



Smart Machine-Hole Monitoring System

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Abstract—India is steadily progressing toward automation, with the goal of making every city a smart city. Many factors must be considered while creating a smart city, including smart water management, smart electricity management, smart transportation, and so on. Subsurface water pipelines, communication cables, gas pipelines, electric flow, and other smart underground infrastructure will be required. Because most Indian towns have adopted an underground drainage system, it is critical that this system function properly in order to keep the city clean, safe, and healthy. If the drainage system is not maintained, the pure water may get contaminated with drainage water, which can spread infectious diseases. So many different types of labor have been done to identify, preserve, and protect the environment.

Keywords —*Thingspeak, IFTTT, IoT, Node MCU Wi-Fi Module, Alarm, Sensors.*

I. INTRODUCTION

Sewerage, gas pipelines, water pipelines, and manholes are all part of underground drainage. The drainage systems in the majority of Indian cities are inadequately developed and maintained. There is a need for the creation of a proper, functional drainage system in areas with a high population density. In India, drainage systems are manually monitored, which is wasteful, and data gathered by sewer workers is limited with inadequate precision. If any of the manholes in a regular drainage system get blocked owing to undesirable waste products or a rise in the level of drainage, it becomes difficult to track down.

A system is created that includes several sensors that are connected to a microcontroller, which processes the data from all of the sensors and shows the system's status on a liquid crystal display. This project explains the many functions that are employed in the underground drainage system's maintenance and monitoring. It includes a device that can track the water level, air temperature, water flow, and harmful gas levels. The sensor system can detect when the drainage system becomes clogged and water overflows. And that sensor delivers data to the relevant management station via a transmitter placed in that location. RELATED WORK

1) The design space of wireless sensor networks, Wireless Communications

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.

2) Towards the Implementation of IoT for Environmental Condition Monitoring in Homes

In this research, we present an effective Internet of Things implementation that uses a low-cost ubiquitous sensor device to monitor typical residential situations. The integrated network architecture and the linking methods for reliable parameter measurement by smart sensors and data transmission via the internet are described. In the monitoring stage, the longitudinal learning system was able to give a self-control mechanism for better device operation. The monitoring system's framework is made up of a mix of pervasive distributed sensing units, data aggregation, reasoning, and context awareness information systems. The dependability of sensing information transmission using the proposed integrated network architecture has been 97% tested to provide real time graphical information rather than a test, and the results are positive..

3) Monitoring Smart City Applications using Raspberry PI Based on IOT

The smart city is a development goal that aims to monitor the quality of resources in the city in order to improve good management and accelerate the city's development. It is necessary to upgrade healthy and safe cities that provide real-time services and the most up-to-date facilities to implement the smart city concept using the Internet of Things (IoT) concept, which allows for easy wireless communication. The system is made up of sensors that collect various types of data and send it to the Raspberry Pi3 controller. The controller's output is emailed to the control room and displayed on a personal computer.

II. OBJECTIVES

1. Cleaner cities and intelligent management of drainage in the city.
2. Detection of drainage water level and blockages in the drainage.
3. Checking water flow rate continuously, as well as sending automatic mail, displays on the monitor if the water level is outside of an expected normal range.
4. The main objective is to obtain an effective low-cost and flexible solution for condition monitoring and infrastructure management in the city.
5. Sensing the temperature and leakage of gas and updating it in real time through IoT.
6. Check the status of the manhole cover (open/closed) and update it in real time to the authorities.

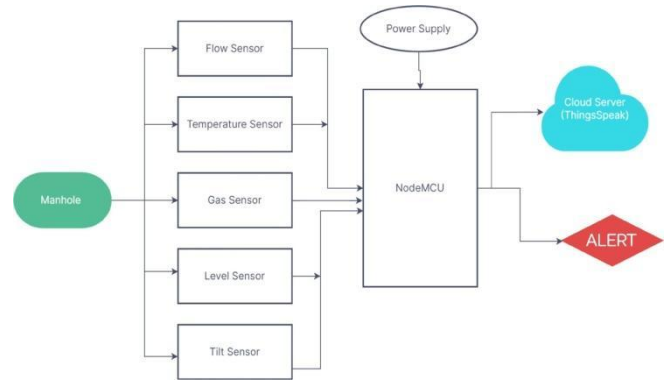


Fig. 1. Block Diagram

III. METHODOLOGY

The smart city is a development goal that tries to track the quality of resources in a city in order to optimize resource management and speed up growth. To implement the smart city concept using the Internet of Things (IoT) concept, which allows for easy wireless connectivity, it is required to upgrade healthy and safe communities that give real-time services and the most up-to-date amenities. Sensors capture various types of data and communicate it to the Raspberry Pi3 controller, which controls the system. The output of the controller is emailed to the control room and displayed on a computer.

A. Hardware

1) **NodeMCU** : The Node MCU (Node Micro Controller Unit) is an open-source software and hardware development environment built around an inexpensive System-on-a-Chip (SoC) called the ESP8266.



Fig. 2. NodeMCU

2) **Flow Sensor**: YF-AS201- Flow sensors are mainly used to measure the quantity or the rate of flow of liquids or gasses. We are using it to detect overflow.

Fig. 3. Flow Sensor

3) **Level Sensor** : Magnetic float water Level sensor is used to detect the level of water in the system. This can turn on to be as a pump, alarm and indicator.



Fig. 4. Level Sensor

4) **Temperature Sensor**: LM35- Temperature sensor is a device used to measure the hotness or coldness of an object. We are using this sensor to obtain the temperature underground.



Fig. 5. Temperature Sensor

5) **Gas Sensor** : MQ135 Gas sensor detects combustible hazardous gases and smoke.

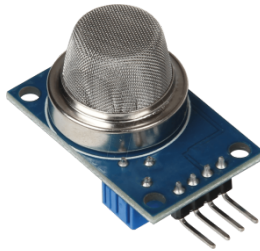


Fig. 6. Gas sensor

6) **Tilt Sensor** : We are using it to detect the opening and closing of the lid of the manhole. It has digital switching output(0/1).



Fig. 7. Tilt sensor

IV. FLOWCHART

The working of the whole unit can be explained by using the following flowchart as shown below.

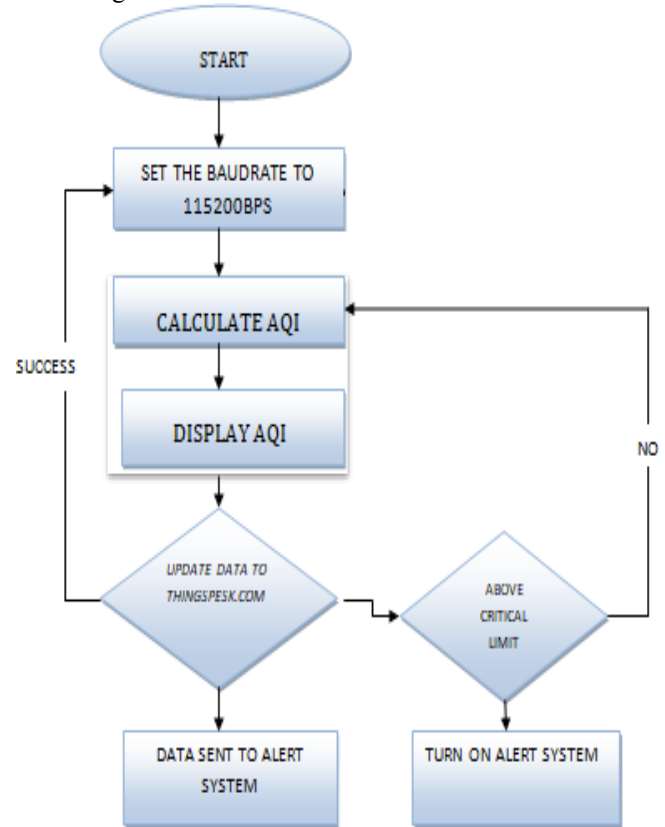


Fig. 8. Flow-chart

V. PROPOSED SYSTEM

The smart city is a development goal that tries to track the quality of resources in a city in order to optimize resource management and speed up growth. To implement the smart city concept using the Internet of Things (IoT) concept, which allows for easy wireless connectivity, it is required to upgrade healthy and safe communities that give real-time services and the most up-to-date amenities. Sensors capture various types of data and communicate it to the Raspberry Pi3 controller, which controls the system. The output of the controller is emailed to the control room and displayed on a computer.

The flaws of paper are also addressed by monitoring temperature differences within the manhole and sending an automatic mail notice to the managing station. Flow rate sensors are also utilized to detect drainage water overflow and send a warning to the managing station via automatic mail.

VIII. REFERENCES

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