

Controlling Toxic Gases in the Tank System Utilizing IoT

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ABSTRACT

IoT is the most widely used system in the world it is of communicate between the device connected with the Wi-Fi module ESP8266 with Wi-Fi connection that makes communication wireless to the other device having the device id of the server. The gas sensors calculate the gas molecules of CO, H₂S and CH₄ present in the air of the drainage then microcontroller check the condition then displays 16x2 LCD, alarm and servo motor connected to the chemical box opens the chemical and sends alert email through the Wi-Fi module. So that we can control toxic gases in the drainage system by exhaust fan and chemicals. This system ensures the safety of drainage cleaners.

Keywords: IOT, PWM, Gas sensors, SMTP, Toxic gas.

1. Introduction

In the modern world the growth of the population increases enormously so that sewage problem also increases due to the maintaining of the drainage. So that clots are often found in the drainage then the sewage cleaners are try to remove the clots in the drainage that time they are affected by the harmful toxic gases present in the drainage this will lead the drainage cleaners life at a risk because of inhale of the toxic gases carbon monoxide, hydrogen sulfide and methane and tends to the death. So that our controlling toxic gases in the drainage system utilizing IOT by the monitoring the gas levels in the drainage by the gas sensors and gives alert by email by server with id connect devices when it exceeds the toxic gases level harmful to the human beings then the LCD display “Toxic Gases Detected” this process are done by ATMEGA328P it is of coded with the minimum threshold of the sensor values by the analog read command in the code .the MQ7, MQ4, MQ9 gas sensors of the gas concentration range of 2PPM to 10000 PPM.

The gas sensors is made up of transducer it is of the electrical signal as output generated proportional to the gas molecules then the sensor data to the microcontroller ATMEGA328P in the arduino UNO R3 then it process with previous set data that compare both by the if statement in the code. To ensure the safety of the drainage cleaners we added feature by controlling the toxic gases in the drainage by chemicals. As this method is of automated is of human lives can be prevented from death.

2. Problem Identification

In the previous existing system they monitor the toxic gases content in the particular place by using various techniques like GSM, GPS and ZIGBEE networks. According to the literature survey the previous existing system monitoring the various toxic gases like carbon monoxide, hydrogen sulfide and methane in the septic tank by the GSM is of certain disadvantages like low frequency SIM cards only used in the GSM module and it is of costly compared to the ESP8266. The GPS based system only locates the toxic gases level content in the septic tank and make the position of the location. The ZIGBEE based network is of very short distance coverage of data transmission is not possible and the very most important problem is of these

previous existing systems or techniques not control the toxic gases level in the septic tank so that we want to rectify this problem so that we introduce new system.

3. Proposed System

In our proposed system we include an extra advantage is of controlling toxic gases level in the tank system and gives alert by IOT. In the system we are using many components like ESP8266 as a WIFI module, ATMEGA328P microcontroller in the Arduino Uno R3, 16x2 LCD Display, Buzzer, MG995 Servo Motor, Motor Driver L293D module, Fan, MQ4, MQ7, MQ9 Sensors and Chemical Box. Block diagram of the system is given in Fig.1.

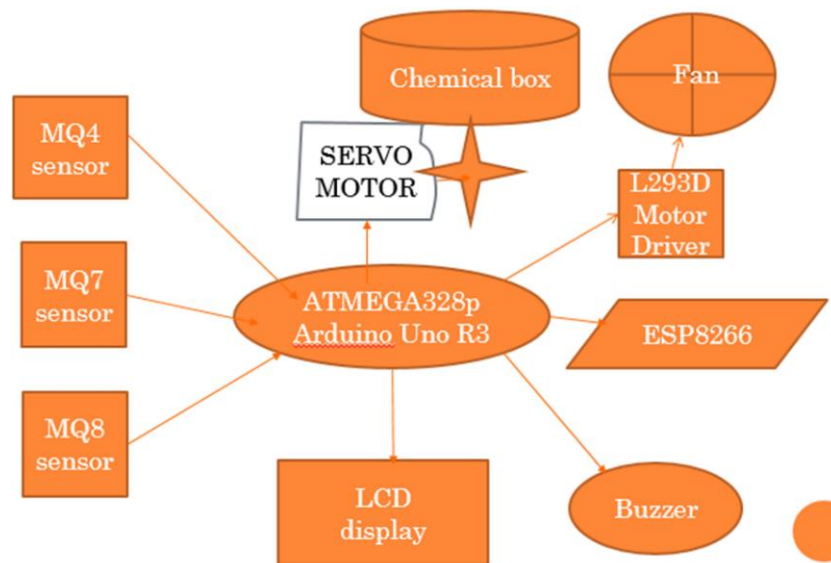


Fig.1 Block diagram of the system

The Arduino Uno with ATMEGA328P microcontroller process the data of the sensors by the gas sensors is of the gas sensor works on the principle of the transducer. The transducer converts the molecular gas concentration proportional to the electric signal to the microcontroller. Then the microcontroller process the sensor data with the threshold value determined toxic gases harmful level in the septic tank. Then the sensor gives the command to the arduino Uno to the LCD display displays *Toxic Gases Detected* when the toxic gases leads the threshold value then the buzzer alerts and then fan is on is of containing chemicals filters the toxic gases. Then the motor driver L293D module is of 12 v power supply it acts as a switch to the fan connected to it by the inputs of two with forward and reverse direction of the fan motion.

Then the microcontroller connected with the MG995 servo motor is of the heavy servo motor with supply of the 4.8-6v with 1.5 Amps current. It is of the RC motors used in the heavy robotics production it is manufactured by the Tower robotics Pulse Width Modulation is send by the microcontroller if the detection of the toxic gases then the servo motor open the chemical box with chemicals.

This chemicals containing the calcium hypo chloride and sodium chloride .This chemicals react with the toxic gases and become calcium GA328P microcontroller check the sensor value With the threshold value set in the program if it exceeds the limit it gives alert by buzzer, email and turn on the fan and servo motor

opens the chemical bi carbonate Gas sensor detect the value of toxic gases in the tank then the Arduino Uno R3 with ATMEGA328P microcontroller.

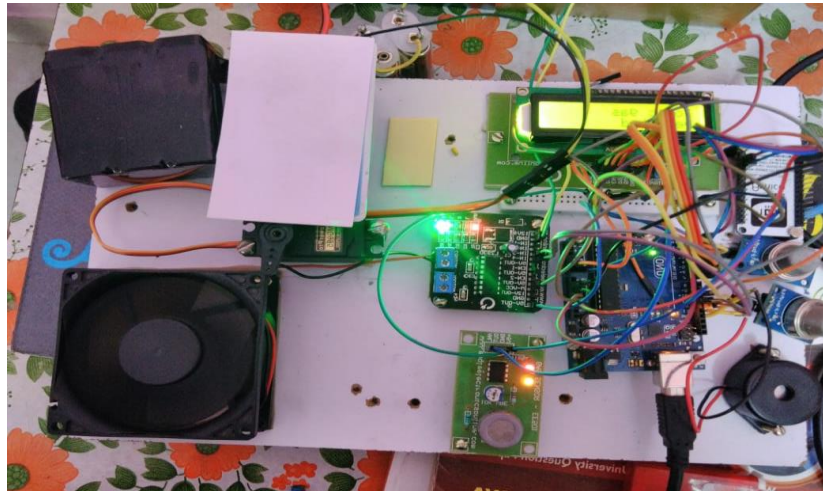


Fig.2 Output of the system

The microcontroller connected with the ESP8266 WIFI module with the wireless communication of Tx and Rx connected with WIFI module is of power supply of 3.3v power supply and ground. Then the ESP8266 connected with the hotspot of the nearest device and connected with the server of the IOT support applications. Then they also send the data to the user those who are having the auth token or ID of the device. According to the authentication based on the hotspot name and password.

Then the IOT device of the user shows the device status of the system by the server data. The email id of the users is to be provided in the program as in the program. The serial communication is of provided between the WIFI module and Arduino Uno. According to the program the algorithm is of following steps. The flow chart easily represents the process clearly.

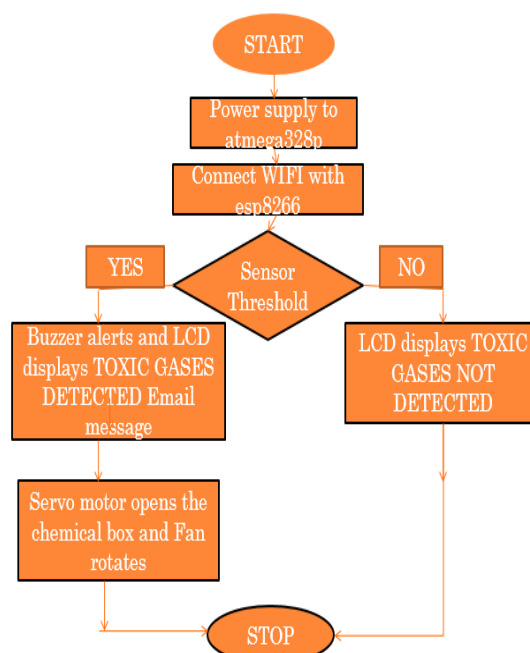


Fig.3 Flow chart of the proposed system

The flow chart steps show that the process is of the system. The Flowchart describes the process of the system by the powering of Arduino Uno with The power supply then connects the WIFI module with the Arduino Uno with serial communication standards. The WIFI module is connected with the hotspot to connect the module with the server. Then the sensor threshold exceeds the sensor data of gas sensor in the tank it displays the LCD as *Toxic Gases Detected* and alarms by buzzer. Then the Fan runs in the clock wise direction with the high speed and the servo motor opens the chemical box with the chemicals the servo motor spreads the chemicals by opening the box it react with air of toxic gases in the septic tank. The sensor threshold is of sensor value less the buzzer not alerts and LCD displays *Toxic Gases Not Detected* then the process stopped.

4. Results

The output of the system results in the form of the detection of toxic gases are transmitted by esp8266 is by Internet of Things by the BLYNK app is of connected with the server.

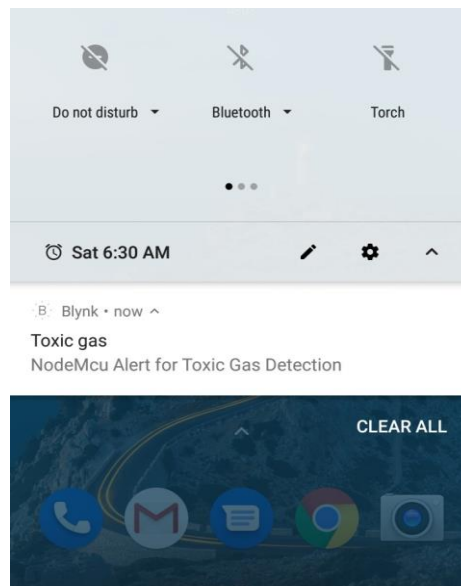


Fig.4 IoT based alert message in email

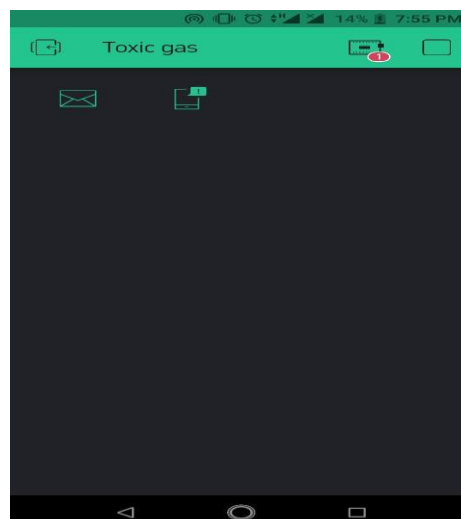


Fig.5 IOT based BLYNK app alert message

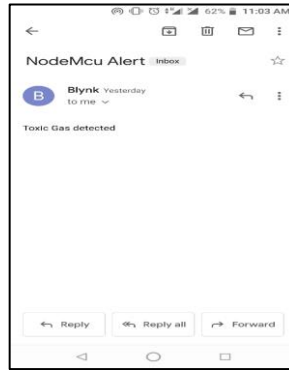


Fig.6 The phone notification is by the IOT server

The results of the system are shown as snapshot and screenshot of the system is put in these before figures. The Toxic gases Controller is of the following advantages in the form of images.

5. Conclusion

In this paper we control the toxic gases with the various chemicals and gives alert to the connected user. This system secures the life of the municipality cleaners by controlling the toxic gases level in the tank. Then the chemicals react with the toxic gases like CO, H₂S and CH₄ becomes calcium carbonate so that presence of toxic gases level is decreased.

Declarations

Source of Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Competing Interests Statement

The authors declare no competing financial, professional and personal interests.

Consent for publication

We declare that we consented for the publication of this research work.

Code availability

The programming code that we have used for this research is available and authors are willing to share when it is required.

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