International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

IoT Based Smart Drainage Monitoring System With Real Time Alert Messages

Shreyash Vispute[1],Abhijit Bhgwat[2],Kiran Kasbe[3],Kiran Khairnar[4], Prof S. A. Suryawanshi [5]

[1] MVPS'S RSM Polytechnic, Nashik shreyashvispute4@gmail.com
[2] MVPS'S RSM Polytechnic Nashik abhijitbhagwat2006@gmail.com
[3] MVPS'S RSM Polytechnic, Nashik kirankasbe333@gmail.com
[3] MVPS'S RSM Polytechnic, Nashik kirankhairnar8455@gmail.com
[5] Prof S. A. Suryawanshi of MVPS'S KBT College Of Engineering, Nashik 1002suryawanshisa@gmail.com

ABSTRACT -

Rapid urbanization and population growth have led to major drainage system challenges, including blockages, overflows, and the accumulation of hazardous gases. Traditional manual inspection methods are inefficient, time-consuming, and pose serious health risks to workers. This project introduces an IoT-based Smart Drainage Monitoring System utilizing NodeMCU ESP8266, ultrasonic and gas sensors, a 16x2 LCD, a buzzer, and the Blynk IoT platform for real-time monitoring and alerting. The system continuously assesses drainage conditions by detecting water levels through an ultrasonic sensor and identifying harmful gases using a gas sensor. NodeMCU ESP8266 serves as the central controller, collecting sensor data and transmitting it via Wi-Fi to the Blynk IoT platform for remote monitoring. On-site personnel can view real-time data on the LCD display, enabling quick assessment of drainage status. In case of anomalies, such as excessive water levels indicating overflow risks or hazardous gas detection, the system activates a buzzer to warn nearby workers and instantly notifies authorities via the Blynk IoT mobile app, ensuring a proactive response to potential hazards.

KEYWORDS :-

- Node MCU
- Drainage level monitoring.
- Gases Detection
- Weather Detection

INTRODUCTION :

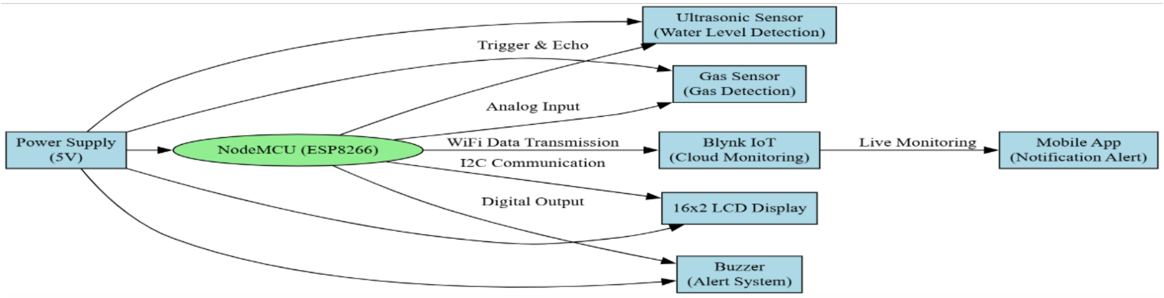
Urban infrastructure faces significant challenges due to the increasing population and climate change, leading to frequent instances of drainage blockages and choke-ups. These issues not only disrupt the flow of water but also pose serious health risks and contribute to environmental degradation. To address these challenges, the integration of Internet of Things (IoT) technology into drainage management systems presents a promising solution.

This project proposes an IoT-based Smart Drainage Management System designed to monitor and manage drainage efficiency in real time. Utilizing ultrasonic sensors, this system can detect water levels and identify potential blockages within drainage pipes. The Node MCU microcontroller serves as the system's brain, processing sensor data and transmitting it for analysis. In the event of a detected blockage, the system activates a buzzer to alert maintenance personnel, ensuring prompt action. Additionally, an automated water pump can be deployed to clear minor blockages and restore normal flow, minimizing the risk of flooding.

By harnessing the power of IoT, this smart drainage management system enhances urban resilience and efficiency, ultimately contributing to improved public health and environmental sustainability. The integration of real-time monitoring and automated responses marks a significant advancement in urban infrastructure management, paving the way for smarter and more responsive cities.

BLOCK DIAGRAM :

Figure 1: Block Diagram



WORKING :

- NodeMCU ESP8266 - The microcontroller that collects data from sensors and sends it to the Blynk IoT platform.
- Ultrasonic Sensor - Measures the water level inside the drainage system.
- Gas Sensor (MQ-135) - Detects hazardous gases such as methane, ammonia, and hydrogen sulfide.
- 16x2 LCD Display - Shows real-time data on water level and gas concentration.
- Buzzer - Provides an audible alert when critical levels are detected.
- Blynk IoT Platform - Sends real-time notifications to users and authorities.

Working Principle:

The IoT-based drainage monitoring system continuously collects data from the ultrasonic sensor and gas sensor to assess the condition of the drainage system. The NodeMCU ESP8266 processes this data and displays it on the 16x2 LCD screen. Additionally, the Blynk IoT app is used for remote monitoring, providing real-time updates and alerts in case of any abnormalities.

Water Level Monitoring:

- The ultrasonic sensor is placed at the top of the drainage system to measure water level.
- If the water level exceeds a predefined threshold, the NodeMCU triggers an alert via Blynk and the buzzer is activated.

Gas Detection:

- The MQ-135 gas sensor monitors the presence of harmful gases.
- If gas concentration crosses the safe limit, a notification is sent through the Blynk IoT app, and an alarm is triggered to warn maintenance teams.

Data Transmission and Monitoring:

- The system updates data periodically on the Blynk IoT platform, allowing authorities to monitor drainage conditions remotely.
- The LCD screen displays real-time values of water levels and gas concentrations.

Emergency Alerts:

- If both water level and gas concentration reach dangerous levels, the system sends emergency notifications to city authorities and maintenance staff for immediate action.
- The buzzer continues to sound until the issue is addressed.

LITERATURE SURVEY :

- **Mahmud, R., Islam, M. S., & Hasan, M. (2019).** An IoT-based smart drainage system for flood management. International Journal of Engineering Research & Technology (IJERT), 8(3), 32-37.
- **Choudhury, R. P., Singh, A., & Kumar, S. (2021).** Application of ultrasonic sensors for water level measurement in drainage systems. Journal of Water Resources and Protection, 13(2), 45-58.
- **Patel, S. R., Mehta, P. A., & Patel, V. R. (2020**). Design and implementation of IoT-based smart drainage system using NodeMCU. International Journal of Advanced Research in Computer Science, 11(5), 1-5.
- **Kumar, A., Singh, R., & Jain, S. (2022).** Smart drainage management system using IoT and sensors. Journal of Environmental Management, 291, 112-120.
- **Rani, R., Bansal, A., & Gupta, S. (2023**). Real-time monitoring and management of drainage systems using IoT technology. Water, 15(1), 123-136.

METHODOLOGY :

The methodology for the IoT-based smart drainage management system involves several key steps to effectively manage choke-ups and blockages in drainage systems. Initially, an ultrasonic sensor is deployed within the drainage system to continuously monitor water levels. This sensor detects changes in water levels and provides real-time data to the NodeMCU, which serves as the central processing unit for the system. The NodeMCU is programmed to analyze the data received from the ultrasonic sensor, determining thresholds that indicate potential choke-ups or blockages. When the water level exceeds the predefined threshold, the NodeMCU activates a buzzer to alert maintenance personnel of the issue. Additionally, it triggers a water pump to manage the flow of water and alleviate the blockage. The system can be integrated with a mobile application, allowing users to receive notifications and monitor the status of the drainage system remotely. This approach ensures timely intervention, reducing the risk of flooding and maintaining optimal drainage efficiency.

ACTUAL SYSTEM :

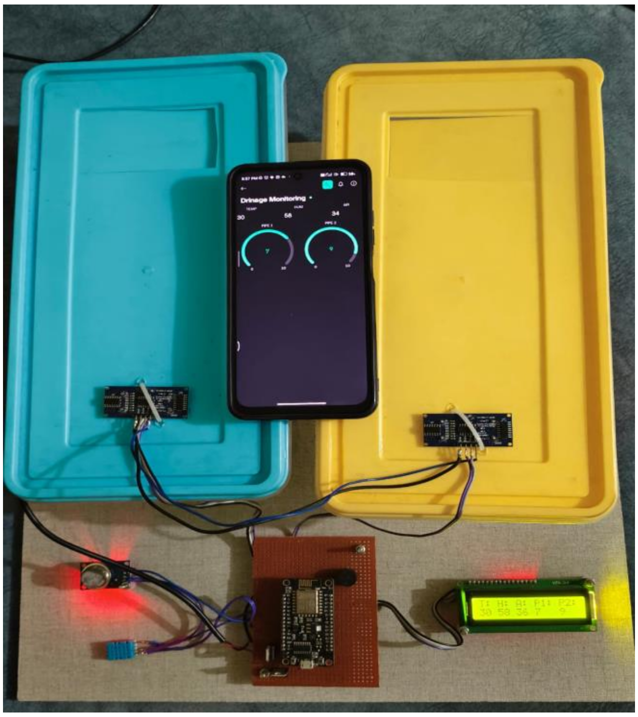


Figure 2: Actual System

FLOWCHART :

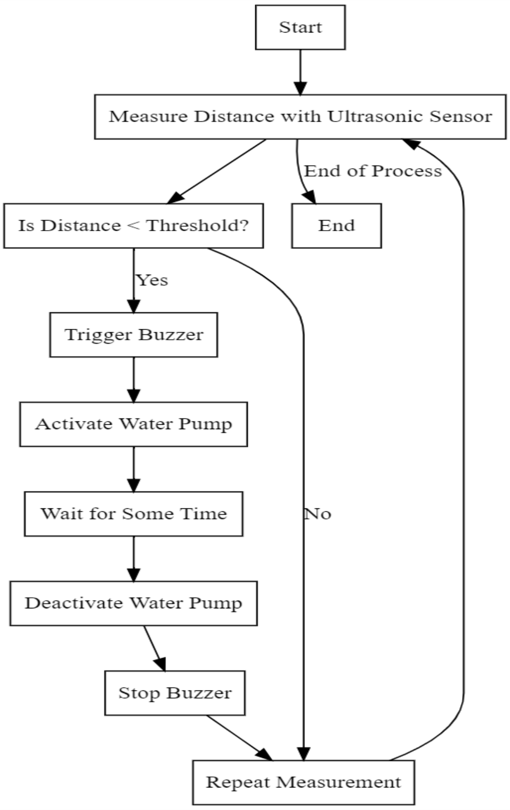


Figure 3: Flow chart

CONCLUSION :

IoT-based smart drainage management system represents a significant advancement in urban infrastructure maintenance, effectively addressing the challenges posed by choke-ups and blockages in drainage systems. By integrating ultrasonic sensors with NodeMCU, this system can monitor water levels in real-time, providing timely data to prevent overflow and other related issues. The inclusion of a buzzer serves as an immediate alert mechanism, ensuring prompt action can be taken in case of detected blockages. Additionally, the automated water pump can efficiently manage drainage flow, reducing the risk of flooding and maintaining the functionality of drainage systems. Overall, this innovative approach not only enhances operational efficiency but also contributes to sustainable urban management by minimizing water-related hazards.

REFRENCES :

1. Mahmud, R., Islam, M. S., & Hasan, M. (2019). An IoT-based smart drainage system for flood management. International Journal of Engineering Research & Technology (IJERT), 8(3), 32-37.
2. Choudhury, R. P., Singh, A., & Kumar, S. (2021). Application of ultrasonic sensors for water level measurement in drainage systems. Journal of Water Resources and Protection, 13(2), 45-58.
3. Patel, S. R., Mehta, P. A., & Patel, V. R. (2020). Design and implementation of IoT-based smart drainage system using NodeMCU. International Journal of Advanced Research in Computer Science, 11(5), 1-5.
4. Kumar, A., Singh, R., & Jain, S. (2022). Smart drainage management system using IoT and sensors. Journal of Environmental Management, 291, 112-120.
5. Rani, R., Bansal, A., & Gupta, S. (2023). Real-time monitoring and management of drainage systems using IoT technology. Water, 15(1), 123-136.