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Problem Statement

Floods are a major natural disaster causing significant loss of life, property, and environmental damage. Traditional flood monitoring systems often lack real-time data and predictive capabilities, leading to delayed responses and increased damage.

Problem Solution

The Smart IoT Flood Monitoring System aims to provide real-time monitoring and early warning of flood conditions using IoT technology. This system integrates various sensors and data analytics to predict and mitigate flood risks effectively.

Technical Implementation

- Sensors: Utilizes ultrasonic sensors to measure water levels.
- Microcontroller: NodeMCU ESP8266 processes sensor data.
- Data Transmission: Data is sent to the ThingSpeak IoT cloud platform for real-time monitoring and analysis.
- Alerts: LED indicators and internet applications provide alerts based on water level thresholds.

Results

The system successfully monitored water levels and provided timely alerts during critical flood conditions. The data was accessible from anywhere, allowing for remote monitoring and quick response.

Comparison

Compared to traditional systems, the Smart IoT Flood Monitoring System offers:

- Real-time data collection and monitoring.
- Predictive analytics for early warning.
- Remote accessibility and control.

Limitations

- Power Dependency: Requires a reliable power source for continuous operation.
- Network Reliability: Dependent on stable internet connectivity for data transmission.
- Sensor Accuracy: Ultrasonic sensors may have limitations in extreme weather conditions.

Future Work

- Enhanced Sensors: Incorporating more advanced sensors for better accuracy.
- AI Integration: Using AI for more accurate flood predictions and automated responses.
- Scalability: Expanding the system to cover larger areas and multiple locations.

Contributions

- Provides a cost-effective and efficient solution for flood monitoring.
- Enhances community safety by offering early warnings and real-time data.
- Demonstrates the potential of IoT in disaster management.

Applications

- Urban Areas: Monitoring water levels in cities to prevent urban flooding.
- Rural Areas: Providing early warnings to remote communities.
- Government Agencies: Assisting in disaster management and response planning.

Ref.	Problem area	Data type	Data size	Data Sources	Availability
1	Flood monitoring System	Here, Used to Real-time sensor data (water level, rainfall)	50MB/day	IoT sensors, weather stations, satellite imagery (NASA GFMS)	Publicly available, but requires an API connection
2	Prediction of flood risk using IoT and GIS mapping	River flow data, elevation models, rainfall, soil moisture	Large datasets (100MB-1GB/day)	IoT river level sensors, GIS mapping data (DEM), remote sensing	Publicly available GIS and satellite data.

References:

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2. **Sharmad Pasha,"Thingspeak Based Sensing and Monitoring System for IoT with Matlab Analysis", International Journal of New Technology and Research (IJNTR) , Volume-2, Issue 6, June 2016 Pages 19-23I. S. Jacobs and C. P. Bean, "Fine particles, thin films and exchange anisotropy," in Magnetism, vol. III, G. T. Rado and H. Suhl, Eds. New York: Academic, 1963, pp. 271–3**

Ref.	Methods/ Techniques	Results/ Outcomes	Research gap/ limitation or drawbacks	Future Direction/ Future work	Opinion/Comments/ Feedback
1	**IoT sensors (water level, rainfall) & NASA GFMS**	**Achieved real-time flood detection with 85% accuracy in flood-prone areas.**	**Limited sensor coverage in remote regions**	**Expand sensor networks in rural areas. Utilize low-cost, solar-powered sensors.**	**usefulness of real-time alerts,**
2	**GIS mapping integrated with IoT data for flood risk visualization.**	**interactive flood risk maps with high accuracy, enabling quicker disaster response.**	**consistent internet connection for real-time updates.**	**Explore offline solutions for areas with limited connectivity.**	**local authorities on ease of use for decision-making.**

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2. **Giovannettone J, Copenhaver T, Burns M, and Choquette S 2018 A statistical approach to mapping flood susceptibility in the Lower Connecticut River Valley Region. Water Resources Research.**