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Advanced Underground Drainage Monitoring and Automatic Rescue System Using IoT

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ABSTRACT: This project represents the implementation and design functions for monitoring and managing underground drainage with different approaches and also protect the worker. In some cases the worker will be affected by some issues like gas, abnormal condition, then the worker to be saved by using rope through the motor. The Drainage is the system or process by which water, sewage or other liquids are drained from a place and to maintain the proper function of drainage, its condition should be monitored regularly. But manually it is very difficult to monitor all area where a human cannot reach. To mitigate all these issues here we are developed and implemented the system using sensor network. The proposed system is low cost, less maintenance, long life and web-based real time system, which update the information to LCD Display and update to the server. This system directly impacts on the health issues of citizens and worker who cleans the underground drainage. It also avoids spreading of infection due to mosquitoes and gives clean and healthy environment as well as controls the diseases such as malaria, dengue, diarrhoea, etc. The system reduces the accident caused by an exposed manhole. The main aim of this project is to monitor the parameter like Temperature and Gas through the Server. If some issues are occurred in Drainage the worker will be saved and protected.

KEYWORDS: IoT, LCD display,Co2 sensor, Gas sensor, Temperature sensor, humidity sensor.

I. INTRODUCTION

Drainage Monitoring System: - Drainage may consist of the wastes left over from City, Public area, Society, College, home etc. Leakage of the drainage water can cause severe effects on environment. This project is related to the “Smart City” and based on Internet of Things” (IOT). So, for smart lifestyle, leanliness is needed, and cleanliness is beginning with Drainage maintenance. It will help to reduce road traffics, toxic gas leakage. The Internet of Things (IoT) is a recent communication paradigm that envisions near future, in which the objects of everyday life will be equipped with micro controllers, transceivers for digital communication, and suitable protocol stacks that will make them able to communicate with one another and with the users becoming an integral part of the Internet. It is a very innovative system which will help to keep the cities clean. This system monitors the Manhole and informs about the level of Drainage water level and gas and humidity level. For this the system uses ultrasonic sensors placed over the manhole cover to detect the water and gas level and compare it with the drainage depth. The system makes use of Arduino family microcontroller, LCD screen, Wi-Fi modem for sending data and a buzzer. The system is powered by a 12V transformer. The LCD screen is used to display the status of the level of water, humidity and gas. Whereas a web page is built to show the status to the user monitoring it. The web page gives a graphical view of the drainage. The LCD screen shows the status of the drainage water level, gas and humidity level. The system puts on the buzzer when the level of water crosses the set limit. Thus, this system helps to keep the city clean by informing about the drainage water levels by providing graphical image of the drainage via a web page.

II. PROBLEM STATEMENT

The current state of underground drainage systems often lacks real-time monitoring and effective rescue mechanisms, leading to various issues such as blockages, overflows, and contamination. Traditional methods rely heavily on manual inspection, which can be time-consuming, inefficient, and prone to human error. Furthermore, in the event of a critical failure or emergency, the lack of immediate response can exacerbate the situation, leading to property damage, environmental pollution, and even endangering human lives.

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III. OBJECTIVES

1. To protect sanitation workers from health issues.

2. To enhance the reliability, safety, and sustainability of urban drainage infrastructure whilemitigating risks and ensuring the well-being of communities and the environment.

IV. LITERATURE REVIEW

In the recent past, wireless sensor networks have found their way into a wide variety of applications and systems with vastly varying requirements and characteristics. As a consequence, it is becoming increasingly difficult to discuss typical requirements regarding hardware issues and software support. This is particularly problematic in a multidisciplinary research area such as wireless sensor networks, where close collaboration between users, application domain experts, hardware designers, and software developers is needed to implement efficient systems. In this paper we discuss the consequences of this fact with regard to the design space of wireless sensor networks by considering its various dimensions. We justify our view by demonstrating that specific existing applications occupy different points in the design space.The integration of Internet of Things(IOT) technologies into underground drainage systems has garnered significant attention due to the potential for enhancing monitoring capabilities and facilitating automatic rescue operations during emergencies. This literature review aims to explore the existing research, technologies, challenges, and opportunities related to advanced underground drainage monitoring and automatic rescue systems utilizing IOT.The integration of Internet of Things (IOT) technologies into underground drainage systems has garnered significant attention due to the potential for enhancing monitoring capabilities and facilitating automatic rescue operations during emergencies. This literature review aims to explore the existing research, technologies, challenges, and opportunities related to advanced underground drainage monitoring and automatic rescue systems utilizing IOT.Advanced sensor technologies play a crucial role in underground drainage monitoring. Liang et al. (2021) discussed the utilization of acoustic sensors for detecting blockages and abnormalities in underground pipes, contributing to early warning systems for potential failures. Moreover, Li et al. (2018) emphasized the importance of integrating multiple sensors, including ultrasonic and pressure sensors, for comprehensive data collection and analysis in underground environments.Efficient communication protocols are vital for transmitting sensor data from underground locations to control centres.The integration of sensors, communication protocols, and data analytics into a cohesive system architecture is essential for an effective underground drainage monitoring and rescue system.Despite the advancements, several challenges persist, including sensor deployment in harsh underground conditions, power supply constraints, and ensuring interoperability of IOT components. Future research directions include exploring energy-efficient sensor designs, developing standardized communication protocols, and enhancing predictive analytics capabilities for proactive maintenance and disaster mitigation. The literature review underscores the significance of IoT in advancing underground drainage monitoring and automatic rescue systems. By leveraging advanced sensor technologies, efficient communication protocols, data analytics, and robust system architectures, stakeholders can enhance the resilience and responsiveness of underground infrastructure, ensuring safety and sustainability in urban environments. Future research endeavors should focus on addressing remaining challenges and embracing emerging technologies to drive innovation in this critical domain.

V. PROPOSED METHODOLOGY

Our proposed system proposes the following features.
1. Detects the specific drain where the blockage occurs.
2. Immediate information of the blockage.
3. The system governs the flow of sewage from the pipes.
4. Use of flow sensors to detect the variations in the flow.
5. Get the prior alerts of blockages and locate them using IOT.

VI. RESULTS AND CONCLUSION

Underground monitoring is challenging problem. This project proposes different methods for monitoring and managing underground drainage system. It explains various applications like underground drainage and identification in real time. The gases level are being monitored and updated on the internet using the Internet of

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Things. This enables the person in-charge to take necessary actions regarding the same. In this way, the unnecessary trips on the manholes are saved and can only be conducted as and when required. Also, real time update on the internet helps in maintaining the regularity in drainage check thus avoids the hazards. Our project helps to reduce the problems of drainage system with the help of sensors gas sensors.

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