A Mini Project Report on

FLOOD DETECTION SYSTEM

T.E. - I.T Engineering

Submitted By

Aashay Ingale	**21104009**
Sumit Gusain	**21104022**
Alok Gupta	**21104028**

Under The Guidance Of

Ms. Charul Singh

DEPARTMENT OF INFORMATION TECHNOLOGY

A.P. SHAH INSTITUTE OF TECHNOLOGY
G.B. Road, Kasarvadavali, Thane (W), Mumbai, 400615,
UNIVERSITY OF MUMBAI

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CERTIFICATE

This to certify that the Mini Project report on Flood Detection System has been submitted by Aashay Ingale (21104009), Sumit Gusain (21104022), Alok Gupta (21104028) who are a bonafide students of A. P. Shah Institute of Technology, Thane, Mumbai, as a partial fulfillment of the requirement for the degree in Information Technology, during the academic year 20232024 in the satisfactory manner as per the curriculum laid down by University of Mumbai.

Ms. Charul Singh
Guide

Dr. Kiran Deshpande
Head Department of Information Technology

Dr. Uttam D.Kolekar
Principal

External Examiner(s)
1.
2.

Place: A.P.Shah Institute of Technology, Thane
Date:

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CHAPTER 1

Introduction

Over the past few decades, science and technology have advanced dramatically in a number of ways. Our lives have been completely transformed by the industrial period we live in, and we have many modern conveniences. But the cost of industrial advancement has been high: global warming and other natural calamities like earthquakes and floods have increased. Furthermore, there is a tremendous loss of life and property as a result of these tragedies. Technology plays a critical role in the prompt detection and avoidance of floods. We have the ability to recognize impending disasters and make necessary preparations for them thanks to the privileges of modern technology.

The most common kind of natural disasters are floods, which happen when a water overflow submerges normally dry area. Heavy rains, quick snowmelt, storm surges from tropical cyclones, or tsunamis in coastal locations are frequently the cause of floods. Natural disasters occur all around the world and have an impact on national economies and quality of life for people. Agriculture is the backbone of every nation's economy and progress; thus, farmers are always on the lookout for ways to protect their crops from flooding when they receive the necessary signal. Floods have damaged property and cost a lot of money to both governments and people in the majority of the world's countries.

An effective flood response operation system is essential for managing all actions across several connected agencies during a flood. The modern world's technology is essential for promptly detecting and averting catastrophic events like floods. A solution to the aforementioned issue is suggested: we can avert natural disasters caused by floods with the help of an early flood related parameter monitoring and detection system and its avoidance utilizing the Arduino Uno project. The suggested methodology is heavily used to track the water level in reservoirs and dams. The measured values are frequently updated and disseminated, which is highly helpful in alerting authorities and individuals about floods so they can take immediate action.

Usually, flooding results from a water system's excess volume, such as a lake or river overflowing. Sometimes a dam bursts, dumping a tremendous amount of water all at once. As a result, some of the water seeps into the soil, "flooding" the area. Rivers involve the banks of the river in a station. In addition to the dearth of goods and real estate, sewage and bacteria from waste sites, chemical spills, and street infrastructure flood water all contribute to the subsequent spread of various diseases.

Predictions of flooding require data such as:

The rate at which the river level is changing in real time, which could assist highlight how urgent and dangerous this issue is. Knowing the characteristics of the storm that is producing the moisture, such as its duration, intensity, and area covered, is important for estimating the possible severity of the flood. The technology notifies the villages and places that may be impacted by floods and estimates how long it will take for flooding to occur in a certain area when it detects flooding conditions. In order to give people enough time to evacuate, the system also estimates how long it will take for the water to reach them.

CHAPTER 2

Review of Literature

Sr.no	Title	Author(s)	Year	Outcomes	Methodology	Result
1	Flood monitoring and alerting system.	Kiran Seth, Jhumpa Desai, Roy Naidu	2023	This system gave an perfect idea about the water level present in the water body with the help of Water level sensor and displaying it on LED display and alerting the danger with the help of buzzer sensor.	Experimental	Flood monitoring and alerting system based on sensors was successfully designed and developed.
2	Flood detection and water monitoring system using sensor	Anand Sen, Pratap Sharma, Gaurav Sukla, Preeti Rai.	2024	This system gave an perfect idea about the water level present in the river with the help of LED lights and LED display.	Experimental	Sensors based flood monitoring and alerting system was successfully designed and implemented.
3	Flood monitoring and alerting system based on sensor.	Anita Nair, Sudha Mitra, Akshat Giri.	2022	This system gave an perfect idea about the water level present in the Dam with the help of Ultrasonic sensor displaying on LED display	Experimental	Flood detection and water monitoring system using sensors was successfully developed.

CHAPTER 3

Problem Statement

The most common kind of natural disasters are floods, which happen when a water overflow submerges normally dry area. Heavy rains, quick snowmelt, storm surges from tropical cyclones, or tsunamis in coastal locations are frequently the cause of floods. Natural disasters occur all around the world and have an impact on national economies and quality of life for people. Floods generate significant losses in both human life and resources, which may have an adverse effect on the nation's economy. Therefore, creating a flood warning system is crucial to averting all of this damage.

a.Motivation

The design of a flood detection system is an essential technique for mitigating floods. This suggested system will be used to remotely monitor and warn the public about the present flood conditions. It will do this by continuously measuring the water level, comparing the reading from rainfall to the current water level status The primary goal of this system's development is to lessen the issues brought on by flooding. Floods have a significant simultaneous impact on human lives and resources. The nation's economy declines as a result of this situation. The system that will detect and monitor the danger of flooding is a crucial duty to reduce these losses.

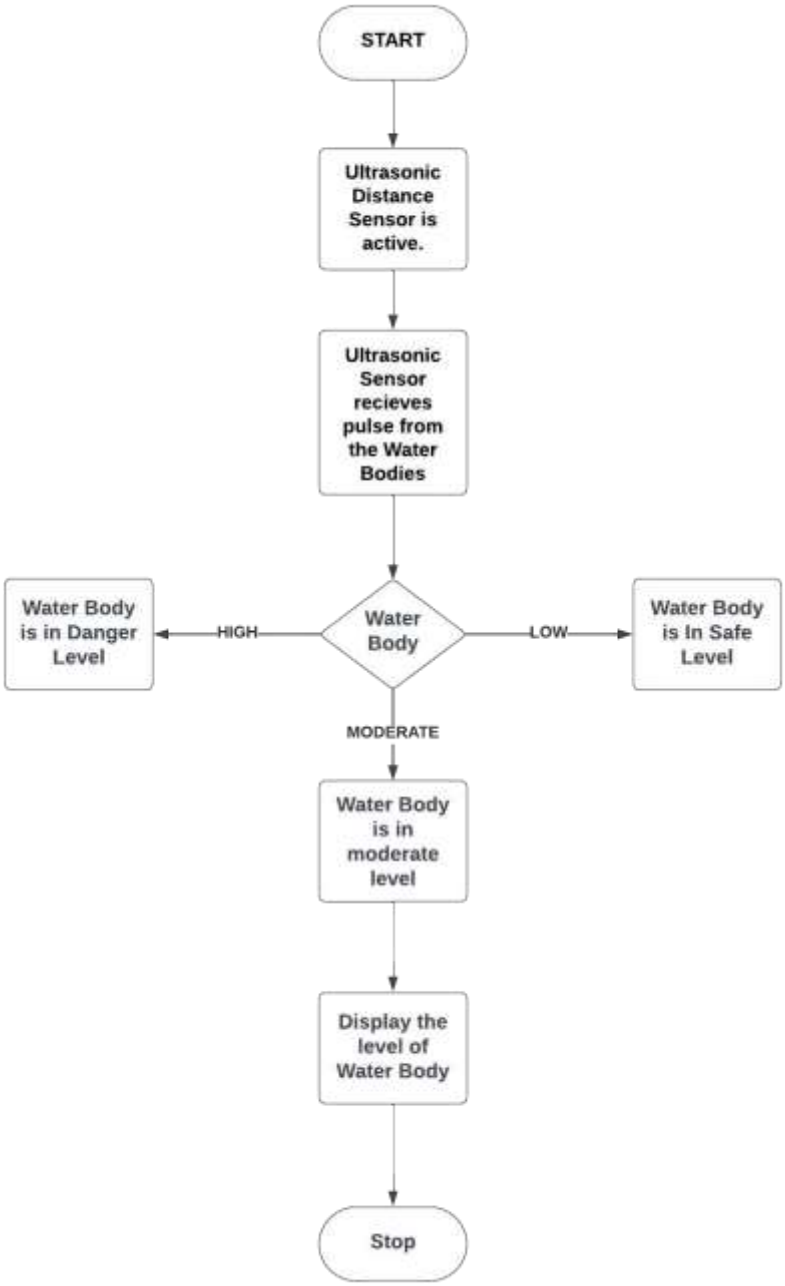
b.Objectives

- To create a system for monitoring and notifying floods.
- To create a flood detection system with a variety of sensors and technologies.
- To keep an eye on the dam's or water reservoirs' rising water levels.
- To lessen losses in regions vulnerable to flooding.
- To prevent the dissemination of incorrect information about floods.
- To offer a dependable and accurate alerting system.
- To design a model which will alert the current flood situation with the help of LCD Display.

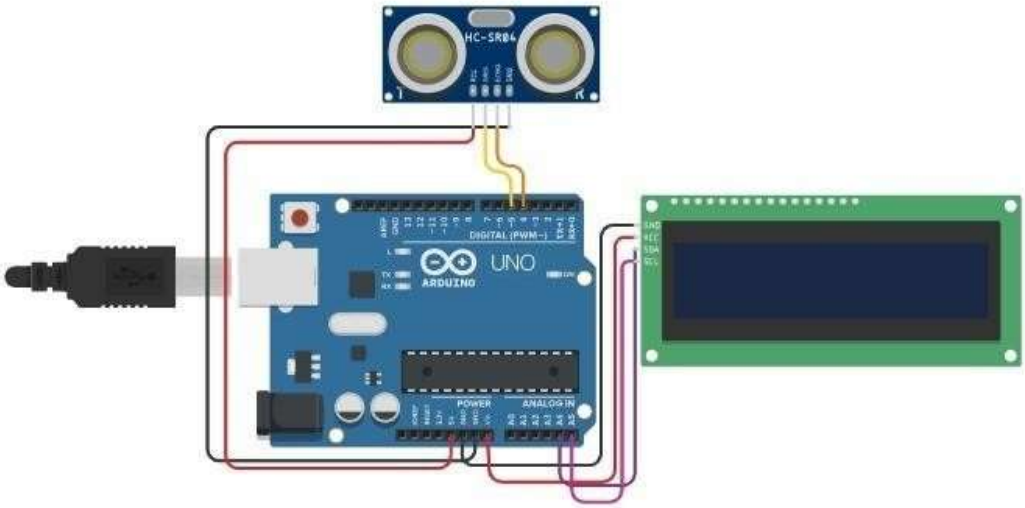
CHAPTER 4

System Architecture

a. State Diagram/Workflow



b. Circuit Diagram:



CHAPTER 5

Project Timeline

Sr.no	Group members	Time Duration	Work to be done
1	Aashay Ingale Sumit Gusain Alok Gupta	3rd and 4th week of January.	Topic finalization and requirements gathering.
2	Aashay Ingale Sumit Gusain Alok Gupta	1st and 2nd week of February.	Implementing the circuit design on software.
3	Aashay Ingale Sumit Gusain Alok Gupta	End of February and 1st week of March.	Connecting the components.
4	Aashay Ingale Sumit Gusain Alok Gupta	By the end of March.	Final testing and resolving issues if any.

CHAPTER 6

Implementation

a. Hardware and Software Requirements

- Arduino UNO R3:

  Arduino UNO is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header and a reset button.

- Water level sensor/ HC-SR04 Ultrasonic sensor:

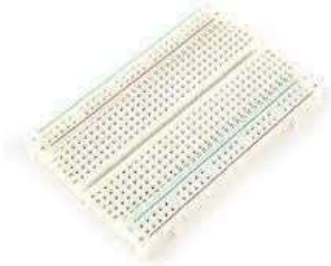
  An ultrasonic sensor is an instrument that measures the distance to an object using ultrasonic sound waves. An ultrasonic sensor uses a transducer to send and receive ultrasonic pulses that relay back information about an object's proximity.

- 16 x 2 LCD display (I2C):

  The 16×2 LCD (I2C) display is a very basic module commonly used in DIYs and circuits. The 16×2 translates o a display 16 characters per line in 2 such lines.

- Breadboard.

  A breadboard (sometimes called a plug block) is used for building temporary circuits. It is useful to designers because it allows components to be removed and replaced easily.



- Jumper wires (M-F, M-M each 10 pcs).

  Jumper cables is a smaller and more bendable corrugated cable which is used to connect antennas and other components to network cabling.

- USB cable:

  USB connector is designed for USB peripherals, such as printer, upstream port on hub, or other larger peripheral devices.

- Arduino IDE (Software Requirements)

  The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino hardware to upload programs and communicate with them.

Hardware	Quantity	Price
Arduino Uno	1	Rs.635 /-
HC-SR04 Ultrasonic sensor	1	Rs.130 /-
16 x 2 LCD display.	1	Rs.270 /-
Breadboard	1	Rs.100 /-
Jumper wires	10-20	Rs.100/-
USB cable (B-type)	1	Rs.150 /-
Total		**Rs.1385 /-**

b. Principle and Working of project.

Step 1: Set up the Hardware:

a. Connect the VCC pin of the ultrasonic sensor to the 5V pin on the Arduino.

b. Connect the GND pin of the ultrasonic sensor to the GND pin on the Arduino.

c. Connect the TRIG pin of the ultrasonic sensor to digital pin 3 on the Arduino.

d. Connect the ECHO pin of the ultrasonic sensor to digital pin 4 on the Arduino.

e. Connect the SDA pin of the I2C LCD display to the A4 pin on the Arduino.

f. Connect the SCL pin of the I2C LCD display to the A5 pin on the Arduino.
g. Connect the VCC and GND pins of the I2C LCD display to the 5V and GND pins on the Arduino, respectively.

Step 2 Install Necessary Libraries:

a. Open the Arduino IDE on your computer.

b. Go to Sketch > Include Library > Manage Libraries.

c. Search for and install the "NewPing" library for the ultrasonic sensor.

d. Search for and install the "LiquidCrystal_I2C" library for the LCD display.

Step 3: Write the Arduino Code

```
#include <Wire.h>
#include <LiquidCrystal_I2C.h>

LiquidCrystal_I2C lcd(0x27,16,2);  // set the LCD address to 0x27 for a 16 chars and 2 line display

const int trigger = 5; const
int ecco = 4;

void setup() {
  lcd.init();                  // initialize the lcd    lcd.init();
  lcd.backlight();
pinMode(trigger, OUTPUT);
pinMode(ecco, INPUT);
  Serial.begin(9600);
lcd.setCursor(0,0);   lcd.print("
Water level=  ");
}
```

```
void loop() {    long duration,
distance ;   digitalWrite(trigger,
LOW);   delayMicroseconds(30);
digitalWrite(trigger, HIGH);
delayMicroseconds(10);
digitalWrite(trigger, LOW);   duration
= pulseIn(ecco, HIGH);   distance =
0.034*duration/2;



  Serial.print("Object is at ");
  Serial.print(distance);
Serial.println(" cm");

  lcd.setCursor(5,1);   lcd.print("              ");
lcd.setCursor(5,1);


  lcd.print(distance);
  delay(1500);

}
```

Step 4: Upload the Code to Arduino:

a. Connect your Arduino Uno R3 to your computer using a USB cable.

b. Select the correct board and port from the Tools menu in the Arduino IDE.

c. Click the Upload button in the Arduino IDE to upload the code to your Arduino board.

Step 5. Test the Project:

a. Once the code is uploaded successfully, the LCD display should show "Distance:" on the first row.

b. Move objects closer or farther from the ultrasonic sensor to see real-time distance measurements displayed on the LCD.

CHAPTER 7

Conclusion

As their name implies, disasters wreak havoc on property and lives indiscriminately throughout the world. In contrast to affluent nations, developing nations suffer from far more devastation and lack the necessary resources to cope with the aftermath of such disasters. So, by giving people time to protect their belongings and leave, awareness of the impending calamity could benefit everyone, but notably the poor world. It thus becomes imperative to design a flood detection system. This project emphasizes the potential to offer an alarm system that would mitigate the risk of flooding. Since advanced technology is integrated into the project, sensor data may be monitored from any location in the world. The system can be expanded to include more
sensors to produce more precise.

CHAPTER 8

Future Scope

The project's future scope includes the possibility that flooding may be correlated with rainfall intensity, or the height of the water layer that covers the ground over time. Therefore, research is being done and could potentially be applied to our current system to enable early flood monitoring and detection through the construction of a rainfall predicting sensor. More system development will enable us to anticipate events even more precisely and lower the number of false alarms. Furthermore, with additional adjustment, we will be able to forecast the extent to which the water level would affect the area surrounding the river bank, which will be important so that the local residents.

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