International Journal of Engineering Inventions
e-ISSN: 2278-7461, p-ISSN: 2319-6491
Volume 12, Issue 5 [May. 2023] PP: 509-513

IOT Based Manhole Detection and Monitoring System for Accident Preventional System

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ABSTRACT:
Manhole recognition and monitoring is one of the essential needs for modern society, particularly smart City plan. The idea of this project roots in fact that missing or stolen manholes results in various road accidents and it shrinks the quality of city. The major challenge in this research is to investigate a method in recognition of manholes and further investigation on the condition of manhole on road. The report can be simultaneously updated in IOT platform which can be further used with other applications such as WAZE or Google MAP. This method uses Naive Bayes classifier to train dataset and detect as well as recognize the missing manhole on road. This project has three main components including 1). Recognize manhole on road, 2). Detect missing manhole, and 3). Update the coordinates to IOT platform. The software used for image processing was MATLAB. The coordinates were obtained via Arduino Mega and SIM808 GSM modem to updates the missing manhole covers coordinates on BLYNK IOT.

Key Words: *PIC controller, LCD, relay and solar.*

Date of Submission: 18-05-2023 Date of acceptance: 31-05-2023

I. INTRODUCTION

For a clean and healthy environment, many Indian cities have an underground drainage system that is controlled by the Municipal Corporation. The water in the drainage system is occasionally mixed with pure water due to poo upkeep Infections and diseases can be spread through the drainage system. Because of climate change, drainage is affected throughout the year, and the environment is dynamic, people's daily lives are disrupted. To fix all drainage system concerns and to send Blynk notifications to the municipal corporation informing them of the state of the drainage system so that officials can take the necessary steps to restore the drainage system[1][2]. A gas sensor was used to detect the gas produced within the bio-waste drainage system, preventing it from escaping. The pressure inside the drainage system produced an explosion. The purpose of this design is to track the drainage system using the sensor[3]. When the sewage system is obstructed, water overflows, or the drainage lid is removed, sensors monitor the drainage and send the data to a nearby municipal corporation official via integrated Wi-Fi, where the water overflow and gas value are presented live in the cloud for later examination. The Blynk Server also provides the drainage's GPS location. [5]

The sewage system exhibits instability and uncertainty due to multivariable, nonlinear, temporal variation, and random treatment processes. This model's purpose is to create a low-cost, customizable solution for detecting obstructions and stinky or foul-smelling gases[4].

On the other side, the ARM family offers unique hardware logic control, real-time performance, and synchronicity, allowing it to collect many sensor data simultaneously and boost system real-time performance significantly. In the IoT world, the Raspberry Pi board has surpassed the MCU in terms of multi sensor data collection. In an IoT setting, however, different industrial WSNs use a significant number of complicated and diverse sensors. At the same time, each sensor has its own readout requirements, and different users have applications that necessitate different sensor kinds. It involves the development of complicated and time-consuming sensor driver code and data collection procedures for each sensor that is newly connected to the interface device, providing several challenges to researchers.[6]

Manhole covers are an important feature of the city drainage system because of their large quantity and widespread distribution. However, every year, hundreds of people suffer various losses as a result of the manhole cover's complex form and ineffective function. We established the integration of urban drainage manhole cover to solve this problem[11].

Intelligent monitoring system to improve urban management and protect people's travel safety capacity. This system features real-time monitoring, timely alarms, precise positioning, and quick processing. etc. [7][8]
The sensors' intelligence and predictive system identify the drain clog and provide us with the information we need to proceed[13].
In a real-time scenario, sensors will monitor water levels, drainage blockages, and the amount of harmful gases.

Urbanization leads to increased flood risk because of the impervious surfaces in urban areas[9][10].Because metropolitan cities have chosen an underground system, the municipal government is responsible for keeping it clean. If drainage outlet management is poor, H_2O becomes contaminated and can lead to disease transmission. Drainage blockages during the monsoon season disrupt the final public's routine. As a result, there should be a facility within the city corporation that alerts officials to sewer blockages and their precise location. It primarily recognizes within the sector of warning people about a gas explosion, an increase in water level, and thus an increase in temperature. It makes use of IOT to create a drainage monitoring system in an extremely high automotive by using sensors to detect and send alerts to authorities via GSM and GPS module.[12]

II. WORKFLOW OF THE PROPOSED APPROACH

This project eliminates the disadvantages by installing water rate of flow sensors at node junctions to identify drainage water blockage. When there is a blockage in a specific node, the flow of drainage water changes, and if it exceeds the set value, an alert is displayed on the station management other faults are solved by monitoring temperature changes inside the manhole and alerting the necessary parties' ability, which is available in both urban and rural settings. If a drain becomes clogged and sewage water overflows, the sensors detect it and send a notification to the municipal. Traveling inside the manholes to assess the current situation is consequently perilous. A distant alarm system is essential for communicating data collected by sensors installed inside the manhole to the management station in order to tackle all concerns associated to underground sanitation. This includes power-supply components such as the controller, memory, transceiver, and battery as shown in Fig.1 and workflow diagram is illustrated in Fig.2.

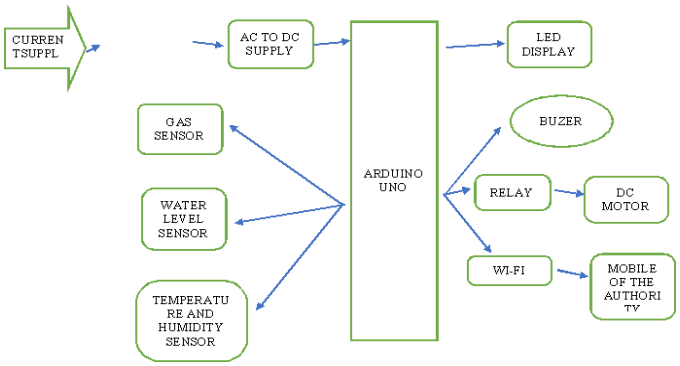


Fig.1.Block diagram

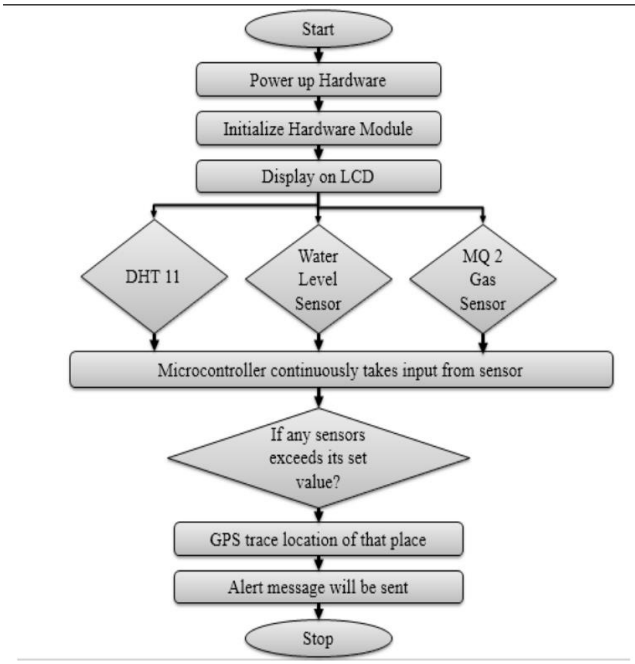


Fig.2. Workflow

Two ultrasonic sensors detect the water level, and if the difference between the two levels exceeds the threshold value, an alert message is delivered to the person in charge. The Arduino microcontroller is connected to the sensors' output. It looks at the previously set threshold level and sends a GSM alarm message to the person in control, which is tracked via IoT. Thing-speak, an IoT server analytics solution, display the graph for clog detection and gas detection on the monitor. The most significant benefit of this technology is that it can save sewage workers from dying from harmful gas exposure.

The system detect the blockage and water level it also monitors the condition water flow rate by different sensor we identify the temperature humidity and gas leakage this is also detect the condition of manhole means the cap of men holes is open or closed Door by using ultrasonic sensor the we used different sensor like tilt sensor gas sensor temperature sensor flow sensor particular sensor particular sensor reaches to respective threshold table this value sends to the microcontroller any problem is occurs sensor fence and send that information to microcontroller then microcontroller sense the signal from the Wi-Fi module to the person in charge then this alert reach to person in charge then this person in charge take the requirement action regarding the problem occupying inside the manhole.

The benefits of this type of technology are

a. Reduces the risk of death for manual scavengers who clean underground drainage, as well as benefiting the general public.

b. Detection of drainage water levels and drainage blockages

c. Continuously checking the water flow rate and sending automatic mail, as well as displaying on the monitor if the water level is outside of the expected normal range.

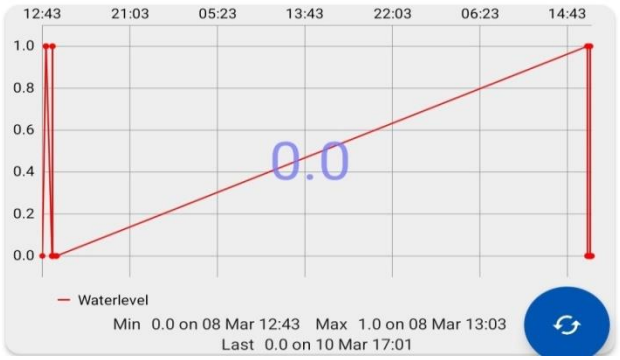
d. Keep track of your manholes, report on them, and improve them.

e. High adaptability and dependability, suitable for both urban and rural settings.

IV.RESULTS AND DISCUSSION

Temperature level

Water level



Gas level

Humidity level

The result obtained from the accuracy of the Naive Bayes classifier that the system can perfectly detect the missing manhole with total accuracy of 85%. The True Negative Rate (TNR), Positive Predictive Value (PPV) and False Discovery Rate (FDR) were found to be 80%,90%, and 10%, respectively. The data shows that the system results indicates that the camera can varied from 30 to 42 degrees while obtaining best result without any misdetection.

V.CONCLUSION

Nowadays, underground observation is tough. This idea suggests a completely new approach to manage the subsurface system. This system offers a clever solution. Clog, foul gas, and temperature can all be detected with this device. This may be the case. Smart cities have been introduced, and they are simple to operate. It is a low-cost, time-saving, and human-friendly option. system of intervention The system that has been presented identifies the sewer water level and thus detects the obstruction quickly present on the inside It also identifies the foul gas produced as a result of sewage-contaminated water The temperature inside the manhole was also rather high. Temperature sensors can also be used to detect it.

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