Smart Band for Scavengers Employed in Sewer Lines using Arduino

Gopalan. R[1],Archana C. R[2], Bavithra. D[3], Gokul. P[4], Jamuna. S[5]
Assistant Professor ECE[1], Final year ECE Students[2,3,4,5]
Velalar College of Engineering and Technology, Erode,
Tamilnadu, India-638 012.

***Abstract*: Sewage treatment is the process of removing contaminants from municipal waste water, which contains mainly household sewage. The practice of manual scavenging involves workers physically entering sewers to clean out the sewage. The poisonous gases had lead to the death of many scavengers. There are numerous devices to detect the level of poisonous gases, but no steps were taken to save the life of workers. Their deaths were not an anomaly but a disturbing pattern. In a little over a year, more than 20 workers have died in sewers in New Delhi which is a city of growing wealth and rising ambition. Across India, the figures are higher. Activists have documented more than 200 such deaths since the start of 2017.**

The workers are commonly exposed to gases like hydrogen disulfide, methane, ammonia carbon monoxide etc. It is found that 53.8% developed sub- acute symptoms including sore throat, cough, thirst etc. severity of symptoms leads to cardiovascular degeneration, infections, respiratory system problems and may also lead to death.

The aim of our project is to detect the level of poisonous gas in sewage and to monitor the body conditions of sewer. If it reaches the critical condition, the buzzer sounds and the motor lifts the person out and the location is shared to the hospital via GSM.

Keywords: ATMEGA 2560 , PULSE SENSOR , GSM, GPS, BUZZER, LDR, LCD.

1.INTRODUCTION

Sewage treatment plant India for municipal and government is a process of sewage collection from city and other areas. It is done through interconnected network of sewage lines and centralized sewage treatment facility. This helps to protect public health and prevent water pollution due to sewage contaminants. This facility also becomes a new source of water, which can be used for irrigation, industrial and other purposes. Recycling of sewage treated water helps to reduce the consumption of fresh water, which in turn reduces the water scarcity problem. Sewage treatment is the process of removing contaminants from waste water called ‘sewage’.

Sewer gas is a complex mixture of toxic and non-toxic gases produced in sewage systems by the decomposition of wastes. Sewer gases are of great concern due to their odour, health effects etc. Some of the sewer gases are hydrogen sulphide, methane, carbon dioxide etc.

Sewer gas have many harmful effects. These gases can affect material durability leading to corrosion. It will also lead to collapse of the structure with significant cost for rehabilitation. Sewer gas also contribute to green-house gas emissions. At high concentration, these gases also affect the health of worker which may also lead to death.

2.EXISTING SYSTEM

Leonardo, Arduino mega (R3). The Uno board is the first among the series of USB Arduino boards. The Uno also differs from all preceding boards in that, and it does not use the FTDI USB-to- serial driver chip. Instead, it uses the Atmega 16U2 programmed as a USB-to-serial converter.

3. BLOCK DIAGRAM (PROPOSED SYSTEM):

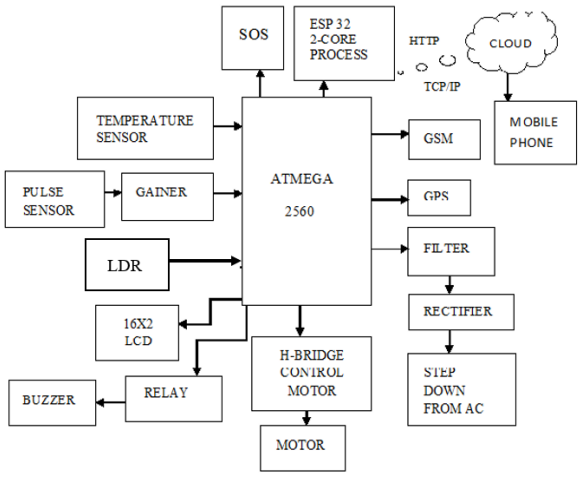


Figure 1: BLOCK DIAGRAM OF THE PROPOSED SYSTEM

3.1 ATMEGA 2560

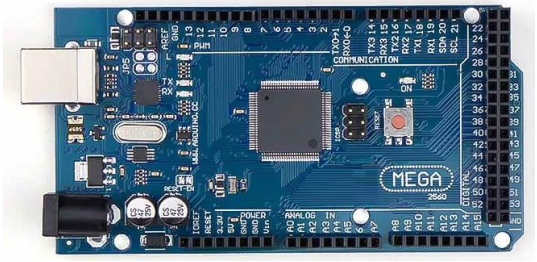


Figure 2:IMAGE OF ATMEGA2560

The above figure 2 shows the image of Atmega2560.Advanced microcontroller, Microchip 8-bit AVR RISC-based microcontroller includes 256KB ISP flash memory, 8KB SRAM, 4KB EEPROM, 86 general purpose I / O lines, 32 general purpose active registration, real-time counter / counter methods, PWM, 4 USART, 2-wire serial interface, 16-channel 10-bit A / D converter, and JTAG debugging interface on the chip. The device achieves 16 MIP output at 16 MHz and operates between 4.5-5,5 volts.

3.2 GSM MODULE

Figure 3:IMAGE OF GSM MODULE

The above figure 3 shows the image of GSM module. GSM stands for Global System for Mobile Communication. It is a standard developed by the European Telecommunication Standards Institute (ETSI). By using mobile devices such as mobile phones and tables, it explains the terms of the second-generation (2G) digital cellular agreement. It was meant to be a secure wireless system. They are also cellular services, localization, NITZ network identity and time zone, wireless protocol application (WAP), multimedia messaging service (MMS).

.*3.3 PULSE SENSOR*

Figure 4:IMAGE OF PULSE SENSOR

The above figure 4 shows the image of pulse sensor. A specially designed plug-and-play rate sensor for Arduino. It can be used by students, musicians, athletes, athletes, and mobile developers who want to easily incorporate heart rate data into their projects. It also includes an open source monitoring system that graphs your drive-in real time.

3.4 *GPS*

Figure 5:IMAGE OF GPS MODULE

The above figure 5 shows the image of GPS module.GPS systems work in many ways and are available in almost any industry. They can be used to look after forests, to help farmers harvest their fields, and to fly on planes on land or in the air. GPS systems are used in military and emergency applications to find people in need.

3.5 LCD module:

Figure 6:IMAGE OF LCD MODULE

The above figure 6 shows the image of LCD module.The display units play a major role in establishing good communication between the human world and the machine world. For our project, we use a 16 * 2 LCD. It has a total of 32 characters in 16 in 1 line and 16 in the second row. Using this type of LCDs, connecting the LCD to ARDUINO is very easy.

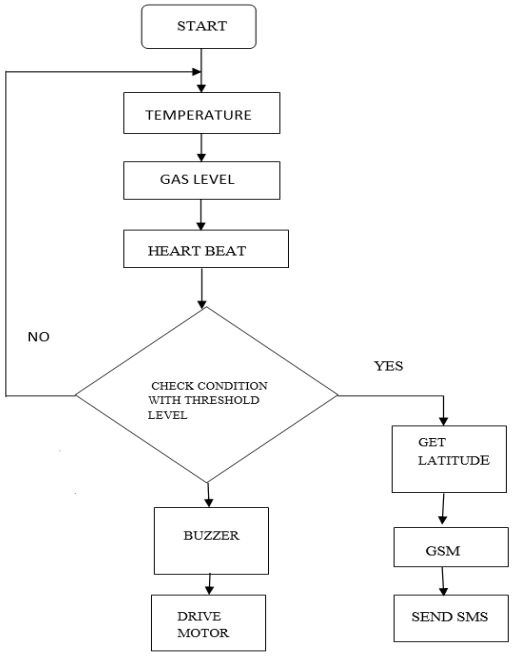
4.PROPOSED SYSTEM:

In our day to day life, we are ceaselessly affected due to air pollution which is made by ourselves through dumping waste. Because of that issue we are forced to inhale many toxiferous gases like CO (Carbon monoxide), CO2 (Carbon dioxide), and so on. It is affecting the human well-being, sometimes it leads to death. For that in our project we are using the MQ4 gas analyzer which is used to detect multiple gases like CO (Carbon monoxide), CO2 (Carbon dioxide), CH4 (Methane).

The proposed system, with the help of ARDUINO UNO microcontroller, MQ4 gas Analyzer processed for ceaseless monitoring of gas level in the surrounding area by using low power consumption components. Whenever the concentration of any toxiferous gases exceeds the normal level, sensor encounters. And then it alerts the respective people in that particular area using buzzer. Following that

the precise amount of the gases present in the atmosphere will be displayed in the LCD in terms of parts per million (PPM). A text can be send by using GSM modulator in order to alert them to pre-secure the human welfare.

5.FLOW CHART



6.RESULT

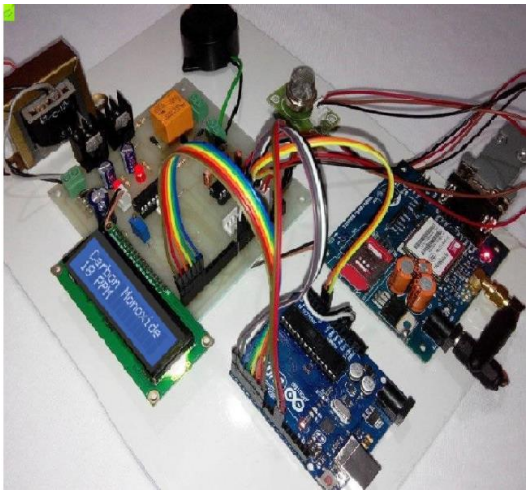


Figure 7:IMAGE OF CARBON MONOXIDE LEVEL

The above figure 7 represents the image of carbon monoxide level.

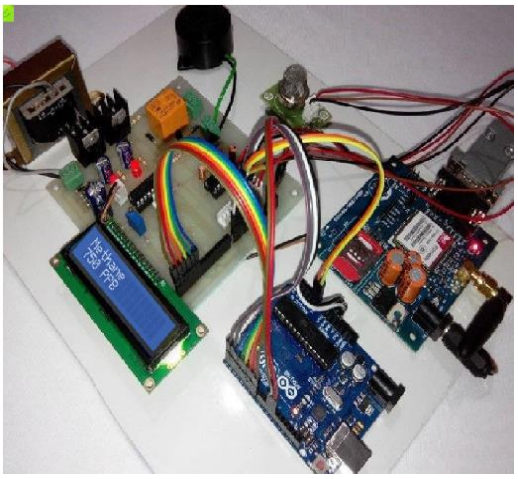


Figure 8:IMAGE OF METHANE LEVEL

The above figure 8 represents the image of methane gas level

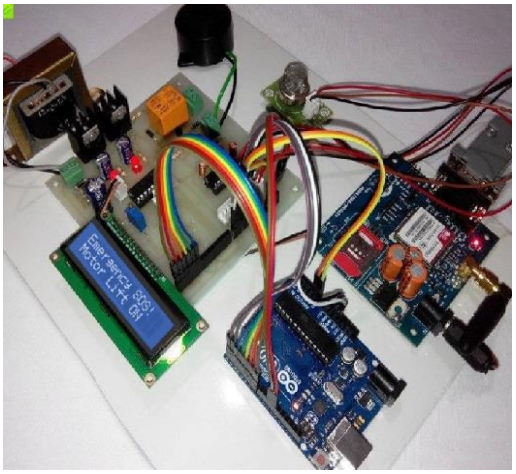


Figure 9:IMAGE OF MOTOR TURNING ON

The above figure 9 represents the image of motor turning on.

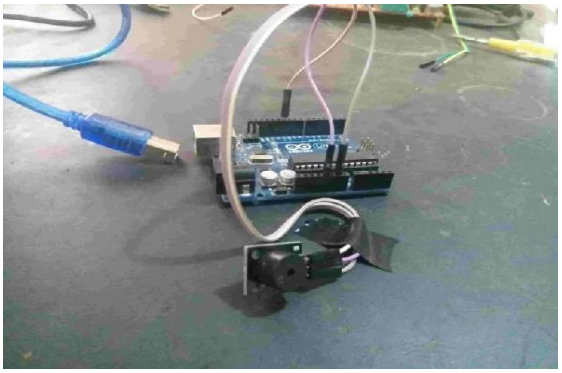


Figure 10:IMAGE OF BUZZER INTERFACED WITH ATMEGA2560.

The above figure 10 shows the image of buzzer interfaced with Atmega2560.

7.APPROXIMATION OF GASES (PERCENTAGE)

TABLE 1. IN TANKS, SEWAGE WELLS:

GASES IN TANKS	PERCENTAGE
Methane	60-70
Carbon Monoxide	10-20
Hydrogen Sulphide	4-5
Other gases	0-2

TABLE 2. INDUSTRIES AND FACTORIES:

GASES IN TANKS	PERCENTAGE
Methane	40-50
Carbon Monoxide	20-30
Hydrogen Sulphide	10-20
Other gases	2-5

8. CONCLUSION:

Our project will be helpful for the workers who are employed in sewer lines by alerting them about the presence of poisonous gases such as methane and carbon monoxide. If these gases reach the threshold value, the buzzer sounds and their body conditions are monitored simultaneously. Then the motor lifts the person out and location will be shared to the hospital via GSM.

9. REFERENCES:

[1] V.S. VELLADURAI Department of Electronics and Communication Engineering, "HUMAN SAFETY SYSTEM IN DRAINAGE UNUSED WELL AND GARBAGE ALERTING SYSTEM FOR SMART CITY", international conference on I-SMAC, 2017.

[2] SHIVARAJ Department of Instrumentation Technology, "DESIGN AND DEVELOPMENT OF GAS ANALYSER FOR DETECTING NH3, NO2, CO, CO2", international journal – NCRIET 2015.

[3] S.S.GROSSEL, "Fires, explosions, and toxic gas dispersions: effects calculation and risk analysis (2010)," PROCESS SAFETY PROGRESS, vol.31, no.3, p.319, 2012.

[4] JOHANSSON, A. (2008). "MODEL BASED GAS LEAKAGE DETECTION AND ISOLATION IN A PRESSURIZED SYSTEM via Laguerre spectrum analysis", IEEE international conference on control applications,Vol.1.212-216.

[5] NihalKularatna, Senior Member, IEEE, and B. H. Sudantha, Member, IEEE "An Environment Air Pollution Monitoring System Based on the IEEE1451 Standard for Low Cost Requirements" IEEE Sensors J., Vol. 8, pp.415-422, Apr. 2008.

[6] H. Huang, H. Bainand S. Zhu, "A Greenhouse Remote Monitoring System Based on GSM," in Proc. of IEEE International Conference on information management, pp. 357-360, 2011.

[7] L.K. Hema, Dr. D. Murugan, M.Chitra, "WSN based Smart system for detection of LPG and Combustible gases",National Conference on Architecture, Software systems and Green computing2013(NCASG2013)

[8] ASHISH SHRIVASTAVA, RATNESH PRABHAKER, RAJEEV KUMAR, RAHUL VERMA,"GSM BASED GAS LEAKAGE DETECTION SYSTEM", International Journal of Emerging Trends in Electrical and Electronics (IJETEE – ISSN: 2320-9569), Vol. 3, Issue. 2, May-2013.

[9] FRAIWAN, L. (2011). "A WIRELESS HOME SAFETY GAS LEAKAGE DETECTION SYSTEM." Biomedical Engineering (MECBME).11–14.

[10] PING, D. (2012). "DEVELOPMENT ON GAS LEAK DETECTION AND LOCATION SYSTEM BASED ON ZIGBEE." Intelligent Control and Automation (WCICA). 429–432.