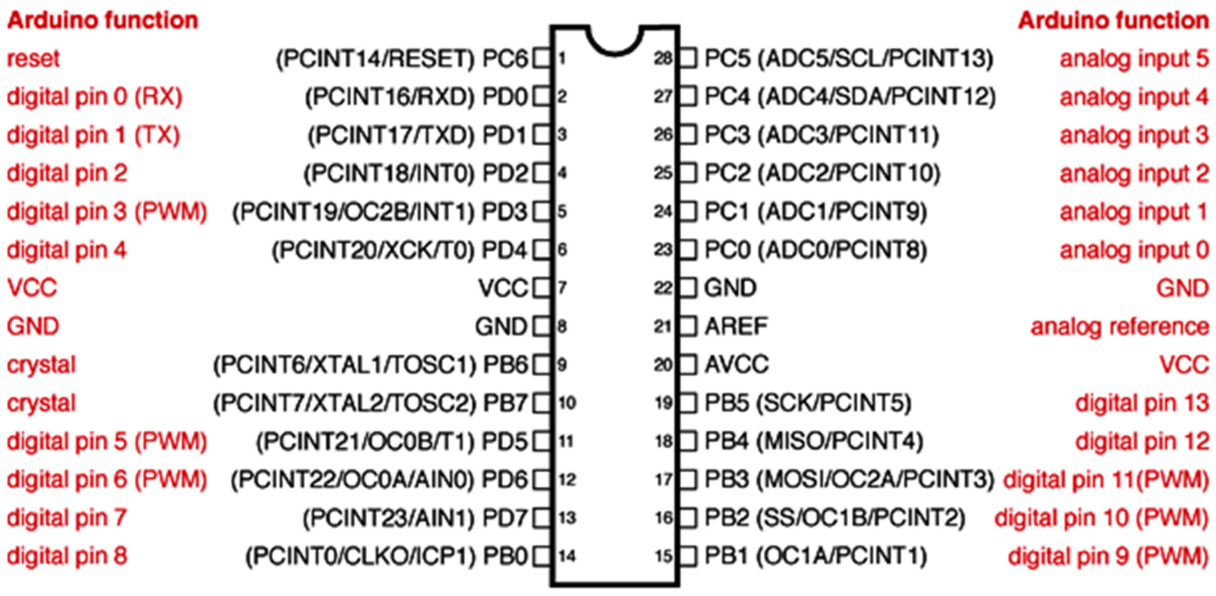


Figure 4.7.1 : Atmega28 pin description

Each of the 14 digital pins on the uno can be used as an input or output, using pinmode(), digitalwrite (), and digitalread () functions. They operate at 5 volts. Each pin can provide or receive 20 ma as recommended operating condition and has an internal pull-up resistor (disconnected by default) of 20-50k ohm. A maximum of 40mA is the value that must not be exceeded on any i/o pin to avoid permanent damage to the microcontroller. In addition, some pins have specialized functions:

- Serial: 0 (rx) and 1 (tx). Used to receive (rx) and transmit (tx) ttl serial data. These pins are connected to the corresponding pins of the atmega8u2 usb-to-ttl serial chip. External interrupts: 2 and 3. These pins can be configured to trigger an interrupt on a low value, a rising or falling edge, or a change in value. See the attachinterrupt() function for details.
- Pwm: 3, 5, 6, 9, 10, and 11. Provide 8-bit pwm output with the analog write() function. Spi: 10 (ss), 11 (mosi), 12 (miso), 13 (sck). These pins support spi communication using the spi library. Led: 13. There is a built-in led driven by digital pin 13. When the pin is high value, the led is on, when the pin is low, it's off. Twi: a4 or sda pin and a5 or scl pin. Support twi communication using the wire library.

  The uno has 6 analog inputs, labeled a0 through a5, each of which provide 10 bits of resolution (i.e. 1024 different values). There are a couple of other pins on the board:
- Aref. Reference voltage for the analog inputs. Used with analogreference().
- Reset. Bring this line low to reset the microcontroller. Typically used to add a reset button to shields which block the one on the board.

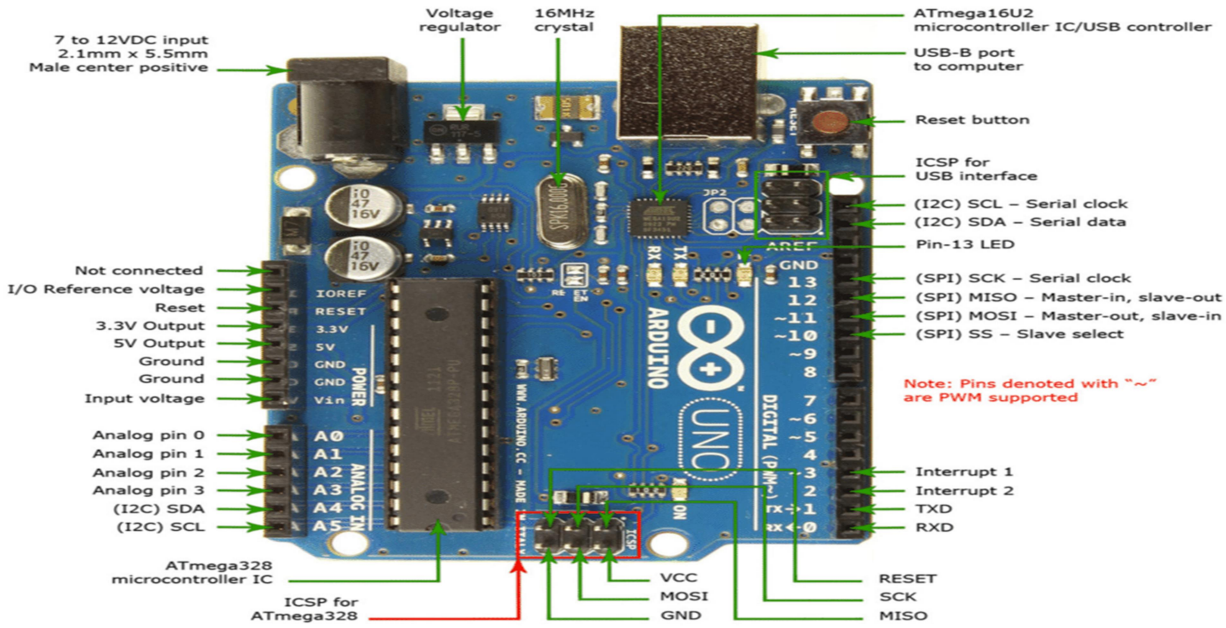


Fig 4.7.2: Arduino UNO Pins

Table 4.2.5 : Arduino Pin description

Pin Category	Pin Name	Details
Power	Vin, 3.3V, 5V, GND	Vin: Input voltage to Arduino when using an external power source. 5V: Regulated power supply used to power microcontroller and other components on the board. 3.3V: 3.3V supply generated by on-board voltage regulator. Maximum current draw is 50mA. GND: ground pins.
Reset	Reset	Resets the microcontroller.
Analog Pins	A0 – A5	Used to provide analog input in the range of 0-5V
Input/Output Pins	Digital Pins 0 - 13	Can be used as input or output pins.
Serial	0(Rx), 1(Tx)	Used to receive and transmit TTL serial data.
External Interrupts	2, 3	To trigger an interrupt.
PWM	3, 5, 6, 9, 11	Provides 8-bit PWM output.
SPI	10 (SS), 11 (MOSI), 12 (MISO) and 13 (SCK)	Used for SPI communication.
Inbuilt LED	13	To turn on the inbuilt LED.
TWI	A4 (SDA), A5 (SCA)	Used for TWI communication.
AREF	AREF	To provide reference voltage for input voltage.

4.3 Water level sensor

4.3.1 Introduction

There are several water level measuring sensros but they are compatible with small water levels only. In order to measure the water levels in huge water bodies like Dams, highly sensitive towards the parameters like Resistance and conductivity and sophisticated devices are required. To satisfy the required limitations and conditions, one brilliant idea is to use the copper wires which we use in our household wirings.

Here we can choose three wires, one for reference(Vcc), which is dipped into the under water level, second one for low level indication which is hanged into the dam upto which we consider the water level is low and the third wire is for indication of high level water in the dam which is hanged into the dam upto which we consider the level of water in the dam is high.

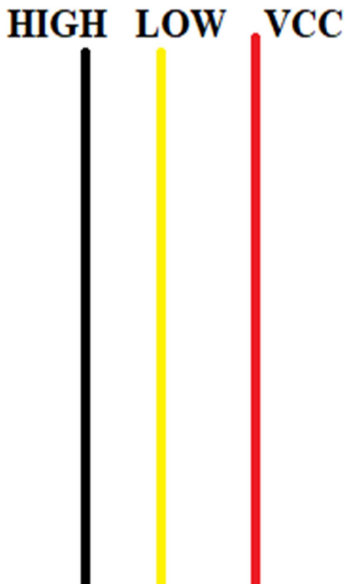


Fig 4.8 : Water level Sensor

4.3.2 Specifications

- Wire conductor : Copper
- Wire insulator : PVC
- Type : Three core wire

4.3.3 How water level sensor is useful in this Project ?

The main theme of the project is to monitor the water levels in the dam and to work accordingly. In order to monitor the water levels in the dam, we are using this water level sensor significantly.

4.3.4 Why the three wired water level sensor only used in the Project ?

Since the water level depth of the dam is too high, no sensors can work in such areas. So, to get the accurate information from the dam, we choosen this component.

4.3.5 Working Principle

Whenever the reference wire(VCC) is activated. If the water level is low, the wire which is assumed to be low level gets activated. If the water level is high, the wire which is assumed to be high level gets activated.

4.3.6 Interfacing Diagram

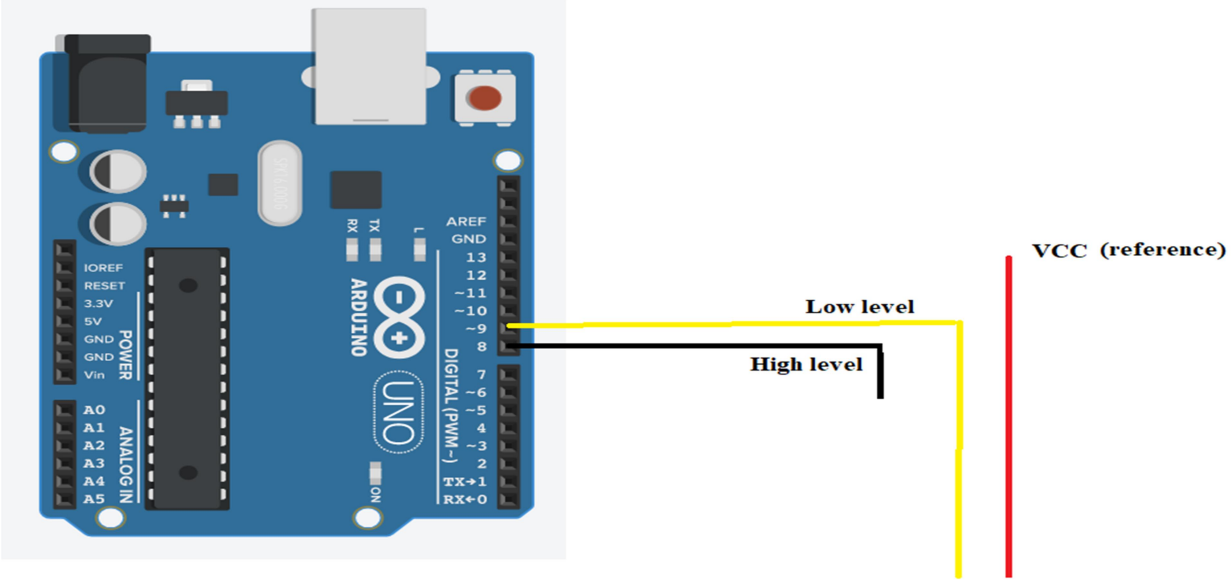


Fig 4.9 : Interfacing Diagram of water level sensor

Explanation :

Here we are using three wires as water level sensors.Three wires are named as low level wire ,high level wire,vcc wire. Vcc wire is connected to vcc reference which is placed at the bottom of the dam.low level wire is placed at the low level of the dam which is connected to digital pin of the arduino.High level wire is placed at the level of the dam and is connected to digital pin of the arduino.

4.4 Rain fall sensor

4.4.1 Description

The rain sensor module is an easy tool for rain detection. It can be used as a switch when raindrop falls through the raining board and also for measuring rainfall intensity. The module features, a rain board and the control board that is separate for more convenience, power indicator LED and an adjustable sensitivity though a potentiometer.

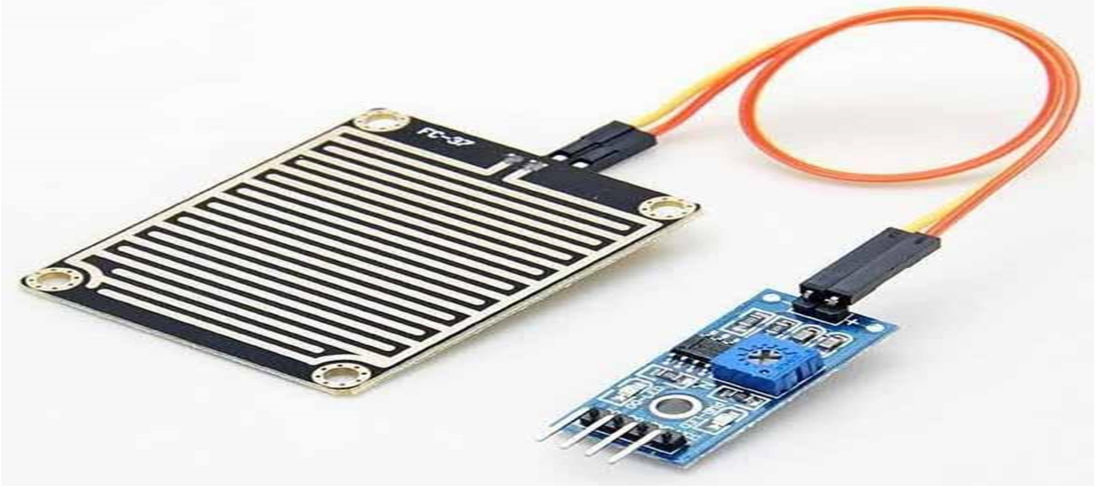


Fig 4.10 : Rainfall Sensor

The analog output is used in detection of drops in the amount of rainfall. Connected to 5V power supply, the LED will turn on when induction board has no rain drop, and DO output is high. When dropping a little amount water, DO output is low, the switch indicator will turn on. Brush off the water droplets, and when restored to the initial state, outputs high level.

4.4.2 Specifications

- Adopts high quality of RF-04 double sided material.
- Area: 5cm x 4cm nickel plate on side,
- Anti-oxidation, anti-conductivity, with long use time;
- Comparator output signal clean waveform is good, driving ability, over 15mA;
- Potentiometer adjust the sensitivity;
- Working voltage 5V;
- Output format: Digital switching output (0 and 1) and analog voltage output AO;
- Small board PCB size: 3.2cm x 1.4cm;
- Uses a wide voltage LM393 comparator

4.4.3 How Rain fall sensor is useful in the Project ?

In the project, to sense the rainfall at the dam, the Rain fall sensor is implemented.

4.4.4 Why the particular Rainfall sensor is only used in the project ?

The working of the rain sensor module is easy and straightforward. The sensor has a series of exposed copper paths that acts as a variable resistor whose resistance varies according to the amount of water on its surface. Usually, they are not connected but are bridged through the water. This resistance is inversely proportional to the amount of water. The more water on the surface of the rain pads the better is the conductivity and will result in a lower resistance. The sensor produces an output voltage through which it determines whether it is raining or not.

4.4.5 Working Principle

The sensing pad with series of exposed copper traces, together acts as a variable resistor (just like a potentiometer) whose resistance varies according to the amount of water on its surface. This resistance is inversely proportional to the amount of water. The more water on the surface means better conductivity and will result in a lower resistance. The less water on the surface means poor conductivity and will result in a higher resistance. The sensor produces an output voltage according to the resistance, which by measuring we can determine whether it's raining or not.

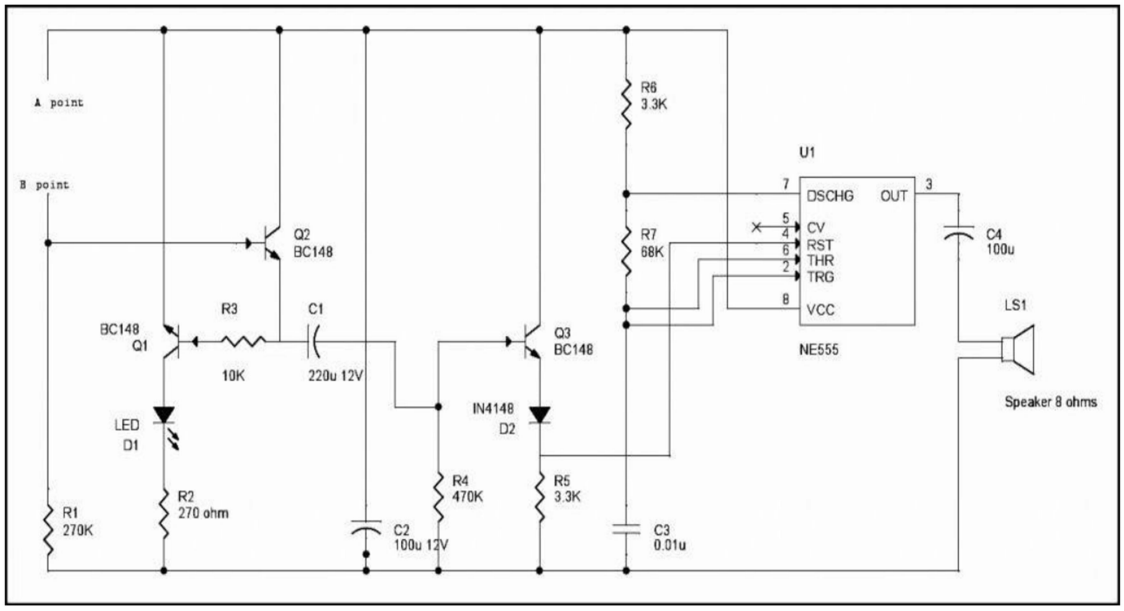


Fig 4.11 : Internal circuit diagram of Rainfall sensor

4.4.6 Pin diagram and explanation

Potentiometer pin description

- Pin1 (VCC): It is a 5V DC pin
- Pin2 (GND): it is a GND (ground) pin
- Pin3 (DO): It is a low/ high output pin
- Pin4 (AO): It is an analog output pin

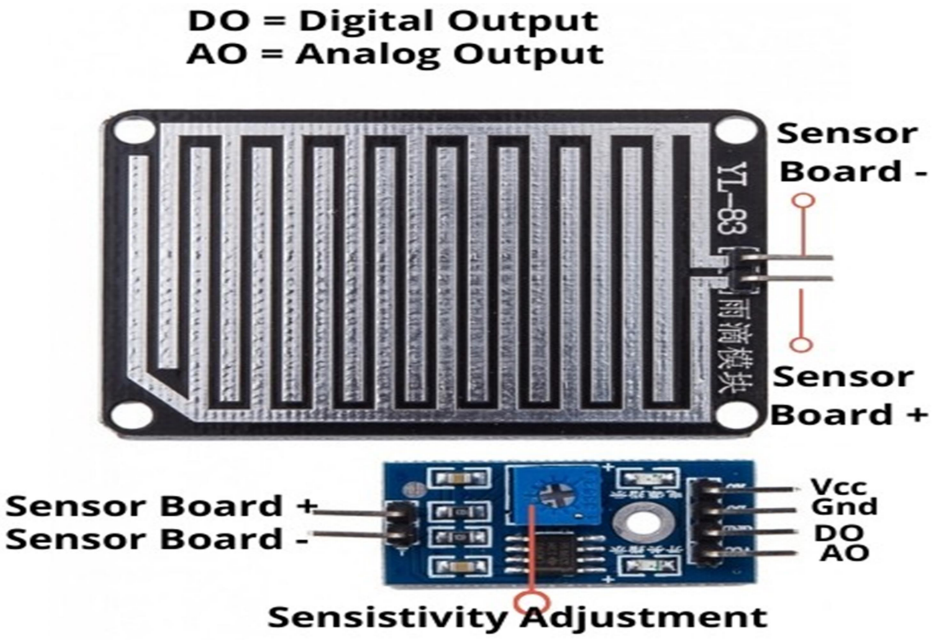


Fig 4.12 : Pin Diagram of rainfall sensor

Pin description of sensor board

- Sensor Board positive
- Sensor Board negative

Explanation

The sensor pad consists of two pins Sensor Board positive and Sensor Board negative which are passive in nature and acts as a passive element which means that the pad requires an external power source via potentiomenter.

4. 4.7 Interfacing diagram and explanation

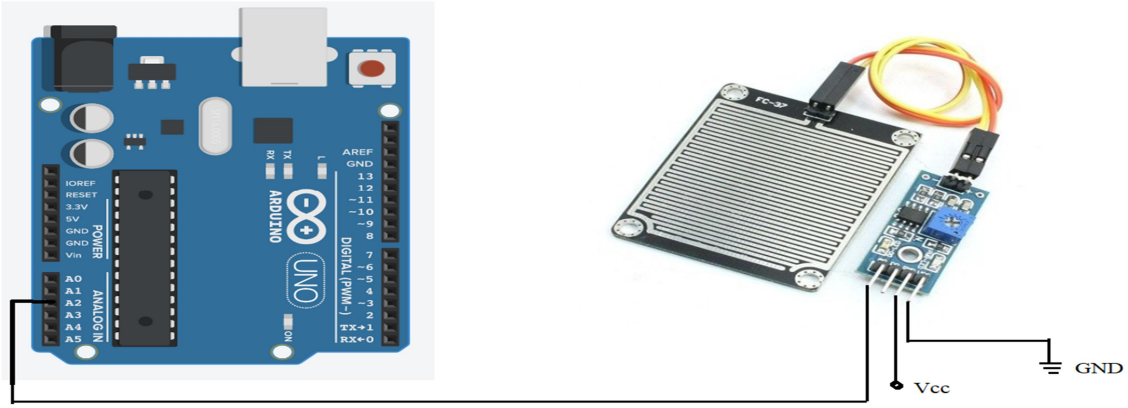


Fig 4.13 : Interfacing Diagram of rainfall sensor

Explanation

rainfall sensor contains rain board and potentiometer.output of the rainboard is connected to potentiometer . Potentiometer has 4 pins they are vcc that is connected to vcc reference, ground that is connected to ground, analog and digital pins where we are connecting analog pin of potentiometer to arduino.

4.5 Ultrasonic Sensor

4.5.1 Description:

Ultrasonic sensors use electrical energy and a ceramic transducer to emit and receive mechanical energy in the form of sound waves. Sound waves are essentially pressure waves that travel through solids, liquids and gases and can be used in industrial applications to measure distance or detect the presence or absence of targets

Ultrasonic sensors (also known as tranceivers when they both send and receive) work on a principle similar to radar or sonar which evaluate attributes of a target by interpreting the echoes from radio or sound waves respectively. Ultrasonic sensors generate high frequency sound waves and evaluate the echo which is received back by the sensor. Sensors calculate the time interval between sending the signal and receiving the echo to determine the distance to an object.

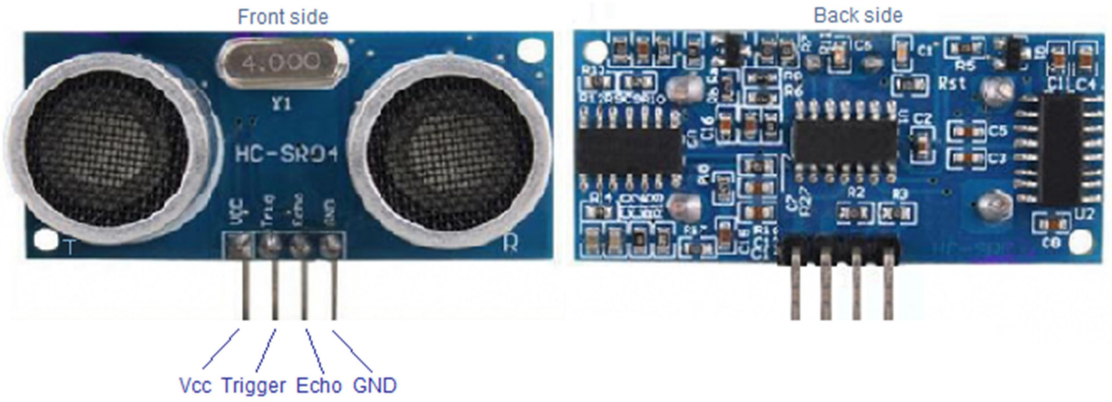


Fig 4.14 : UltraSonic sensor

This technology can be used for measuring: wind speed and direction (anemometer), fullness of a tank, and speed through air or water. For measuring speed or direction a device uses multiple detectors and calculates the speed from the relative distances to particulates in the air or water. To measure the amount of liquid in a tank, the sensor measures the distance to the surface of the fluid. Further applications include: humidifiers, sonar, medical ultrasonography, burglar alarms, and non-destructive testing. Systems typically use a transducer which generates sound waves in the ultrasonic range, above 20,000 hertz, by turning electrical energy into sound, then upon receiving the echo turn the sound waves into electrical energy which can be measured and displayed.

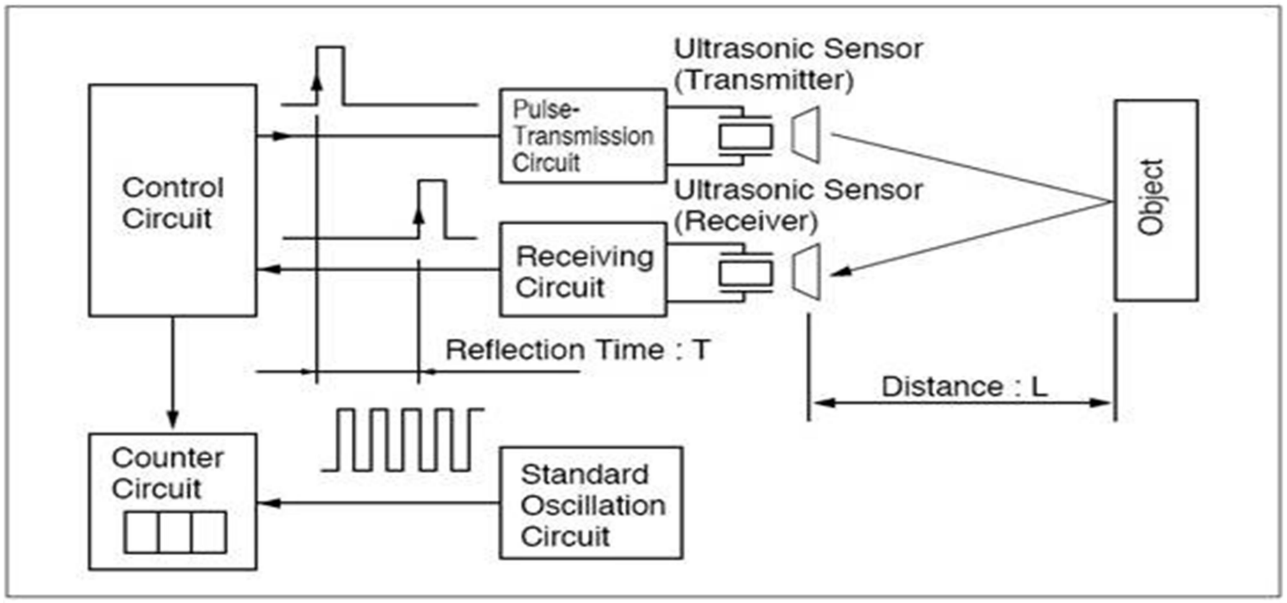


Fig 4.15 : Block Diagram of Ultrasonic Sensor

4.5.2 Specifications

Range

This ultrasonic rangefinder can measure distances up to 2.5 meters at accuracy of 1 centi- meter.

Working

The sensor has a ceramic transducer that vibrates when electrical energy is applied to it. The vibrations compress and expand air molecules in waves from the sensor face to a target object. A transducer both transmits and receives sound. The ultrasonic sensor will measure distance by emitting a sound wave and then "listening" for a set period of time, allowing for the return echo of the sound wave bouncing off the target, before retransmitting.

Microcontroller and the ultrasonic transducer module HC-SR04 forms the basis of this circuit. The ultrasonic module sends a signal to the object, then picks up its echo and outputs a wave form whose time period is proportional to the distance. The microcontroller accepts this signal, performs necessary processing and displays the corresponding distance on the 3 digit seven segment display. This circuit finds a lot of application in projects like automotive parking sensors, obstacle warning systems, terrain monitoring robots, industrial distance measurements etc.

It has a resolution of 0.3cm and the ranging distance is from 2cm to 500cm. It operates from a 5V DC supply and the standby current is less than 2mA. The module transmits an ultrasonic signal, picks up its echo, measures the time elapsed between the two events and outputs a waveform whose high time is modulated by the measured time which is proportional to the distance.

The supporting circuits fabricated on the module makes it almost stand alone and what the programmer need to do is to send a trigger signal to it for initiating transmission and receive the echo signal from it for distance calculation.

4.5.3 How Ultrasonic sensor is useful in the project ?

We used the Ultra Sonic sensor to monitor the dam gates position i.e., whether the dam gate is opened or closed in accordance to the project.

4.5.4 Why UltraSonic sensor is only used in the project ?

It has sensing capability to sense all the material types. This sensor is not affected due to atmospheric dust, rain, snow etc. It can work in any adverse conditions. It has higher sensing distance (in centimeters and

inches) compare to inductive/capacitive proximity sensor types. It provides good readings in sensing large sized objects with hard surfaces

4.5.5 Working Principle

Ultrasonic sensors work on a principle similar to radar or sonar which evaluate attributes of a target by interpreting the echoes from radio or sound waves respectively. Ultrasonic sensors generate high frequency sound waves and evaluate the echo which is received back by the sensor. Sensors calculate the time interval between sending the signal and receiving the echo to determine the distance to an object.

4.5.6 Pin diagram and Explanation

The HR-SR04 has four pins namely Vcc, Trigger, Echo, GND and they are explained in detail below.

1) VCC : 5V DC supply voltage is connected to this pin.
2) Trigger: The trigger signal for starting the transmission is given to this pin. The trigger signal must be a pulse with 10uS high time. When the module receives a valid trigger signal it issues 8 pulses of 40KHz ultrasonic sound from the transmitter. The echo of this sound is picked by the receiver.

3)Echo: At this pin, the module outputs a waveform with high time proportional to the distance.

4) GND: Ground is connected to this pin.

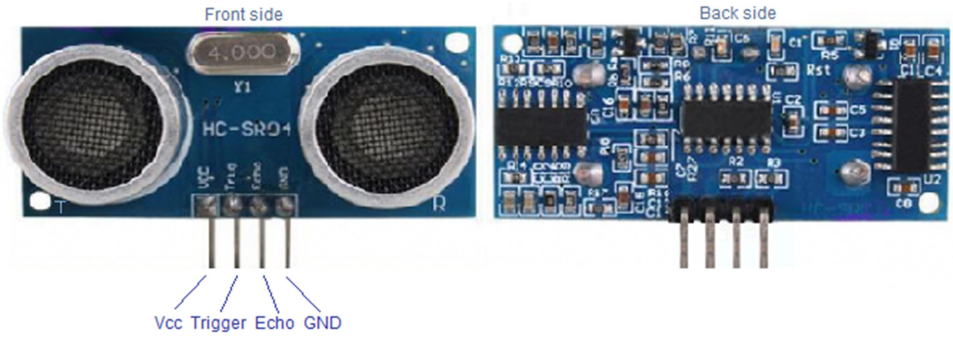


Fig 4.16 : Pin Diagram of Ultrasonic sensor

Explanation

The transmitter part of the circuit is build around IC1(NE 555).The IC1 is wired as an astable multi vibrator operating at 40KHz.The output of IC1 is amplifier the complementary pair of transistors (Q1 & Q2) and transmitted by the ultrasonic transmitter K1.The push button switch S1 is used the activate the transmitter.

The receiver uses an ultrasonic sensor transducer (K2) to sense the ultrasonic signals. When an ultrasonic signal is falling on the sensor, it produces a proportional voltage signal at its output. This weak signal is amplified by the two stage amplifier circuit comprising of transistors Q3 and Q4.The output of the amplifier is rectified by the diodes D3 & D4.The rectified signal is given to the inverting input of the opamp which is wired as a comparator. Whenever there is an ultrasonic signal falling on the receiver, the output of the comparator activates the transistors Q5 & Q6 to drive the relay. In this way the load connected via the relay can be switched. The diode D5 is used as a free-wheeling diode.

Detectors

Since piezoelectric crystal generate a voltage when force is applied to them, the same crystal can be used as an ultrasonic detector. Some systems use separate transmitter and receiver components while others combine both in a single piezoelectric transceiver. Alternative methods for creating and detecting ultrasound include magnetostriction and capacitive actuation.

4.5.7 Interfacing Diagram and Explanation

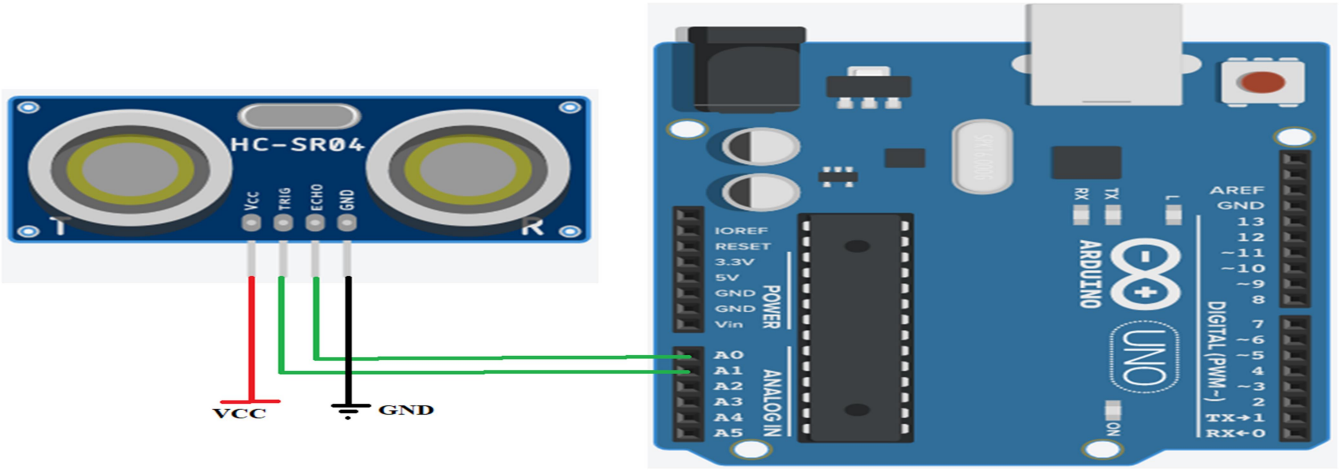


Fig 4.17 : Interfacing Diagram of Ultrasonic sensor

Explanation

Ultrasonic sensor contains 4 pins.They are echo, trigger, vcc and ground. Vcc and ground are connected to vcc reference and ground respectively. echo and trigger pins of the ultrasonic sensor are connected to analog pins A0, A1 respectively of the arduino.

4.6 Temperature Sensor

4.6.1 Description

The LM35 series are precision integrated-circuit temperature sensors, with an output voltage linearly proportional to the Centigrade temperature. Thus LM35 has an advantage over linear temperature sensors calibrated in ° Kelvin, as the user is not required to subtract a large constant voltage from the output to obtain convenient Centigrade scaling.

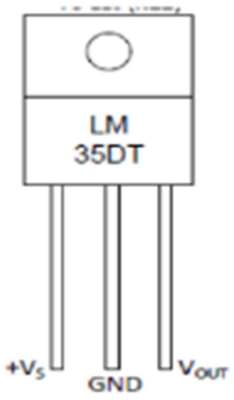


Fig 4.18 : Temperature sensor

In the temperature functional module we developed, we use the LM34 series of temperature sensors. The LM34 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Fahrenheit temperature.

The LM34 thus has an advantage over linear temperature sensors calibrated in degrees Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient Fahrenheit scaling. The LM34 does not require any external calibration or trimming to provide typical accuracies of ±1.2°F at room temperature and ±11.2°F over a full -50 to +300°F temperature range. The LM34 is rated to operate over a -50° to +300°F temperature range.

It is easy to include the LM34 series in a temperature measuring application. The output voltage of LM34 is linearly proportional to the Fahrenheit temperature, it has a Linear +10.0 mV/°F scale factor which means that you will get n*10.0 mV output voltage if the environment temperature is n°F.

4.6.2 Specifications

- Type: Analog
- Sensitivity: 10mV per degree Celcius
- Functional range: 0 degree Celsius to 100 degree Celsius
- Calibrated directly in Celsius (centigrade)
- 0.5^0 C Ensured accuracy (at $+25^0$ C)
- Suitable for remote applications
- Operate from 4 to 30 V
- Low cost due to wafer-level trimming

4.6.3 How Temperature sensor is useful in your project

We used the temperature sensor to monitor the raise and fall of temperature conditions near the dam which helps to monitor the weather conditions at the dam.

4.6.4 Why LM35 temperature sensor only used in your project

The LM35 series are precision integrated-circuit temperature devices with an output voltage linearlyproportional to the Centigrade temperature. The LM35 device has an advantage over linear temperature sensors calibrated in Kelvin, as the user is not required to subtract a large constant voltage from the output to obtain convenient Centigrade scaling. The LM35 device does not require any external calibration or trimming to provide typical accuracies of ±¼°C at room temperature and ±¾°C over a full −55°C to 150°C temperature range. Lower cost is assured by trimming and calibration at the wafer level. The low-output impedance, linear output, and precise inherent calibration of the LM35 device makes interfacing to readout or control circuitry especially easy.

4.6.5 Working principle

The sensor will perform sensing when the temperature changes every 1 ºC temperature will show a voltage of 10 mV. The ambient temperature is converted into electrical voltage by a circuit in the IC, where the temperature change is proportional to the output voltage changes.

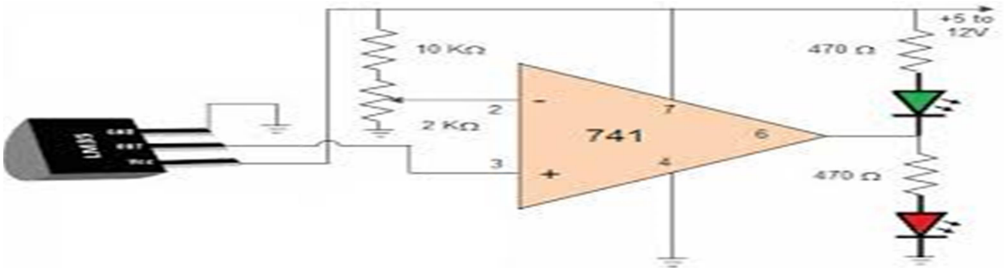


Fig 4.19 : Internal circuitary of LM35DT

4.6.6 Pin diagram and Explanation

Pin Description

- Vout - There will be increase in 10mV for raise of every 1°C. Can range from - 1V(-55°C) to 6V(150°C)
- GND - Ground
- Vcc - Input voltage is +5V for typical applications

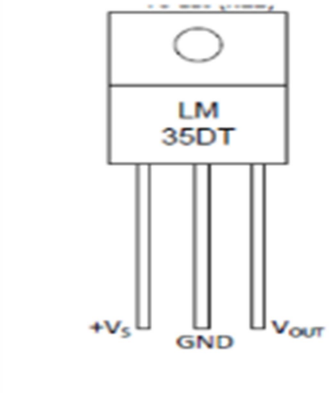


Fig 4.20 : Pin Description of temperature sensor

Explanation

The Temperature sensor LM35DT has three pins viz, VCC, Vout, GND. The pin Vout gives the data collected to the controller as input and the rest of the pins VCC and GND are connected to respective pins.

4.6.7 Interfacing Diagram and Explanation

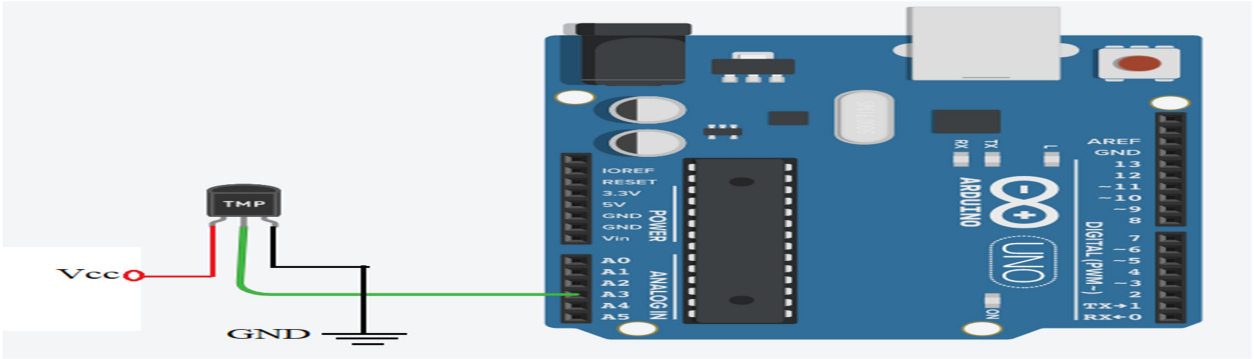


Fig 4.21 : Interfacing Diagram of temperature sensor

Explanation

Temperature sensor has three pins . They are Vcc, ground and output pin. Vcc and ground are connected to vcc reference and ground respectively where as output pin of temperature sensor is connected to analog pin A3 of the arduino.

4.7 LCD

4.7.1 DESCRIPTION

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on.

A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data.

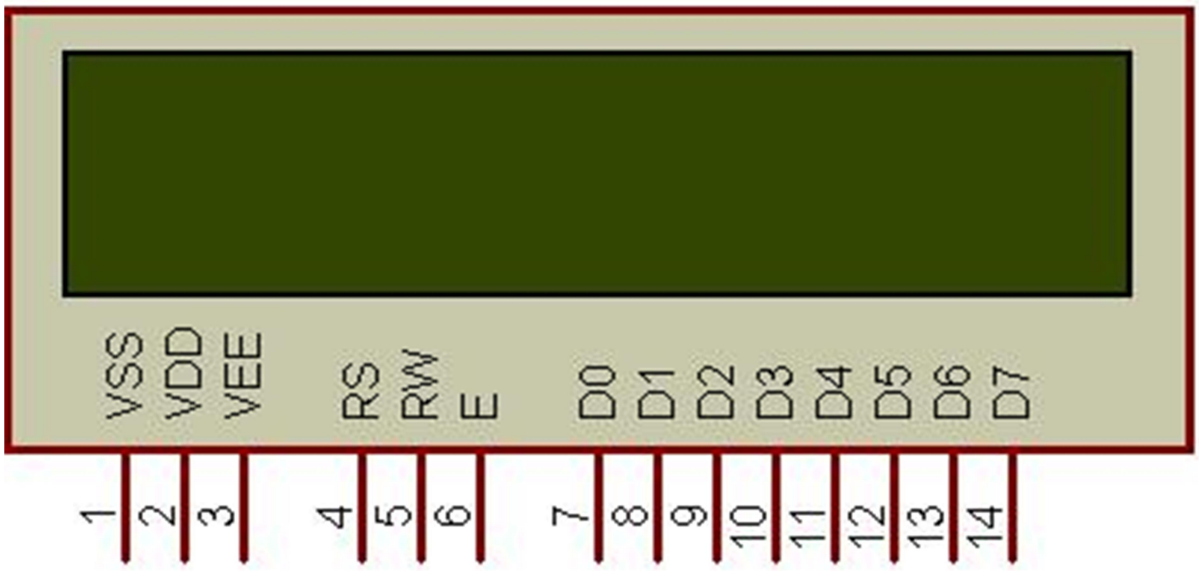


Fig 4.22 : LCD

The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD.

4.7.2 Specifications

- Operating Voltage is 4.7V to 5.3V
- Current consumption is 1mA without backlight
- Alphanumeric LCD display module, meaning can display alphabets and numbers
- Consists of two rows and each row can print 16 characters, Each character is build by a 5×8 pixel box.
- Can work on both 8-bit and 4-bit mode
- It can also display any custom generated characters
- Available in Green and Blue Backlight

4.7.3 How LCD is useful in the project ?

LCD is used to display the parameters of sensors that are calculated in real time and displays the status of sensor calculated parameters like “Temperature is High” or “ITS RAINING” etc.

4.7.4 Why LCD only used in your project ?

LCDs are known for their energy-efficient properties. LCDs have ability to last for a very long time. LCDs support backlighting with light-emitting diode (LED). You don’t have to worry about screen burn-in with LCDs. LCDs use pixels made of organic material, so they don’t suffer from screen burn-in. You can leave a static image on an LCD for multiple consecutive hours without fear of it “burning” into the display. LCD devices come in all shapes and sizes. It allows for small and low-profile designs that isn’t possible with other, older display technologies.

4.7.5 Working principle

The principle behind the LCD is that when an electrical current is applied to the liquid crystal molecule, the molecule tends to untwist. This causes the angle of light which is passing through the molecule of the polarized glass and also causes a change in the angle of the top polarizing filter. As a result, a little light is allowed to pass the polarized glass through a particular area of the LCD.

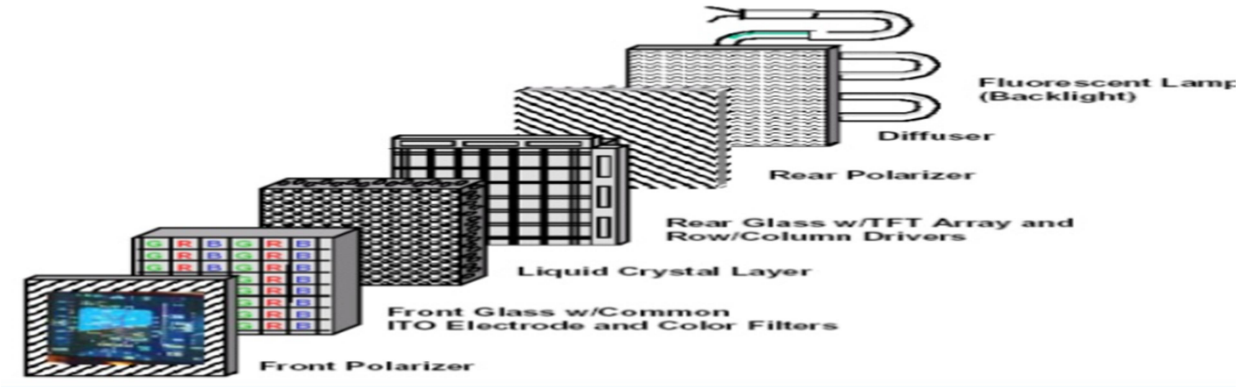


Fig 4.23 : Working Principle of LCD

4.7.6 PIN DESCRIPTION AND EXPLANTION

Most LCDs with 1 controller has 14 Pins and LCDs with 2 controller has 16 Pins (two pins are extra in both for back-light LED connections). Pin description is shown in the table below.

Table 4.7.6 : Pin Configuration for a 16X2 LCD character display

Pin Number	Symbol	Function
1	Vss	Ground Terminal
2	Vcc	Positive Supply
3	Vdd	Contrast adjustment
4	RS	Register Select; 0→Instruction Register, 1→Data Register
5	R/W	Read/write Signal; 1→Read, 0→ Write
6	E	Enable; Falling edge
7	DB0	Bi-directional data bus, data transfer is performed once, thru DB0 to DB7, in the case of interface data length is 8-bits; and twice, through DB4 to DB7 in the case of interface data length is 4-bits. Upper four bits first then lower four bits.
8	DB1	
9	DB2	
10	DB3	
11	DB4	
12	DB5	
13	DB6	
14	DB7	
15	LED-(K)	Back light LED cathode terminal
16	LED+(A)	Back Light LED anode terminal

The LCD standard requires 3 control lines and 8 I/O lines for the data bus.

• 8 data pins D7:D0

Bi-directional data/command pins.

Alphanumeric characters are sent in ASCII format.

• RS: Register Select

RS = 0 -> Command Register is selected

RS = 1 -> Data Register is selected

• R/W: Read or Write

0 -> Write, 1 -> Read

• E: Enable (Latch data)

Used to latch the data present on the data pins.

A high-to-low edge is needed to latch the data.

4.7.7 Interfacing Diagram and Explanation

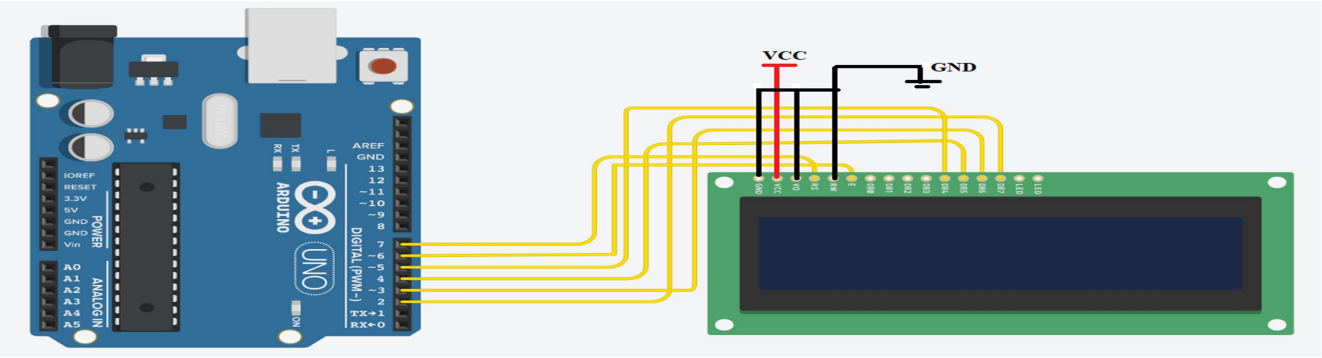


Fig 4.24 : Interfacing Diagram of LCD

Explanation

In the proposed system, the D4, D5, D6, D7 pins are connected to 5, 4, 3, 2 digital pins of arduino. RS pin to 7 pin of arduino. E pin to 6 pin of arduino.R/W pin to ground.VDD pin to power supply and VSS ,VEE pins to ground.

4.8 Buzzer

4.8.1 Description

A buzzer or beeper is a signaling device, usually electronic, typically used in automobiles, house hold appliances such as a microwave oven, or game shows. It most commonly consists of a number of switches or sensors connected to a control unit that determines if and which button was pushed or a preset time has lapsed, and usually illuminates a light on the appropriate button or control panel, and sounds a warning in the form of a continuous or intermittent buzzing or beeping sound.

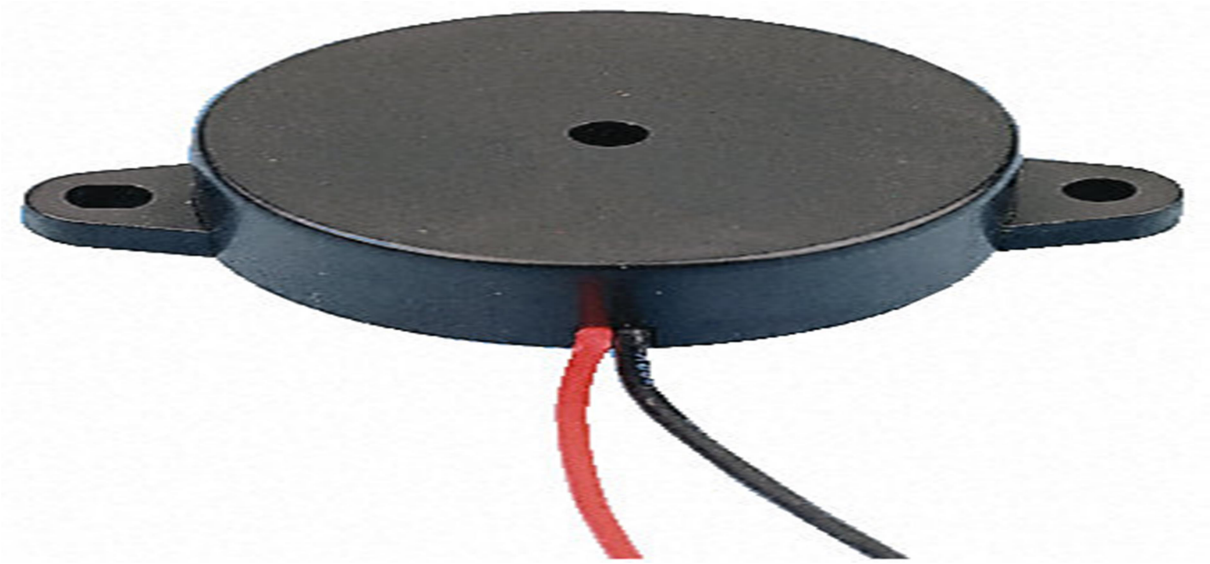


Fig 4.25 : Buzzer

4.8.2 Specifications of component

- Rated Voltage: 6V DC
- Operating Voltage: 4-8V DC
- Rated current: <30mA
- Sound Type: Continuous Beep
- Resonant Frequency: ~2300 Hz
- Small and neat sealed package
- Breadboard and Perf board friendly

4.8.3 How Buzzer is useful in our project ?

In the proposed system when the water level is reached more than a high level buzzer will ring to alert the authorities and public.So they will take measures after to control the water level.

4.8.4 Why this component only used in the project ?

Piezo buzzers have larger frequency ranges and SPL values, as well as a high resonant frequency. Piezo buzzers also have higher operating voltages and lower current requirements.Magnetic buzzers have smaller frequency ranges and SPL values and lower resonant frequencies than piezo buzzers. They also operate with lower operating voltages but high current requirements.

4.8.5 Working Principle:

The vibrating disk in a magnetic buzzer is attracted to the pole by the magnetic field. When an oscillating signal is moved through the coil, it produces a fluctuating magnetic field which vibrates the disk at a frequency equal to that of the drive signal.

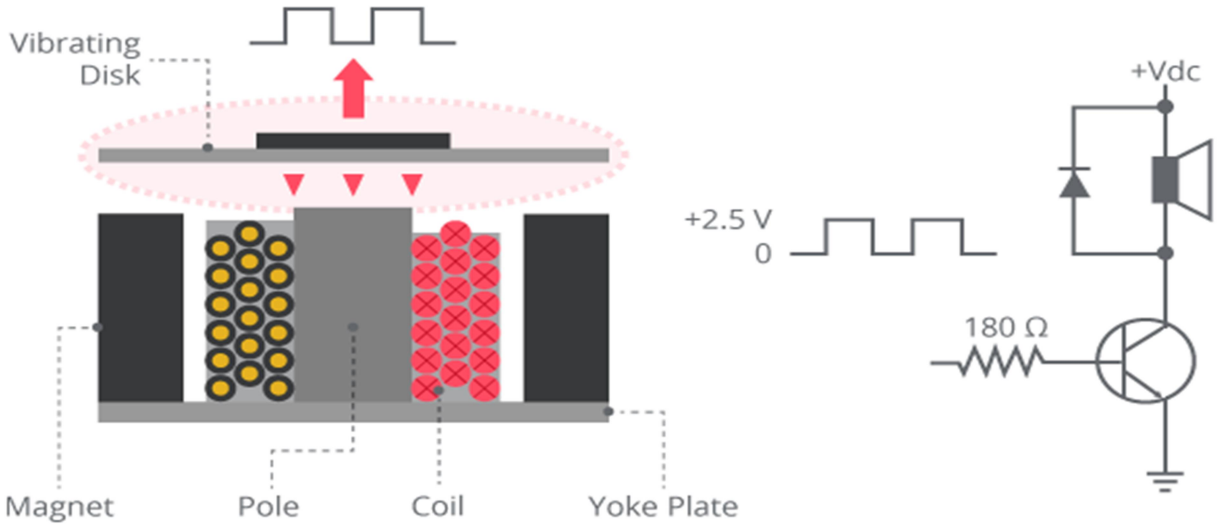


Figure 4.26 : Working principle of Buzzer

4.8.6 Pin Description and Explanation

Pin Description :

Terminal - 1 : Positive

Terminal - 2 : Negative

Explanation

Generally, the positive terminal is given as supply (VCC), But the negative terminal is used as the controlling terminal for the buzzer which is connected to the controller in accordance with the purpose.

4.8.7 Interfacing Diagram and Explanation

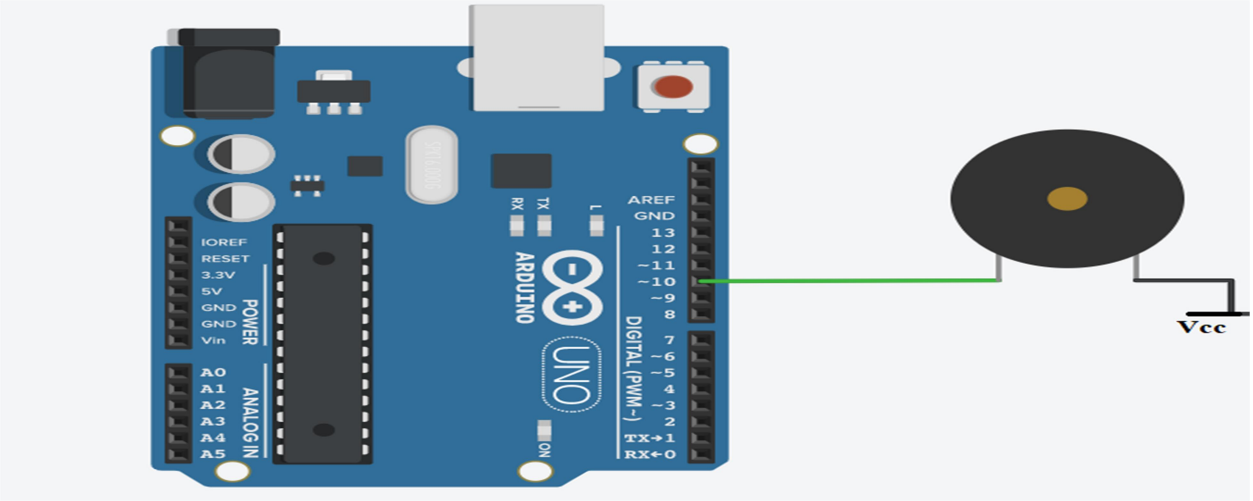


Fig 4.27 : Interfacing diagram of Buzzer

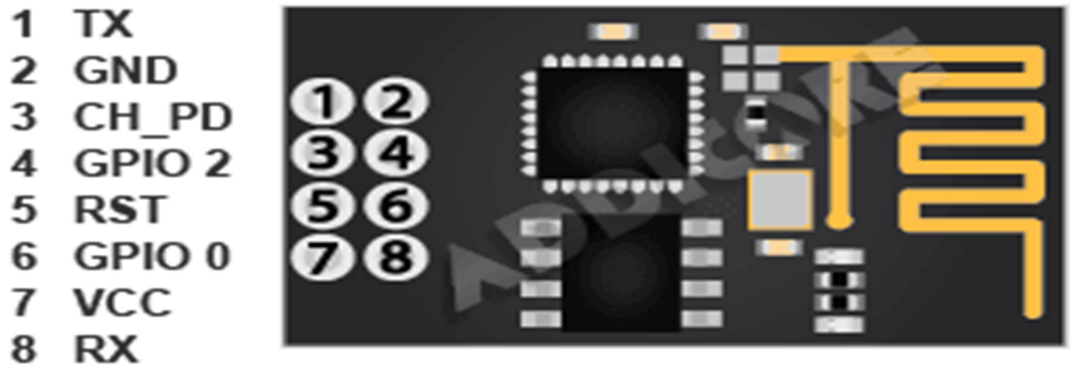
Explanation

In proposed system the positive terminal to power supply and negative terminal to 10 digital pin of arduino which acts as the control signal for the Buzzer.

4.9 IoT Module

4.9.1 DESCRIPTION:

- These modules include 1MB (8Mbit) of flash memory, twice the size of the older blue colored ESP-01 module
- The ESP8266 Serial/UART to WiFi module is a great way to connect your Arduino or other microcontroller projects to a WiFi network
- Create your next internet of things (IOT) project with affordable network connectivity by implementing



this module into your design

Fig 4.28 : IoT module

- The module has the ability to run independent of a host controller
- The eight pin header includes two GPIO pins that allow for direct connection of the module to sensors, peripherals, or host controller. Check out our ESP8266 breadboard adapter to use your ESP8266 module with a breadboard
- The ESP8266 has 3.6V tolerant I/Os so you will need a logic level converter to connect it with higher voltage devices such as Arduino
- The ESP8266 requires 3.3V power so you may need a 3.3V voltage regulator to provide the correct voltage, depending on your setup

PRODUCT CONTENTS:

- 1 — ESP8266 ESP-01 WiFi Tranceiver Module with baud rate set at 115200 bps
- 1 (per order) — Addicore ESP8266 info card (includes pinout diagram)

4.9.2 SPECIFICATIONS:

- 802.11 b/g/n
- Serial/UART baud rate: 115200 bps
- Integrated TCP/IP protocol stack
- Input power: 3.3V (see "Recommended Accessories" below for 3.3V power options)
- I/O voltage tolerance: 3.6V Max (see "Recommended Accessories" below for level converters to connect to higher voltage devices (i.e. Arduino))
- Regular operation current draw: ~70mA
- Peak operating current draw: ~300mA
- Power down leakage current: <10µA
- +19.5dBm output in 802.11b mode
- Flash Memory Size: 1MB (8Mbit)
- WiFi security modes: WPA, WPA2
- Module's dimensions: 24.75mm x 14.5mm (0.974" x 0.571")
- Through this module we can connect directly to the website and mobile (app) that is tcp/ip,and laptop
- Here ther are some ports, which are used to connect with different devices like,if i want to connect websitet through port80 which can available this information in datasheet and for mobile port 23 and for loptop putty(it is a software like xctu for communicating (data transmission and receiving purpose)
- For operating this module we have to set an ip address for this module 192.168.4.1

4.9.3 How IoT module is useful in our project

Here IoT module collects all the sensors information and updates the information in the app continuously.

4.9.4 Why this component only used in our project

Because IoT applications need to send data automatically, in real-time, without someone hitting a send button. IoT environments can be tremendously demanding with extreme temperatures, vibration, and humidity. Besides, they're often in remote, hard-to-reach locations, making it cost-prohibitive to send a technician out for repairs. IoT wireless modules must be ruggedized to provide reliable connectivity without service interruption, regardless of location or wireless network.

4.9.5 Working principle

IoT devices like IoT module works as follows.First, sensors or devices collect data from their environment. This could be as simple as a temperature reading . The sensors/devices can be connected to the cloud through WiFi. Once the data gets to the cloud, software performs some kind of processing on it. Next, the information is made useful to the end-user in some way.

4.9.6 IoT module Pin Diagram and Explanation

Table 4.9.6 : IoT module pin description

PIN No.	PIN NAME	USE
1	GND	Ground
2	Tx	Connected to Rx pin of programmer/uC to upload program
3	GPIO-2	General purpose Input/output pin
4	CH_EN	Chip Enable – Active high
5	GPIO-0	General purpose Input/output pin
6	RESET	Resets the module
7	Rx	General purpose Input/output pin
8	Vcc	Connect to +3.3V only

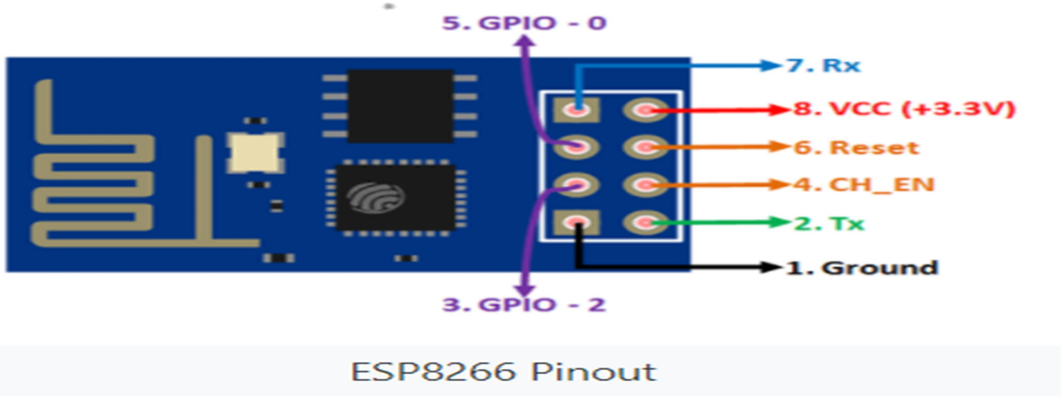


Fig : 4.29 : Pin diagram of IoT Module

4.9.7 Interfacing diagram & Explanation

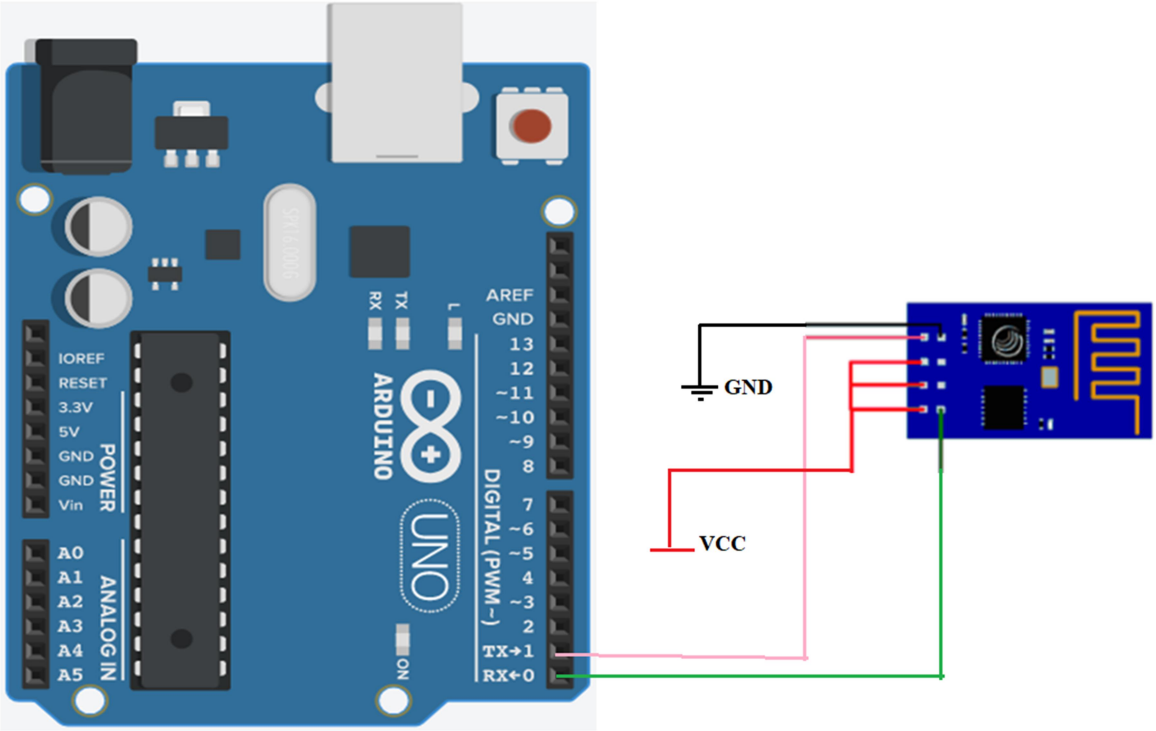


Fig : 4.30 : Interfacing Diagram of IoT Module

Explanation

In the proposed system the receiver of arduino is connected to transmitter of IoT module. And transmitter of arduino is connected to receiver of IoT module.And ground pin to ground.And enable ,reset and 3V3 pin to vcc.

4.10 Motor Driver

4.10.1 INTRODUCTION

L293D IC generally comes as a standard 16-pin DIP (dual-in line package). This motor driver IC can simultaneously control two small motors in either direction; forward and reverse with just 4 microcontroller pins (if you do not use enable pins).

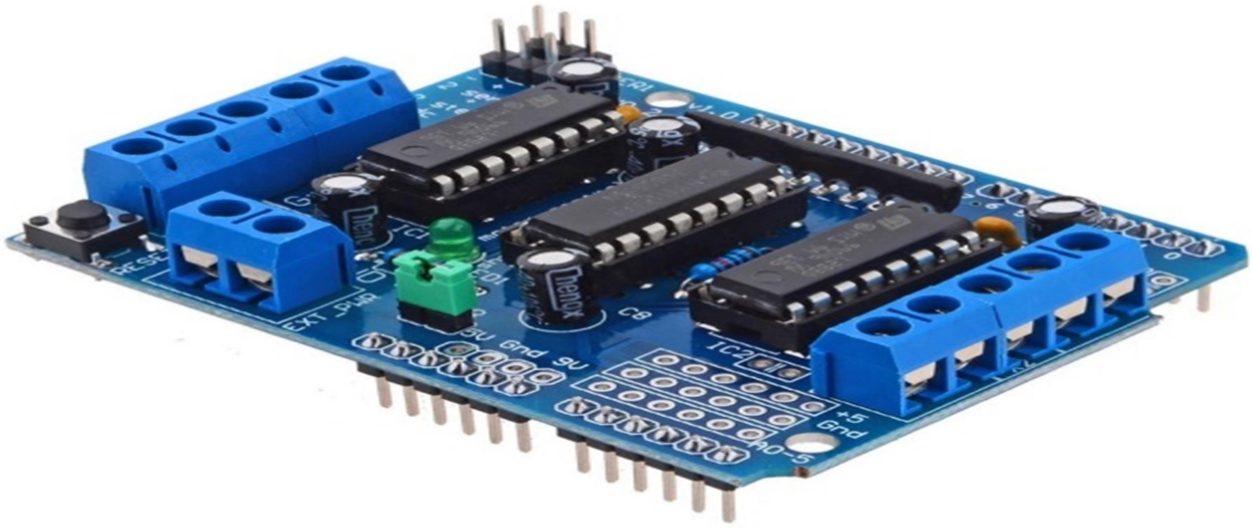


Fig 4.31 : Motor Driver

Some of the features (and drawbacks) of this IC are:

1. Output current capability is limited to 600mA per channel with peak output current limited to 1.2A (non-repetitive). This means you cannot drive bigger motors with this IC. However, most small motors used in hobby robotics should work. If you are unsure whether the IC can handle a particular motor, connect the IC to its circuit and run the motor with your finger on the IC. If it gets really hot, then beware... Also note the words "non-repetitive"; if the current output repeatedly reaches 1.2A, it might destroy the drive transistors.
2. Supply voltage can be as large as 36 Volts. This means you do not have to worry much about voltage regulation.
3. L293D has an enable facility which helps you enable the IC output pins. If an enable pin is set to logic high, then state of the inputs match the state of the outputs. If you pull this low, then the outputs will be turned off regardless of the input states
4. The datasheet also mentions an "over temperature protection" built into the IC. This means an internal sensor senses its internal temperature and stops driving the motors if the temperature crosses a set point
5. Another major feature of L293D is its internal clamp diodes. This flyback diode helps protect the driver IC from voltage spikes that occur when the motor coil is turned on and off (mostly when turned off)

6. The logical low in the IC is set to 1.5V. This means the pin is set high only if the voltage across the pin crosses 1.5V which makes it suitable for use in high frequency applications like switching applications (upto 5KHz)
7. Lastly, this integrated circuit not only drives DC motors, but can also be used to drive relay solenoids, stepper motors etc.

Working of L293D

The 4 input pins for this l293d, pin 2,7 on the left and pin 15 ,10 on the right as shown on the pin diagram. Left input pins will regulate the rotation of motor connected across left side and right input for motor on the right hand side. The motors are rotated on the basis of the inputs provided across the input pins as LOGIC 0 or LOGIC 1. In simple you need to provide Logic 0 or 1 across the input pins for rotating the motor.

4.10.2 Specifications

- Wide Supply-Voltage Range: 4.5 V to 36 V
- Separate Input-Logic Supply
- Internal ESD Protection
- High-Noise-Immunity Inputs
- Output Current 600 mA Per Channel
- Peak Output Current 1.2 A Per Channel
- Output Clamp Diodes for Inductive Transient Suppression
- Operation Temperature 0°C to 70°C.
- Automatic thermal shutdown is available

4.10.3 How Motor Driver is useful in our project ?

The L293D is a 16-pin Motor Driver IC which can control a set of two DC motors simultaneously in any direction. The L293D is designed to provide bidirectional drive currents of up to 600 mA (per channel) at voltages from 4.5 V to 36 V (at pin 8!). You can use it to control small dc motors - toy motors.To control the dc motor we are using in the proposed system to open or gates we are using this motor driver.

4.10.4 Why the motor driver L293D only used in our project ?

In the proposed system we need to move motor in required directionto open or close gates.Motor driver is capable of controlling dc motors to move in required direction.

4.10.5 Working principle

This L293D IC works on the basic principle of H-bridge, this motor control circuit allows the voltage to be flowing in any direction. As we know that the voltage must be change the direction of being able to rotate the DC motor in both the directions. Hence, H-bridge circuit using L293D ICs are perfect for driving a motor. Single L293D IC consists of two H-bridge circuits inside which can rotate two DC motors separately.

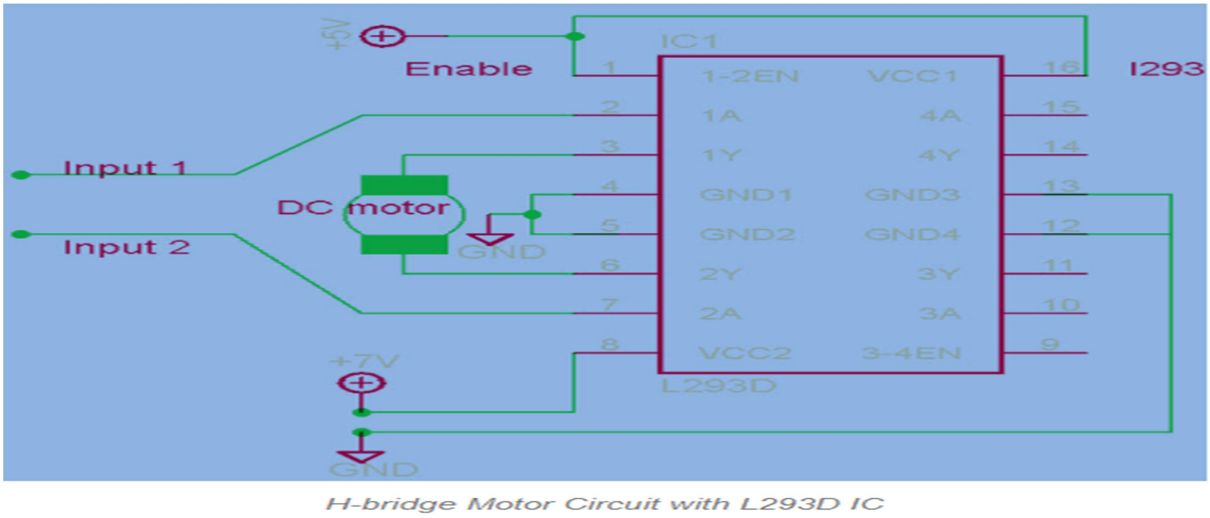


Fig 4.32 : Motor Driver internal circuitary

4.10.6 Pin diagram and explanation

Pin Diagram

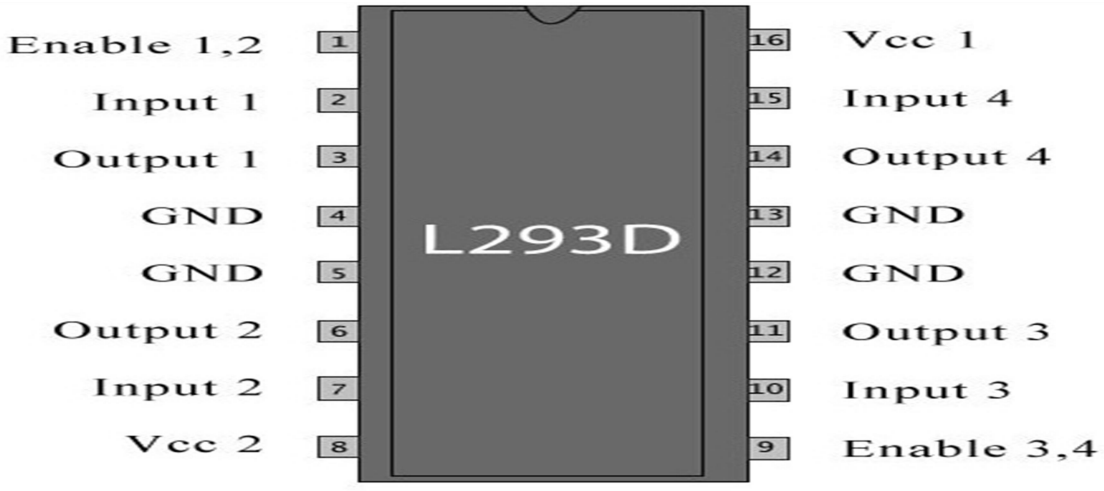


Fig 4.33 : Pin Diagram of Motor Driver

Table 4.10.6 : Pin Description of L293D Motor Driver

Pin No	Function	Name
1	Enable pin for Motor 1; active high	Enable 1,2
2	Input 1 for Motor 1	Input 1
3	Output 1 for Motor 1	Output 1
4	Ground (0V)	Ground
5	Ground (0V)	Ground
6	Output 2 for Motor 1	Output 2
7	Input 2 for Motor 1	Input 2
8	Supply voltage for Motors; 9-12V (up to 36V)	Vcc_2
9	Enable pin for Motor 2; active high	Enable 3,4
10	Input 1 for Motor 1	Input 3
11	Output 1 for Motor 1	Output 3
12	Ground (0V)	Ground
13	Ground (0V)	Ground
14	Output 2 for Motor 1	Output 4
15	Input2 for Motor 1	Input 4
16	Supply voltage; 5V (up to 36V)	Vcc_1

4.10.7 Interfacing diagram & Explanation

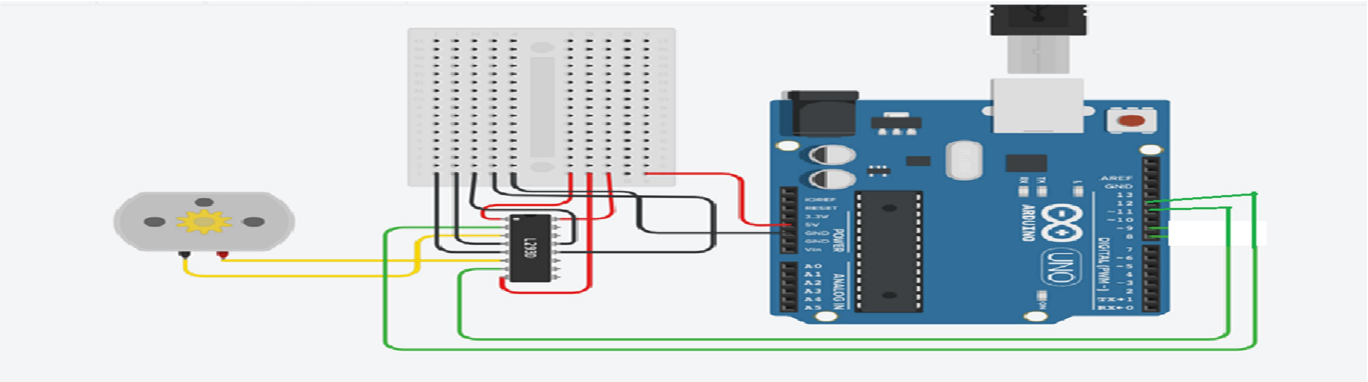


Fig 4.34 : Interfacing diagram of Motor Driver

Explanation

In the propsed system the vss and vs pins are connected to power supply.The two ground pins are connected to ground.OUT1 and OUT2 are connected to motor.EN1 and EN2 pins are connected to power supply. IN1 pin is connected to 11 digital pin of arduino.IN2 pin is connected to 12 digital pin of arduino.

4.11 DC Motor

4.11.1 Description

A DC motor in simple words is a device that converts direct current(electrical energy) into mechanical energy. It's of vital importance for the industry today.

A DC motor is designed to run on DC electric power. Two examples of pure DC designs are Michael Faraday's homo-polar motor (which is uncommon), and the ball bearing motor, which is (so far) a novelty.

By far the most common DC motor types are the brushed and brushless types, which use internal and external commutation respectively to create an oscillating AC current from the DC source—so they are not purely DC machines in a strict sense.

We in our project are using brushed DC Motor, which will operate in the ratings of 12v DC 0.6A.

The speed of a DC motor can be controlled by changing the voltage applied to the armature or by changing the field current. The introduction of variable resistance in the armature circuit or field circuit allowed speed control. Modern DC motors are often controlled by power electronics systems called DC drives.

Fig 4.35 : DC Motor

4.11.2 Specifications

- Standard 130 Type DC motor
- Operating Voltage: 4.5V to 9V
- Recommended/Rated Voltage: 6V
- Current at No load: 70mA (max)
- No-load Speed: 9000 rpm
- Loaded current: 250mA (approx)
- Rated Load: 10g*cm
- Motor Size: 27.5mm x 20mm x 15mm
- Weight: 17 grams

4.11.3 How DC Motor is useful in our project ?

In this project, DC motor is used to opening and closing of the dam gates whenever the water level is high in accordance with the instructions getting from the controller.

4.11.4 Why only DC motor used in the project ?

In order to open the dam gates, a complete rotation of the armature is required for opening and closing which is possible only with the DC motor.

4.11.5 Working principle

The basic working principle of a DC motor is: "whenever a current carrying conductor is placed in a magnetic field, it experiences a mechanical force". The direction of this force is given by Fleming's left-hand rule and its magnitude is given by,

F = BIL Where, B = magnetic flux density

I = current

L = length of the conductor within the magnetic field

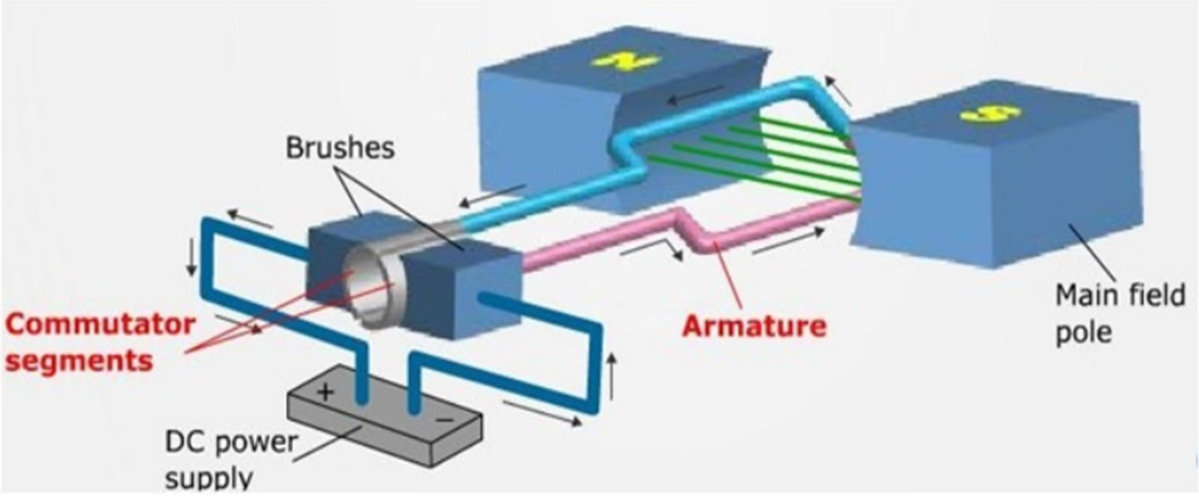


Fig 4.36 : Working principle of DC Motor

4.11.6 Pin description and explanation

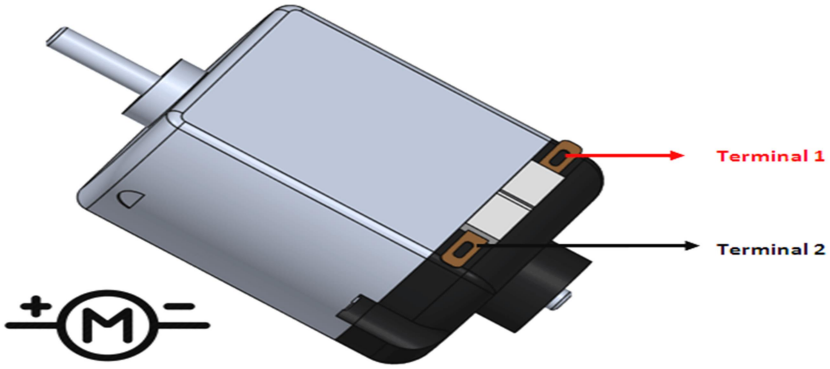


Fig 4.37 : Pin diagram of DC Motor

Terminal 1 - POSITIVE

Terminal 2 - NEGATIVE

Explanation

When the positive and the negative terminals are connected to the supply voltage to the corresponding terminals, the DC Motor starts rotating and the direction can be reversed by interchanging the terminals respectively.

4.11.7 Interfacing diagram & Explanation

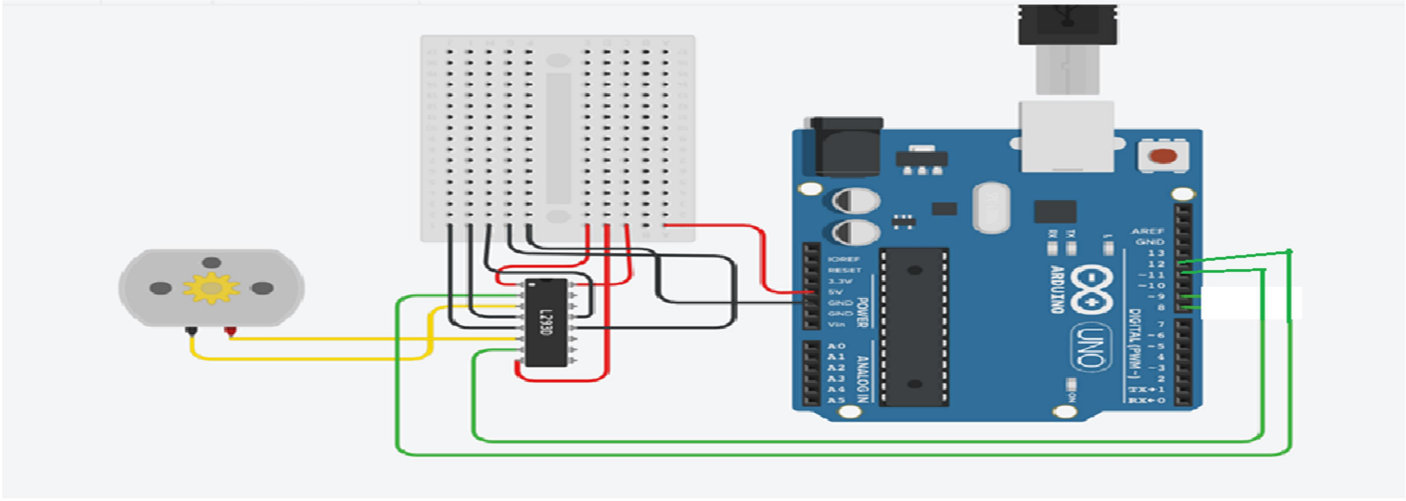


Fig 4.38 : Interfacing Diagram of DC Motor

Explanation

Here the motor has two pins i.e,two terminals Terminal1,Terminal2 which are connected to OUT1 and OUT2 pins of motor driver. Since these terminals are connected together only through a coil they have not polarity. Revering the connection will only reverse the direction of the motor.

CHAPTER 5

CIRCUIT DIAGRAM & EXPLANATION

5.1 CIRCUIT DIAGRAM

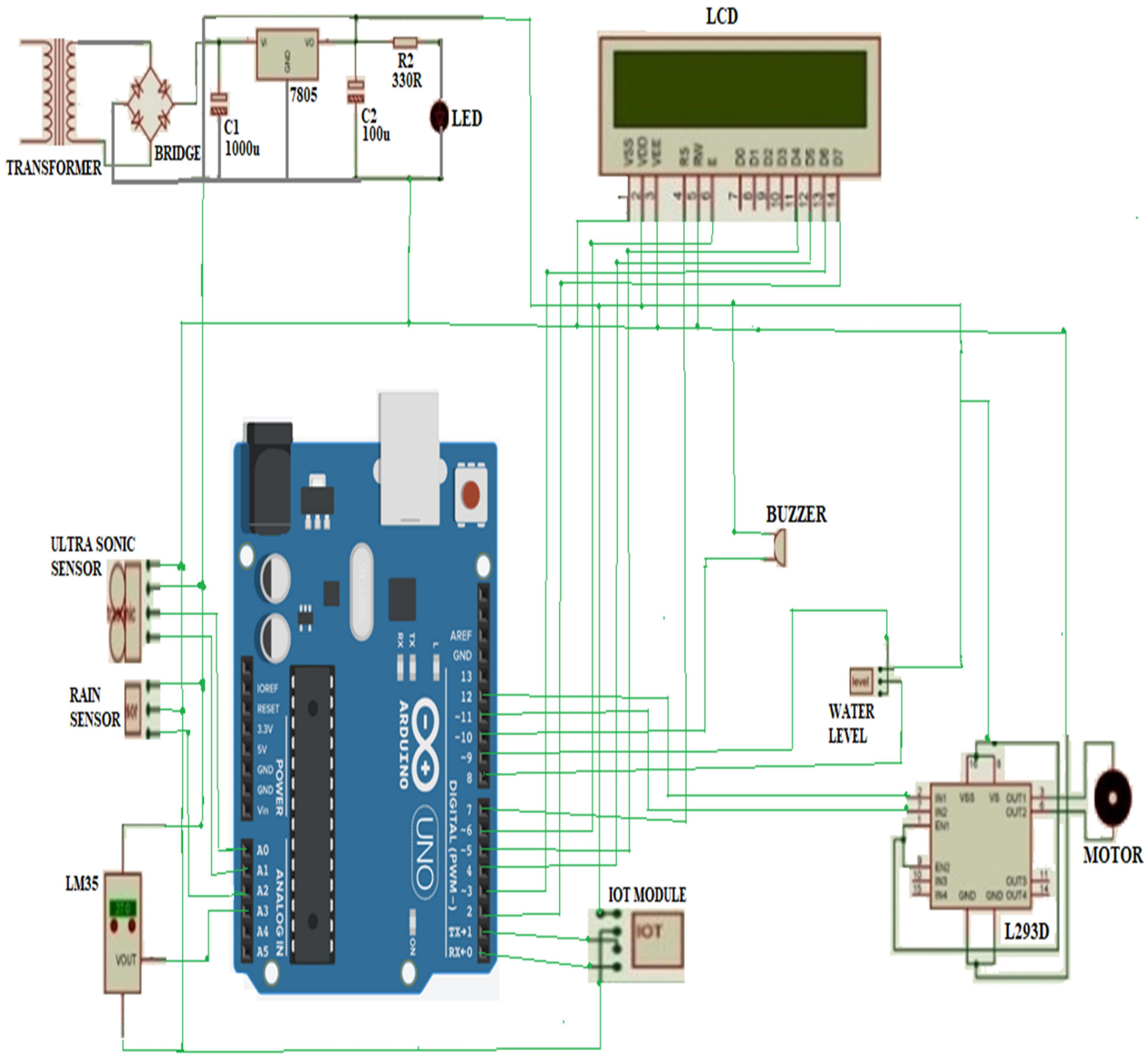


Fig 5.1 : Circuit Diagram

5.2 EXPLANATION

In this IoT based Disaster Monitoring and Management System for Dams(IDMMSD), the transformer is connected to Bridge Rectifier and Bridge Rectifier is connected to capacitors and regulators. Buzzer is connected to digital pin 10 of arduino and power supply. Here three wires act as Water level sensor ,one wire is connected to VCC,other two wires are connected to 8 and 9 digital pins of Arduino. Temperature sensor is connected to VCC , gnd to ground and analog output to arduino pin A3. Ultrasonic sensor is connected VCC to power supply, GND to ground, trig to A0 pin and echo to A1 pin of arduino. Rain fall sensor is VCC connected to Vcc , GND to ground and A2 pin of arduino. LCD pins(D4,D5,D6,D7) connected to arduino(5,4,3,2)digital pins and RS pin is connected digital pin 7, enable is connected to digital pin 6.r/w pin to the iot module. In the Iot module transmitter is connected to receiver of arduino and receiver to transmitter of arduino. DC Motor is connected to motor driver and motor driver is connected to digital pins 11,12 of arduino and power supply.

5.3 WORKING :

Here first after giving power supply ,we check the wifi availability and it replies back with ok signal.here we are sending string arguments and length of data that are sent next to wifi.here we are using serial communication with baud rate 9600.lcd initialized with title “DISASTER MANAGEMENT SYSTEM”.Here by giving AT command CIPMUX gives ip address of iot module ,once its confirmed we connect it to port number 23.and connection is establised with a message displayed on lcd as “CONNECTED”. Intially we have doors closed ,motors off ,buttonState and buttonState1 water levels are off and buzzer is also off.First, we will check buttonState is high or buttonState1 is high and accordingly if its buttonstate the motor1 will be low and motor2 will be high and thus we will close the dam and if its buttonState1 the motor1 will be high and motor2 will be low and thus we will we will open the dam gate.Here using Ultra sonic sensor we will give trigger input and wait until the echo is reached .

Based on the time taken distance is calculated in terms of inches .If the inches is less than 3 the gates are closed or if inches is greater than 7 the the gates are opened and buzzer will be on. .Next we will read Temperature sensor analog value as sensor1Value. It will display as “TEMP=sensor1Value”.If the sensor1value>250 the “Temperature is HIGH” is displayed on LCD and app.After we will read Rain sensor value in analog form as sensor2Value and its value is displayed on LCD as “Rain=sensor2Value”. If the sensor2value<800 “ITS RAINING” is displayed on lcd and app.And the process repeats again from reading water level sensor state.

CHAPTER 6

SOFTWARE SECTION

6.1 SOFTWARE USED

6.1.1 ARDUINO INTEGRATED DEVELOPMENT ENVIRONMENT (IDE)

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 series of menus. It connects to the Arduino and Genuino hardware to upload programs and communicate with them.

6.1.2 WRITING SKETCHES

Programs written using Arduino Software (IDE) are called sketches. These sketches are written in the text editor and are saved with the file extension ino. the editor has features for cutting/pasting and for searching/replacing text. The message area gives feedback while saving and exporting and also displays errors. The console displays text output by the Arduino Software (IDE), including complete error messages and other information. The bottom right hand corner of the window displays the configured board and serial port. The toolbar buttons allow you to verify and upload programs, create, open, and save sketches, and open the serial monitor.

NB: Versions of the Arduino Software (IDE) prior to 1.0 saved sketches with the extension .pde. It is possible to open these files with version 1.0, you will be prompted to save the sketch with the .ino extension on save.

FILE

- New

  Creates a new instance of the editor, with the bare minimum structure of a sketch already in place.
- Open

  Allows to load a sketch file browsing through the computer drives and folders.
- OpenRecent

  Provides a short list of the most recent sketches, ready to be opened.

EDIT

- Undo/Redo

  Goes back of one or more steps you did while editing; when you go back, you may go forward with Redo.
- Cut

  Removes the selected text from the editor and places it into the clipboard.
- Copy

  Duplicates the selected text in the editor and places it into the clipboard.

SKETCH

- Verify/Compile

  Checks your sketch for errors compiling it; it will report memory usage for code and variables in the console area.

  Upload
  Compiles and loads the binary file onto the configured board through the configured Port

- UploadUsingProgrammer

  This will overwrite the bootloader on the board; you will need to use Tools > Burn Bootloader to restore it and be able to Upload to USB serial port again. However, it allows you to use the full capacity of the Flash memory for your sketch. Please note that this command will NOT burn the fuses. To do so a Tools -> Burn Bootloader command must be executed.

- ExportCompiledBinary

  Saves a .hex file that may be kept as archive or sent to the board using other tools.

- ShowSketchFolder

  Opens the current sketch folder.

- IncludeLibrary

  Adds a library to your sketch by inserting #include statements at the start of your code. For more details, see libraries below. Additionally, from this menu item you can access the Library Manager and import new libraries from .zip files.

- AddFile...

  Adds a source file to the sketch (it will be copied from its current location). The new file appears in a new tab in the sketch window. Files can be removed from the sketch using the tab menu accessible clicking on the small triangle icon below the serial monitor one on the right side o the toolbar.

6.1.3 SKETCH BOOK

- The Arduino Software (IDE) uses the concept of a sketchbook: a standard place to store your programs (or sketches). The sketches in your sketchbook can be opened from the File >Sketchbook menu or from the Open button on the toolbar. The first time you run the Arduino software, it will automatically create a directory for your sketchbook. You can view or change the location of the sketchbook location from with the Preferences dialog.
- Beginning with version 1.0, files are saved with a .ino file extension. Previous versions use the .pde extension. You may still open .pde named files in version 1.0 and later, the software will automatically rename the extension to .ino.
- Tabs, Multiple Files, and Compilation

- Allows you to manage sketches with more than one file (each of which appears in its own tab). These can be normal Arduino code files (no visible extension), C files (.c extension), C++ files (.cpp), or header files (.h).

6.1.4 UPLOADING

- Before uploading your sketch, you need to select the correct items from the Tools > Board and Tools > Port menus. The boards are described below. On the Mac, the serial port is probably something like /dev/tty.usbmodem241 (for an Uno or Mega2560 or Leonardo) or /dev/tty.usbserial-1B1 (for a Duemilanove or earlier USB board), or /dev/tty.USA19QW1b1P1.1 (for a serial board connected with a Keyspan USB-to-Serial adapter). On Windows, it's probably COM1 or COM2 (for a serial board) or COM4, COM5, COM7, or higher (for a USB board) - to find out, you look for USB serial device in the ports section of the Windows Device Manager. On Linux, it should be /dev/ttyACMx , /dev/ttyUSBx or similar. Once you've selected the correct serial port and board, press the upload button in the toolbar or select the Upload item from the Sketch menu. Current Arduino boards will reset automatically and begin the upload. With older boards (pre-Diecimila) that lack auto-reset, you'll need to press the reset button on the board just before starting the upload. On most boards, you'll see the RX and TX LEDs blink as the sketch is uploaded. The Arduino Software (IDE) will display a message when the upload is complete, or show an error.
- When you upload a sketch, you're using the Arduino bootloader, a small program that has been loaded on to the microcontroller on your board. It allows you to upload code without using any additional hardware. The bootloader is active for a few seconds when the board resets; then it starts whichever sketch was most recently uploaded to the microcontroller. The bootloader will blink the on-board (pin 13) LED when it starts (i.e. when the board resets).

6.1.5 LIBRARIES

- Libraries provide extra functionality for use in sketches, e.g. working with hardware or manipulating data. To use a library in a sketch, select it from the Sketch > Import Library menu. This will insert one or more #include statements at the top of the sketch and compile the library with your sketch. Because libraries are uploaded to the board with your sketch, they increase the amount of space it takes up. If a sketch no longer needs a library, simply delete its #includestatements from the top of your code.
- There is a list of libraries in the reference. Some libraries are included with the Arduino software. Others can be downloaded from a variety of sources or through the Library Manager. Starting with version 1.0.5

of the IDE, you do can import a library from a zip file and use it in an open sketch. See these instructions for installing a third-party library.

- To write your own library, see this tutorial.
- Third-Party Hardware
- Support for third-party hardware can be added to the hardware directory of your sketchbook directory. Platforms installed there may include board definitions (which appear in the board menu), core libraries, bootloaders, and programmer definitions. To install, create the hardware directory, then unzip the third-party platform into its own sub-directory. (Don't use "arduino" as the sub-directory name or you'll override the built-in Arduino platform.) To uninstall, simply delete its directory.
- For details on creating packages for third-party hardware, see the Arduino IDE 1.5 3rd party Hardware specification.

6.1.6 SERIAL MONITOR

- Displays serial data being sent from the Arduino or Genuino board (USB or serial board). To send data to the board, enter text and click on the "send" button or press enter. Choose the baud rate from the drop-down that matches the rate passed to Serial.begin in your sketch. Note that on Windows, Mac or Linux, the Arduino or Genuino board will reset (rerun your sketch execution to the beginning) when you connect with the serial monitor.
- You can also talk to the board from Processing, Flash, MaxMSP, etc (see the interfacing page for details).

6.1.7 BOARDS

- The board selection has two effects: it sets the parameters (e.g. CPU speed and baud rate) used when compiling and uploading sketches; and sets and the file and fuse settings used by the burn bootloader command. Some of the board definitions differ only in the latter, so even if you've been uploading successfully with a particular selection you'll want to check it before burning the bootloader. You can find a comparison table between the various boards here.
- Arduino Software (IDE) includes the built in support for the boards in the following list, all based on the AVR Core. The Boards Manager included in the standard installation allows to add support for the growing number of new boards based on different cores like Arduino Due, Arduino Zero, Edison, Galileo and so on.

6.2 FLOW CHART AND EXPLANATION

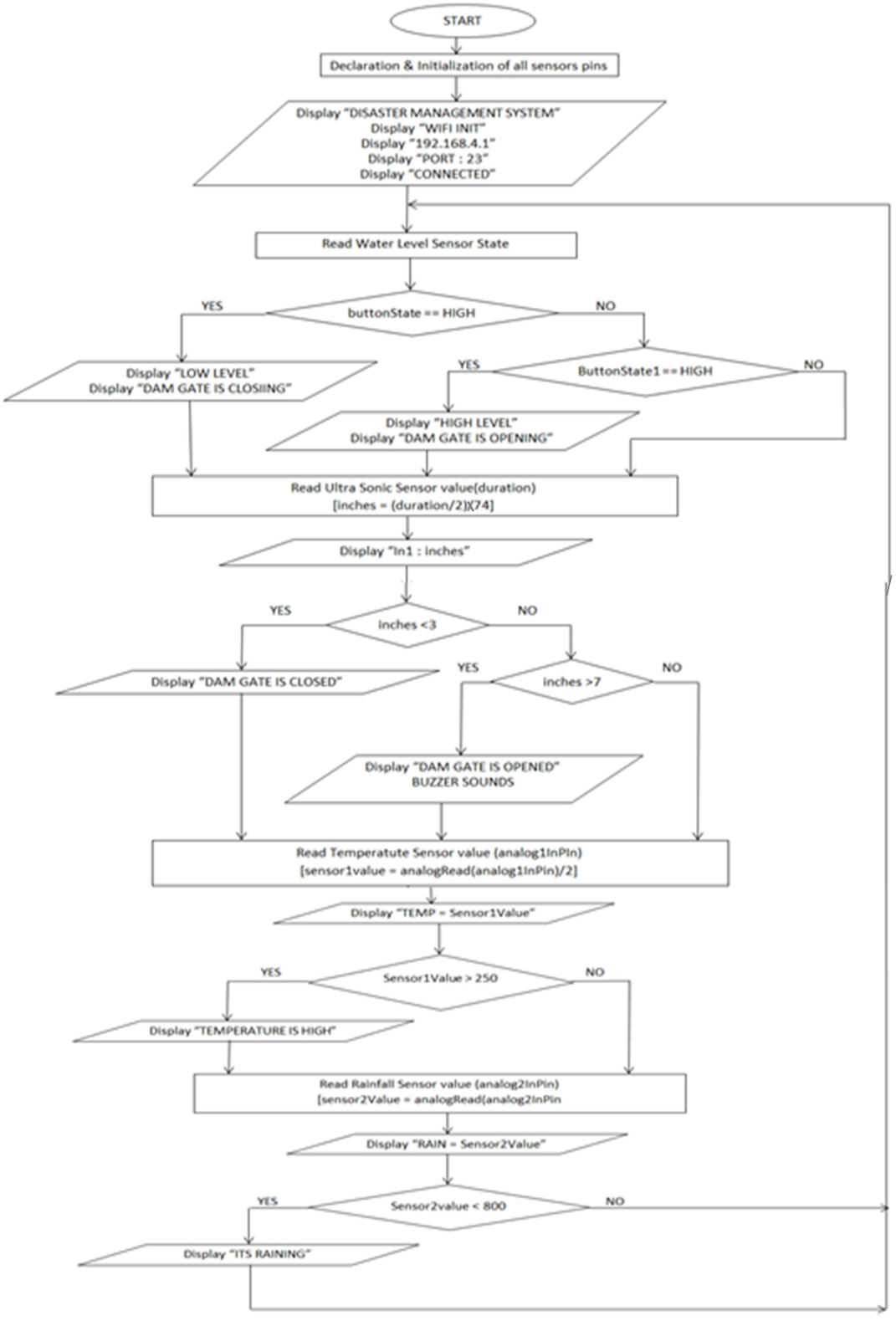


Fig : 6.1 Flow chart

6.2.1 EXPLANATION

- We will start the proposed system.
- We will Initialize and define all the required pins.
- Later we will Display on the LCD as “DISASTER MANAGEMENT” when system starts.“WIFI INIT” when we are initializing the wifi with app, “192.168.4.1” when we are giving the ip address of the app to connect, “Port:23” when we give port address to connect to the app, “CONNECTED” when iot module is connected to app.
- Later the propsed system will detect the water level sensor state.
- If the water level sensor “buttonState==HIGH” it will display on LCD as “LOW LEVEL” and “DAM GATE IS CLOSING”.
- If the water level sensor “buttonState1==HIGH”it will display on LCD as “HIGH LEVEL” and “DAM GATE IS OPENING”.
- Later the proposed system will detect the ultra sonic sensor value(duration) and calculate in terms of inches using a formula(inches=(duration/2)*74).
- After we will display on the LCD as “In1:inches” after calculation.
- If the calculated value is less than 3 inches it will display on LCD as “DAM GATE IS CLOSED” .
- Else If the calculated value is greater than 7 inches it will display on LCD as “DAM GATE IS OPENED” and buzzer will be on here.
- After the proposed system will detect the Temperature sensor value(analog1InPin) in terms of sensor1Value by the formula(sensor1Value=analogRead(analog1InPin)/2).
- Next we will display on the LCD as “TEMP = sensor1Value” after calculation.
- If the sensor1Value is greater than 250 it will display on LCD as “Temperature is HIGH” .
- Next we will detect the Rainfall sensor value(analog2InPin) in terms of sensor2Value by the formula(sensor2Value=analogRead(analog2InPin)).
- Next we will display on the LCD as “RAIN = sensor2Value” after calculation
- If the sensor2Value is lesser than 800 it will display on LCD as “ITS RAINING”.
- The process repeats again from calculating water level sensor states.

CHAPTER 7

RESULTS

RESULTS

After conducting the project "IoT based Disaster Monitoring and Management System for Dams(IDMMSD). The results are Displayed on LCD as follows

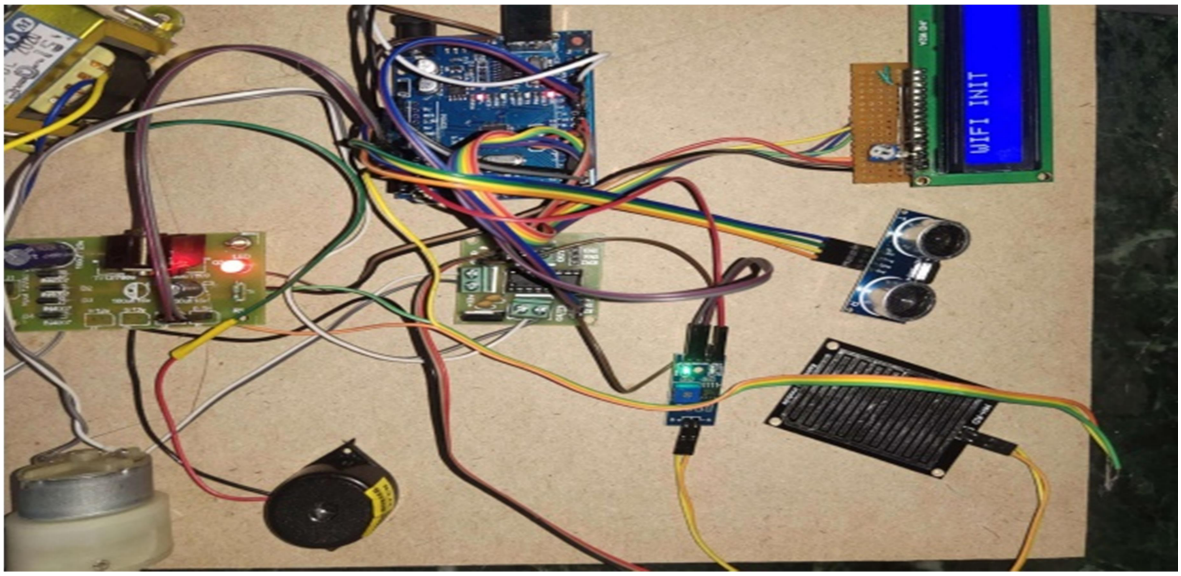


Fig 7.1 :WIFI INITIALIZATION DISPLAY

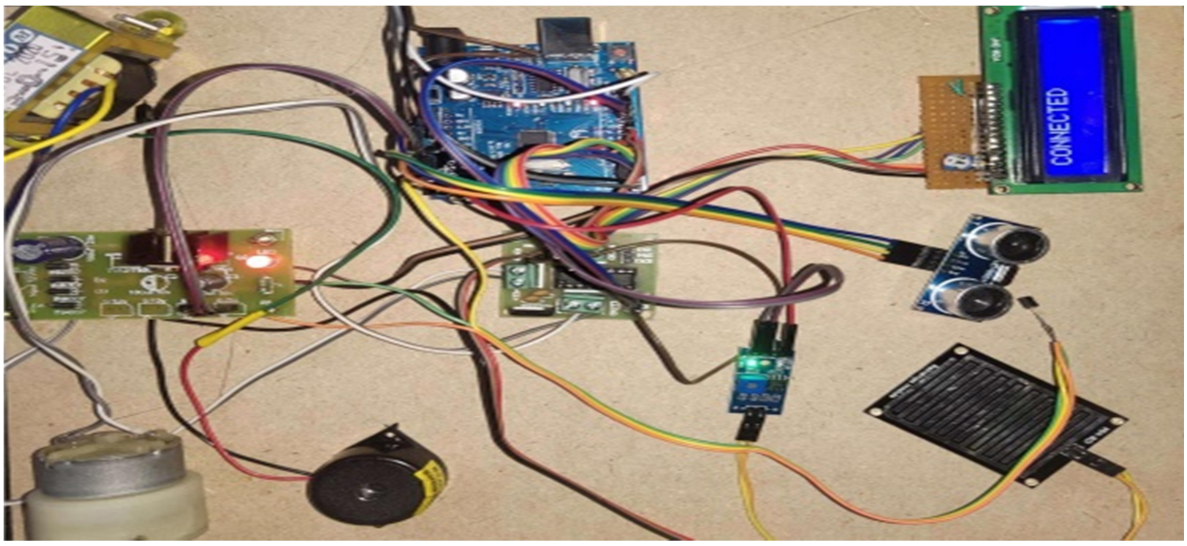


Fig 7.2 : CONNECTED MESSAGE DISPLAY

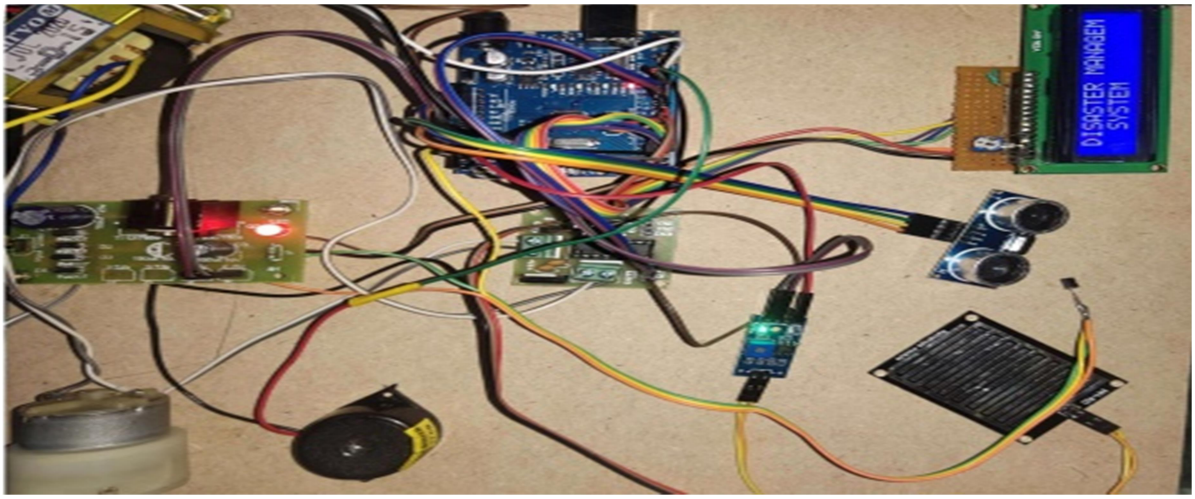


Fig 7.3 : TITLE DISPLAY

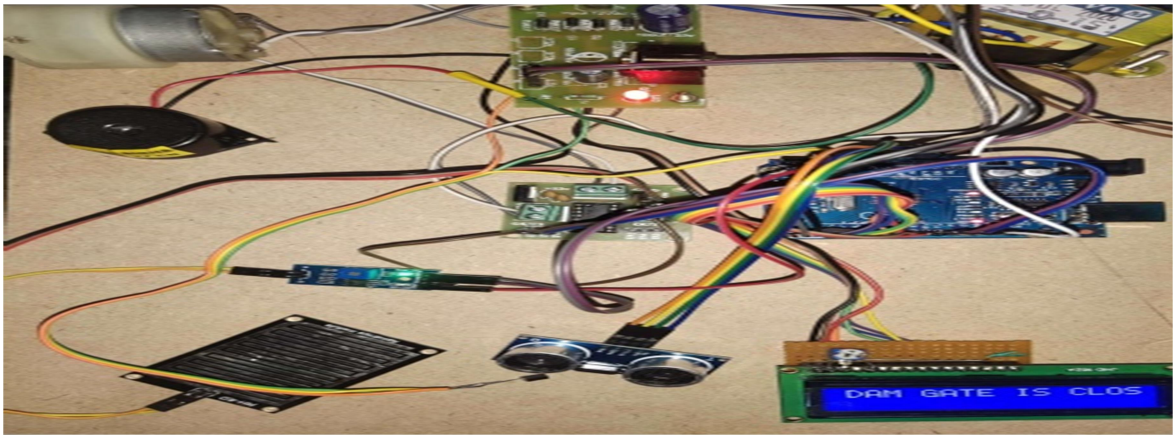


Fig 7.4 : WATER LEVEL SENSOR OUTPUT 1

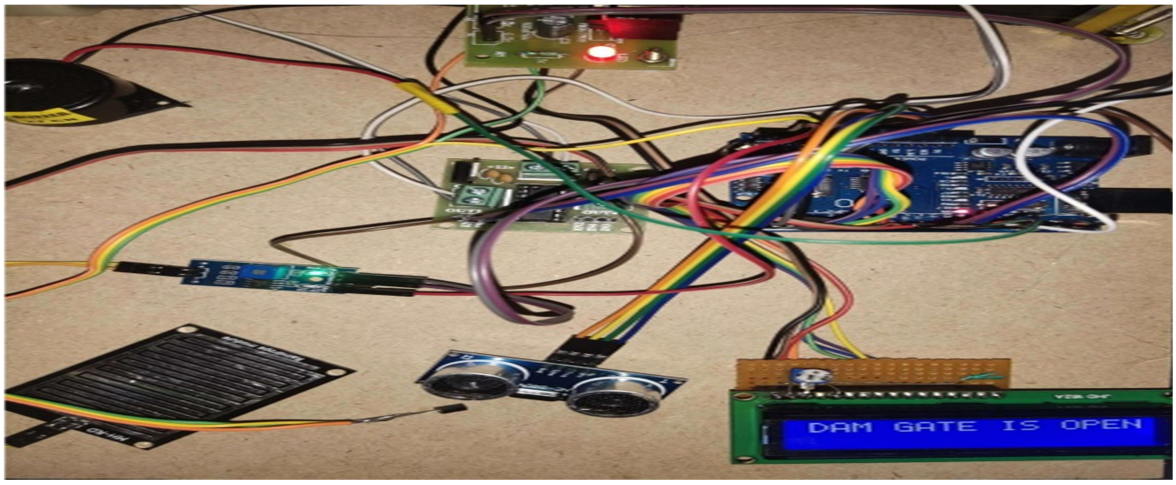


Fig 7.5 : WATER LEVEL SENSOR OUTPUT 2

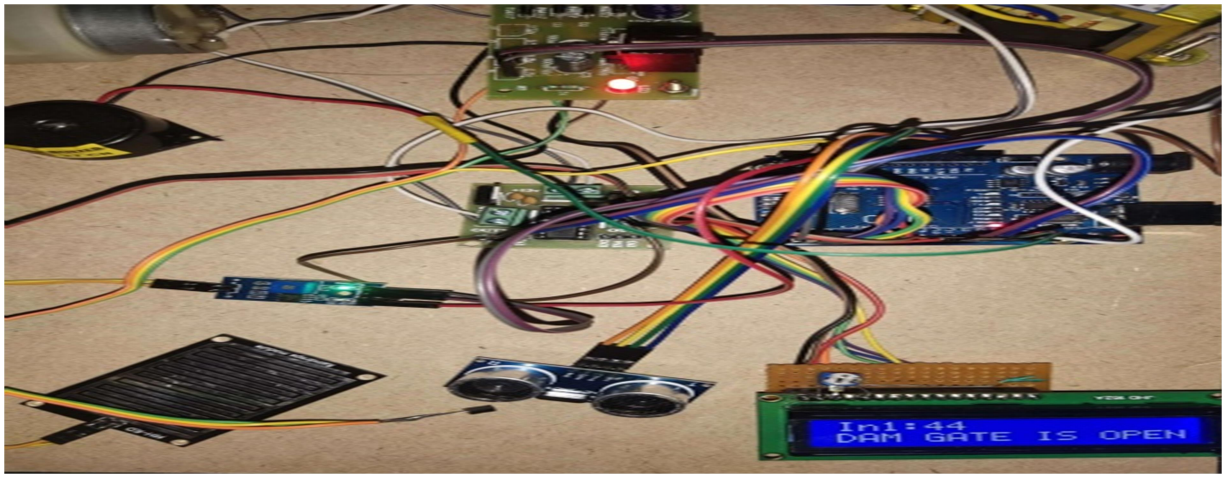


Fig 7.6 : ULTRASONIC SENSOR OUTPUT

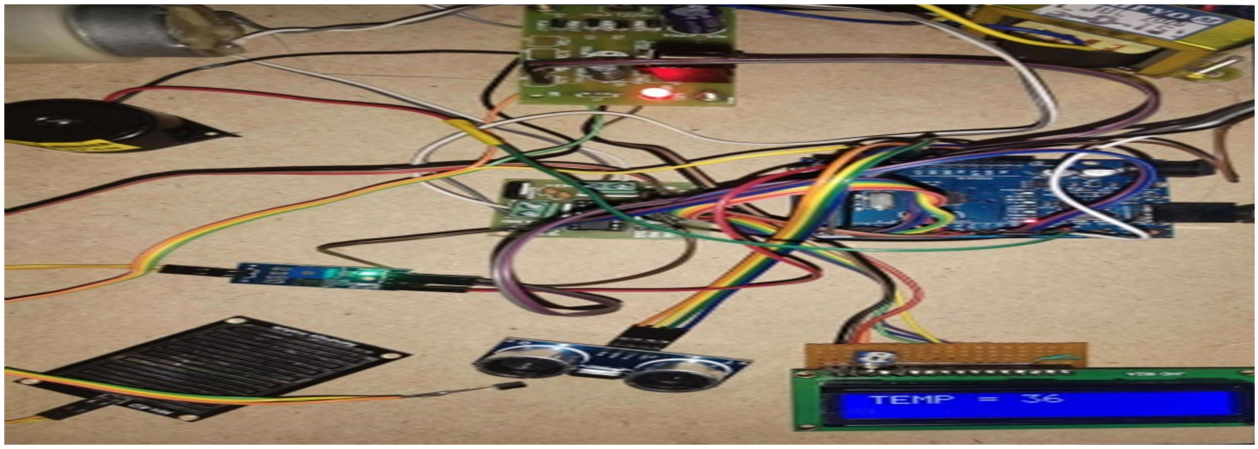


Fig 7.7 : TEMPERATURE SENSOR OUTPUT 1

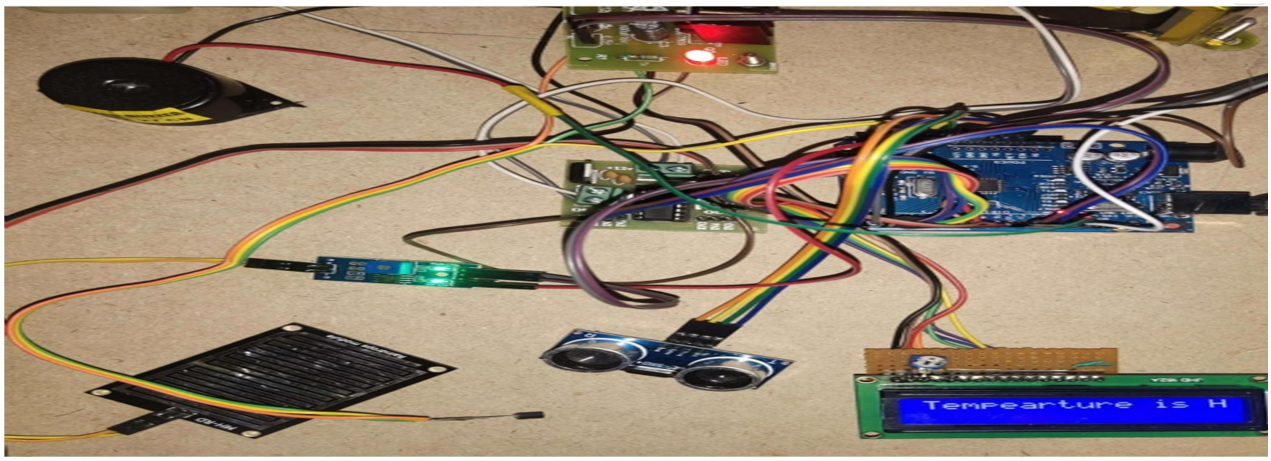


Fig 7.8 : TEMPERATURE SENSOR OUTPUT 2

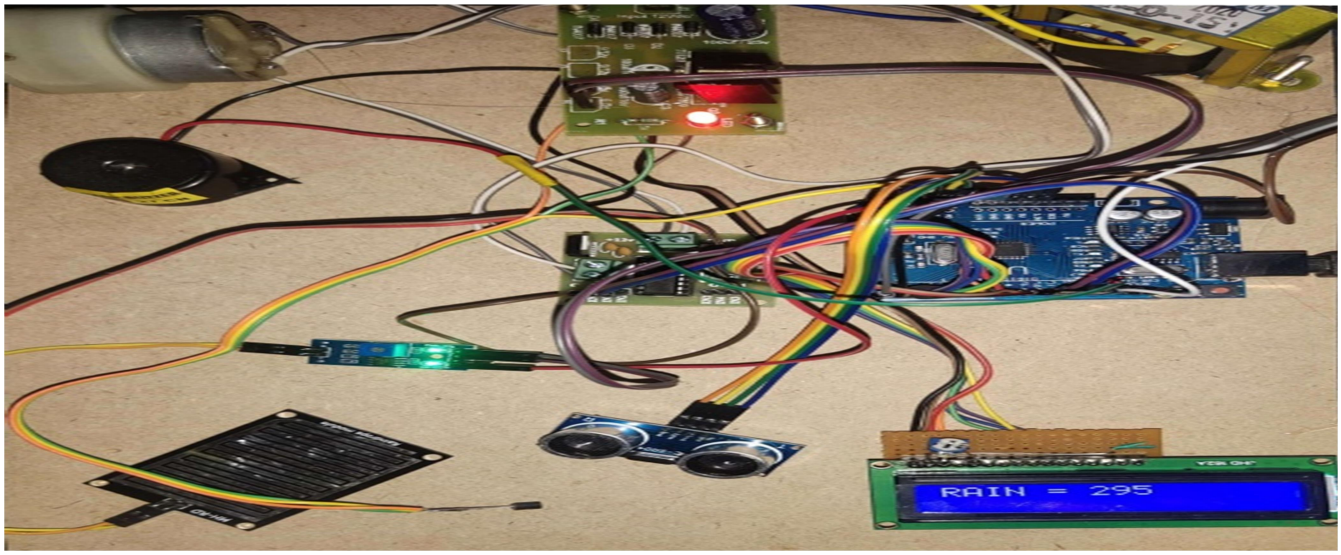


Fig 7.9 : RAIN FALL SENSOR OUTPUT 1

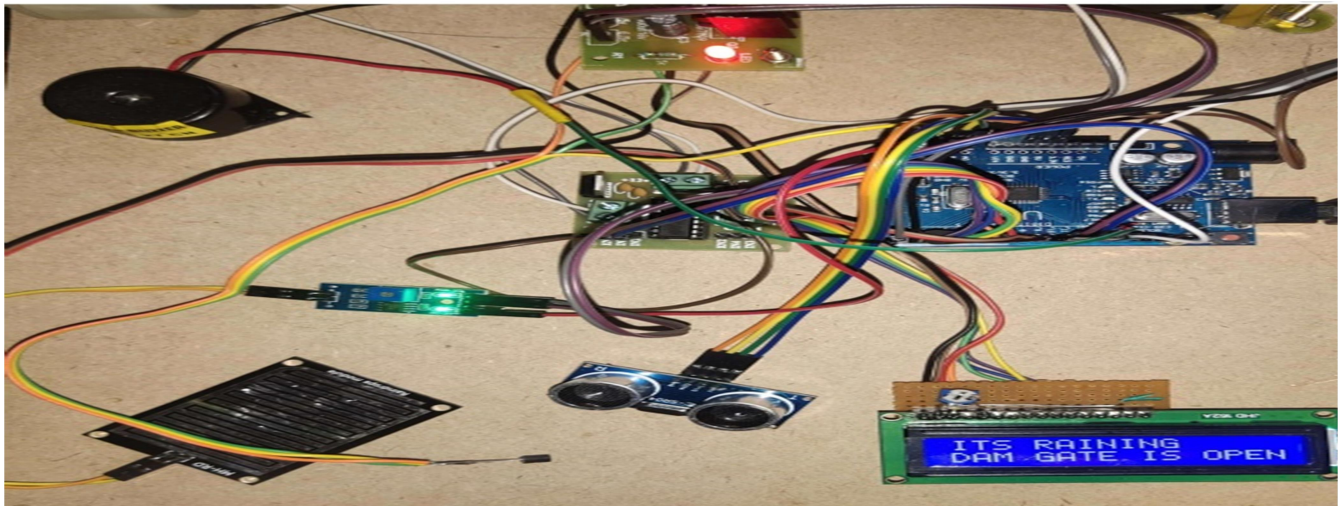


Fig 10 : RAIN FALL SENSOR OUTPUT 2

CHAPTER 8

ADVANTAGES & APPLICATIONS

8.1 ADVANTAGES

- By using this idea we can reduce the man power required at each and every dam. Since this is a fully automated project any kind of human activity can be avoided. So the possibility of faults has also decreased.

- During times of natural disaster like floods this method very helpful as we don't need any human to control near the actual site of the dam.

- The alarm given to the particular authorities can take the necessary steps and give instructions to the people.

8.2 APPLICATIONS

- The chances of the water level dropping below the threshold level for water pumping purposes gets higher. If this continues, the pump motor may get damaged due to dry running. This calls in irreversible business expenditure and losses. Hence, timely water level monitoring can actually save fortunes for a business. There are various situations where water level monitoring becomes mandatory.

- IoT solution for water level monitoring processes supports two-way communication. This enables a Water Utility Provider to not even just get the real-time data from sensors but also to control the devices installed (Valves, Pumps, etc.). This becomes a possibility as the IoT solutions come with a centralized dashboard on which one can follow all the important information required to carry out business operations without much hindrance.

- The farmhands frequently travel to silos, tanker or/and a reservoir located in different areas of the farm and manually gauge the instrumentation for identifying the water level. In order to be in sync with the silo, tanker or/and a reservoir status, the workforce collects data from the silos several times each day. This can be really exhausting for the workforce, but the pressure of meeting job demands can still make them work. This is where human error comes into the picture.

- They offer budget-friendly solutions for a variety of tank level monitoring applications. IoT water level monitoring is versatile and is often safer than traditional manual gauges and wired instrumentation. They are wireless control systems that successfully meet different challenges for tank level monitoring. Other technologies miss the potential to promote the required safety level and cannot address issues related to water level monitoring. IoT solutions can operate in remote locations.

CHAPTER 9

CONCLUSION & FUTURE SCOPE

9.1 CONCLUSION

Dams are of major importance,primarily because of their use for generating hydro electricity and irrigation purposes.This has resulted in the construction of a number of dams in potential areas over the years . As there lot of risk factors with existence of these dams. Mismanagement of these dams leads to disasters. So we need to monitor the dams and have a management system for dams.

So this proposed system gave the solution to the problems .In this project it will monitor the parameters continuously in real time.In this project it will automatically operate the gates using motors monitoring water levels using water level indicator.It will opens the gate,if the water level is high than normal level and it closes the gate if the water level is equal to or less than the normal level.Here we monitor the weather conditions like temperature of water using temperature sensor and update its information so that when it will report temperature of certain level which is greater than the normal level the authorities can take action it.Also conditions like rain and its intensity as it becomes a important aspect in monitoring of dams ,if it rains heavily there is a chance of overflow of water and can lead to floods.Which can take lives of so many people and destruction of lot of property .Using Rain fall sensor senses that it is raining or not , intensity of rain and updates its values continuously .Using ultrasonic sensor we detect the distance between gate and water level and updates its values continuously and decide whether to keep dam door close or open.

All this sensor values are updated in the app using IoT module.And results are displayed on LCD.So using this sensor nodes,smart controller ,and communication system ,we overcame the major disadvantages in the present existing system .And thus we can decrease the men require at each site of dams and decrease the man made mistakes .And also we can decrease the chance of losing lives of people ,at the time of disaster because using this proposed system we dont need any person to present at the actual site for controlling it .If the water levels go higher tthe alarm will ring , authorities will be informed and they take necessary actions required .And that makes our proposed system “IoT based Disaster Monitoring and Management system for Dams(IDMMSD)”.

9.2 FUTURE SCOPE

In the future we can add a device which can inform near by village people during Natural disasters through SMS.

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11) Daniel wu, Fakhreddine karray and Insop song," Water level control by fuzzy logic and neural networks", published in IEEE journal in July 2014.

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