iJRASET
International Journal For Research in
Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH
IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 11 Issue: V Month of publication: May 2023

DOI: https://doi.org/10.22214/ijraset.2023.52708

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 11 Issue V May 2023- Available at www.ijraset.com

# Smart Sewage System

Anchal Pandey[1], Huzaifa Rashid[2], Kartikeya Tiwari[3], Vedangi Sahu[4], Dharmesh Kumar[5]
[1, 2, 3, 4, 5]*Department of Electronics & Communication Engineering, Babu Banarasi Das Institute of Technology & Management, Lucknow*

***Abstract: Sewage treatment is an important environmental protect problem. If the drainage system is not maintained properly, the pure water got mixed with drainage water and cause infectious disease. It is very important that underground drainage system should work in a proper manner to keep the city clean, safe and healthy. So various kind of work has been done to detect, maintain and manage these underground systems. To create a barrier to this problem, a hardware model is designed to monitor the sewage system. In this project, we aim to design a system to measure the water level in sewage continuously using the ultrasonic sensor. The toxicity of CO and methane gases are also sensed to avoid danger for human life. This project attempts to device that detect the humidity, temperature levels, and mixture of gases, sensing each type of gas to measure its level while keeping track of the real-time dynamic changes in the above factors using Arduino. If levels exceed beyond the threshold, it shall send an alert on the connected mobile devices of the authorized people who are remotely located in the job with the help of Node MCU.***
***Keywords: Ultrasonic sensor, CO, Methane Gas, Arduino, Node MCU***

## I. INTRODUCTION

The management of sewage is an essential component of modern urban infrastructure. Sewage treatment plants play a crucial role in protecting public health and the environment by removing pollutants and harmful substances from wastewater before it is discharged into water bodies. However, the safe and efficient management of sewage is not without its challenges. One of the main challenges is the detection of toxic gases and water levels in sewage, which can pose significant health and environmental risks if left undetected. To address this challenge, we propose the development of a smart sewage system that leverages the power of modern technology to detect toxic gases and water levels in sewage. Specifically, our system uses an Arduino Uno microcontroller to collect data from various sensors that are placed in the sewage system. These sensors are designed to detect the presence of toxic gases, such as methane and hydrogen sulfide, as well as to measure the water level in the sewage. Once the data is collected, it is sent to the cloud via a wireless module, where it is analysed using advanced algorithms to identify any potential risks or anomalies in the sewage system. This data can be accessed in real-time by the sewage treatment plant operators, allowing them to take immediate action to mitigate any potential risks to public health or the environment. Overall, our smart sewage system represents a significant step forward in the management of sewage, and has the potential to revolutionize the way we monitor and treat wastewater in urban environments. By detecting toxic gases and water levels in sewage, we can ensure that our sewage treatment plants are operating safely and efficiently, and that our communities are protected from the harmful effects of pollutants and other harmful substances in wastewater.

## II. ARDUINO UNO

It's fourteen digital input/output pins (of that half-dozen will be used as PWM outputs), half-dozen analog inputs, a sixteen-rate ceramic resonator (CSTCE16M0V53-R0), a USB affiliation, an influence jack, associate ICSP header and a push button. It contains everything required to support the microcontroller; merely connect it to a laptop with a USB cable or power it with a AC-to-DC adapter or battery to urge started. you'll tinker together with your Uno without concern an excessive amount of regarding doing one thing wrong, worst-case situation you'll replace the chip for some bucks and begin another time. "Uno" suggests that one in Italian and was chosen to mark the discharge of Arduino software package (IDE) one.0. The Uno board and version one.0 of Arduino software package (IDE) were the reference versions of Arduino, currently evolved to newer releases.

Figure 1: Arduino UNO

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 11 Issue V May 2023- Available at www.ijraset.com

## III. NODE MCU

Node MCU is an open-source platform that is based on the popular ESP8266 Wi-Fi microcontroller. It provides a simple and easy-to-use programming interface for developing IoT (Internet of Things) applications. It is capable of connecting to the Internet and can be programmed using the Lua scripting language. It offers a number of advantages over traditional microcontrollers, including its built-in Wi-Fi connectivity and its ability to be programmed using Lua, which is a lightweight and easy-to-learn scripting language. This makes it an ideal platform for developing IoT applications that require wireless connectivity and can be programmed quickly and easily. It is also highly customizable, allowing developers to add additional sensors and other components to their projects as needed. It is compatible with a wide range of sensors and other hardware components, making it a versatile platform for IoT development.

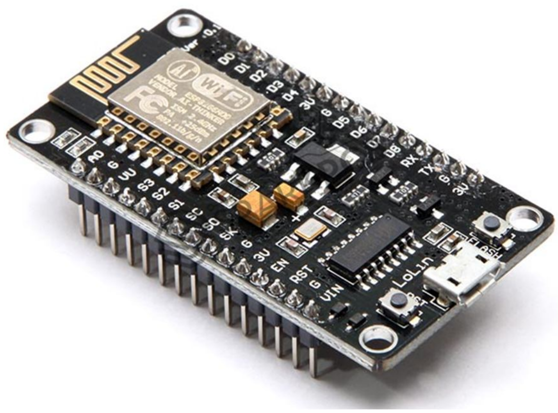


Figure 2: Node MCU

## IV. METHANE GAS SENSOR (MQ6)

Methane gas sensor MQ6 is a popular gas sensor used for detecting methane gas in various applications, including industrial and domestic settings. The sensor is based on the principle of gas conductivity, where the electrical conductivity of the sensor changes in the presence of methane gas. The MQ6 sensor is a low-cost and compact device that can detect methane gas concentrations in the range of 200 to 10000 ppm. It is a small module that can be easily integrated into various electronic devices and systems, including the Arduino Uno microcontroller used in our smart sewage system project. One of the key advantages of the MQ6 sensor is its fast response time, which allows it to detect methane gas quickly and accurately. The sensor is also highly sensitive to methane gas, making it ideal for detecting even small concentrations of the gas.


Figure 3: Methane Gas Sensor (MQ 6)

## V. CARBON MONOXIDE (MQ 7)

The Carbon monoxide (CO) gas sensor MQ7 is a highly sensitive device that is widely used for the detection of CO gas in a variety of applications, including air quality monitoring, safety and industrial processes. The MQ7 sensor is based on the principle of a chemical reaction between CO and a sensing material, which changes the electrical resistance of the sensor. This change in resistance is then measured and converted into an electrical signal, which can be used to detect the presence of CO gas. One of the key advantages of the MQ7 sensor is its high sensitivity and selectivity to CO gas, which makes it a valuable tool in the detection of CO in a range of applications. The MQ7 sensor is also relatively low-cost and easy to use, which has contributed to its popularity in the industry.


Figure 4: Carbon Monoxide (MQ 7)

## VI. TEMPERATURE SENSOR (DHT 11)

The DHT11 temperature sensor is a popular digital sensor that is widely used in various applications, including home automation, HVAC systems, and weather monitoring. The sensor is small, low-cost, and easy to use, making it an ideal choice for many DIY projects and prototypes. It measures both temperature and humidity levels with high accuracy and reliability. The DHT11 sensor is based on a capacitive humidity sensor and a thermistor to measure humidity and temperature, respectively. The sensor provides digital output, which makes it easy to interface with microcontrollers such as Arduino and Raspberry Pi. It has a temperature measurement range of 0°C to 50°C with an accuracy of ±2°C and a humidity measurement range of 20% to 90% RH with an accuracy of ±5%. One of the key advantages of the DHT11 sensor is its low power consumption, which makes it ideal for battery-powered applications. It also has a simple two-wire interface, which makes it easy to integrate with other sensors and devices.

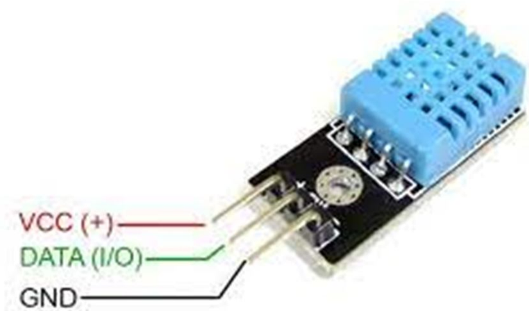



Figure 5: Temperature Sensor (DHT 11)

## VII. WATER LEVEL SENSOR

A water level sensor is an electronic device that is designed to measure the water level in a tank, reservoir, or other water storage system. It works by detecting changes in the electrical conductivity of the water, which vary depending on the level of water in the tank. The sensor typically consists of two electrodes that are placed at different heights in the tank. When the water level rises and touches the higher electrode, a circuit is completed and a signal is sent to the sensor module, indicating that the tank is full.

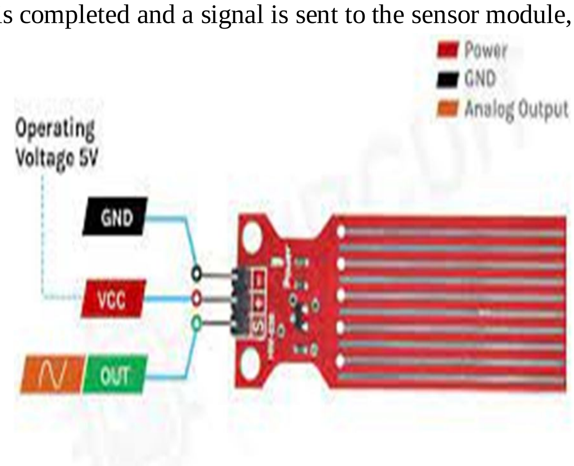



Figure 6: Water Level Sensor

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
*ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538*
*Volume 11 Issue V May 2023- Available at www.ijraset.com*

## VIII. BLOCK DIAGRAM

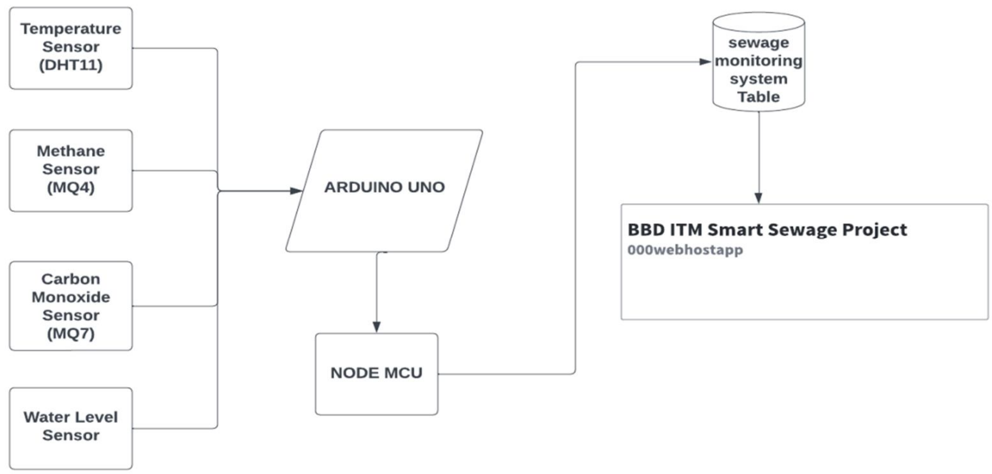



Figure 7: Block Diagram of project

## IX. WORKING MODEL

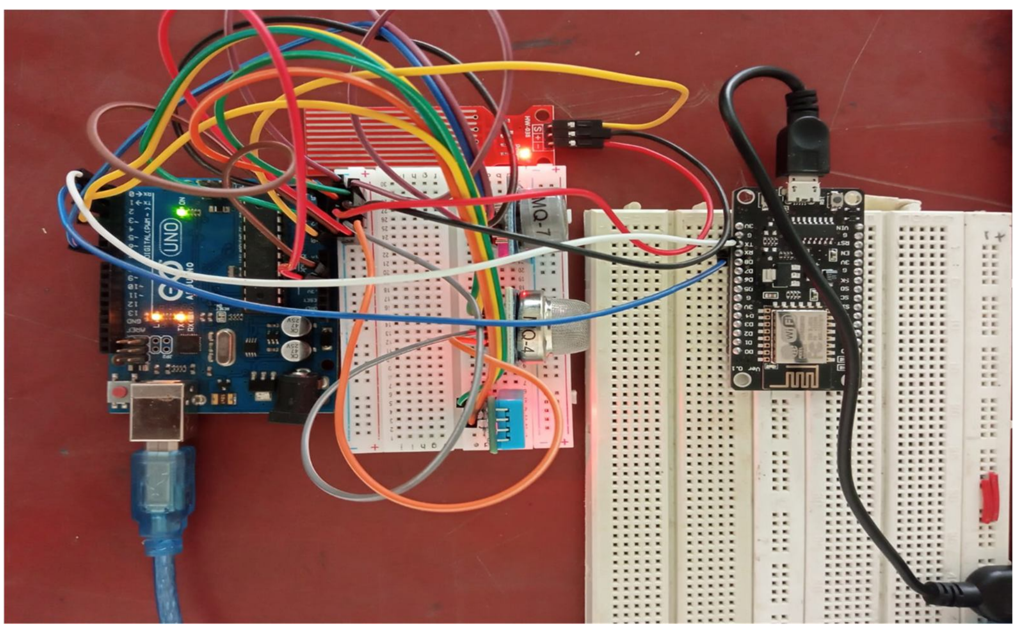


Figure 8: Working Model

## X. FUTURE SCOPE

In future to use this device on city scale each such device can be placed in the sewage and the sewage could be monitored with help of IOT real time analysis could be done. The smart sewage system that we have developed using an Arduino Uno microcontroller and various sensors has the potential to revolutionize the way sewage is managed in urban environments. However, there are still several areas where this technology can be improved and expanded in the future. One area for future development is the integration of artificial intelligence and machine learning algorithms into the system. By using these advanced technologies, we can not only detect toxic gases and water levels in sewage, but also predict potential issues before they occur. This will allow us to take proactive measures to prevent sewage overflows and other problems, leading to even greater efficiency and cost savings. Another area for future development is the use of alternative energy sources to power the system. Currently, the system relies on electricity from the grid, which can be unreliable and expensive in certain areas.

By integrating solar panels or other renewable energy sources, we can reduce the reliance on the grid and make the system more sustainable and cost-effective. Finally, the data collected by the smart sewage system can be analysed and used to inform policy and decision-making related to sewage management. For example, by analysing trends in water usage and sewage generation, city planners can make more informed decisions about the location and size of sewage treatment plants, leading to more efficient and effective management of sewage in urban environments. Overall, the smart sewage system that we have developed represents a significant step forward in sewage management technology, and has the potential to improve the quality of life for people living in urban areas around the world. With further development and expansion, this technology can become an even more powerful tool for managing and protecting our precious water resources.

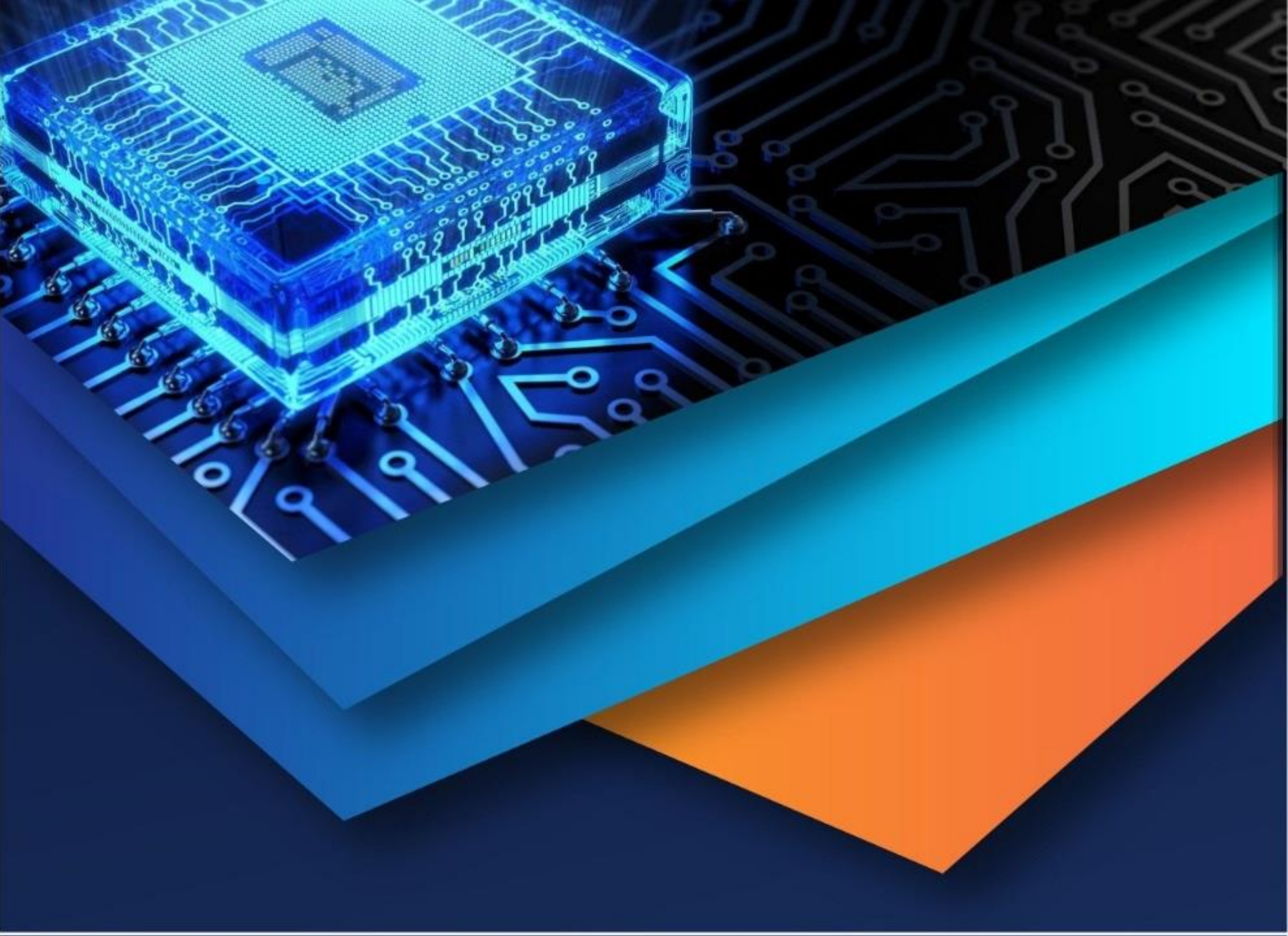
Figure 9: IOT Real Time Analysis

## XI. CONCLUSION

The goal of this project is to provide a methodology to check harmful release of gaseous materials in areas includes in the drainage system, in social housing and industrial facilities. Sewage also contributes to the natural process of producing poisonous gases. When inhaled foe a significant period of time, these gases can be harmful and if high does are absorbed in the bloodstream, it may lead to serious illnesses in the work force. Drainage system indicates the presence of gases, namely sulphur dioxide and carbon, ammonia, nitrogen dioxide, carbon dioxide and carbon monoxide. Therefore, these toxic gases are hazardous and sometimes lead to their death, particularly for sewage workers and cleaners. Hence, an IOT- based monitoring system is being introduced programs suggested manual sampling for the sewer gas analysis at defined time intervals. Many variables such as humidity, temperature and generation of live videos were not considered.

## REFERENCES

[1] Pendharkar, Anushka & Chillapalli, Jyothi & Dhakate, Kanksha & Gogoi, Subhalaxmi & Jadhav, Yogesh. (2020). IoT based Sewage Monitoring System. SSRN Electronic Journal. 10.2139/ssrn.3697395.
[2] Smart System for Hazardous Gases Detection and Alert System using Internet of Things (R. Ganesh, M. Mahaboob, Janarthanan An, Lakshman C, Poonthamilan S, K. Kumar)
[3] https://docs.arduino.cc/hardware/uno-rev3
[4] https://en.wikipedia.org/wiki/NodeMCU
[5] https://www.elprocus.com/mq4-methane-gas-sensor/
[6] https://www.elprocus.com/a-brief-on-dht11-sensor/
[7] https://www.sparkfun.com/datasheets/Sensors/Biometric/MQ-7.pdf




10.22214/IJRASET

INDEX COPERNICUS 45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429


# INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY