

Drainage Overflow and Manhole Monitoring Using Nodemcu and Arduino Cloud

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Abstract—Urban drainage and sewage systems are essential components of smart city infrastructure. However, drainage overflow, manhole blockages, and accumulation of toxic gases such as methane pose serious threats to public safety and sanitation workers. Manual inspection, which is time-consuming, inefficient, and hazardous. This paper presents an IoT-based drainage overflow and manhole monitoring system using NodeMCU (ESP8266) and Arduino Cloud. The proposed system continuously monitors water level, gas concentration, and temperature inside manholes using sensors. Sensor data is transmitted in real time to the Arduino Cloud platform through Wi-Fi, enabling remote monitoring, visualization, and alert generation. Automated alerts are triggered when sensor values exceed predefined safety thresholds, allowing authorities to take timely preventive action. The system improves public hygiene, enhances worker safety, and supports smart city development through reliable, scalable, and cost-effective wastewater management.

Index Terms—IoT, Drainage Monitoring, NodeMCU, Arduino Cloud, Smart City

I. INTRODUCTION

Rapid urbanization and population growth have placed immense pressure on existing drainage and sewage systems. Aging infrastructure, improper maintenance, and sudden heavy rainfall often result in drainage overflow and manhole blockages. These conditions lead to unhygienic surroundings, odour, road damage, the spread of diseases. Manual inspection exposes sanitary workers to hazardous gases.

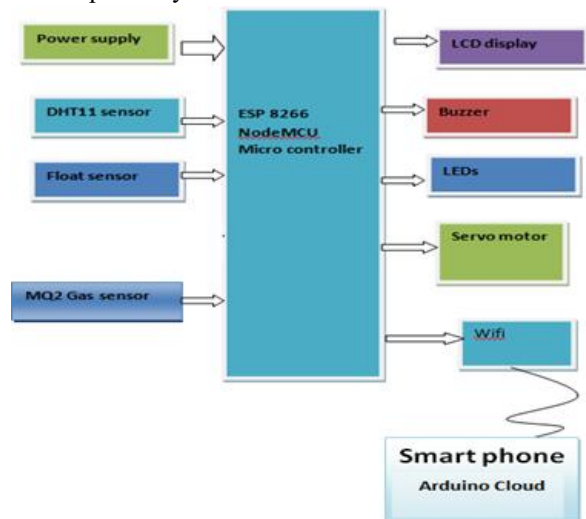
II. LITERATURE REVIEW

Several studies have explored IoT and wireless sensor networks for environmental and smart city monitoring. Existing systems highlight the importance of real-time data collection, automation, and early warning.

III. PROBLEM STATEMENT

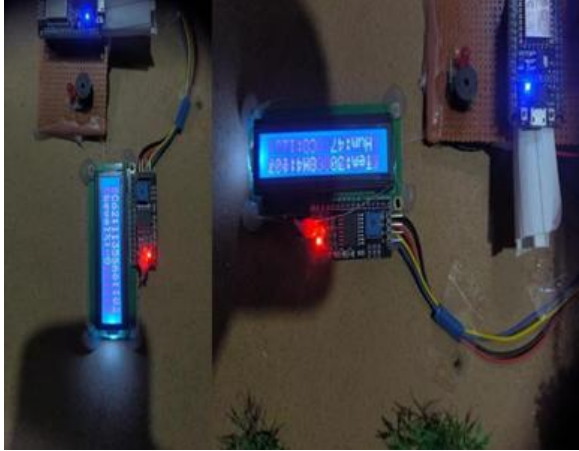
Traditional drainage monitoring relies on manual inspection, which is unsafe, inefficient, and lacks real-time alerts.

3.1 Proposed System



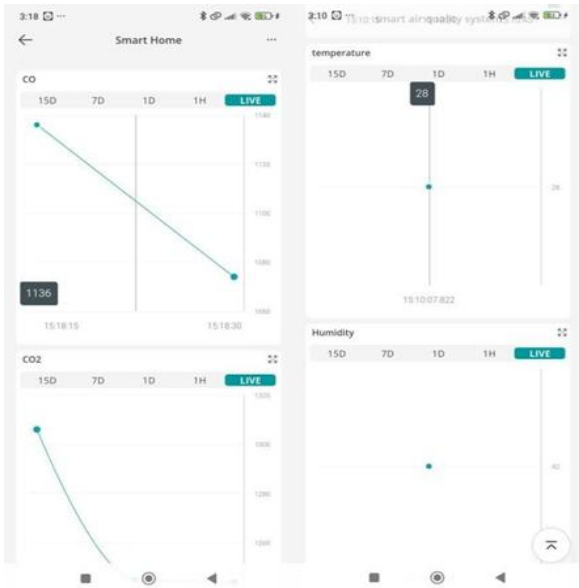
3.2 The proposed system integrates NodeMCU, water level sensor, gas sensor, temperature sensor, servo motor, and Arduino Cloud to provide automated monitoring and alerting.

IV. METHODOLOGY



Sensors continuously collect data from manholes and transmit it to Arduino Cloud using Wi-Fi. Threshold-based alerts notify authorities during abnormal conditions.

V. RESULTS AND DISCUSSION



The system was tested under simulated conditions and successfully detected overflow, gas leakage, and temperature variations.

VI. CONCLUSION

The system provides a reliable, scalable, and cost-effective solution for smart drainage monitoring and worker safety.

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