Detection of Manhole Overflow and Monitoring System

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Abstract:

The manhole detection and monitoring system presented in this project aim to develop a reliable and efficient solution for detecting and monitoring manholes in urban areas. The system utilizes advanced technologies, including sensors, communication modules, and data analytics, to improve the maintenance and safety of manholes. The system consists of multiple components, including float switch sensors, Arduino uno and sim 800C. The float switch is designed to detect the status of maximum level of sewer. The control system receives and processes the data, applying data analytics algorithms to identify potential issues in real time. In summary, the manhole detection and monitoring system provide an intelligent solution for enhancing the maintenance and safety of manholes in urban areas andrural areas.

Keywords: Manhole detection, Sensors, Data Analytics.

1. INTRODUCTION

Access points are a vital part of any drainage system when it comes to upkeep, inspection, and cleaning. Subsurface drainage systems are now common in metropolitan areas, and the municipal corporation is in charge of keeping the region clean. Inadequate sewage upkeep can taint the water table and cause serious illnesses. The rainy season causes drain obstructions, which interfere with people's daily routines. The city corporation should thus have a mechanism that alerts the appropriate authorities about sewer clogs and their exact location. It excels primarily in the field of alerting the public to temperature changes, water level rises, and gas explosions.

During routine city trips, the drains pipe issue may result significant issues. If the proper precautions are taken, issues during cleaning may include littering, an abrupt rise in the water level, and numerous dangerous gases. It is challenging to tell whether a blockage has formed at a given site because the current drainage system is not computerized. Sometimes it's also because the waste in these drains emits different gases, such methane (CH_4). Dangerous compounds like carbon monoxide (CO), if ingested in significant amounts by people, can lead to major health problems. The issue of fatalities brought on by sewage workers. Furthermore, there has been no notification that the rise in these gases or the rise in water levels will be stopped. These are actual instances that we can examine to determine the drainage system's shortcomings.

The two main parts of a manhole are the chamber or ring and the vertical circular pipe. The vertical circular pipe has different depths and diameters. To reach the system's inspection joints, these pipes are used. Normally, manholes are positioned 0.5 metres from the road's curb lines. The majority of the time, it is constructed to be outside of the traffic's wheel path.

The plug-like function of a manhole cover prevents unauthorised access to the manhole. The shapes of manhole cover range from circular to square to rectangular. The cover material might be made of precast concrete, composite

materials, or any glass-reinforced plastic. The access through the manhole provision is made using certain procedures. If the depth of the manhole is less than 1 m, a step ladder is constructed. In the event that the manhole is deeper than 2.5 metres, a normal ladder is built. Physical access is no longer necessary to enter modern manholes.

2. STATEMENT OF PROBLEM

The drainage system in use today is simple. Therefore, anytime a blockage arises, it could be difficult to determine its precise location. Furthermore, there are no forewarnings of the impediment. It takes time to identify the obstruction and remove it as a result. Handling the issue becomes quite challenging when pipes are completely obstructed. Such drainage line failures cause a great deal of troubles for people. A manhole monitoring system's goal is to identify and track changes in a manhole's status, such as cracks, leaks, and structural damage, in real time. When a potential problem is found, the system should be able to warn and notify the appropriate employees, enabling quick maintenance and repair. The system should also be able to gather and analyses data to reveal information on the effectiveness and upkeep requirements of the sewer system.

Keeping this in mind this research work is carried out to avoid the overflow of the waste-water in manhole and to alert the municipality authority regarding the overflow of waste-water through a text message.

3. METHODS AND MATERIAL

A. Components Required

ARDUINO UNO: A prevalent micro-controller board that is frequently used in DIY electronics projects and electronics prototyping is the Arduino Uno, which is depicted in Figure 3.1. It belongs to the Arduino series of development boards and is based on the ATmega328P microprocessor.

Fig 3.1: Arduino uno

SIM 800C: It is a widely used GSM/GPRS module shown in Figure 3.2 that provides wireless communication capabilities to electronic devices. It is part of the SIM800 series of modules manufactured by SIM800C. The SIM800C module integrates the GSM/GPRS functionality, making it suitable for applications that require cellular connectivity.
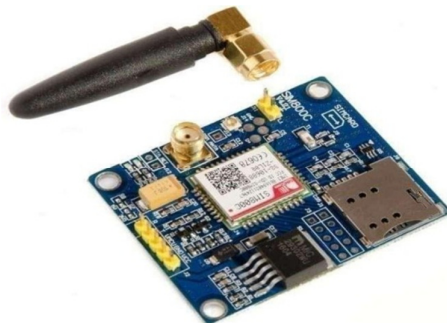

Fig 3.2:SIM800C

FLOAT SWITCH: A float switch, like the one in Figure 3.3, is a tool used to measure the fluid quantity in a tank of any kind. It is composed of a float or other buoyant object fastened to a lever or switch mechanism. The switch activates or deactivates based on the predetermined level thresholds when the liquid level fluctuates, depending on whether the float rises or falls. A mechanical switch or a magnetic reed switch can be used as the switch.

Fig 3.3: Float Switch

B. Working Procedure

Figure 3.4 shows the connections of Arduino uno, SIM800C and Float Switch all put together to form a working model. Figure 3.5 shows the flow chart of the working procedure. If the sewage level in the manhole is higher than the maximum level, the float switch gets on and the message is passed to the managing department with the help of Sim Module 800c and Arduino uno, the notification of the message alert is as shown in figure 3.5. The proto type model has been developed to check working of the model the same is as shown in figure 3.6.
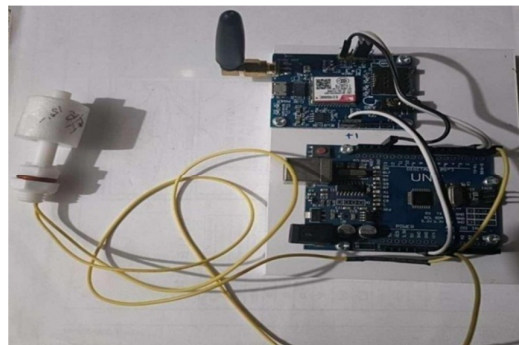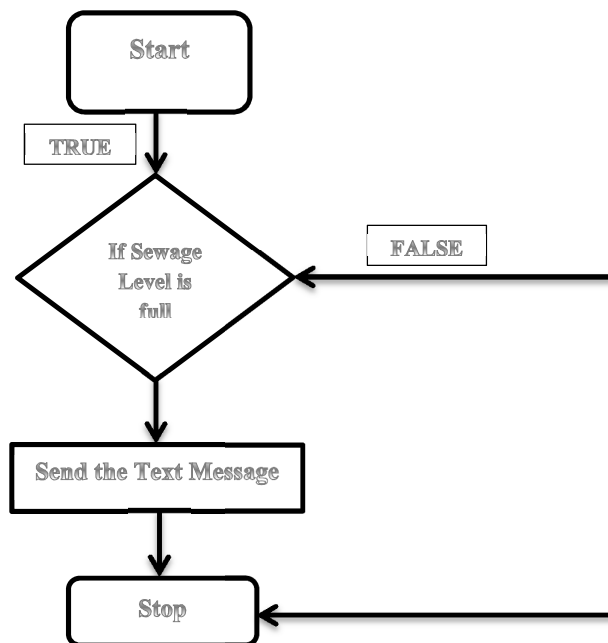

Fig 3.4: Working Model

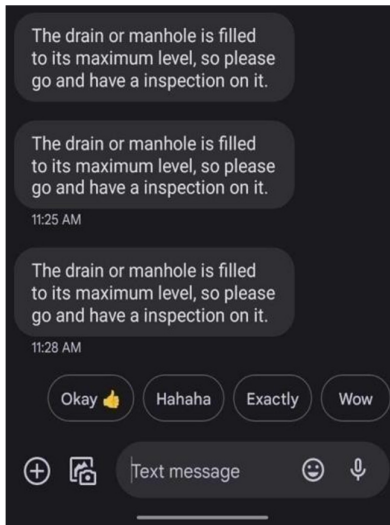**Fig 3.4**: Flow Chart of Working Procedure
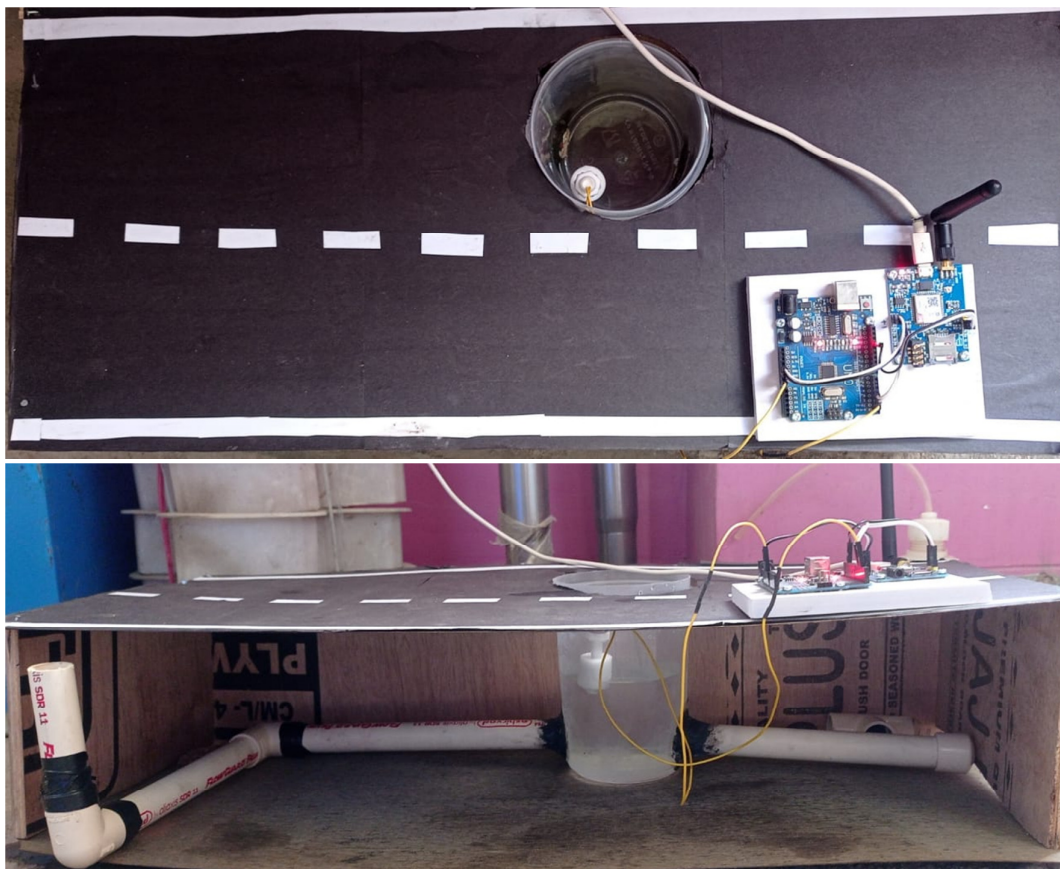
Fig 3.5: Alert Notification

Fig 3.6: Prototype Model

4. CONCLUSION

The following conclusions were drawn:

- The invention discloses a road manhole cover monitoring device based on a float switch system.
- The device comprises an Arduino uno float switch and sim 800C.
- Prototype model has been developed using the float switch which can detect the maximum sewer level in manhole and inform the concerned authority by sending the message, which is one of the major advantage.

- By providing this type float sensor, it avoids the over flow in the manhole, and it avoids the problem created by overflow of waste-water.
- By providing the float switch in the manhole, the regular inspection is not required. It can be applied for all types of manholes, for monitoring and the cost of implementation are economical.

REFERENCES

[1] Ruheena M.A, Rukheya Sheereen, sheeba kulsum and T komala. "Manhole Detection monitoring system" International Journal of Engineering Research and Technology, Volume 9 special Issue 12, ISSN: 2278-0181, (www.ijert.org).

[2] G. M. Barbade, Chandurkar Shreyas, Shounak Vedant, Nimkar Vaibhav, Patil Umesh. "Automatic Water Tank Filling System with Water Level Indicator", Indian Journal of Microprocessors and Microcontroller (IJMM), volume-1, Issue-2, September 2021, ISSN: 2582-8835.

[3] Pavithra M, Gowtham P K, Jignesh M Jayasubha K, JeevithaBrindha A. "IOT Based Underground Drainage Monitoring System", International Journal Of Creative Research Thoughts (IJCRT) Volume 10 Issue 5 May 2022, ISSN: 2320-2882.(www.ijcrt.org)

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