PREVENTION OF SEWAGE WORKERS FROM POISONOUS GAS

K Arunkumar[1],S Surendar[2],S Piraisudan[3],G Siva[4]

1,2,3,4Student, Dept.of.Electrical & Electronics Engineering,
Knowledge Institute of Technology, Salem - 637 504

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Abstract - *In India The sewage cleaning work is very dangerous as 70% of all sewer divers die on the job from poisonous gas causes diseases Since the job is so risky and disgusting. In india sewage line plumbing is not that great, so there is a need for workers who earn their money diving into sewage to unclog drains. Heavy machinery is used to unblock the sewage lines in most cases and manual unblocking of the sewage is banned in India. In rare cases where the machine cannot do the job the sewage diver has to dive into the sewer. This Shown here a sewage diver manually unclogs the sewer line with his bare hands. sewage worker is entered into the manhole which contain poisonous gas. The main Objective of this project is to detect the poisonous gas inside the sewage with use of sensors if there is any poisonous gas inside sewage it can be indicated by the light and also the value of poisonous gas is send to the cloud using Internet of Things (IoT).*

Keywords: Arduino,ESP8266,Hydrogen Sulphide,Methane, IoT, WSN.

1. INTRODUCTION

Air Pollution Monitoring System using wireless sensor network that provides real time monitoring of polluted materials at proper locations with low power and low cost[1]. The toxic gases such as butane, methane and carbone monoxide are sensed by gas sensor. and displayed the concentration of the gasses in the form of percentage in LCD display using arduino.this system can be implemented in house and workplace[2]. The LPG and propane hazardous gases were sensed. If normal level of the gases exceed it generate alaram immediately with high accurate detection and sent a SMS to the authorized person with the use of GSM(Global System for mobile communications)[3]. The automatic gas detection and stop leakage of gases in vulnerable premises using particular gas sensor which has high sensitivity for butane and propane and also warns by SMS using GSM[4]. To detect the harmful gases using poisonous gas detector for safety purposes by Atmel Atmega 328p microcontroller with cost effective and efficient. And also this device used to detect multi ple gases[5]. Weather conditions monitoring at a particular place and that information can be monitored anywhere in the world by using Internet of Things(IoT),and the system sent the data to cloud that can be accessed with use of internet from anywhere in the world[6]. Toxic gas detection system using Multisensor wirelessly that system detect four type of gases such as Cl_2, CO, NO_2, and SO_2 by wireless communication technologies such as Wi-Fi and Zigbee[7].

The working conditions of these sanitary workers have remained virtually unchanged for over a century. Many sewage workers die while cleaning drainage and also sewage workers suffer from tuberculosis and respiratory problems and skin allergies as they inhale methane and hydrogen sulphide gases generated in sewage which are highly toxic.

2 .PROBLEM STATEMENT

Sewage management is major concern in India. With increasing population this is becoming one of the major reason for environment pollution.The Tata Institute of Social Sciences, an educational and research organization, found that 80% of the workers die before age 60 because of work-related health problems. In Mumbai, an average of 20 sewer workers die each month from accidents, suffocation or exposure to toxic gases, the study found. Due to this many of the sewage workers lost their life. The Main objective is to measure monitor and indicate the harmful gases in the sewage to the sewer divers. This is achieved through the gas detecting sensors interfaced to cloud through a controller connected to internet. By doing this, save the lives of sewer divers.

3.PROPOSED METHODOLOGY

The proposed design is a setup that measures the harmful gases present in the sewage, also indicate to sewer workes based on the Toxic level of gases, which is done through sensors communicate through internet. It has NodeMcu ESP8266, acts as processing and controlling unit, to which the sensors are connected and sensed data are collected & stored through wireless networks.

4.BLOCK DIAGRAM & EXPLANATION
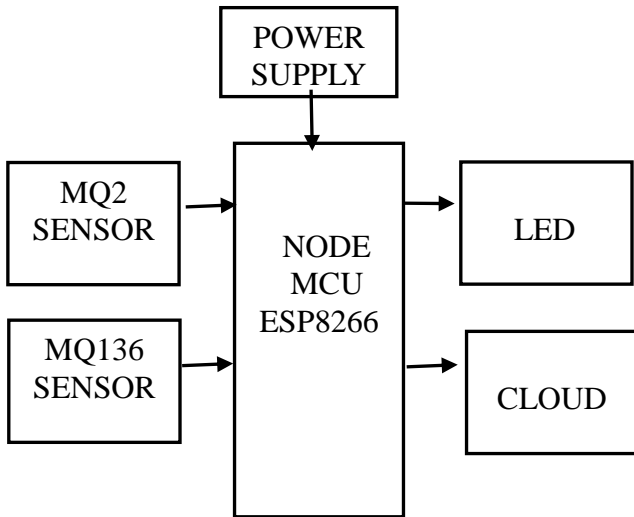
The NodeMcu ESP8266 in Fig 4 is a Wi-Fi module, is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor. This chip is with full TCP/IP stack and Micro Controller Unit. ESP8266 module comes pre-programmed with an AT command set firmware, which means simply hook this up to your Arduino device. This module is extremely cost effective which consume very less power and reliable in operation. This establishes communication between sensors, controller and user.
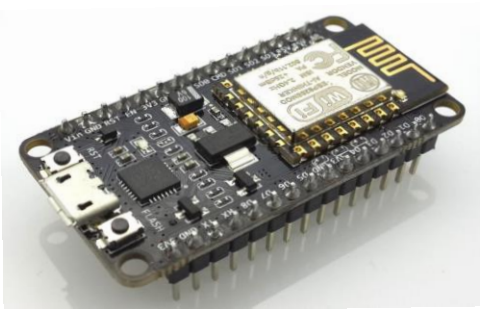

Fig 1.ESP8266 Wi-Fi module

MQ136 gas sensor in Fig2 is SnO2, which with lower conductivity in clean air. When H2S gas exists, the sensor's conductivity gets higher along with the gas concentration rising. Users can convert the change of conductivity to correspond output signal of gas concentration through a simple circuit. MQ136 gas sensor has high sensitivity to H2S gas, also can monitor organic vapour including sulfur well.

Fig 2.MQ136 sensor

MQ2 sensor in Fig3 is a low cost semiconductor sensor which can detect smoke and flammable gases at concentrations from 300 to 10,000 ppm. The sensitive material used for this sensor is SnO2, whose conductivity is lower in clean air. It's conductivity increases as the concentration of combustible gases increases. This sensor has high sensitivity to Hydrogen, Propane, LPG, Methane and other combustible steams. This can be used to detect gas leakage in industries and houses. MQ2 gas sensor can be easily interfaced with Microcontrollers, Arduino Boards, Raspberry Pi etc using an Analog to Digital Converter (ADC). Based on its fast response time. measurements can be taken as soon as possible. Also the sensitivity can be adjusted by the potentiometer.

Fig 3. MQ2 Sensor

A light-emitting diode (LED) in Fig4 is a semiconductor device when forward voltage is applied to the semiconducting element forming the PN junction (heretofore referred to as the junction), electrons move from the N region toward the P region and holes move toward the N region Near the junction, the electrons and holes combine with each other. As this occurs, energy is released in the form of light.

Fig 4.LED

Arduino IDE is Arduino integrated development environment. It consists of a text editor, where the code is written. A message area is given, which shows message or any error message. The tool bar contains buttons for common features. The programs are uploaded to Arduino board by USB connection. The coding for soil moisture monitoring system is done using Arduino IDE.

5. EXPERIMENTAL PROCEDURE FOR SETUP AND TESTING

This system measures the two most important parameters of Hydrogen sulfide, Methane. The different steps for hardware implementation of Sewage hazardous gas detection system are described as below.

Step1: Connect MQ136 and MQ2 sensor to NodeMcu Esp8266 using jumper wires.

Step2:Open Arduino Software, Click on Tools -> Board -> Board Manager

Step3:Install esp8266 libraries

Step4:Select correct NodeMCU board and PORT number

Step5: Write code for interfacing sensor with NodeMcu Esp8266 in text editor of Arduino IDE.

Step6: Save the code and compile it. After compilation if any error occurs, debug it.

Step7: Connect the NodeMcu Esp8266 module to Arduino IDE using USB connection.

Step9: Upload the code to NodeMcu8266.

The prototype of Hazardous gas detection system has been tested by sensing a small amount of Hydrogen sulphide and Methane near to the sensor. MQ-136 and MQ-2 gas sensor detects Methane, and Hydrogen sulphide gas and sends a signal to the Esp8266. After that ESP8266

send an active signal to other externally connected devices.

6. CONCLUSION

The more difficult and dangerous job of unblocking sewer lines is usually done by casual workers. A sewer workers continually risk their health and life to ensure upkeep of the sewerage system.   huge number of sewer workers who die in India every year because they are not given any safety equipment. Through this work the hazardous gases present in the sewage is identified with the use of MQ136 and MQ2 gas sensor and indicated. hence this system provides the sustainable information to them and reduces the risk of works to the sewer workers.

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