iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 10 **Issue:** IV **Month of publication:** April 2022

DOI: https://doi.org/10.22214/ijraset.2022.41464

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 10 Issue IV Apr 2022- Available at www.ijraset.com

Automatic LPG Sensing Device with Switching Off Mechanism

Ankit. A Jaisswal[1], Ajay. B. Thakur[2], Rohit. D. Gawade[3], Kaustubh. S. Kamble[4], Md Saqib Ansari[5]
[1, 2, 3, 4]Student, [5]Assistant Professor, Department of Mechanical Engineering, Theem College of Engineering,Boisar 401501

Abstract: ***As we know, security has been major issue in today's scenario. Accidents are on increasing day by day. Here, we are talking about those accidents that are being occurred due to combustible gases, i.e., LPG, CNG. Frequently we hear, explosion in cylinder of household and vehicles. Several people have been injured and some got dead. So, we are making this project for security purpose that will detect combustible gases and alert candidates. Now a day's, LPG Gas leakage detectors comes in the market with the LPG sensor that only senses any gas leakage and sends a SMS to the emergency no. provided to it and alerts the user via audio or visual indications while we are on a project in which we are using a stepper motor also in addition to the normal LPG Gas leakage detectors which helps in turning off the switch when there an emergency in our absence. One of the preventive methods to stop accidents associated with the gas leakage is to install a gas leakage detection kit at vulnerable places. The main purpose of this project is to achieve a successful working prototype that is capable to detect the presence of gas leakage, which in this case, the Liquefied Petroleum Gas (LPG). The device should also perform automatic response with the implementation of an alarm system and the emergency shut down valve once the leakage has occurred and detected.***

Keywords: MQ5 Sensor, buzzer, servo motor, spur gear, gas stove, leakage sensor, L324 AMPLIFIER, L239 DRIVE, potentiometer.

I. INTRODUCTION

Liquefied Petroleum Gas is non-renewable source of energy. In short form it is called as LPG. LPG is a made up with the mixture of propane gas and butane gas and the which is generated after the process is smell like odourless and colourless. liquefied petroleum gas (LPG) which is used in every sector like hotel, hostel, hospital, cafeteria, it is also used for industries-based purposes this is also used for cutting objects and welding purposes and the main advantages of LPG and CNG gas are such gases are eco-friendly. Because of Gas leakage many accidents happened and their result shows as both material, products loss and human injuries. When LPG leakage is occurred, many dangerous situations can happen like toxic gas, explosion risk, suffocation on the physical properties based .as we had seen numbers of deaths rate increased in recent years due to LPG leakage. Liquefied petroleum gas (LPG) is currently the most used gas in our home for cooking purposes. LPG gas is a flammable gas, if leaked it can cause major damage to life and property. Therefore, it should be used in safe handling manner and additional care has to be taken in order to prevent any leakage possible. The main features of LPG are that being heavier than air, it does not disperse easily and may lead to suffocation when inhaled. The leaked gases when ignited may lead to explosion. The number of deaths due to the explosion of gas cylinders has been increasing in recent years. Introduction Liquefied petroleum gas (LPG) is currently the most used gas in our home for cooking purposes. LPG gas is a flammable gas, if leaked it can cause major damage to life and property. Therefore, it should be used in safe handling manner and additional care has to be taken in order to prevent any leakage possible. The main features of LPG are that being heavier than air, it does not disperse easily and may lead to suffocation when inhaled. The leaked gases when ignited may lead to explosion. The number of deaths due to the explosion of gas cylinders has been increasing in recent years. LPG Gas leaks have been increased from 0.72% of all kitchen accidents to 10.74% of all the kitchen accidents. LPG consists of mixture of propane and butane which is highly flammable chemical. It is odourless gas due to which Ethane is added as powerful odorant, so that leakage can be easily detected Nowadays, as people have very busy lifestyle, they are involved at multiple places at a time, in such situations people might fail to remember to get hold of all the required actions at the time of cooking or can leave the knob of the regulator lose, or the stove's burner on, this carelessness could be very dangerous and can turn into a big disaster also. With the development of world, the technology is enhanced day by day with the realistic projects and efficient work. In this project we are using MQ-5 semiconductor sensor to detect combustible gas. This sensor has lower conductivity in fresh air. When target combustible gases exist, the sensor conductivity is higher along with gas concentration rising. Basically, conductivity of this sensor depends upon concentration of the gas so it may detect not only combustible gas but also, butane, isobutene is basically a mix of hydrocarbons with (C_3H_8 – propane) and (C_4H_{10} – butane) carbon atoms, receiving its name from the fact that it can be liquefied by compression at room temperature.

II. LITERATURE REVIEW

Norite azrin binti shahrulzaman2009[1] Designed a wireless LPG leakage monitoring system for home safety. The proposed system detects the leakage of the LPG and alerts the consumer using GSM about the leakage and it will switch on the exhaust fan. This system also has a feature that the consumption is approximately indicated in terms of the total weight. Whenever the system detects the increase in the concentration of the LPG leakage it immediately alerts by activating an alarm and simultaneously sending message to the particular mobile phones.

The fan is switched on to exhaust gas and an LPG safe valve fitted to the cylinder is closed through signals to avoid further leakage. The device assures safety and prevents explosion.

Srinivasan, Leela, Jeya bharathi, Kirthik, Rajasree;2015[14] in this research paper they talked about gas leakage detection and control. In this paper, the gas leakage resulting into fatal inferno has become a serious problem in household and other areas where household gas is handled and used. It alerts the subscriber through the alarm and the status display besides turning off the gas supply valve as a primary safety measure.

Vasudev Yadav, Akhilesh Shukla, Sofiya Bandra, Vipin Kumar, Ubais Ansari, Suraj Khanna 2016[3]; As we know, security has been major issue in today's scenario. Accidents are on increasing day by day. Here, we are talking about those accidents that are being occurred due to combustible gases, i.e., LPG, CNG. Frequently we hear, explosion in cylinder of household and vehicles. Several people have been injured and some got dead. So, we are making this project for security purpose that will detect combustible gases and alert candidates.

Now a day's, LPG Gas leakage detectors comes in the market with the LPG sensor that only senses any gas leakage and sends a SMS to the emergency no. provided to it and alerts the user via audio or visual indications while we are on a project in which we are using a stepper motor also in addition to the normal LPG Gas leakage detectors which helps in turning off the switch when there an emergency in our absence.

In this paper, we are reviewing on the use of LPG Gas leakage detector along with the stepper motor instead of using other simple Gas leakage detector.

The sensor we are using here has excellent sensitivity combined with a quick response time. The sensor can also sense isobutane, propane, LNG and cigarette smoke. The report consists of a background into the area of 8051 microcontroller and mobile communication, how they are interfaced to each other and AT commands set used in communication.

Kulothungan.S, Gukan.A, Arunprabu.K. B,2019[4]; The current problem in gas leakage detection systems is not in proper conditions. It doesn't have a prevention system. In Existing, the gas leakage systems used in hospitals at the time of firing it only detects and keeps on alarming to evacuate people form the danger zone, it doesn't close the valve automatically, this can cause fire to be spread in all over the area in an instance of time.

To Overcome this, we have designed a robotic drive which is capable of detecting the gas leakages in pipelines and it will detect the leakage and automatically closes the valve by using Arduino controller. Since, we are using GSM Module for communication the gas leakage is communicated to the authority via SMS, as soon as the alarm will rang and LED Display shows the leakage point to the control room.

Manichandana,Simrah UmmeRuman, Harshavardhini Biderkota, Ms.Pr Anisha, Dr.B V Ramana Murthy, And Mr.C Kishor Kumar, 2019[5]; Internet of Things (IoT) is the networking of 'things' by which physical things can communicate with the help of sensors, electronics, software, and connectivity. These systems do not require any human interaction. Internet of Things aim towards making life simpler by automating every small task around us. As much is IoT helping in automating tasks, the benefits of IoT can also be extended for enhancing the existing safety standards. Safety plays a major role in today's world and it is necessary that good safety systems are to be implemented in places of education and work. This work modifies the existing safety model installed in industries and this system can also be used in homes and offices.

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 have used the IoT technology to make a Gas Leakage Detector for society which having Smart Alerting techniques involving sending text message to the concerned authority and an ability performing data analytics on sensor readings.

Politeknik sultan Salahuddin abdul aziz shah, 2020[6]; Safety plays a major role in today's world and it is necessary that good safety systems are to be implemented in places of education and work. This work modifies the existing safety model installed in industries and this system also be used in homes and business premises. One of the preventive measures to avoid the danger associated with gas leakage is to install a gas leakage detector at vulnerable locations. A gas detector is a device that detects the presence of gases in an area, often as part of a safety system.

Gas Detector where it can sound an alarm to operators in the area where the leak is occurring, giving them the opportunity to fix or leave. This type of device is important because there are many gases that can be harmful to organic life, such as humans or animals. Containment into any area where the gas should not be present must be avoided. Because a small leak may gradually build up an explosive concentration of gas, leaks are very dangerous. Nowadays, existing gas detector is less effective in usage because the user can only detect the gas leakage when they test by using gas detector. It is dangerous since gas leakage must be identified from early of the leak.

That is why the Gas Leakage Detector with Notifier System was invented to avoid the fire or explosion occur in the houses or premises. This kind of gas detector will detect the gas continuously as long as there is power supply. This project used Microcontroller Arduino UNO at the processor where it processes the input from the sensor and to GSM module to communicate with the user by sending an alert through SMS. The buzzer will ring until its dangerous concentration of gas is achieved. The benefit of these projects is to prevent the earlier stage of fire because of unattended cooking without a human supervision, could prevent the explosion because of gas leakage.

Mohammad Monirujjaman Khan2020[7]: Liquefied Petroleum Gas (LPG) is a main source of fuel, especially in urban areas because it is clean compared to firewood and charcoal. Gas leakage is a major problem in the industrial sector, residential premises, etc. Nowadays, home security has become a major issue because of increasing gas leakage. Gas leakage is a source of great anxiety with ateliers, residential areas and vehicles like Compressed Natural Gas (CNG), buses, and cars which are run on gaspower. One of the preventive methods to stop accidents associated with the gas leakage is to install a gas leakage detection kit at vulnerable places. The aim of this paper is to propose and discuss a design of a gas leakage detection system that can automatically detect, alert and control gas leakage. This proposed system also includes an alerting system for the users. The system is based on a sensor that easily detects a gas leakage.

Pooja. B. M, Sandhya. S. M, Chethan. K. E, Siriparpu Abraham, Dr. M. S. Nagaraj 2020(8); Gas leakage is a major problem with industrial sector, residential premises and gas-powered vehicles like CNG (compressed natural gas) buses, cars. One of the preventive methods to stop accident associated with the gas leakage is to install gas leakage detection kit at vulnerable places. The aim of this paper is to present such a design that can automatically detect and stop gas leakage in vulnerable premises. In particular gas sensor has been used which has high sensitivity for propane (C3H8) and butane (C4H10). Gas leakage system consists of GSM (Global System for mobile communications) module, which warns by sending SMS. However, the former gas leakage system cannot react in time. This paper provides the design approach on both software and hardware.

K Padma Priya et al.2017[9] proposed an embedded system for Gas Cylinder maintenance, the proposed system consists of three main modules a GSM and PIC module, leakage detection module and protection circuitry. The detection module detects the gas leakage and sends SMS to the consumer through GSM.

The GSM module is used to send short messages about the possibility of gas leak and as an added feature indicate that it may book a refill cylinder or can program the device to automatically book the cylinder via SMS. The weight of the cylinder is monitored by interfacing load cell to micro-controller.

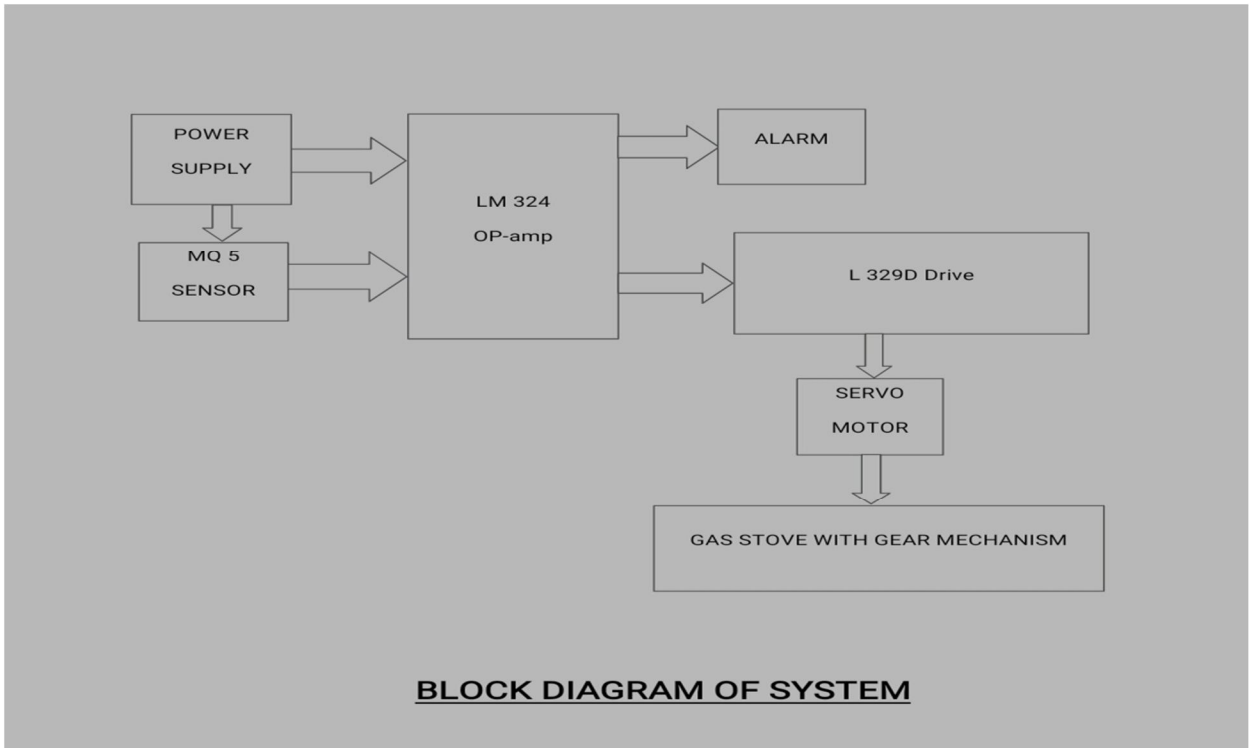
Shivam rana2021[9] LPG/CNG GAS LEAKAGE DETECTION BASED ON IOT “The main aim of our project is to detect LPG leakage using gas sensor and notify the user with the help sending SMS to alerts the people.in this paper we have puts our main focus on our safety. Generally, fire mishaps show up because of awful lovely elastic cylinder utilization or when the controller is presently not developed to become off appropriately. The stockpile of fuel from controller to burner is left on even after the controller is turned off. By some coincidence, if the handle become on, it would outcome in the fuel spills. This paper helps in the headway mechanical ability that is identified with gas detecting, checking and oversee device of LPG spillage.

III. PROBLEM STATEMENT

1) We want to build a system which not only notify but also switch off the stove regulator without any physical touch. Using of exhaust fan to blow out the leaked LPG through exhaust, which also is not solving the problem switching off the regulator.

2) In future use of cylinder will decrease as the government is providing new gas pipelines, our system will directly connect to the stove regulator. Accident due to gas leakage is increasing day by day, so for control that, we want a system which can directly fixed on regulator of stove, helping us to reduces accident. sending SMS on phone is not enough for avoiding any leakages accidents, with want a system which will automatically switch off the knob. We want a system which is efficient but not much expensive for normal people to use.

IV. METHODOLOGY



BLOCK DIAGRAM OF SYSTEM

First the LPG is detected by the MQ5 sensor, and this sensed input is sent to pin no. 3 of LM324 (op-amplifier) and the output of LM324 goes to buzzer from pin no.1 as well as to pin no.2 of L293D drive. And from D drive to regulator (REES52) which will convert 5v to 1.2v and send to motor and motor rotate the gear which automatically rotate the knob of the regulator.

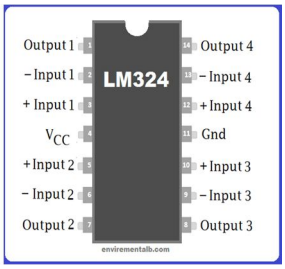
V. COMPONENTS

I. PCB (**printed circuit board**

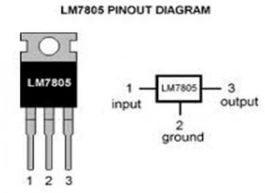
II. MQ5 Sensor

v.L293D Motor Driver

vi. LM324IC



iii. LM7805 Regulator



vii. stove

iv. Servo Motor

viii. adapter

VI. CONCLUSION

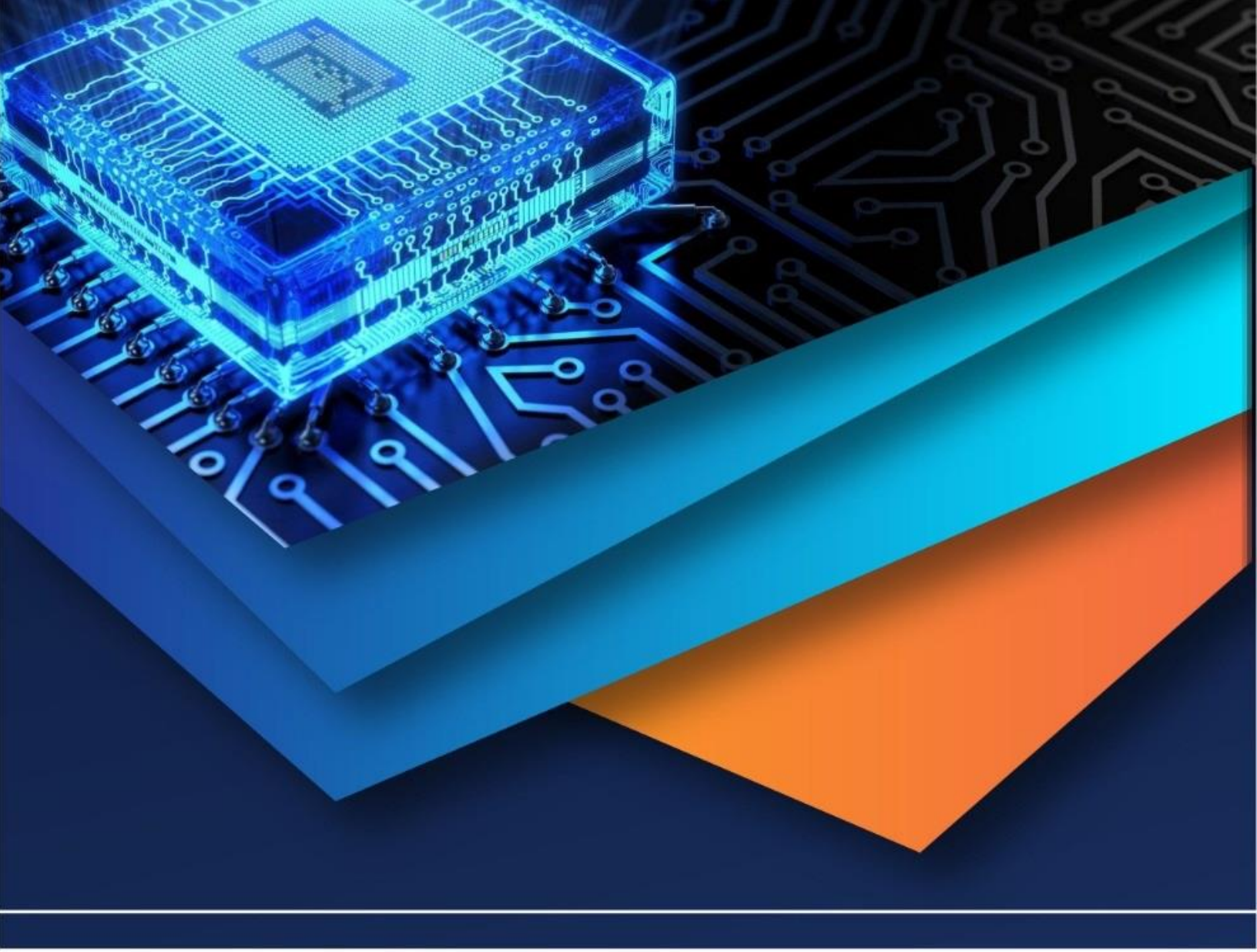
A. We observe our system was efficiently and easily without any major problem.
B. Above 2vlt is required for sensing the leaked gas, below 2volt was not sufficient for further operation.
C. We observed that plastic gear was easy to rotate, and our overall weight was also less.
D. LPG is detected very quickly by the mq5 sensor with using it with potentiometer, by using potentiometer we can adjust the amount of LPG to convert it into voltage for sensing. It can prevent accident in domestic or anywhere LPG is been used

VII. FUTURE SCOPE

A. Mechanism can be made more efficient by using small gear with high torque for increasing system efficient. We can use battery in place of power adapter or both at same time if required in case of electricity power cut. We can use multiple motor for multiple knobs of the stove.
B. Use of LPG cylinder is reducing day by day, so our system can be connected directly to the regulator of stove, so our system future scope is excellent.
C. We can increase system efficient by using metal gears, which will increase gear ratio.
D. In future, everything is going to automation, so our system can used as fully automated system
E. In future we can operates it automatically from anywhere.

REFERENCES

[1] Norita azrin binti shahrulzaman,Bachelor of Engineering, automatic safety system for gas leakage2009[1].
[2] Srinivasan.A,Leela.N,Jeyabharathi V,Kirthika. R,Rajasree D,Department of ECE, GKM college Engineering and technology,Chennai gas leakage detection and control- Scientific Journal of Impact Factor(SJIF)2015[2].
[3] Vasudev Yadav, Akhilesh Shukla, Sofiya Bandra, Vipin Kumar, Ubais Ansari, Suraj Khanna, Department of E&C Engineering, MIT, India, A Review on Microcontroller based LPG Gas Leakage Detector2016[3].
[4] Kulothungan.S, Gukan.A, Arunprabu.K. B, 1Associate Professor, 2Student, 3Student IFET College Of Engineering, Automatic Gas Leakage Detection. System-IJEDR 2019[4].
[5] Manichandana,Simrah UmmeRuman, Harshavardhini Biderkota, Ms.Pr Anisha, Dr.B V Ramana Murthy, Mr.C Kishor Kumar, Stanley College of Engineering and Technology for Women Chapel Road, Abids, Hyderabad-A servey paper on gas leakage detection using IOT, JASC: Journal of Applied Science and Computations 2019[5].
[6] Politeknik sultan Salahuddin abdul aziz shah,SMS notifier gas leakage detector 2020[6].
[7] Mohammad Monirujjaman Khan, Department of Electrical and Computer Engineering, North South University, Bashundhara, Dhaka1229, Sensor-Based Gas Leakage Detector System- www.mdpi.com/journal/engproc 2020[7].
[8] Pooja. B. M, Sandhya. S. M, Chethan. K. E, Siriparpu Abraham, Dr. M. S. Nagaraj, Department of Electrical and Electronics Engineering, GSM Based Gas Leakage Detection System,] BIET, Davangere, India, IJESC 2020[8].
[9] Shivam Rana, Saumya Kumari, Devansh Dubey, Computer Science and Engineering Galgotias University Greater Noida, U.P, LPG/CNG Gas Leakage Detection Based on Iot- International Journal of Innovative Science and Research Technology 2021[9].



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY