

Automatic Rescue System for Underground Drainage Monitoring

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Abstract— Underground drainage monitoring system plays an important role in keeping the cities clean and healthy. Compared to other countries, India consists of highest number of sewage workers. Exposure of sewage workers to poisonous gases like hydrogen sulphide, sulphur dioxide, carbon monoxide, methane, ammonia, nitrogen oxide increases the death of the sewage workers. The main aim of this project is to design a network system which helps in monitoring poisonous gases present in sewage. Whenever the gas level crosses the threshold value, the information with different gas ppm values is displayed in the smart phone through the app. It also indicates whether it is safe for the manual scavengers to work in the environment or not. The 2021 Socio-Economic and caste census recorded more than 1,82,000 families reporting at least one member as a sanitation worker: 376 of these workers have died over five years to 2019, with 110 dying in 2019, a 61% rise over the previous year. There have been no reported convictions. The problem of manual only appears to be worsening and entrapping thousands in a supposedly illegal profession, despite recent government efforts to automate the cleaning of India's vast, invisible and dangerous underbelly.

Index Terms: IOT, Threshold value, Sensors, Application, LED, Sewage system.

I.INTRODUCTION

The underground drainage system monitoring plays a very important role in making the cities clean. In India, the process of monitoring and maintaining the drainage system is done manually. The drainage consists of solid and liquid waste generated by hospitals, industries, factories and from homes [1-4]. Hazardous gases are released from this waste which poisonous gases increases the chances of sewage workers affected by diseases like paratyphoid fever, hepatitis and even death. Manual monitoring &

cleaning the drainage is necessary but it leads to huge accidental deaths of human due to over gas in manholes[5-7]. The death of sewage workers has been increasing day by day. In order to protect the sewage worker from death we have come up with the solution called IOT based underground drainage monitoring system which helps in monitoring hazardous gases present in sewage & helps to alert the sewage workers whenever the gas level crosses the specified limit. It also displays the value of gas level in the smart phone through the app. It also helps to decide whether it is safe for the worker to work in the environment or not[8-10].

II. PROPOSED SYSTEM

The drainage monitoring system that consists of a gas sensor, arduinouno, ESP8266 module, Buzzer and LCD Display. Below shows the block diagram of Drainage monitoring and Rescue system. Arduino UNO is an ATmega 328P based microcontroller. It has 14 digital pins of which 6 can be used as PWM outputs, 6 analog inputs, a USB connection, a 16 MHZ quartz crystal, a power jack, an ISCP header and a reset button.

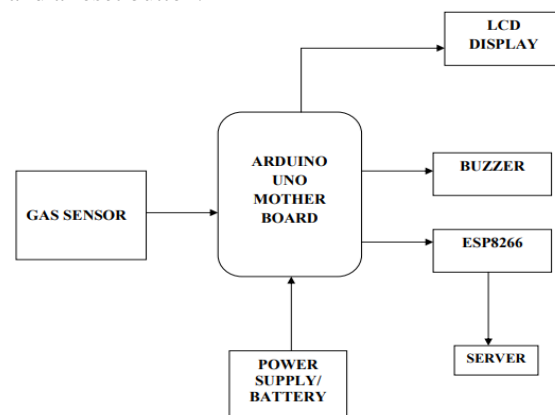


Fig. Block Diagram of Underground Drainage Monitoring System

III. SYSTEM SPECIFICATION

- Arduino UNO
- ESP8266 MODULE
- MQ2 Sensor
- LCD Display
- Buzzer

A. ARDUINO UNO

Arduino is an open source physical science platform attended with a hardware and software system to style, develop and take a look at complicated physical science prototypes and merchandise. The hardware consists of a microcontroller with other electronic components which can be programmed using the software to do almost any task. The simplicity of the Arduino language makes it terribly simple for pretty much in writing programs while not the understanding of advanced algorithms or codes. Arduino UNO features AVR microcontroller Atmega38, 6 analogue input pins, and 14 digital I/O pins out of which 6 are used as PWM output. This board contains a USB interface i.e. USB cable is used to connect the board with the computer and Arduino IDE software is used to program the board.

B. ESP8266 MODULE

ESP8266 is the name of the chip that was developed by Expressive Systems. This provides Wi-Fi (and in some models) dual-mode Bluetooth connectivity to embedded devices. While ESP32 is technically just the chip, modules and development boards that contain this chip are often also referred to as "ESP32" by the manufacturer.

It is an open source firmware for which open source prototyping board designs are available. The name NodeMCU combines node and MCU (microcontroller unit). The term node MCU strictly speaking refers to the firmware rather than the associated development kits. Both the firmware and prototyping board designs are open source. Node MCU ESP8266 and NodeMCU ESP32 are becoming very popular and are almost used in more than 50% IOT based projects today. ESP32 has many applications when it comes to the Internet of Things (IoT).

C. MQ2 Sensor

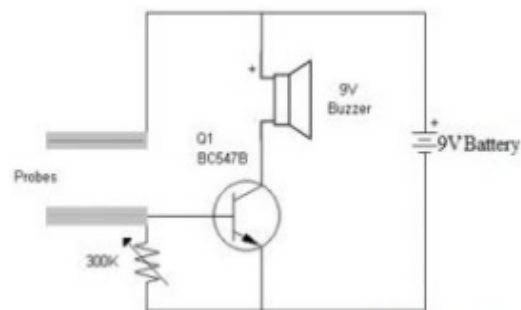
The Gas sensor (MQ2) module is useful for gas leakage detecting (in home and industries). It can detect H₂, LPG, CH₄, CO, Alcohol, Smoke, Propane. Based on its fast response time. Measurements can be taken as soon as possible. This is a robust Gas sensor suitable for sensing LPG, Smoke, Alcohol, Propane, Hydrogen, Methane and carbon Monoxide concentration in the air.

D. LCD Display

LCD is a type of display used in digital watches and many portable computers. LCD displays utilize to sheets of polarizing material with a liquid crystal solution between them. An electric current passes through the liquid causes the crystals to align so that light cannot pass through them. LCD technology has advanced very rapidly since its initial inception over a decade ago for use in lap top computers

E. BUZZER

A buzzer or beeper is an audio signalling device, which may be mechanical, electromechanical, or piezoelectric (piezo for short). Typical uses of buzzers and beepers include alarm devices, timers, and confirmation of user input such as a mouse click or keystroke. When current is applied to the buzzer it causes the ceramic disk to contract or expand. Changing the This then causes the surrounding disc to vibrate. That's the sound that you hear. By changing the resulting sound. There are many ways to communicate between the user and a product. One of the best ways is audio communication using a buzzer IC. The main function of this is to convert the signal from audio to sound. Generally, it is powered through DC voltage and used in timers, alarm devices, printers, alarms, computers, etc. Based on the various designs, it can generate different sounds like alarm, music, bell & siren.



WORKING

Our mechanism helps to notify the registered number, when the harmful gases are detected to gas sensor with help Wi-Fi module like NODE_MCU Arduino which is connected with the blink server. By this project the underground drainage system can be easily organized. When the system gets started by taking power supply externally, the sensor will start working. The gas sensor senses the harmful gases and reports to the node MCU. Node MCU which is having the in-built Wi-Fi module will process the informative/values sent by sensors and will be displayed in blink server app. The recorded values will be displayed in the 16x2 LCD and if sensed values exceed the threshold value, then buzzer starts making sound and LED blinks.

IV. FUTURE SCOPE AND MARKET POTENTIAL

Sensor networks are considered as the key enablers for the IoT paradigm. However, due to the widening variety of applications, it is increasingly difficult to define common requirements for the WSN nodes and platforms. This paper addresses all phases of the practical development of an Underground Drainage and Manhole monitoring System (UDMS) through IoT applications for metropolitan cities. A real-network platform considered are: platform structure, flexibility and reusability, optimization of the sensor nodes, optimization of the communication, error recovery from communications and node operation, high availability of service at all levels, application server reliability and the interfacing with IoT applications. This paper can be used to guide the specification, optimization and development of sensor network Platforms for other IoT application domains.

V. RESULT AND CONCLUSION

Underground monitoring is challenging problem. This project proposes different methods for monitoring and managing underground drainage system. It explains various applications like underground drainage and identification in real time. The gases level are being monitored and updated on the internet using the Internet of Things. This enables the person in-charge to take necessary actions regarding the same. In this way, the unnecessary trips on the manholes are saved and can only be conducted

as and when required. Also, real time update on the internet helps in maintaining the regularity in drainage check thus avoid the hazards. Our project helps to reduce the problems of drainage system with the help of sensors gas sensors. Our mechanism helps to notify the registered number, when the harmful gases are detected to gas sensor with help Wi-Fi module like NODE_MCU Arduino which is connected with the blink server.

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