© November 2025 | IJIRT | Volume 12 Issue 6 | ISSN: 2349-6002

Disaster Management System and Prediction

Sasane Kartik[1], Dhamale Nikhil[2], Yadav Om[3] Prof. Bramhane P.S[4]
[1,2,3,4]*Samarth collage of engineering and management*

***Abstract*— Natural disasters similar as cataracts, earthquakes, cyclones, backfires, and landslides beget significant loss of life, property, and coffers every time. A Disaster Management System and Prediction aim to minimize these losses by using ultramodern technologies for early discovery, vaticination, and effective response collaboration. This system integrates data from multiple sources similar as rainfall satellites, seismic detectors, IoT bias, and literal datasets to dissect and prognosticate implicit disaster circumstances using machine literacy and artificial intelligence algorithms. The proposed system consists of three major factors data accession, disaster vaticination, and response operation. The vaticination module utilizes AI- grounded models to read disaster chances and issue timely cautions to authorities and the public. The operation module supports decision-making during extremities by offering real- time situational mindfulness, automated announcements, resource allocation, and communication between deliverance brigades and original authorities. By employing prophetic analytics, geospatial visualization, and pall- grounded communication, the system enhances preparedness and reduces response time during critical events. The integration of AI and IoT enables nonstop monitoring and intelligent soothsaying, leading to visionary disaster operation. Overall, this system provides a comprehensive, data- driven approach to perfecting adaptability, minimizing mortal and profitable losses, and icing effective disaster response**

I. INTRODUCTION

Natural disasters similar as earthquakes and cataracts beget heavy loss of life and property. Traditional systems frequently give delayed cautions and warrant real- time monitoring, making disaster response reactive rather than preventative. To overcome these challenges, the proposed design develops an IoT grounded Disaster Management and Prediction System that combines detector technology and machine literacy for early discovery and warning. In this system, IoT detectors similar as vibration, ultrasonic, temperature, and moisture detectors continuously cover environmental parameters. The data collected by the ESP32 microcontroller is transferred via Wi- Fi or GSM to a Beaker- grounded web garçon, where ML models like Random Forest and Decision Tree dissect patterns to prognosticate disaster pitfalls. still, the system automatically triggers original cautions (buzzer/ temptress) and sends warnings to druggies and authorities through SMS APIs and a web dashboard, if any abnormal readings are detected. The dashboard displays real- time detector data, vaticination results, and near exigency services. This IoT- enabled system ensures early warning, real- time monitoring, and briskly communication during disasters. It supports both citizens and authorities by reducing response time and perfecting preparedness. The design demonstrates how the integration of IoT and AI can produce a smart, effective, and scalable platform for disaster forestallment and operation

II. LITERATURE SURVEY

A brief overview of being work in colorful papers, which have been appertained for perpetration in (1) 2023, Event Discovery and Monitoring for Disaster Management in IoT Environment. Gas detectors, seismic detectors, temperature and moisture detectors, Images etc. In (2) 2025, Patel et al. Real- Time Earthquake Discovery Combined IoT detectors with ML models Early seismic alert system in (3) 2024, Sharma et al. Sentiment Analysis in Disaster Events Used VADER for tweet- grounded sentiment bracket Detected public fear situation

III. EXISTING SYSTEM

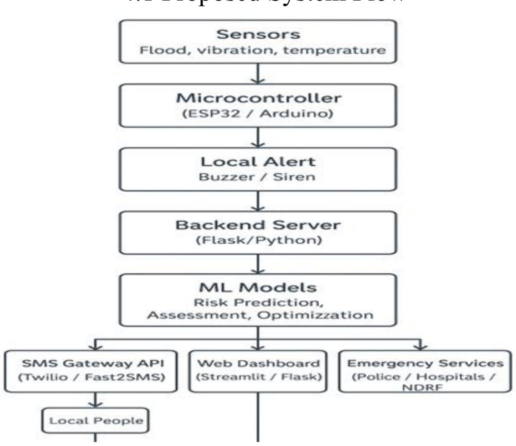
The being disaster operation systems substantially calculate on homemade data collection, traditional Page 1 of 3 communication channels, and reactive response mechanisms. These systems primarily concentrate onpost disaster conditioning similar as relief distribution, deliverance operations, and recuperation, rather than visionary vaticination and early warning. Conventional approaches depend heavily on satellite monitoring, meteorological reports, and literal data gathered by government agencies similar as IMD (Indian Meteorological Department), NDMA (National Disaster Management Authority), and other transnational associations. While these systems give precious information, they frequently face detainments in data processing and limited real- time communication, which can lead to late warnings and shy preparedness

IV. PROPOSED SYSTEM

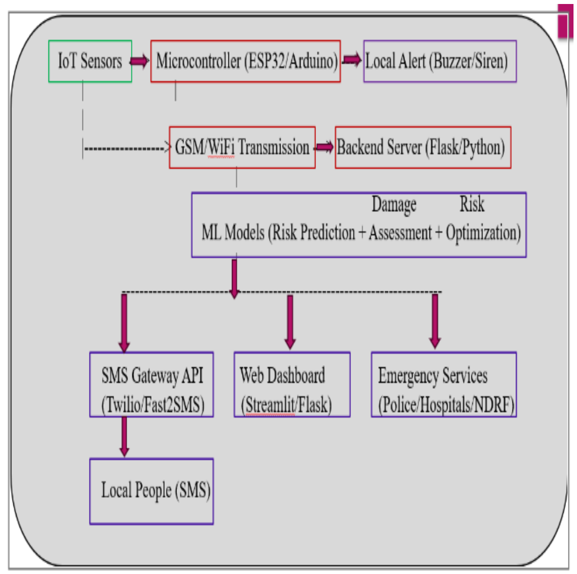
natural disasters similar as earthquakes and cataracts using IoT detectors and Machine literacy (ML) ways. It provides real- time monitoring, early cautions, and a centralized web dashboard for authorities and druggies to take timely action. System Overview The system integrates IoT detectors, a microcontroller (ESP32), and ML models into one connected platform. Detectors like vibration, ultrasonic, temperature, and moisture continuously collect environmental data. The ESP32 regulator transmits the data to a Beaker-grounded web garçon via Wi- Fi or GSM. ML algorithms similar as Random Forest and Decision Tree dissect real- time and literal data to prognosticate disaster pitfalls. still, the system triggers automatic cautions through SMS and buzzer/ temptress announcements, If peril is detected.

Main Components 1. IoT Sensors Layer Collects vibration, water position, temperature, and moisture data from the terrain. 2. Processing Layer The backend garçon runs ML models to prognosticate the probability of disasters. 3. operation Layer A web dashboard displays live data, threat status, and sends SMS cautions to druggies

4.1 Proposed System Flow



V. System Architecture



1.SENSING LAYER

1. This subcaste includes IoT detectors placed in the terrain to collect real- time data. Detectors Used Vibration Detector – Detects ground movements for earthquake discovery. Ultrasonic Sensor – Measures water position for flood tide vaticination. Temperature and moisture Detector (DHT11) – Observers rainfall changes. The detectors are connected to an ESP32 microcontroller. Data is transferred from ESP32 to the garçon using Wi- Fi or GSM.
2. 2. Processing Layer This subcaste processes all the data entered from detectors. It uses a Beaker-grounded web garçon where Machine Learning algorithms dissect data. Page 2 of 3 Random timber and Decision Tree models help to prognosticate the chances of an earthquake or flood tide. The system checks for abnormal values and identifies if there's any threat.
3. 3. operation Subcaste This subcaste shows the results and cautions to druggies. A web dashboard (made using Flask, HTML, CSS) displays real- time data and warnings. The system sends SMS cautions through Twilio or Fast2SMS when peril is detected. A buzzer or temptress is also actuated locally to advise near people.

DATA FLOW

1. Detectors collect real- time data.
2. ESP32 sends data to the garçon.
3. ML models dissect and prognosticate pitfalls.
4. Cautions are displayed on the dashboard and transferred to druggies. seismic exertion, and tweets.

VI. CONCLUSION

Developed a working disaster vaticination and response system using machine literacy. Addressed real- time requirements for cautions, prognostications, and public sentiment. Combined multiple ML models with a simple interface. Created modules for earthquake, flood tide, cyclone vaticination and sentiment analysis. Demonstrated community and exigency integration. Learned full- mound ML deployment, real- world connection, and platoon collaboration

REFERENCES

[1] V. Chamola, V. Hassija, S. Gupta, A. Goyal, M. Guizani and B. Sikdar, "Disaster and Pandemic Management Using Machine Learning a Survey," IEEE Internet of effects Journal, vol. 8, no. 21, pp. 16047 16071, Dec.

[2] W. Leong, "Internet of effects for Enhancing Public Safety, Disaster Response, and Emergency Management," in Proceedings of the 2024 IEEE 6th Eurasia Conference on IoT, Communication and Engineering, Eng. Proc. vol. 92(1) 2025, p. 61.

[3] A. Adeel, M. Gogate, S. Farooq, C. Ieracitano, K. Dashtipour, H. Larijani and A. Hussain, "A Survey on the part of Wireless Sensor Networks and IoT in Disaster Management," arXiv preprint, 2019

[4] M. Ali Jamshed, F. Ayaz, A. Kaushik, C. Fischione, M. Ur- Rehman, "Green UAV-enabled Internet- of effects Network with AI-supported NOMA for Disaster Management,"

[5] Dynamic Disaster Management with Real-Time IoT Data Analysis and Response," 2024 transnational Conference on robotization and calculation (AUTOCOM), IEEE, 2024

[6] C. Zeng and D. Bertsimas, "Global Flood Prediction a Multimodal Machine Learning Approach," arXiv preprint, Jan. 2023. (strong ML approach to flood tide vaticination)

[7] A. Rajab, H. Farman, N. Islam, D. Syed, M. A. Elmagzoub and A. Shaikh, "Flood soothsaying by Using Machine Learning Major Climatic Records of Bangladesh," Water, vol. 15, no. 22, 2023.

[8] R. Saha, P. K. Das, S. K. Sarker and S. N. S., "GaLeNet Multimodal Learning for Disaster Prediction, Management and Relief.

[9] everaging IoT for Real- Time Disaster Management Enhancing Preparedness and Response Through Smart Monitoring," Research & Reviews A Journal of Bedded System & Applications, vol. 13, no. 02, 2025 [10] An Intelligent Early Flood soothsaying and vaticination using Machine and Deep literacy Algorithms with Advanced Alert System," Processes, vol. 11, no. 2, Art. 481, Feb. 2023.

[10] Review and Intercomparison of Machine Learning operations for Short- term Flood soothsaying," Water coffers Management, vol. 39, pp. 1971- 1991, Jan. 2025

[11] A Comprehensive Review of Machine Learning Approaches for Flood Depth Estimation," International Journal of Disaster Risk Science, vol. 16, pp. 433- 445, Jun. 2025

[12] Impact of Internet of effects (IoT) in Disaster Management A Task- Technology Fit Perspective," Annals of Operations Research, vol. 283, pp. 759- 794, Oct. 2019 [14] Internet of effects for Enhancing Public Safety, Disaster Response, and Emergency Management," Eng. Proc., vol. 92, no. 1, p. 61, 2 May 2025.

[13] M. H. Abdullah and Z. Hamodat, "IoT ways for Disaster Prediction and Prevention," International Journal of Intelligent Systems and Applications in Engineering, vol. 11, no. 9s, pp. 34- 45, Jul. 2023

[14] K. Qaedi, M. Abdullah, K. A. Yusof, et al., "Multi-class bracket automated machine literacy for prognosticating earthquakes using global geomagnetic field data," Nat. Hazards, vol. 121, pp. 14531 14544, Jul. 2025. DOI 10.1007/ s11069-025-07373-2 [17] Recent Advances in Internet of effects results for Early Warning Systems A Review,"

Detectors, vol. 22, no. 6, art. 2124, Mar. 2022. DOI 10.3390/ s22062124

[15] Employing Machine Learning for Seismic Intensity Estimation Using a Single Station for Earthquake Early Warning," Remote Sens., vol. 16, no. 12, art. 2159, Jun. 2024. DOI 10.3390/ rs16122159

[16] Intelligent flood tide soothsaying and advising a check," Intell. Robot., vol. 3, no. 2, pp. 190-212, Jun. 2023. DOI 10.20517/ ir.2023.12

[17] IoT- Grounded Disaster Management and Early Warning System for Fallen Trees," in Proc. Int. Conf Science and Technology UISU, 2024. DOI 10.30743/ gbs8ms92