FLOOD MONITORING AND EARLY WARNING

INNOVATION:

Innovations in flood monitoring and early warning system include advanced sensors networks, satellite imagery, AI algorithms for data analysis, and integration with mobile technology for real-time alerts to affected areas. Advance in machine learning also enhance predictive modeling for more accurate warning.

COMPONENTS:

Hardware components:

1.Bolt-IoT wi-fi module

2.Arduino uno

3.Breadboard- 400 tie points

4.5mm LED:(Green, Red, Orange) and Buzzer

5.16×2 LCD Display

6.LM35 Temperature Sensor

7.HC-SR04 Ultrasonic Sensor

8.Some Jumper Wires

Male to Female Jumper Wires- 15 pcs

Male to Male Jumper Wires- 10 pcs

Female to Female Jumper Wires- 5 pcs

9. 9v Battery and Snap Connector

10.USB Cable Type B

Software components:

1.Arduino IDE

2.Python 3.7 IDLE

3.Bolt IoT Cloud

4.Bolt IoT Android App

5. TWILLO SMS Messaging API

6. MAILGUN EMAIL Messaging API Software component

HAND TOOLS AND FABRICATION MACHINE

1.Electrical Tape

2.Green Cello Tape

HARDEWARE SETUP:

For Building this project we first configure the hardware connections. Then later on moving to the software part.

Steps involved in hardware setup:

Step 1:

Connecting 5v and GND of Arduino to the Breadboard for power connection to other components. Connecting 5v and GND of Arduino

Step 2:

Connecting LED’s

For Green LED:

VCC of Green color LED to Digital Pin ‘10’ of the Arduino.

GND of Green Color LED to the GND of Arduino.

For Orange LED:

VCC of Orange Color LED to Digital Pin ‘11’ of the Arduino.

GND of Orange Color LED to the GND of Arduino.

For Red LED:

VCC of Red Color LED to Digital Pin ‘12’ of the Arduino.

GND of Red Color LED to the GND of Arduino.

Step 3:

Connecting Buzzer

VCC of Buzzer to Digital Pin ‘13’ of the Arduino.

GND of Buzzer to the GND of Arduino.

Connecting Buzzer

Step 4:

Connecting HC-SR04 Ultrasonic Sensor

Step 5:

Connecting Bolt Wi-Fi Module

5v of Bolt Wi-Fi Module to 5v of Arduino.

GND of Bolt Wi-Fi Module to GND of Arduino.

TX of Bolt Wi-Fi Module to RX of Arduino.

RX of Bolt Wi-Fi Module to TX of Arduino.

Step 6:

Connecting LM35 Temperature Sensor

VCC of LM35 to 5v of Bolt Wi-Fi Module.

Output Pin of LM35 to Pin ‘A0’ of Bolt Wi-Fi Module.

GND of LM35 to GND of Bolt Wi-Fi Module.

Connecting LM35 Tempera

Step 7:

Connecting 16×2 LCD Display

Pin 1,3,5,16 of 16×2 LCD to GND of Arduino.

Pin 2,15 of 16×2 LCD to 5v of Arduino.

Pin 4 of 16×2 LCD to Digital Pin ‘2’ of Arduino.

Pin 6 of 16×2 LCD to Digital Pin ‘3’ of Arduino.

Pin 11 of 16×2 LCD to Digital Pin ‘4’ of Arduino.

Pin 12 of 16×2 LCD to Digital Pin ‘5’ of Arduino.

Pin 13 of 16×2 LCD to Digital Pin ‘6’ of Arduino.

Pin 14 of 16×2 LCD to Digital Pin ‘7’ of Arduino.

SOFTWARE PROGRAMMING:

After the successful completion of hardware setup. Now it’s the time to do software setup for the project. For that you have to first Download and Install Arduino IDE and Python IDE from the link given above in the software apps and online services section. Also Creating account on various online app services and noting down the important keys and ids. Below all the steps given to create account on online app services and noting down the keys.

WORKING:

1. Sensor Networks:

\* Rainfall Sensors: These detect and measure rainfall in real-time, helping to assess the intensity and duration of rainfall in specific areas.

\* River and Stream Gauges: These measure water levels in rivers and streams, providing information about rising water levels.

2. Remote Sensing:

\* Satellite Imagery: Satellite data can be used to monitor large-scale weather patterns, identify potential flood-prone areas, and track changes in land use.

3. Data Collection and Processing:

\* Weather Stations: Collect meteorological data such as temperature, humidity, and atmospheric pressure.

\* GIS (Geographic Information System): Integrates various spatial data to analyze and v4.

4. Modeling and Analysis:

\* Hydrological Models: Simulate the movement of water through the environment based on input from various sensors and data sources.

\* Weather Forecast Models: Predict future weather conditions to anticipate potential flood events.

5. Communication Infrastructure:

\* Early Warning Centers: Centralized facilities that receive and process data from sensors and models.

\* Communication Networks: Use various channels like radio, TV, SMS, and mobile apps to disseminate warnings to the public.

6. Public Awareness and Education:

\* Community Engagement: Educate residents in flood-prone areas about evacuation procedures and preparedness.

\* Warning Systems: Implement sirens, text alerts, or other warning signals in vulnerable areas.

7. Response Coordination:

\* Emergency Services: Local authorities coordinate response efforts based on the information received from the monitoring system.

\* Evacuation Plans: Implement evacuation plans for residents in high-risk zones.

8. Continuous Monitoring and Updates:

\* Real-Time Updates: Regularly update information based on ongoing data collection and analysis.

\* Post-Event Analysis: Assess the effectiveness of the early warning system after a flood event for continuous improvement.

By integrating these components, flood monitoring and early warning systems aim to provide timely and accurate information to help communities prepare for and respond to potential flood hazards. Visualize potential flood risk areas.

CONCLUSION:

Flood monitoring and early warning systems play a crucial role in mitigating the impact of floods on communities. By leveraging advanced sensor technologies, remote sensing, and data analysis, these systems provide real-time information on weather conditions, river levels, and potential flood risks. The integration of communication networks ensures that timely warnings reach the affected populations, enabling proactive measures such as evacuations and emergency response. Public awareness and education further enhance the effectiveness of these systems. Continuous monitoring and post-event analysis contribute to ongoing improvements, making flood monitoring and early warning a vital component of disaster resilience strategies.