



FLOOD DETECTION AND INTIMATION

Prepared By:

Somya Rathi - 20BCE2323

Aryan Agrawal - 20BCE2876

Ishaan Rejra - 20BCE2847

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Prof. Krishnamoorthy A (Assistant professor Sr. Grade 1)

School of Computer Science and Engineering

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Abstract:

The purpose of this study is to develop a real-time flood monitoring and early warning system. Ultrasonic sensing techniques have become mature and are widely used in the various fields of engineering and basic science.

One advantage of ultrasonic sensing is its outstanding capability to probe inside objects non-destructively because ultrasound can propagate through any kinds of media including solids, liquids and gases.

This study focuses only on the water level detection and early warning system (via notification on phone) that alerts concerned agencies and individuals for a potential flood event.

The paper envisions helping flood-prone areas. Indeed, it is relevant and important as per needs for safety and welfare of the community.

Section 1:

1.1 Aim and Objective:

The Aim of this project is to develop a prototype that can sense the flood early and intimate us with whether the flood is coming or not.

We aim for a proper working project that can intimate us early about the flood in the flood prone areas and can save lives.

1.2 Introduction:

“Flood Detection and Intimation” is an intelligent system which keeps close watch over various natural factors to predict a flood, so we can embrace ourselves for caution, to minimise the damage caused by the flood.

To detect a flood the system observes various natural factors, which includes humidity, temperature, water level and flow level. To collect data of mentioned natural factors the system consists of different sensors which collects data for individual parameters.

For detecting changes in humidity and temperature the system has a DHT11 Digital Temperature Humidity Sensor. It is an advanced sensor module with consists of resistive humidity and temperature detection components. The system also consists of a HC-SR04 Ultrasonic Range Finder Distance Sensor. The Ultrasonic sensor works on the principle of SONAR and is designed to measure the distance using ultrasonic wave to determine the distance of an object from the sensor. All the sensors are connected to Arduino UNO, which processes and saves data.

Section 2:

2.1 Literature Survey:

Title	Author & year	Purpose	Methods/ technology used	Limitations/ gaps identified
Flood detector using Arduino	Roy Allan Santos, Ryan Richard Guadaña, Our Lady of Fatima University.2016	Flood is an unavoidable natural disaster in Metro Manila, Philippines, causing heavy flow of traffic and can also cause severe damage to properties and lives. For this reason, researchers created a flood detection system to monitor rising water in residential areas.	Ultrasonic Sensor, Arduino Yun, Flood sensor and microcontroller, solar power bank with 80,000 Ampere-Hour (mAh), LED, Camera	In the proposed system when the level of water goes below a certain limit, the HC-SR04 starts showing some irregular values of distance.
Survey on Flooding Detection System using Internet of Things	Mahendra Salunke, Nilesh Korade May 2017	This paper aims to realize the security requirement and security architecture of Internet of things technology for	Ultrasonic Flow-meter, Water Level Indicator, Rain sensor	In places like J&K, there are longer tunnels that are under construction, Panjal Railway Tunnel it is part of the USBRL Project having

		urban flooding prevention management system and discussed the demand and overall design of urban flooding prevention management system.		length 11.2 km long. The system will not be able to effectively calculate how much time will be required to fill tunnel so travelers get the information about flooding.
Flood detecting and alerting system	Tera.Shobhitha, Shaik.Abdul Shabbir,Vesapogu.Jyothi Priya , Sajja.Priyanka and Dr.Kalyanapu. Srinivas. 2022	The floods occurs due to the release of water from the dams but also the overflow of water from the manholes can also cause flood which affects the people who are living in that particular area. So the system that we are proposing can be implemented to both detection of flood from the dams as well as the over flooding of water from sewers.	Sensors,Microcontroller Node MCU,Ultrasound sensor, water level sensor, temperature and humidity sensor, flow level sensor.	We are using solar cells to provide cheaper source of power to the entire system, but the main drawback of the solar cells is that although solar energy can still be collected during cloudy and rainy days, the efficiency of the solar system drops and it uses a lot of space.

Flood Detection using Sensor Network and Notification via SMS and Public Network	Azizah suliman.2011	This paper focused on the development of the system which will determine the current water level by means of sensors and by using wireless sensor network will then provide notification via GSM modem. The system sends notification through popular social network like the Facebook and Twitters.	Water level sensor PIC16F877 A Radio frequency Global system communication mobile(GSM)	The most challenge in the SMS channel when the local people don't use mobile service. The language problem to the foreign people is also one of the major issue
A low cost flood early warning system for developed countries	Rizwan Hamid Randhawa, Rashid Mahmood,Tahir Ahmad	This paper introduces a novel approach towards designing a Computer Vision (CV) based low cost and self sustained intelligent flood early warning system named AquaEye	AquaEye uses commercial off the shelf components and open source web dashboard development tools. takes real time image of the water level on sites, computes	The design proves to be a simple and easy to develop low cost inundation alert system using readily available components but it cannot be used for complex situations

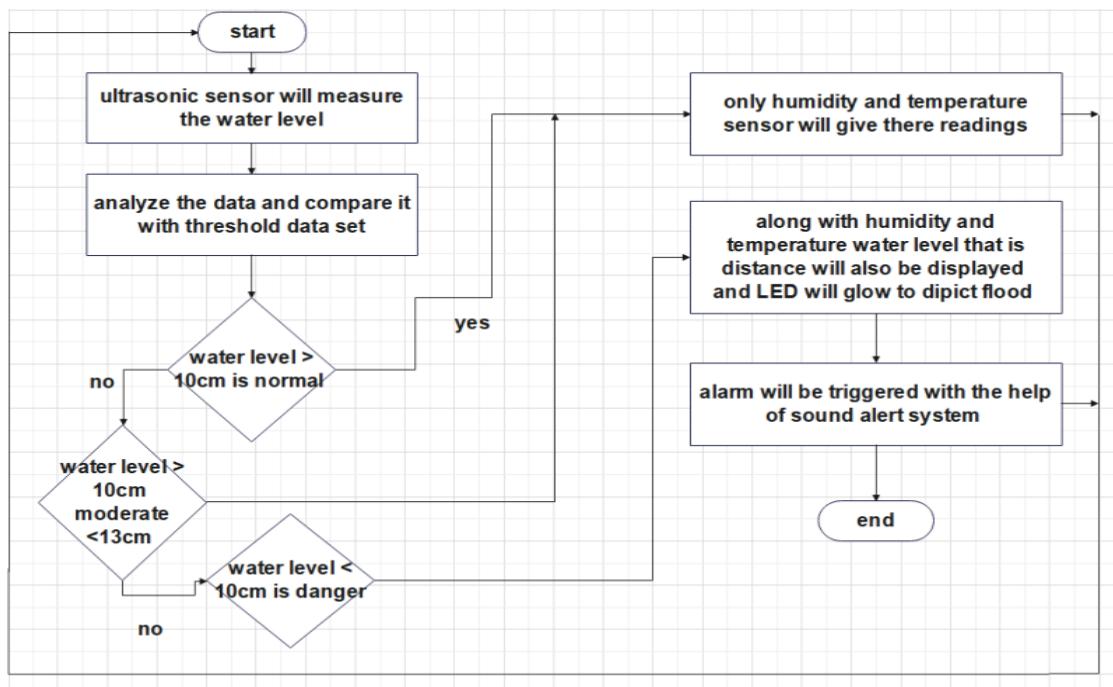
			it through a CV blobs detection technique. sends the water level telemetry encapsulat ed in an SMS to the main server	
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2.2 Proposed System:

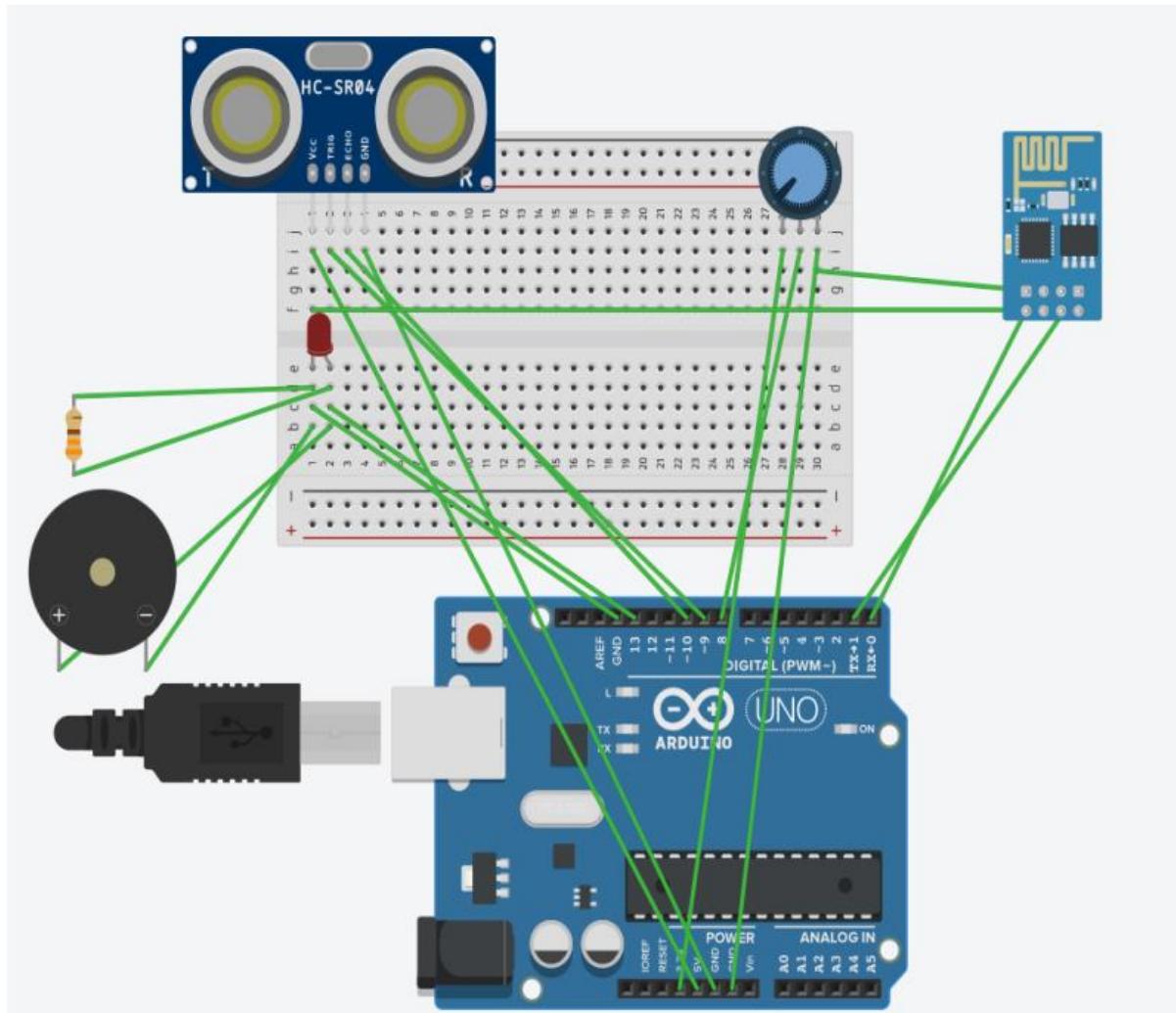
- 1) This project intends to provide a correlation between water level(distance), humidity, temperature, with the help of sensors like DHT 11, HC SR-04, LED, ALARM (sound alert), and intimates about the flood.
- 2) Also, it consists of a Buzzer system which is effective from a threshold of under 10cm and beeps when the object is at a distance less than 10cm.
- 3) If the ultrasonic sensor detects movement within its range, then an alarm is activated notifying danger ,that helps in early prediction of flood. And gives appropriate time to deal the situation in best possible manner.

Section 3:

3.1 Proposed system design architecture:



3.2 Architecture Explanation:



The system architecture is divided into five modules and the functioning of each module is described as below:

Module 1: Water Level Detection

This module concentrates on detecting the water level with the help of an ultrasonic sensor (HCSR04). It calculates distance using SONAR. Gives the information of the rise in water level above threshold.



0.3 CM

RESOLUTION



<15'

ANGLE



<2MA

CURRENT



2-450CM

DETECTION RANGE



- 1. VCC**
- 2. TRIG**
- 3. ECHO**
- 4. GND**

Module 2: Indicator Module

LED This module intimates the danger in the form of light signals (LED) whenever the reading goes over the threshold value. The LED turns high indicating danger.



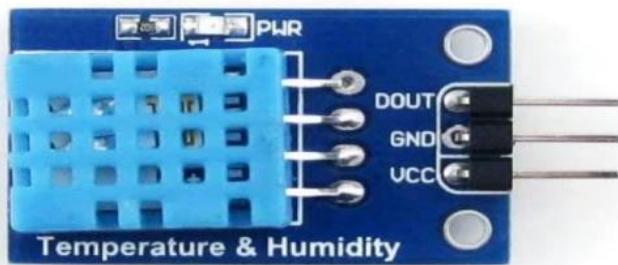
Module -3: Sound Alert-Buzzer

This module alerts the users in the form of sound. This happens whenever the reading goes above the specified threshold. The buzzer beeps continuously whenever the object crosses the specified threshold.



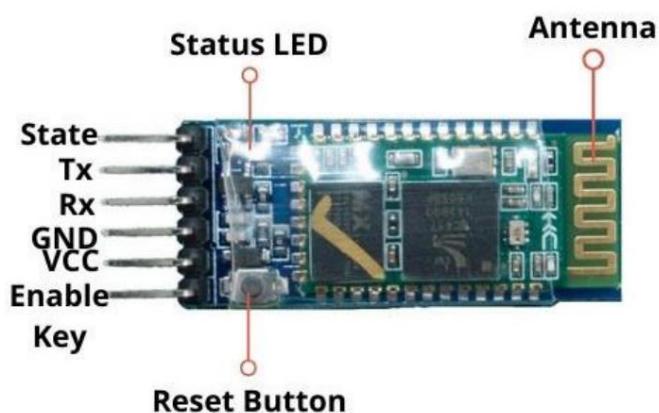
Module -4: Temperature and humidity sensor

With the help of DHT11 sensor temperature and humidity readings are extracted. This module correlates environmental factors such as temperature and humidity to predict the flood more accurately.



Module 5: Bluetooth Module

The Bluetooth module (HC-05) uses serial communication to communicate with other electronic devices such as cell phones on a base of wireless connection , so the date collected with the integration of all sensors is displayed in readable form on cell phone so that user understands the information and can act accordingly.



3.3 Arduino Code:

```
#include <dht.h>                                //Temprature and Humidity
Library
#define outPin 8                                //

const int trigPin = 9;
const int echoPin = 10;
const int led = 2;

long duration;
int distance;
int safetyDistance;

dht DHT;

void setup() {
    pinMode(trigPin, OUTPUT); // Sets the trigPin as an Output
    pinMode(echoPin, INPUT); // Sets the echoPin as an Input
    pinMode(led, OUTPUT);
    pinMode(13, OUTPUT);
    Serial.begin(9600);
}

void loop() {

    digitalWrite(trigPin, LOW);
    delayMicroseconds(2);
    // Sets the trigPin on HIGH state for 10 micro seconds
    digitalWrite(trigPin, HIGH);
    delayMicroseconds(10);
    digitalWrite(trigPin, LOW);
    // Reads the echoPin, returns the sound wave travel time in
    microseconds
    duration = pulseIn(echoPin, HIGH);
    // Calculating the distance
    distance = duration * 0.034 / 2;

    if (distance<10){
        digitalWrite(13, HIGH);
    }
    else {
```

```

digitalWrite(13, LOW);
}

int readData = DHT.read11(outPin);

float t = DHT.temperature; // Read temperature
float h = DHT.humidity; // Read humidity

// Prints the distance on the Serial Monitor
Serial.print("Distance: ");
Serial.println(distance);
Serial.print("Temperature = ");
Serial.print(t);
Serial.print("°C | ");
Serial.print((t*9.0)/5.0+32.0); // Convert celsius to fahrenheit
Serial.println("°F ");
Serial.print("Humidity = ");
Serial.print(h);
Serial.println("% ");
Serial.println("");
delay(3000); // wait two seconds
}

```

OUTPUT ON ARDUINO SCREEN:

```

Temperature = 27.00°C | 80.60°F
Humidity = 75.00%

Distance: 3
Temperature = 27.00°C | 80.60°F
Humidity = 75.00%

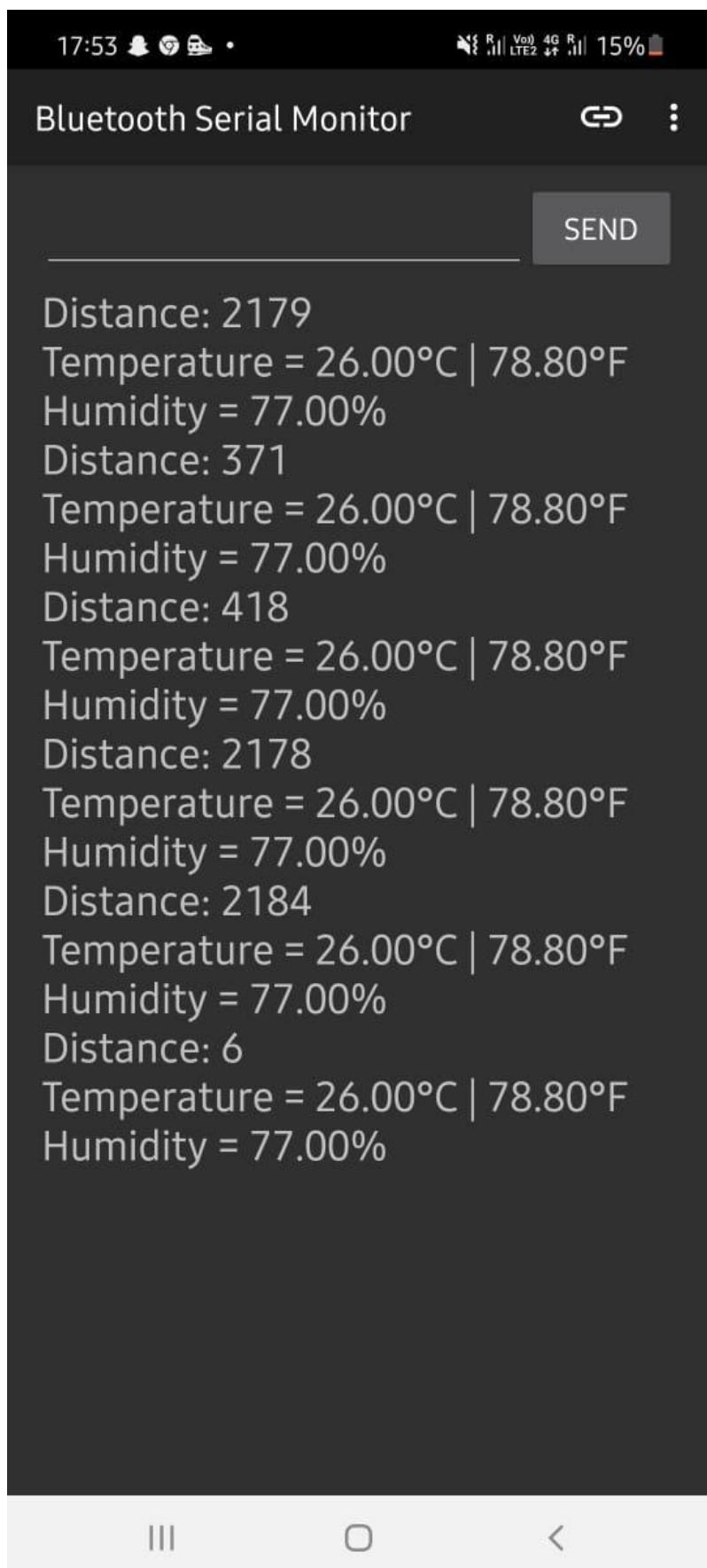
Distance: 4
Temperature = 27.00°C | 80.60°F
Humidity = 75.00%

Distance: 5
Temperature = 27.00°C | 80.60°F
Humidity = 75.00%

Distance: 6
Temperature = 27.00°C | 80.60°F
Humidity = 75.00%

```

Bluetooth Serial monitor:



Section 4:

4.1 Conclusion and Future Work:

Proposed arrangement used for “Flood Detection and Intimation” has a lot of potential applications especially in flood prone areas and where natural calamities like floods have caused huge losses in the past. This is an intelligent system that closely monitors many natural conditions to forecast a flood, allowing us to take precautions and limit the damage the flood does. This system can be implemented on a large scale in near future as it's a totally different concept and if it is made to implement properly with the help of the government- it can predict danger and save thousands, if not lakhs of lives by alerting of danger beforehand.

4.2 REFERENCES

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- [2] https://www.researchgate.net/profile/Kalyanapu-Srinivas-2/publication/359133552_FLOOD_DETECTING_AND_ALERTING_SYSTEM/link/s/6229a0b1a39db062db8ebc85/FLOOD-DETECTING-AND-ALERTING-SYSTEM
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