GAS LEAKAGE INVESTIGATION USING EMBEDDED SYSTEM

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ABSTRACT: Our paper implements Gas leakage Detector using IOT. The paper is based on 'Embedded System Robotics' is the robot consists of gas sensor that is used to detect gas leakages. As the mechanism keeps moving on the metal pipe it keeps observance for any gas escape, on detection it uses an interface gps detector to transmit location of the leakage detected over to the IOT login system, here in project use GPS-GSM module to receive and display the gas leakage alert and location over IOT. Thus we have a fully automated insect like mechanism that moves with the gas pipe and detects gas leakages instantly at a coffee budget.

Index Terms: **Gas Detector, Robotics, Embed system,arduino.**

1. INTRODUCTION

Nowadays,Petroleum gas and natural gases are used very commonly in day-to-day lives as fuel for cooking, vehicles, etc. This gas is in various formats like CNG, PNG, LPG depending upon these needs. Urban citizens prefer to get pipeline gas to their houses directly rather than in cylinders. Though pipeline gas is feasible, affordable and easy to get there are various disadvantages of pipeline natural gas.

Pipelines are directly connected to the cooking stoves in houses of most of the societies. They mostly cover the overall society and it can result into very dangerous accident if there is leakage in these pipelines. Detection of these leakages is very difficult as the pipelines are on great heights and manual detection can be very dangerous.This project intends to design and verify if a climbing robot can detect leakages in these gas pipelines.

2. LITERATURE REVIEW

Meer Shadman Saeed, Nusrat Alim[1] have "implemented dual mode robot that can be used everywhere but equation used here are not able to automatically calculate ppm of the specific gas."

N. Manjur, M. Arifin, R. Islam, F. Nusrat, R. Islam and R. Tabassum[2] have "implemented a robot than can work on rough surface because it has behaviour of obstacle avoiding but it can be used on plain surfaces only."

Marwah M. Almasri, Khaled M. Elleithy, Abrar M. Alajlan[3] have "implemented robot that can avoid collision effectively but predefined path has to be provided."

Kumar Keshamoni, Sabbani Hemanth[4] have "implemented LPG monitoring system that is available in a cup of coffee price but it is limited to LPG gas only."

Alan Macker, Anil Kumar Shukla, Sagarika Dey, Jyoti Agarwal[5] have "proposed a framework that will make whole LPG cylinder booking system robotized without human intercession but it increases cost of LPG booking system."

3. PROBLEM DEFINITION

Design and implement a pipeline climbing robot to detect leakages in gas pipeline using internet of things. CNG (Compress Natural Gas) & LPG (Liquid Petroleum Gas) are common gases utilized in home and automobiles,they are formed with the chemicals called as Methane, Butane and Propane.

Detecting gas leakages by human help can be dangerous.This process of detecting gas leakage can be carried out by the various sensors.The design of climbing robot contains various types of sensors with the help of these sensors the climbing robot can easy detect the hazardous gases where human access is impossible.

4. MATHEMATICAL MODEL

- Let S be the whole system S={I,P,O}

- I – Input

- P – Procedure

- O – Output

- Input(I)

    I = {Gas pipe , Sensor}

    Where

    Sensor – Nature of gas , type of gas.

    Gas Pipe – Society gas pipeline.

- Procedure(P)

    P = {I , Gas type analysing algorithm , Notification , Review leakage}

- For Gas Type Analysing Algorithm

    Input – Gas
    Output – Type of gas.

- Output(O)

    O = {Buzzer Alarm , Effective notification and location of leakage.}

5. DESIGN OF SYSTEM ARCHITECTURE

Overall system of Gas Leakage Detector is divided into two parts, the climbing robot and a receiving module.
Climbing robot is used for leakage detection. As shown in the architecture it has hardware components like Raspberry Pi,
Gas sensor, GPS-GSM module, buzzer, DC motors, etc.
While receiving module consists of LCD/LED display, buzzer, DC motors, etc.
GPS-GSM module and buzzer are common to both the parts and they are used for communication, tracking and alerting respectively.
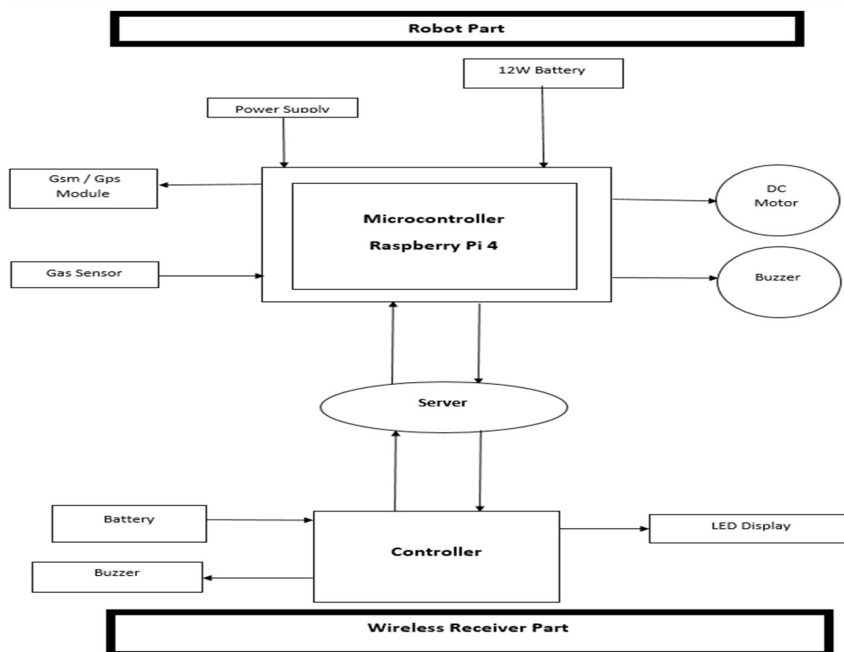

Figure1: Model of system architecture

6. CONCLUSION

The main objective of this project is to build a robot that can climb the gas pipelines where human access is difficult. That can be effectively used to detect gas leakage.From test results it can be seen that the robot can successfully send data about gas leakage took place in its surrounding environment to the wireless module which can later show the results on the display.

In this work two curves obtained with the help of equations for smoke and LPG gas are used. As it can effectively climb the pipes and send the location of gas leak it can be used in mufti-storeyed buildings where LPG gas is provided through pipelines.

It can be further used for other gas detection too. A lot of improvement is expected in robotic sector.This paper only gives a short survey of the climbing robot for hazardous gas detection's.

7. REFERENCES

[1]"Design and Implementation of a Dual Mode Autonomous Gas Leakage Detecting Robot," Meer Shadman Saeed, Nusrat Alim, *2019 International Conference on Robotics,Electrical and Signal Processing Techniques (ICREST)*

[2] "Light following & obstacle avoiding robot using autonomous & android based manual controller," N. Manjur, M. Arifin, R. Islam, F. Nusrat, R. Islam and R. Tabassum, *18th International Conference on Computer and Information Technology (ICCIT)*, Dhaka, 2015.

[3] "Development of efficient obstacle avoidance and line following mobile robot with the integration of fuzzy logic system in static and dynamic environments," M.M. Almasri, K.M. Elleithy and A.M. Alajlan, *Long Island Systems, Applications and Technology Conference (LISAT)*, New York, USA, April 2016.

[4] K. Keshamoni and S. Hemanth, "Smart Gas Level Monitoring, Booking & Gas Leakage Detector over IoT," *7th International Advance Computing Conference (IACC)*, Hyderabad, July 2017.

[5] Alan Macker , Anil Kumar Shukla , "Arduino Based LPG gas Monitoring & Automatic Cylinder booking with Alert System," *IOSR Journal of Electronics and Communication Engineering (IOSR-JECE)*, 11(4) , 6-12, 2018.