iJRASET
International Journal For Research in Applied Science and Engineering Technology

# INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

**Volume:** 9 **Issue:** VI **Month of publication:** June 2021

**DOI:** https://doi.org/10.22214/ijraset.2021.35668

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
*ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429*
*Volume 9 Issue VI June 2021- Available at www.ijraset.com*

# Manhole Management System

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***Abstract:*** ***A smart city is the future goal of providing cleaner and better services to society. Smart underground infrastructure is an important feature to consider when implementing a smart city. Monitoring the drainage system plays a vital role in keeping the city clean and healthy. The supervision is incompetent, this results in slow treatment of drainage problems and takes more time to resolve. In order to alleviate all of these problems, the system is being developed with a wireless sensor network consisting of sensor nodes. The project aims to design a well management system using IOT that will notify the management station via email when a well exceeds its thresholds, and the system will also monitor the data from the sensors on the LCD module, the system will reduce the risk of death for manual collectors that clean the underground drain and also benefits the public. The project uses a water level sensor, a water flow sensor, an SR04 ultrasonic sensor, a temperature sensor, a gas sensor, an Arduino UNO atmega328 microcontroller and a Raspberrypi3 processor. This project "MANHOLE MANAGEMENT SYSTEM" helps to send signals from sensors. This project consists of Raspberry Pi3 and Arduino Uno, the two microcontrollers that are connected to each other.The signals received by the Arduino from the sensors are converted from analog signals into digital signals with the help of the ADC on the Arduino board and then processed and sent to the Raspberry Pi, it takes this as input data and the Raspberry Pi is sent to an E. -Mail to the appropriate authority. The status of the project is displayed on the LCD module.***

## I. INTRODUCTION

The Smart City concept aims to provide society with cleanliness and better facilities. Intelligent underground infrastructure is considered an outstanding feature that should be taken into account When implementing a smart city, monitoring the drainage system plays a very important role for the cleanliness of the city and the health of the people living in it, as manual monitoring is incompetent, it leads to that management slows down drainage problems and is time consuming determination. All of these problems, and to solve them, a system is developed that uses a wireless sensor network composed of sensor nodes. IOT management system that notifies the management station via email when a manhole exceeds its thresholds and the system also monitors the data from the sensors on the LCD module, this system aims to reduce the risk of death for manual collectors who clean the underground sewers and also benefit the public. This "MANHOLE MANAGEMENT SYSTEM" project uses sensors to send the signals. The signals received by the Arduino from the sensors are converted into digital signals with the help of the ADC on the Arduino board and then processed and sent to the Raspberry Pi, it takes them as input data and the Raspberry Pi is sent to the Raspberry Pi an E -Mail to the competent authority The status of the project is displayed on the LCD module.

## II. METHODOLOGY

The proposed system will help us to see if a manhole is clogged or if gases are detected or if the flow is detected with the appropriate. The sensor detects and sends a warning system to the management station so that it can be continuously monitored and necessary measures can be taken.

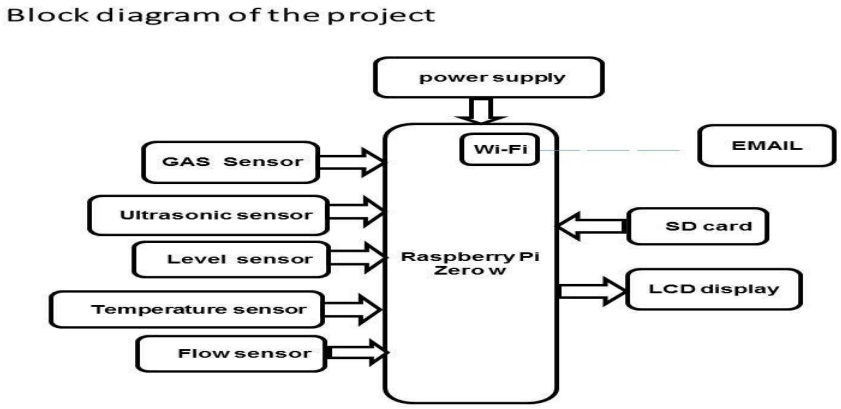


Fig 2.1 Block diagram of the system

*A. Sensor Network*

The sensor network used in this project consists of ultrasonic sensor, gas sensor, flow sensor, level sensor, temperature sensor.

1) *Ultrasonic Sensor (SR-04):* Ultrasonic sensors emit short, high-frequency sound pulses at regular intervals. These propagate within the air at the rate of sound. If they strike an object, then they're reflected back as echo signals to the sensor, which itself computes the gap to the target supported the time-span between emitting the signal and receiving the echo. As the distance to an object is set by measuring the time of flight , ultrasonic sensors are excellent at suppressing background interference.
2) *Gas Sensor:* The gas sensor used is MQ-2 gas sensor. The sensitive material of the MQ-2 smoke sensor is SnO2, which has a lower conductivity in clean air. If the target smoke is combustible, the conductivity of the sensor and the increased smoke concentration will be higher. The MQ-2 smoke sensor has high sensitivity to LPG, propane and hydrogen, it can also be used for methane and other flammable vapors, it is inexpensive and suitable for various applications. The sensor can be operated at temperatures from -20to 50 ° C and only consumes 150 mA at 5 V.
3) *Flow Sensor:* A flow meter is an instrument accustomed measure linear, nonlinear, mass or volumetric flow of a liquid or a gas. When choosing flow meters, one should consider such intangible factors as familiarity of plant personnel, their experience with calibration and maintenance, spare parts availability, and unit of time between failure history, etc., at the actual plant site.
4) *Level Sensor:* A level sensor is used to detect the level of the fluids. Once the level is detected it converts the received signals to electric signals.
5) *Temperature Sensor (LM-35):* To detect the heat produced during fire occurrence we use temperature sensor. The LM35 sensors are integrated-circuit temperature sensors, with high precision, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35 sensor thus, encompasses a bonus over linear temperature sensors calibrated in ° Kelvin, because the user isn't required to subtract the foremost of the constant voltage from its output to induce convenient centigrade scaling.

## III. FLOWCHART

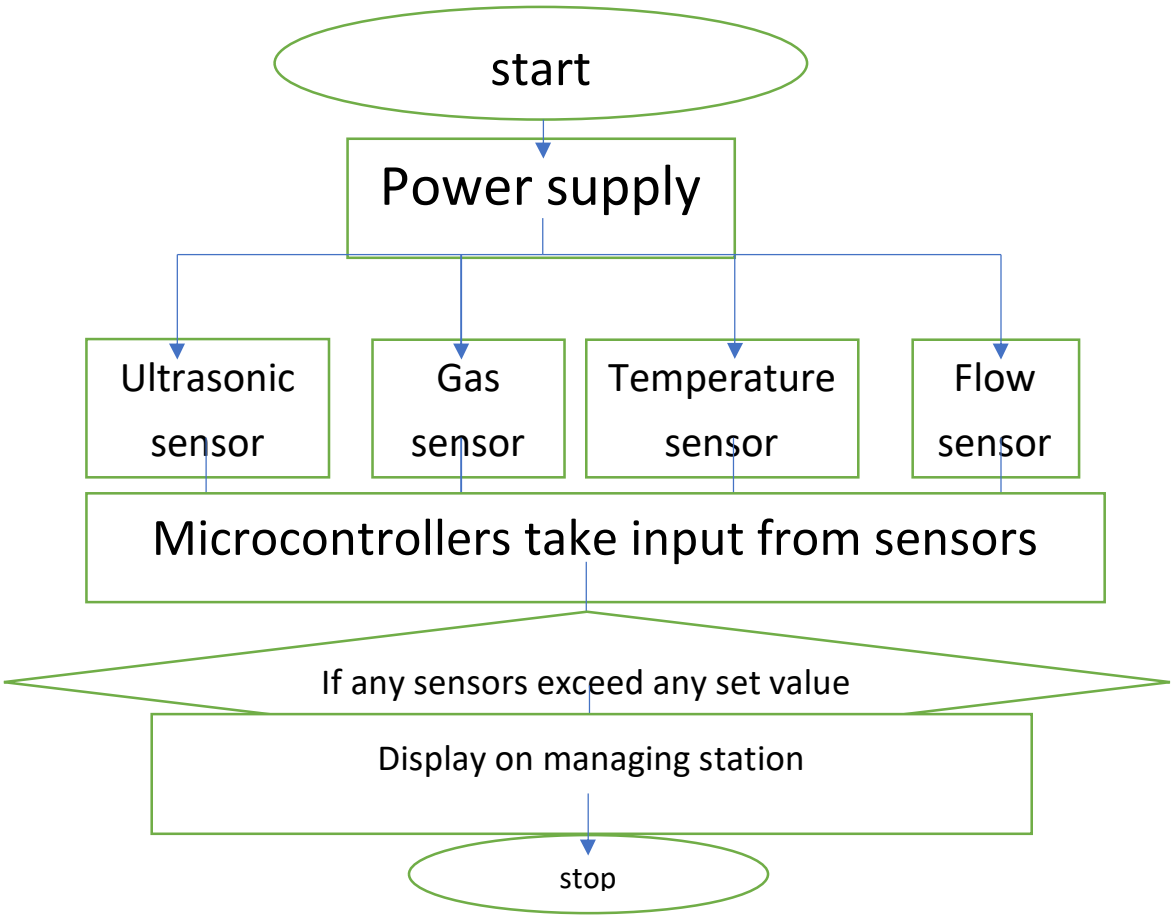


Fig 3.1 Functional flow of the system

## IV. PROPOSED SYSTEM

In the proposed system a Manhole monitoring system using IOT is developed. In this sensors are integrated with the help of raspberry pi and atmega micro controller. The sensors senses if any anomalies are resent in the manholes. This system monitors the temperature in the manholes, detects any gas leaks, rate of flow is monitored, detects if any blockages are present. If any threshold anomalies are noticed the system sends an alert mail to the managing station (i.e: Municipal Corporation) and required action can be taken. This is very useful as it can be a means for attaining cleanliness in the society.

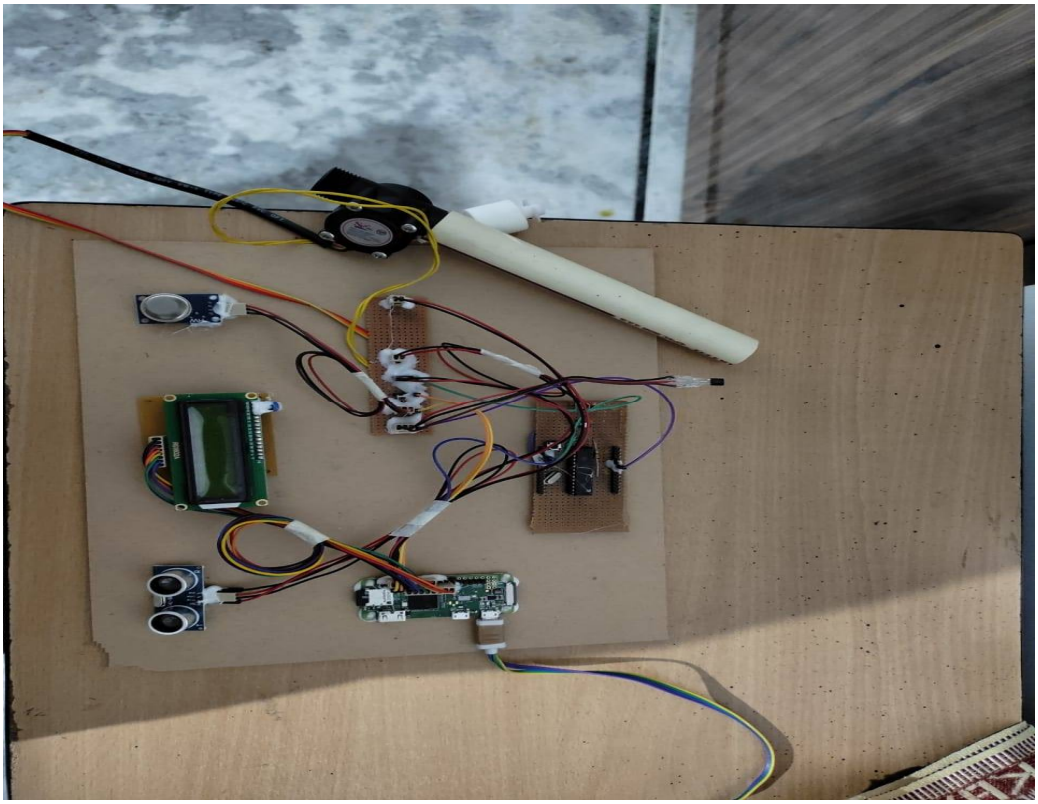

Fig 4.1: Experimental setup

## V. RESULT

The system is used to detect if any blockages or if any gases are detected or if the rate of flow is increased in the manholes. As soon as any anomaly is detected in the manholes the system sends an alert message to the managing station. By using this system time is saved and also human involvement is focussed only at the needed places.

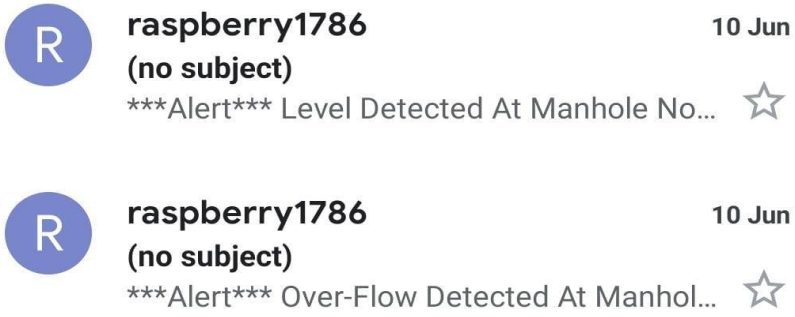


Fig 5.0.1: Alert mails when thresholds are exceeded

## VI. FUTURE SCOPE

This is going to have a very high scope in the coming years as it is very important to have a system which continuously monitors the drainage system and gives alerts as it detects any anomalies. As the cities are being transformed into smart cities cleanliness is very important and people are not going to compromise on the terms of cleanliness and hygiene. As the system is basically a cleanliness derived system the life for this system I going to be high and also, this is feasible to update even further which makes it compatible to any environment.

## VII. CONCLUSION

In the near future it is all about smart cities and everything is automatised or everything is interlinked to internet. In such times maintaining the city clean becomes very basic necessity. To keep the cities clean, drainage monitoring system is very important. To serve that purpose, a smart manhole management system becomes a kind of necessity. So, this manhole management system serves that purpose of being that necessity. And becomes quite handy in maintaining the cleanliness in the society.

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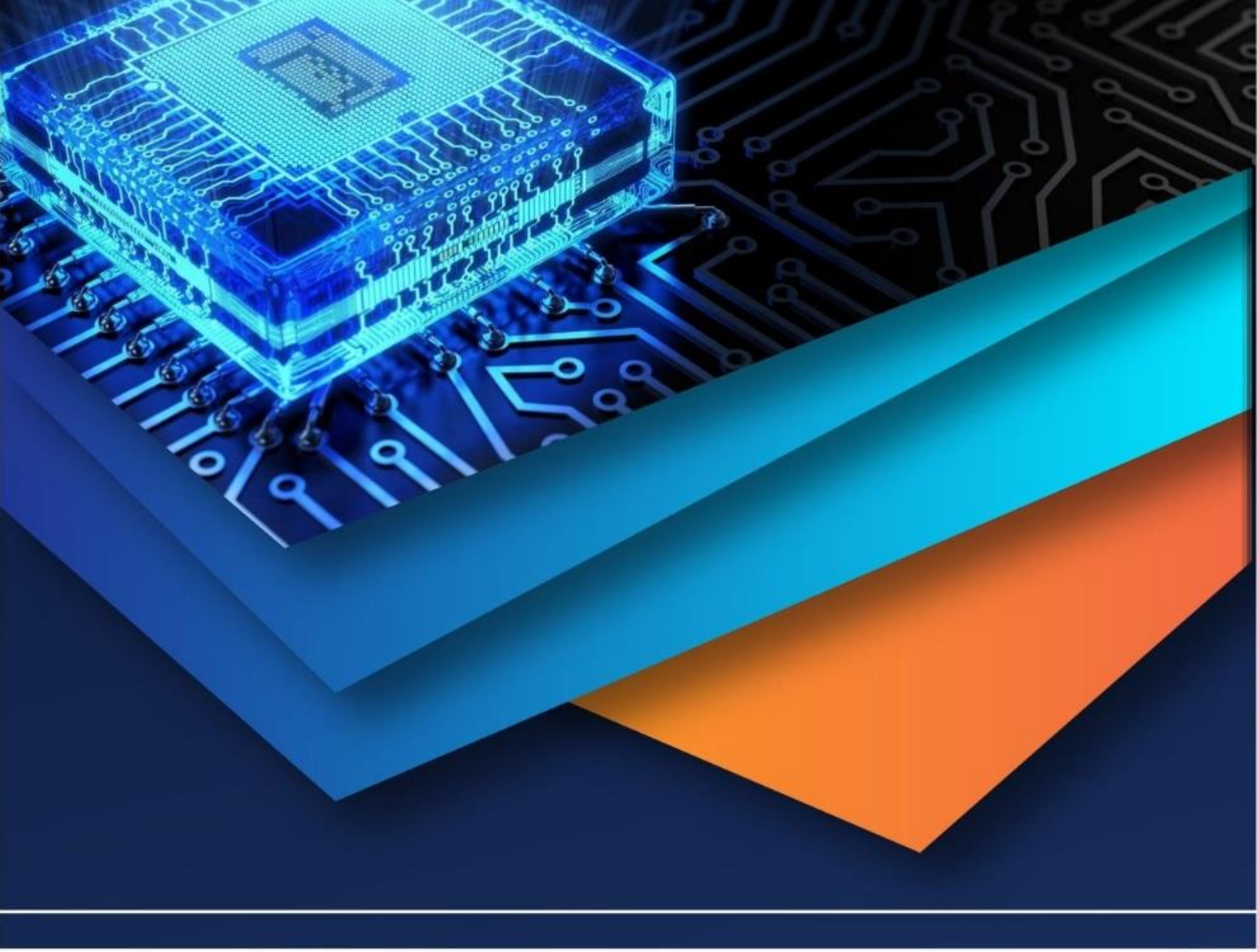

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