DETECTION OF EXPLOSIVE SEWAGE GASES IN DRAINAGE SYSTEMS USING AN ARDUINO

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Abstract– This paper explores the idea of the detecting sewer gases that get exist in drainage systems. The interest of this paper is on safety of people who work in drainage systems. These so called sewer gases can be detected by making use of some sensors like MQ 4, MQ 7 and MQ 136 which can detect Methane, carbon Monoxide and Hydrogen sulfide respectively are interfaced with an arduino microcontroller, LCD display and GSM module can collectively produce an output which can alert the people in that area and also can inform the presence of sewer gases to the authorities, thereby preventing or decreasing the chance of risk.

Index Terms- CH_4, H_2S, CO, GSM

I. INTRODUCTION

Due to the endless ever growing human population, the people voluntarily or involuntarily make their surroundings unhygienic by dumping organic and inorganic materials in the drainages. This dumping results in release of sewage gases like Methane, Hydrogen sulfide, Carbon monoxide and their components. These gases when inhaled by people may cause some short term effects like dizziness, loss of consciousness, suffocation and also some long term effects like lung cancer, nausea, skin infections. Subsequently, there is also a high probability of risk of death when exposed to these gases for longer periods. Sewer gases likeCH_4 and H_2S are even explosive. Any wrong step in these areas can cause a great hazard. Hence there is a dire necessity to identify the presence of these sewer gases in the drainage systems where all the dumping takes place.

II. LITERATURE SURVEY

Sensing of toxic gases that exist in environment using Arduino microcontroller to help the workers and alert on danger of being in that area and send the message to base station through GSM module and displaying the alert message on LCD display using microcontroller[1]. Monitoring the pollutants concentration from water surfaceby inspecting wells also monitoring the pollutants concentration in the air near by inspection wells, and assessing the impacts of gases emission on urban drainage system [2].

Designing microcontroller based toxic gas detecting,alerting system and also gas purification system. The hazardous gases likeH_2S, CO and Methane will be sensed and displayed each andevery second in the LCD display [3].To alert the people on presence of harmful gases using poisonous gas detector by building a system using ATmega 328 controller which makes the system cost efficient[4].Make use wireless communication technologies like WIFI and Zigbee and developing a system to detect four gases like Cl_2, CO, NO_2 and SO_2 that prevail in drainage systems[5].Using of WSN based Air Pollution monitoring system to collect the pollutants like CO_2, NO_2 and SO_2 from environment to evaluate the quality of air in specific area[6].

Monitoring the gases in an area from anywhere by giving command and uploading it to cloud to access it anywhere around the globe by using Internet of Things[7].This paper is more advantageous because the system we built is portable and very much cost efficient.

III. PROPOSED METHOD

HARDWARE USED:

The system we proposed include gas sensors like MQ 7 (Carbon monoxide sensor), MQ 136 (Hydrogen sulfide sensor), MQ 4 (Methane sensor) and also a control base unit Arduino that intake all the information from this sensors. We use a GSM module to send the statistics of the data we collected from the sensors which is to inform authorized person by sending an SMS and also we have an LCD display to alert the people near the place where gases exist

SOFTWAREUSED:

Arduino Integrated Development Environment is a cross platform application written in JAVA and derives from the IDE for the processing programming language and the wiring projects . A program or code written for arduino is called a sketch. Arduino programs are written in C or C++.
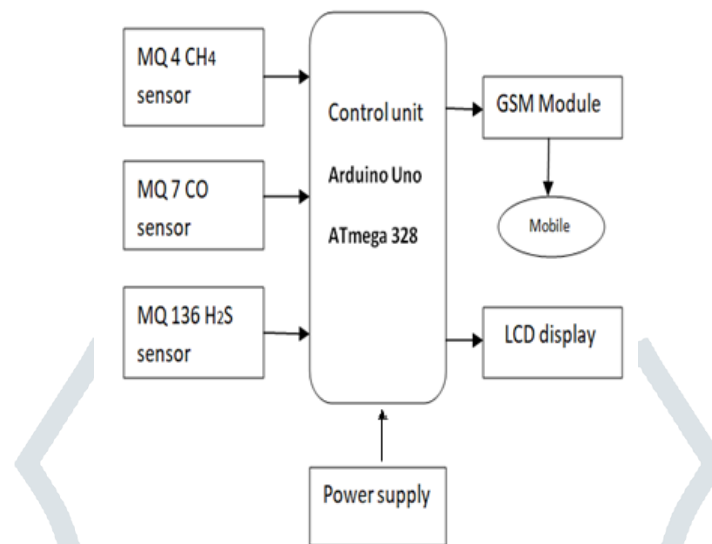
IV. EXPERIMENTAL SETUP

Fig 1.Block diagram of Detection of Explosive Sewage Gases in Drainage Systems Using an Arduino

The working of this system starts when the sensors are put in a place where the targeted sewage gases are expected to exist. As these sensors are fabricated with sensitive material SnO2 which are less conductive in clean air. The conductivity of these sensors increases with the presence of the above stated sewage gases. One can convert the change of the conductivity of these sensors and generate a corresponding output of analog resistance. The sensitivity of detection of these sensors can be adjusted by using a potentiometer. This variable resistance output from the sensors is now converted into variable voltage output by supplying a constant current and measuring the voltage around sensor.
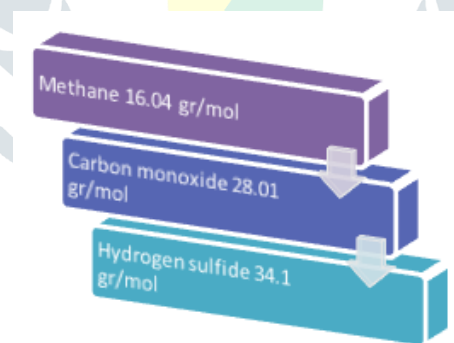

Fig. 2Distribution of sewage gases inside a drainage system based on their weights

As we see that hydrogen sulfide is heavier than other sewer gases it gets deposited on the bottom of them. After detection of this sewer gases we can take the effective action by sending a message to the designated mobile by using GSM module and thereby alerting the people.

V. RESULTS

The program is compiled in the Arduino IDE software which is a sketch and saved with an extensioninformation. The developed model has been simulated and the results of the program are examined. The proposed system is as shown below.

STANDARD VALUES

Sewer gas Found	Normal value	Hazardous value
Hydrogen Sulfide	20 ppm	100 ppm or more
Methane	7 – 15 ppm	1000 ppm
Carbon Monoxide	0.2 ppm	50 ppm or more

Table 1: Standard Values Permittable

EXPERIMENTAL VALUES

Sewer Gases Found	Experimental values
Hydrogen Sulfide	58 ppm
Methane	76 ppm
Carbon Monoxide	2.5 ppm

Table 2: Experimental Values

VI. CONCLUSION

The proposed system is developed keeping in mind the safety of the workers who are casual people. This system gives a great advantage of portability and also low cost of building. It is mainly directed to work towards sewage gases like Methane, Carbon-monoxide and Hydrogen sulfide. It also helps in detection of explosive gases like methane and hydrogen sulfide. The system alerts the labor to identify the presence of the above stated gases and thereby decrease the risk of Danger.

VII. REFERENCES

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