



“Sentiview: Flood Detection & Avoidance System Using IOT”

1. MR.K. RAMA KRISHNA 2. M.BHAVYA SRI 3. I.HARSHITHA 4. J.LAHARI

1. Assistant Professor, Dept. of Electronics and Communication Engineering, KKR&KSR INSTITUTE OF TECHNOLOGY AND SCIENCES, VINJANAMPADU, GUNTUR, A.P, INDIA.
2. STUDENT, Dept. of Electronics and Communication Engineering, KKR&KSR INSTITUTE OF TECHNOLOGY AND SCIENCES, VINJANAMPADU, GUNTUR, A.P, INDIA.
3. STUDENT, Dept. of Electronics and Communication Engineering KKR&KSR INSTITUTE OF TECHNOLOGY AND SCIENCES, VINJANAMPADU, GUNTUR, A.P, INDIA.
4. STUDENT, Dept. of Electronics and Communication Engineering, KKR&KSR INSTITUTE OF TECHNOLOGY AND SCIENCES, VINJANAMPADU, GUNTUR, A.P, INDIA.

Abstract: The flood detection and alerting system utilizes Arduino and Node MCU as controllers, with the latter serving as the Wi-Fi module for remote communication. The system incorporates a raindrop sensor to monitor precipitation levels and categorize them into three distinct stages: the anticipation of rain, light rain, and heavy rain. Additionally, a DHT11 sensor measures temperature to provide supplementary environmental data. Information gathered by these sensors is displayed in real-time on an LCD screen, offering users immediate insights into weather conditions. To mitigate the risks associated with flooding, the system features an innovative mechanism for controlling barrage gates remotely. A motor connected to the Node MCU serves as a proxy for these gates, enabling automated responses to varying flood levels. Leveraging a server-based infrastructure, users can initiate gate operations from a distance, thereby facilitating timely interventions to manage water flow and mitigate flood-related damages. This integration of remote control capabilities enhances the system's effectiveness in flood management and response, offering a proactive approach to safeguarding communities against the adverse effects of inundation.

Keywords: Arduino, LCD, Rain drop sensor, DHT11 sensor, Ultrasonic sensor, Node MCU

1. INTRODUCTION:

The "Flood Detection and Avoidance System" is a critical infrastructure designed to monitor and respond to changing weather conditions, particularly those associated with heavy rainfall and potential flooding. As climate change continues to exacerbate extreme weather events, such as storms and floods, there is an urgent need for robust systems capable of detecting and mitigating these hazards in real-time. This project aims to address this challenge by leveraging advanced sensor technologies and remote communication capabilities to provide timely warnings and facilitate proactive flood management strategies.

At the core of this system are Arduino and Node MCU microcontrollers, which serve as the brains of the operation. The Arduino board is responsible for interfacing with various sensors, including the raindrop sensor and DHT11 temperature sensor, to collect crucial environmental data. Meanwhile, the Node MCU module enables wireless connectivity via Wi-Fi, allowing the system to transmit information to remote servers and receive commands for automated responses. This combination of hardware components forms the foundation for building an intelligent flood detection and alerting system capable of monitoring weather conditions and taking proactive measures to mitigate flood risks.

The implementation of this project entails the deployment of sensors in flood-prone areas, such as riverbanks and low-lying regions susceptible to water overflow. These sensors continuously monitor rainfall intensity and temperature fluctuations, providing real-time data that is analyzed by the system's onboard microcontrollers. Through the integration of an LCD display, users can access up-to-date information on weather conditions and flood risk levels, enabling informed decision-making and timely interventions. Additionally, the system's ability to remotely control barrage gates adds an extra layer of sophistication, allowing authorities to manage water flow and minimize flood damage in vulnerable areas. Overall, the Flood Detection and Alerting System represents a proactive approach to disaster management, leveraging IoT technology to enhance resilience and protect communities from the devastating impacts of flooding.

LITERATURE REVIEW:

Recent advancements in flood detection and avoidance systems have also leveraged the power of big data analytics and cloud computing. Big data analytics techniques process large volumes of heterogeneous data sources, including weather forecasts, hydrological models, social media feeds, and historical flood data, to generate accurate predictions and real-time insights. Cloud computing platforms provide scalable and cost-effective infrastructure for storing and processing such vast amounts of data, enabling rapid decision-making and coordination among stakeholders during flood events.

Moreover, the integration of Geographic Information Systems (GIS) and simulation models has enhanced flood risk assessment and management strategies. GIS tools enable spatial analysis, visualization of flood-prone areas, and simulation of flood scenarios based on different variables such as land use, soil type, and drainage systems. Coupling GIS with hydraulic and hydrological models allows for simulating flood propagation, evaluating flood impact on infrastructure and communities, and optimizing emergency response plans.

EXISTING SOLUTION :

The existing method of flood detection and alerting typically relies on manual monitoring and observation by local authorities or weather stations. This approach involves periodic checks of rainfall levels using traditional rain gauges and visual inspections of water levels in rivers and streams. However, these methods are often labor-intensive, time-consuming, and prone to delays in data collection and analysis. Moreover, they may not provide comprehensive coverage of all flood-prone areas, leading to gaps in early warning systems. Additionally, traditional flood detection methods may lack the ability to integrate real-time data from multiple sources or communicate alerts rapidly to affected communities. As a result, there is a need for more advanced and automated flood monitoring systems capable of leveraging IoT technology to improve accuracy, efficiency, and timeliness in detecting and responding to flood events.

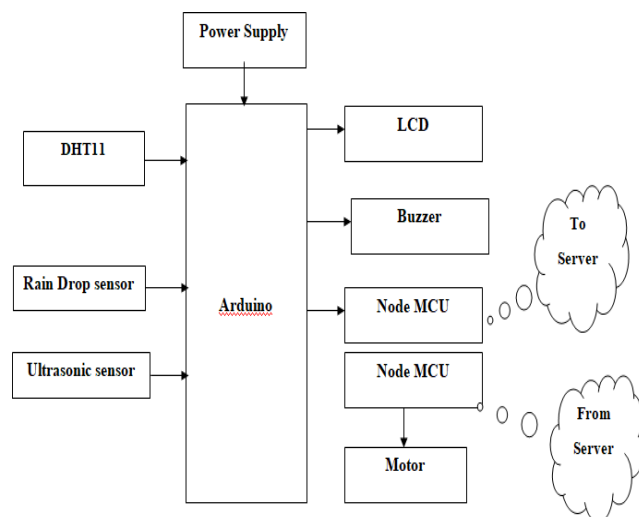
Drawbacks:

1. Manual Monitoring
2. Limited Coverage
3. Time-Consuming
4. Delayed Response
5. Lack of Integration

PROPOSED SOLUTION :

The proposed method of the flood detection and alerting system aims to address the limitations of the existing manual monitoring approach. In this method, Arduino and NodeMCU are utilized as the primary controllers, offering enhanced automation and real-time data processing capabilities. Raindrop sensors are strategically deployed to detect varying levels of rainfall intensity, categorized into three levels: light rain, moderate rain, and heavy rain. Additionally, a DHT11 sensor is employed to measure temperature fluctuations, providing supplementary environmental data.

To enhance the system's functionality, a Wi-Fi module is integrated with Node MCU, enabling seamless communication and data transmission to remote servers or cloud platforms. This connectivity facilitates real-time monitoring of rainfall and temperature conditions, enabling timely responses to potential flood situations. Moreover, an LCD display is incorporated to provide visual feedback on the detected rain intensity and temperature levels, ensuring transparency and accessibility of information to users. Furthermore, an innovative aspect of the proposed method involves the integration of a motor with Node MCU, representing gate control mechanisms during flood scenarios. This enables remote operation of flood barriers or gates based on the detected rainfall levels, enhancing the system's responsiveness and effectiveness in flood management.



A flood detection and avoidance system typically works by utilizing various sensors to monitor water levels and weather conditions. These sensors can include water level sensors, rainfall gauges, weather stations, and sometimes even satellite data for advanced warning. When the system detects rising water levels or heavy rainfall that could lead to flooding, it sends alerts to relevant authorities and residents in the affected areas. These alerts can be in the form of SMS messages, emails, or notifications through dedicated apps. In terms of avoidance, the system may also provide recommendations for evacuation routes, suggest flood barriers deployment, or activate automatic floodgates to divert water away from critical areas. Additionally, machine learning algorithms can be employed to predict flood patterns and improve the system's accuracy over time. Overall, flood detection and avoidance systems aim to provide early warnings and proactive measures to minimize the impact of flooding on communities and infrastructure.

MODEL :

IMPLEMENTATION AND RESULTS :

Stage 1: Considering the problems of existing methods and giving solution to that problem by considering the basic requirements for our proposed system

Stage 2: Considering the hardware requirement for the proposed system

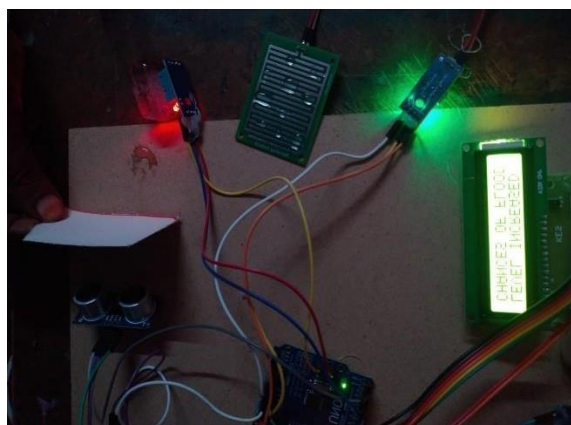
For this we need to select the below components:

1. Microcontroller
2. Inputs for the proposed system (ex: sensors, drivers etc..)
3. Outputs (ex: relays, loads)

Stage 3:

After considering hardware requirements, now we need to check out the software requirements. Based on the microcontroller we select there exists different software for coding, compiling, debugging. we need to write source code for that proposed system based on our requirements and compile, debug the code in that software .

After completing all the requirements of software and hardware we need to bring both together to work our system. For this we need to burn our source code into microcontroller, after burning our source code to microcontroller then connect all input and output modules as per our requirement.



PERFORMANCE EVALUATION:



Fig: Rain Expected at Normal Temperature

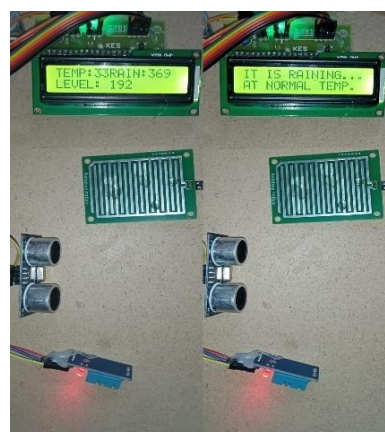


Fig: Light Rain at Normal Temperature

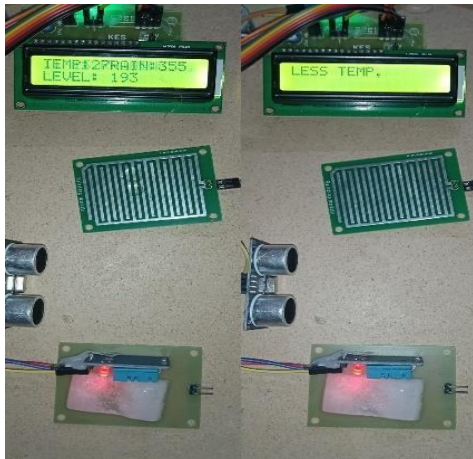


Fig : Temperature is Decreased



Conclusion and Future Scope:

The flood detection system, utilizing IoT sensors, aids proactive decision-making with real-time warnings, serving various applications. Integration into existing infrastructure boosts resilience, while collaborations strengthen preparedness efforts. Through data analytics, it mitigates disaster risks, promoting safety and fostering resilient communities amidst escalating extreme weather events. Here are some key areas of future scope for these systems:

1. Advanced Sensors: Enhance accuracy with IoT, LiDAR, and radar.
2. AI/ML Integration: Revolutionize forecasting and optimization.
3. Early Warning Systems: Focus on robust flood prediction for timely alerts.
4. Smart Infrastructure: Use sensors and adaptive designs for resilience.
5. Collaboration: Essential for effective response and coordination.
6. Climate Change Adaptation: Design with resilience to address evolving risks.

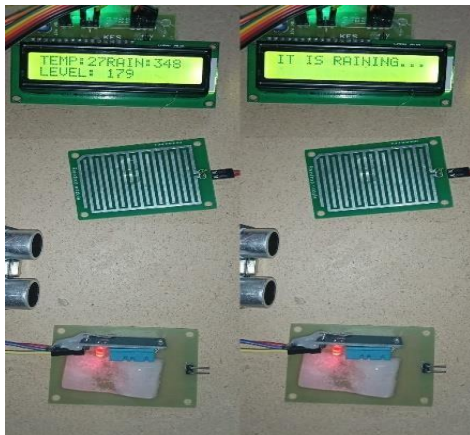


Fig : Raining at Low Temperature

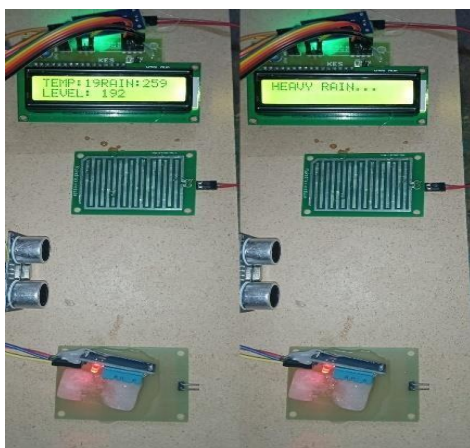


Fig : Heavy Rain at Low Temperature

REFERENCES :

- [1] Sebin Sabu1 and Nora Elizabeth, “Kerela floods- A model of rescue and rehabilitation using information technology and social media based crowdsourcing”, IEEE India info. Vol. 13 No. 3 Jul-Sep 2018.
- [2] H. Hamidon, “Flood level indicator and risk warning system for remote location monitoring flood observatory system”, WSEAS Trans. Syst. Control, vol. 5, no.3, pp. 153-163, 2018
- [3] Z.M. Taib, N.S. Jaharuddin, and Z.D. Mansor, “ A review of flood disaster and disaster in Malaysia” International journal of Accounting and business management, vol. 4, no.3, 2016.
- [4] A.M. Leman, K.A. Rahman, M.N.M.Salleh, I.Baba, D.Feriyanto, L.S.C. Johnson, and S.N Hidayah M., “A review of flood catastrophic management in malaysia, “ ARPN Journal of Engineering and applied sciences, vol.11, no. 14, Jul 2016.
- [5] A. Al-Faquha, M. Guizani, M.Mohammadi, M. Aledhari, and M. Ayahs, “ Internet of things: A survey on enabling technologies, protocols, and applications,” IEEE Communications surveys Tutorials, vol. 17, no. 4, pp. 2347- 2376, Fourthquarter 2015.
- [6] M. Mathematic and R. Grace, “Flood alert management system using iot and microcontroller,” International journal of innovative research in computer and communication engineering, vol. 5, no. 4, April 2017.
- [7] S.J. Priya, S. Kashaya, E. Arena, J. A. M. Julie, and V. Ranjani, “ Flood monitoring and alerting system,” International journal of computer engineering and technology (IJCET), vol. 8, no. 2, p.15, Mar 2017.