



MAHENDRA INSTITUTE OF TECHNOLOGY (AUTONOMOUS)

NALAIYATHIRAN

TEAM LEADER

JEEVITHA C

TEAM MEMBER

- **INDHUMATHI B**
- **JEEVAJOTHI D**
- **KANISHKA K**

TITLE

**IOT BASED GAS LEAKAGE
MONITORING AND ALERTING
SYSTEM**

IOT Based Gas Leakage Monitoring and Alerting System

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, the elementary concern of any project, has not been left untouched by IoT. Gas Leakages in open or closed areas can prove to be dangerous and lethal. 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. Our main aim is to proposing the gas leakage system for society where each flat have gas leakage detector hardware. This will detect the harmful gases in environment and alerting to the society member through alarm and sending notification.

INTRODUCTION:

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 has always been an important criterion while designing home, buildings, industries as well as cities. The increased concentration of certain gases in the atmosphere can prove to be extremely dangerous. These gases might be flammable at certain temperature and humidity conditions, toxic after exceeding the specified concentrations limits or even a contributing factor in the air pollution of an area leading to problems such as smog and reduced visibility which can in turn cause severe accidents and also have adverse effect on the health of people.

Most of the societies have fire safety mechanism. But it can use after the fire exists. In order to have a control over such conditions we proposed system that uses sensors which is capable of detecting the gases such as LPG, CO₂, CO and CH₄.

This system will not only be able to detect the leakage of gas but also alerting through audible alarms. Presence of excess amounts of harmful gases in environment then this system can notify the user. System can notify to society admin about the condition before mishap takes place through a message.

System consists of gas detector sensors, Arduino board, ESP8266 and Cloud server. One Society authority person can register the all-flat member user to our system. Society admin can add the details of per flat user such as user name, mobile number, per user flat sensor details information. Society admin can configure the threshold value of each sensor. System hardware can be deployed on each flat. Sensors can sense the value per time. System can send the values to cloud server. Server can check that the sensor values exist the threshold value. If sensor value can cross the limit the server can send the command to hardware for buzzing the alarm. Server also sends the notification message to user.

LITERATURE SURVEY

Smart Gas Level Monitoring, Booking & Gas Leakage Detector over IoT

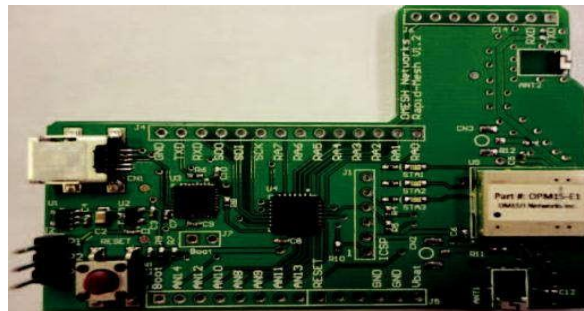
This project proposed the most common problem experienced in our day-to-day lives that is regarding GAS container going empty. We bring this paper to create awareness about the reducing weight of the gas in the container, and to place a gas order using IOT. The gas booking/order is being done with the help of IOT and that the continuous weight measurement is done using a load cell which is interfaced with a Microcontroller (to compare with an ideal value). For ease it is even has been added with an RF TX & Rx module which will give the same information. When it comes to security of the kit as well as gas container, we have an MQ-2(gas sensor), LM35(temperature sensor), which will detect the surrounding environment for any chance of error. Whenever any change is subjected in any of the sensors (load cell, LM35, MQ-2) a siren (60db) is triggered.

For the sensors, if any fire is to be happened then the temperature sensor will sense an high change(positive change) in temperature and will send an pulse to microcontroller which intern will send an update to the internet through IoT, and as well it will trigger an siren alarm in the RF Rx kit(sub board) MQ 2 sensor is basically an LPG (liquefied petroleum gas) which is composed of propane & butane, so when a gas leakage is sensed by the sensor it will send an high pulse to the Mc

which will update it in the IoT, and even a buzzer is heard in the RF Rx kit. And the problem can be sorted & solved. Thus, the overall components & sensors play a role in the paper as explained above.

Gas Leak Detection and Localization System through Wireless Sensor Networks

In this project we proposed a prototype of a Wireless Sensor Network (WSN) to monitor and locate gas leaks of a complex indoor environment. Specifically, a mobile node is moving inside a building to monitor any leakage of carbon dioxide (CO₂), supporting and displaying the level and the location of the leakage. Throughout the demonstration, the technological advantages of cognitive networking along with multichip routing are explored.



Rapid Mesh board



Stationary Node

Cloud Connected Smart Gas Leakage Detection and Safety Precaution System

The project design and develop a cloud connected smart LPG gas cylinder platform, acting as a safety device for detecting LPG gas leak at low levels to avoid any possible accidents. It is also capable of sensing fire breakout in the area and weight of the gas in order to provide real time monitoring and alert over Internet. If an abnormal condition is detected, the device sends an alert to the smartphone app of the user and also generates an alert e-mail to other authorities. In addition to this upon detecting a gas leakage or a fire breakout, the device automatically takes safety precautionary measures, like gas valve closing, ventilation opening, fire sprinkler activation and homeelectrical power supply cut-off. The device connects to the internet via Wi-Fi and thus increasing the mobility of the platform within the premises of the house. A Wi-Fi capable ARM Cortex-M4 microcontroller is used to implement the system. This device offers a complete, low cost, powerful and user-friendly way of real-time monitoring and remote control of gas leakages and prevention mechanisms in household and industrial areas.

Features of system hardware:

Live-Monitoring and Control

The smartphone app can show the amount of LPG gas remaining, present room temperature other device status. These data are updated every few seconds providing real-time live monitoring. In addition to this, the actuators connected on the device can be controlled from the smartphone app giving additional benefits for the user.

On-Demand Automatic Reordering Facility

If the device is configured in automatic reordering mode, whenever the gas level comes below a certain threshold, the device automatically sends a gas cylinder requesting e-mail to the gas vendor or gas distributor. The user must save the e-mail address of the gas distributor before enabling this feature.

Low Weight Alert

Every time when a new gas cylinder is delivered, the user must press a button on the device which starts the process of measuring the weight of the cylinder and

if it detects low weight cylinder, which means a low fuel content, it will immediately alert the user smartphone app about this as well as send an e-mail alert to the gas agency company to register this case. This is a useful application in finding and avoiding a low weight gas cylinder at the time of delivery.

Actuators

A servo motor is used to control the gas valve position, whereas DC fan motor mechanism acts like a ventilation/exhaust fan. Another DC electrical motor will do the work of a fire sprinkler motor. All these motors are controlled using appropriate PWM signal generation. An AC relay circuitry is used to cut-off the mains electrical supply.

Local Audio Alarm

A loud beep alarm sound is generated intermittently to alert the neighbouring people.

Device User Interface

Notification LEDs are used to indicate Wi-Fi provisioning and cloud server connection status.

Gas Leakage Detection and Smart Alerting and Prediction Using IoT

IoT is an expanding network of physical devices that are linked with different types of sensors and with the help of connectivity to the internet; they are able to exchange data. Through IoT, internet has now extended its roots to almost every possible thing presents around us and is no more limited to our personal computers and mobile phones. Safety, the elementary concern of any project, has not been left untouched by IoT. Gas Leakages in open or closed areas can prove to be dangerous and lethal. 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 having Smart Alerting techniques involving calling, sending text message and an e-mail to the concerned authority and an ability to predict hazardous situation so that people could be made aware in advance by performing data analytics on sensor readings.

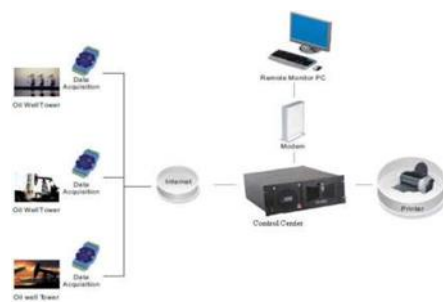
Internet of Things is being used everywhere in order to ease our daily tasks and improve the quality of life. There are innumerable modules that could be thought of for smart homes and cities and one of them are discussed below

Gas Detection Systems

This is the system which has been discussed in this paper. The versatile nature of this system comes because of the fact that the same system with a change in the type and number of sensors can be used in different places. They can be used at homes, buildings, industries for detecting LPG, Propane, Methane or any other harmful gas leakages (discussed in this paper) and with some changes could be used in cities for detecting air pollution and performing analytics on the sensor readings to predict and prevent dangerous situations.

Applications of Wireless Sensor Networks in the Oil, Gas and Resources Industries

The paper provides a study on the use of Wireless Sensor Networks (WSNs) in refineries, petrochemicals, underwater development facilities, and oil and gas platforms. The work focuses on networks that monitor the production process, to either prevent or detect health and safety issues or to enhance production. WSN applications offer great opportunities for production optimization where the use of wired counterparts may prove to be prohibitive. They can be used to remotely monitor pipelines, natural gas leaks, corrosion, H₂S, equipment condition, and real-time reservoir status. Data gathered by such devices enables new insights into plant operation and innovative solutions that aid the oil, gas and resources industries in improving platform safety, optimizing operations, preventing problems, tolerating errors, and reducing operating costs. In this paper, we survey a number of WSN applications in oil, gas and resources industry operations.



The principle Local Monitoring System

GSM Based Gas Leakage Detection System

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 (C_3H_8) and butane (C_4H_{10}). 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 project provides the design approach on both software and hardware.

Gas leakage detection is not only important but stopping leakage is equally essential. This paper provides a cost effective and highly accurate system, which not only detect gas leakage but also alert (Beep) and turn off main power and gas supplies, and send an SMS. GSM module is used which alerts the user by sending an SMS. In order to provide high accuracy gas sensor MQ-6 has been used.

Conclusion:

In this paper we use IOT technology for enhancing the existing safety standards. While making this prototype has been to bring a revolution in the field of safety against the leakage of harmful and toxic gases in environment and hence nullify any major or minor hazard being caused due to them. 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. This system will be able to detect the gas in environment using the gas sensors. This will prevent from the major harmful probe

REFERENCES

- [1] Kumar Kesha Moni and Sabahi Hemanth. "Smart Gas Level Monitoring, Booking & Gas Leakage Detector over IoT " International Advance Computing Conference IEEE, 2017.

- [2] Petros Spachos Liang Song and Dimitrios Hatzinakos. "Gas Leak Detection and Localization System Through Wireless Sensor Networks" The 11th Annual IEEE Consumer Communications and Networking Conference - Demos. IEEE, 2014.
- [3] Babu Prasanth V. "Cloud Connected Smart Gas Leakage Detection and Safety Precaution System" International Journal of MC Square Scientific Research Vol.6, No.1 Nov 2014.
- [4] Asmita Varma, Prabhakar S, Kayalvizhi Jayavel "Gas Leakage Detection and Smart Alerting and Prediction Using IoT." *Internet of Things and Applications (IOTA), International Conference on*. IEEE, 2017
- [5] Mohammad Reza Akhondi, Alex Talevski, Simon Carlsen, Stig Petersen. "Applications of Wireless Sensor Networks in the Oil, Gas and Resources Industries." International Conference on Advanced Information Networking and Applications, IEEE 2010
- [6] Ashish Shrivastava, Ratnesh Prabhakar, Rajeev Kumar and Rahul Verma "GSM Based Gas Leakage Detection System." International Journal of Technical Research and Applications E-ISSN: 2320-8163.