

FLOOD MONITORING AND EARLY WARNING using IoT

Phase 3 Submission document

Introduction:

Floods are natural disasters that can cause extensive damage to property, infrastructure, and loss of lives. Developing an effective Flood Monitoring and Early Warning System (FMEWS) is essential to minimize the impact of floods on communities and the environment.

This system aims to provide timely and accurate flood-related information to enable proactive decision-making, preparedness, and response by governments, emergency services, and affected communities.

The purpose of this project is to sense the water level in river beds and check if they are in normal condition. If they reach beyond the limit, then it alerts people through LED signals and buzzer sound. Also it alerts people through Sms and Emails alerts when the water level reaches beyond the limit.

Project description:

Floods are one of the most devastating natural disasters, causing loss of life, property damage, and disruption to communities. An integrated flood monitoring and early warning system is crucial for minimizing the impact of floods. This project aims to design and implement a comprehensive flood monitoring system that combines technology, data analysis, and community engagement to provide timely alerts and actionable information in the event of flooding.

Components:

Hardware components -

1. wifi module
2. Arduino uno
3. Breadboard- 400 tie points
4. 5mm LED(Green, Red, Orange) and Buzzer
5. 16x2 LCD Display
6. LM35 Temperature Sensor
7. HC-SR04 Ultrasonic Sensor
8. Some Jumper Wires
9. Male to Female Jumper Wires- 15 pcs
10. Male to Male Jumper Wires- 10 pcs
11. Female to Female Jumper Wires- 5 pcs

12. 9v Battery and Snap Connector
13. USB Cable Type B

Software components –

1. Arduino IDE
 2. Python 3.7 IDLE
 3. IoT Cloud
 4. Twilio SMS Messaging API
 5. Mailgun EMAIL Messaging API
- Software components

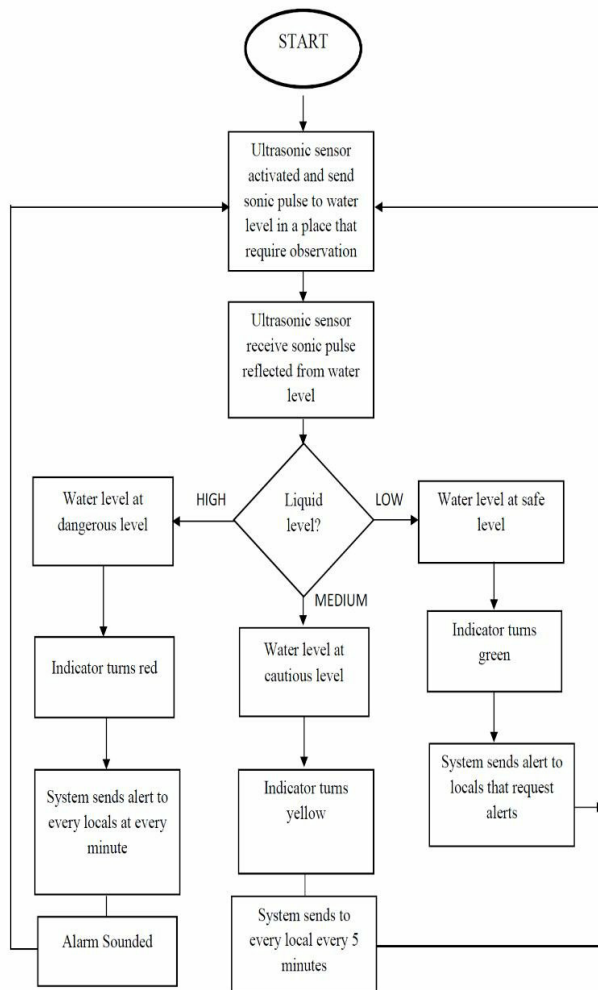
Working flow:

For doing the practical demonstration. First connect the USB cable type-B to the Laptop's USB slot for power supply. Also simultaneously run the python program (ie Main.py). Firstly the ultrasonic sensor will sense the water level in distance and then the arduino program will help to convert it into percentage. Also the sensed water level will be displayed on Lcd display (In Percentage) along with zone/area the water level is present. The full water tank/container is divided into 3 zones ie Green, Orange and Red. Now let's look into each zone.

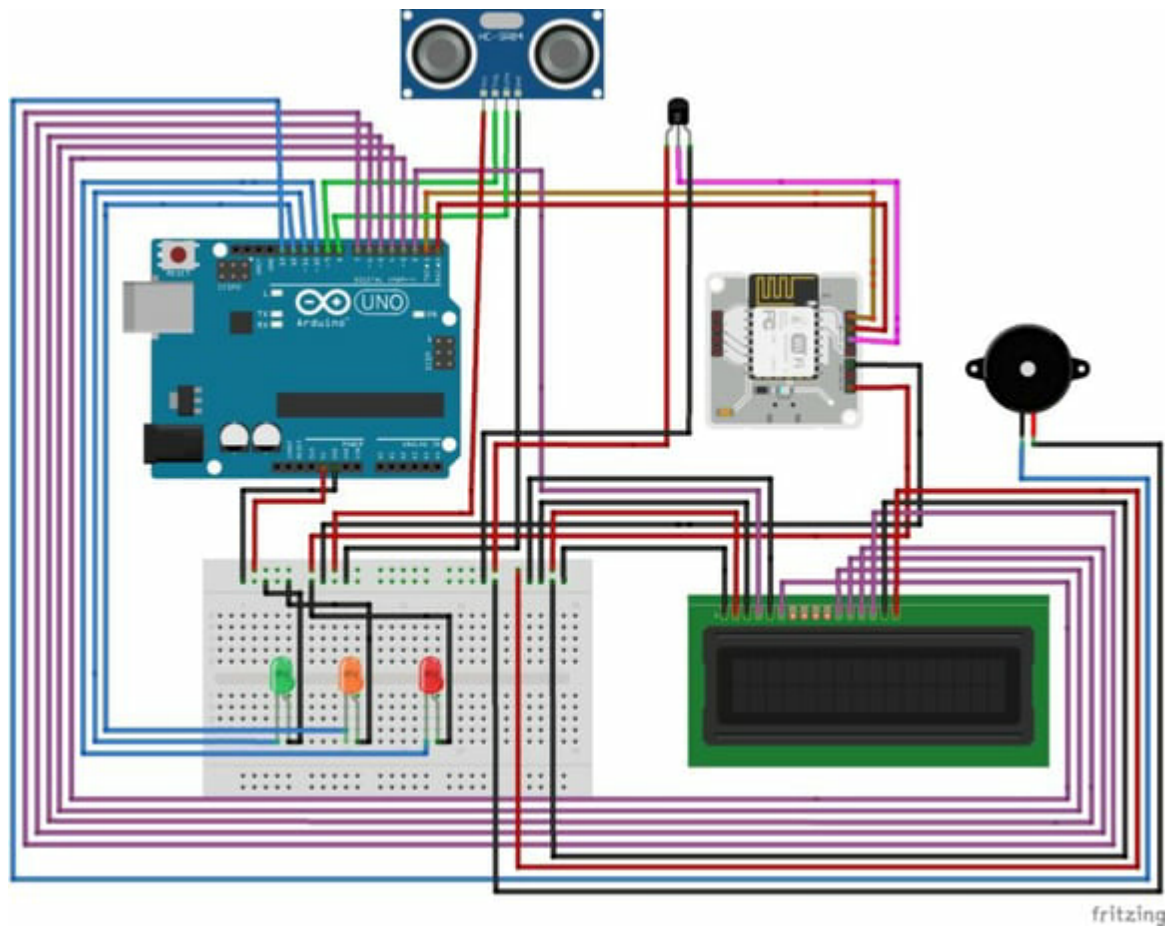
When water level is at Min/Normal level. That resembles 'Green Alert'. This means that water is at normal position and no sign about flood condition. Also green led will glow and it will also show green alert in Lcd display with water level.

When water level crosses the Intermediate level. That resembles 'Orange Alert'. This means that water has crossed the 55% mark and there can be chances of flood condition at that place. With increase in water level the system sends Sms and Email alerts to the authority or registered user from Twilio and Mailgun Services respectively. Also orange led will glow and buzzer will buzz. It will also show orange alert in Lcd display.

Flow Chart:



Circuit Diagram.



Program:

```

Int Distance=0;

long readUltrasonic Distance (int trigger pin,int echo pin)
{
    pinMode(trigger pin, OUTPUT);
    digitalWrite(trigger pin,LOW);
    delay(Microseconds(2));
    digitalWrite(trigger pin, HIGH);
    delay(Microseconds(10));
    digitalWrite(trigger pin,LOW);
    pinMode (echo pin, INPUT)
    return pulseIn(echo pin, HIGH);
}

void setu_p()
{
    pinMode (13, INPUT);

```

```

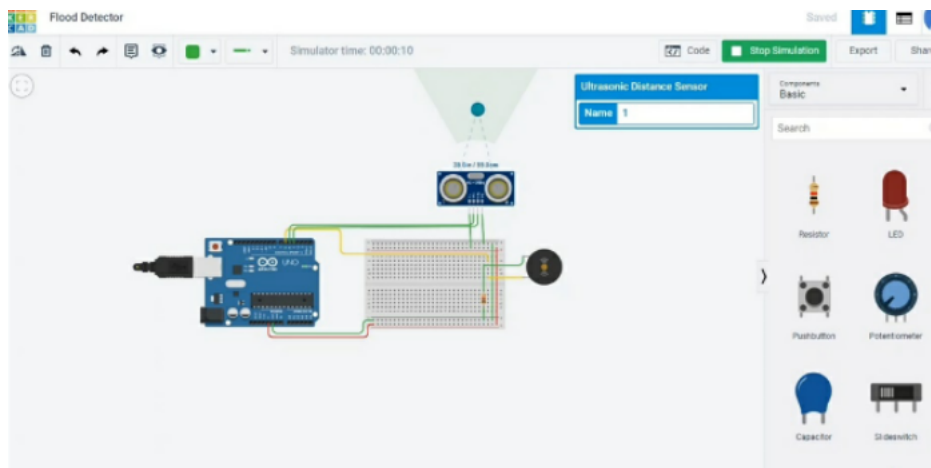
pinMode (12, OUTPUT);
pinMode (6, OUTPUT);
}

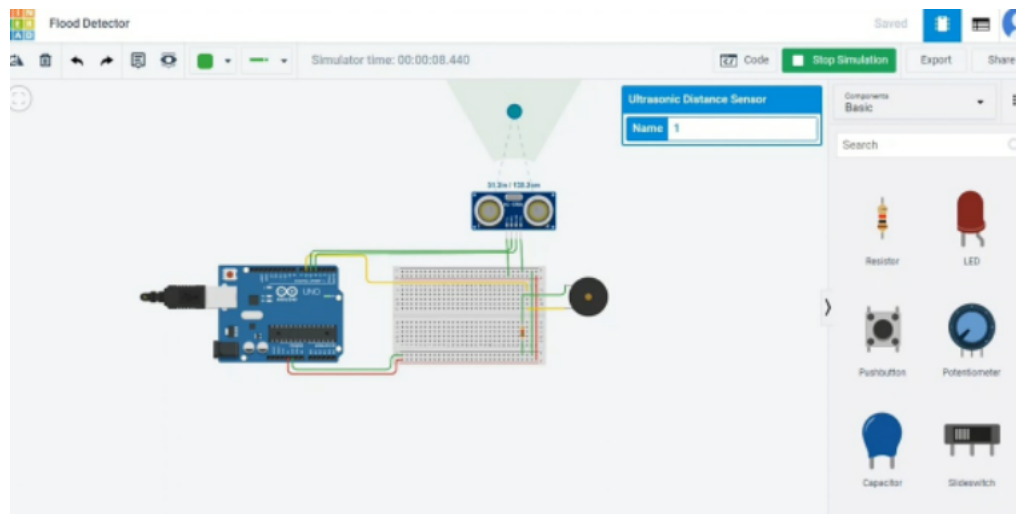
Void loop()
{
Distance=0.01723*readUltrasonic Distance(5,4);
if(Distance <= 100)
Tone(6,880,125);
Delay(125);
}

else
{
noTone(6);
}
}

```

Output:





Conclusion

In conclusion, flood monitoring and early warning systems play a critical role in mitigating the devastating impact of floods. By utilizing advanced technologies and real-time data, these systems can provide timely alerts and valuable information to both authorities and the public, allowing for better preparedness and response. However, their effectiveness relies on continuous improvements, community education, and government support to ensure that they are well-maintained and accessible to all vulnerable populations. It's imperative to recognize the importance of these systems in saving lives, protecting property, and reducing the overall socio-economic consequences of flooding.

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