IoT Based Inflammable Gas Detection And Alerting System

Rukhsar Kausar Ansari[1],Kudarat Shamshuddin Atar[2], Aniket Shivaji Bandal[3] ,Rohit Ravindra Mangade[4]
Department of Computer Engineering
[1,2,3,4]NESGOI, Naigaon, Pune, India.

Abstract- *Internet of things (IoT) based gas leakage and monitoring system best suited for industrial and home applications. Fire is the major cause of accidents claiming valuable lives and property. The chemical reaction between carbon-based materials in presence of oxygen generates flammable vapor causing a steady rise in temperature and results in a fire. Hence, timely detection of gas leakage is critical for avoiding a major accident. Fire alarm and monitoring system are integrated with IoT platform. In the design prototype, sensors are installed in distinct locations to identify the exact location of Gas leakage that has taken place. In this project we are using smoke detection sensor for detecting the leakage of gas. If gas leakage is detect then windows / doors are automatically open and alert message is send to the owner of house as well as the security to perform desired operation.*

Keywords- Chemical reaction; Flammable vapor; Detection of gas; Smoke detection sensor.

I. INTRODUCTION

The Internet of Things is an emerging topic of technical, social, and economic significance. Consumer products, durable goods, cars and trucks, industrial and utility components, sensors, and other everyday objects are being combined with Internet connectivity and powerful data analytic capabilities that promise to transform the way we work, live, and play. This technology is embodied in a wide spectrum of networked products, systems, and sensors, which take advantage of advancements in computing power, electronics miniaturization, and network interconnections to offer new capabilities not previously possible.

This paper mainly focuses on the detection of gas leakage and providing security when the user is around or away from home. The system is Short Message Service (SMS) based and uses wireless technology for providing security against gas leakage to users hence cost effective and more adaptable.

If there's any leakage of gas, it will be detected by gas sensor which is placed at roof or on the wall or near the gas cylinder. The signal from Gas sensor is given to the Controller/Processor and according to the changes in signal from sensor the controller will predict the leakage of gas. After detection the message as "GAS LEAKAGE" will be forwarded on user phone using Bluetooth module at Controller and windows will be opened automatically.

II. LITERATURE SURVEY

Z	Year	Paper Name	Abstract Idea
1	2017	LPG Monitoring and Leakage Detection System	In this paper, they have proposed a Liquefied Petroleum Gas (LPG) monitoring and leakage detection system. With the large demand and use of LPG, this system would be helpful to monitor the usage of LPG on a regular basis and to alert about any hazards that may occur due to LPG leakage. In this paper a system was developed that alerts the user of the amount of LPG left so that appropriate measures can be taken[1].
2	2017	Internet of Things (IOT) Based Gas Leakage Monitoring and Alerting System with MQ-2 Sensor	The main objective of the work is designing microcontroller based toxic gas detecting and alerting system. The hazardous gases like LPG and propane were sensed and displayed and notify each and every second in the LCD display. If these gases exceed the normal level then an alarm is generated immediately and also an alert message (Email) is sent to

			the authorized person through the INTERNET and used ARM development board. This results in a more efficient in operation because it is connected to a common web page specially built to notify or email the responsible authority automatically so reduces the stress of constant monitoring[2].
3	2016	IoT Based Fire Alarm and Monitoring System	The aim of the paper was to implement a smart home system and the goal was met. The Galileo board unit responds to the instructions sent by the sensors. The aim of the application to manage the electronic devices remotely was also achieved. The objective of this paper was successful in developing a programmable Galileo board based system with smart sensors and working actuators. Fire is the major cause of accidents claiming valuable lives and property. The chemical reaction between carbon-based materials in presence of oxygen generates flammable vapor causing a steady rise in temperature and results in a fire. The major characteristics of fire are it extends exponentially with time[3].
4	2017	IOT Based Gas Leakage Detection System with Database Logging, Prediction and Smart Alerting-Review	The traditional Gas Leakage Detector Systems though have great precision, fail to acknowledge a few factors in the field of alerting the people about the leakage. Therefore we are using the IoT technology to make a Gas Leakage System with Database logging and Prediction having Smart Alerting techniques involving sending text message and an e-mail to the concerned authority. The proposed system will analyze the data stored in the database. It will also predict whether gas leak will occur or not with the values provided by the user[4].

III. SYSTEM DESIGN

The working modules of the system are as below:

1) Module 1 - Gas monitoring and gas leakage detection – In this module controller send signal to smoke detection sensor. Smoke detection sensor monitor cylinder. If gas leakage detect then smoke detection sensor send signal to controller.

2) Module 2 - Actions performing – If gas detected is greater than the threshold value then buzzer gets on, lights gets off, windows (and/or) exhaust fan is on.

3) Module 3 - Alert user – In this module alert message is sent to the user, security of the area as well as fire brigade of the area.

Below Use case diagram gives detail Idea about modules:

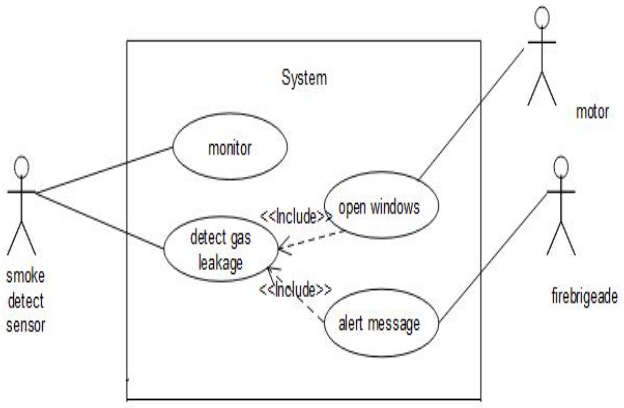


Figure1: Use case diagram of modules

The system architecture is depicted in following figure2:

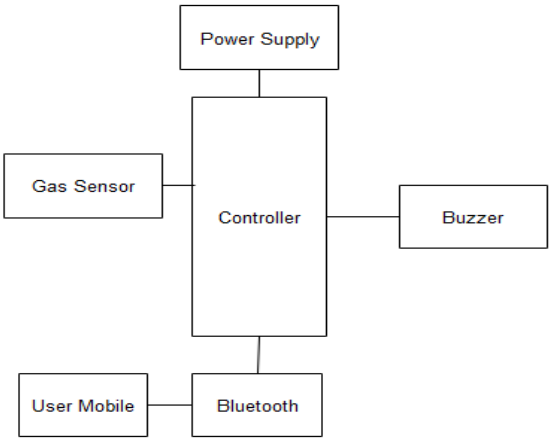


Figure2: System arshitecture

IV. ALGORITHM

Input: Gas detected values.
Output: Determines if gas detected is higher than the threshold value.
Step 1: Start.

Step 2: Centralized server running.

Step 3: Controller sends signal to sensor.

Step 4: Sensor monitor cylinder.

Step 5: If gas greater than threshold value buzzer on, lights off, window open (and/or) exhaust fan on and alert message send to user.
Else
System normal.

Step 6: End.

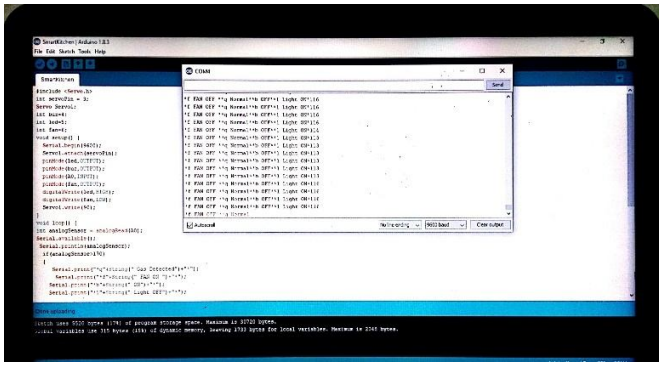
V. ADVANTAGES AND LIMITATIONS

Advantages :
1) Industrial fire protection
2) Homes and Societies
3) Private office
4) College Infrastructure

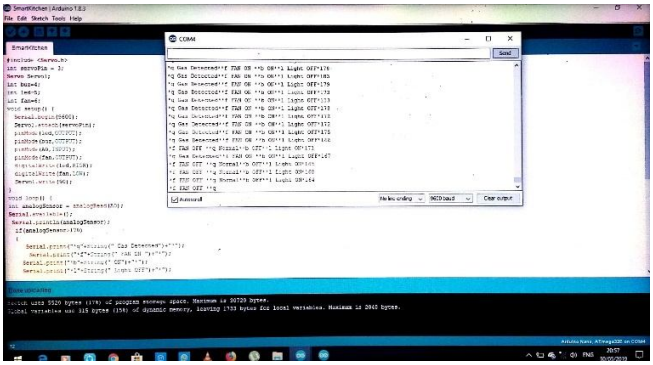
Limitations :
1) If subjected to extreme gas concentration, the sensor may become damaged and show low or no signal.

VI. RESULT AND CONCLUSION

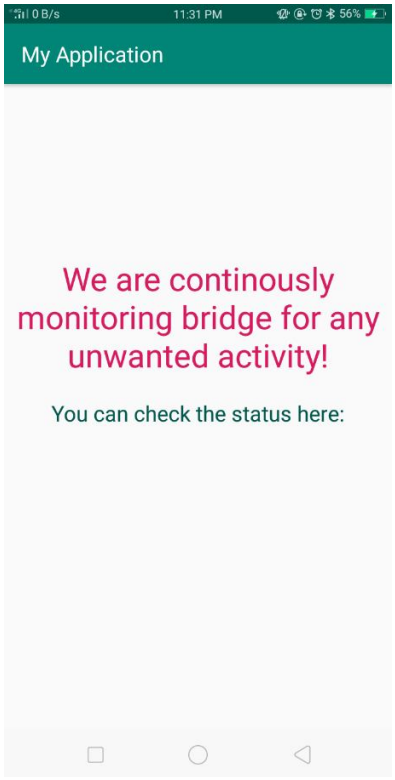
Following picture shows the values detected by the gas sensor in the environment:



Following picture shows the values detected by the gas sensor which are greater than the threshold value:



Following picture shows the homepage of the application which is used to send messages to the user:



REFERENCES

[1] Smart Gas Level Monitoring, Booking & Gas Leakage Detector over IoT Kumar Keshamoni1 Sabbani 2017 IEEE 7th International Advance Computing Conference.
[2] LPG Monitoring and Leakage Detection System. Shruthi Unni krishnan, Mohammed Razil, Joshua Benny, Shelvin Varghese and C.V. Hari IEEE WiSPNET 2017 conference.
[3] Simulation Experiment of Leakage and Diffusion and Monitoring System of Gas Network . Zhang Furen Zhang Furen, Xu Pai, Xing Rongjun
[4] A LabVIEW Based Remote Monitoring and Controlling of Wireless Sensor Node for LPG Gas Leakage Detection. L.P.Deshmukh1, T.H.Mujawar1, M.S.Kasbe1,S.S.Mule1, J.Akhtar2 and N.N.Maldar.
[5] Advanced Monitoring System for Gas Density of GIS. Makiko Kawada Tadao Minagawa, Eiichi Nagao, Mitsuhito Kamei, Chieko Nishida and Koji Ueda. 2008 International Conference on Condition Monitoring and Diagnosis, Beijing, China, April 21-24, 2008