



# IoT Based Air Pollution Level Monitoring and LPG Cylinder Regulation and Security System

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## Abstract:

Air pollution is a growing issue these days. It is necessary to monitor air quality and keep it under control for a better future and healthy living for all. Here we propose an air quality monitoring system that allows us to monitor and check live air quality through IOT. System uses air sensors to sense presence of harmful gases/compounds in the air and constantly transmit this data to microcontroller. Also the sensors interact with microcontroller which processes this data and transmits it over internet. This allows authorities to monitor air pollution in different areas and take action against it Similarly in today's world the LPG cylinder plays a vital role not only for domestic but also use in industries, hospital, automobiles, educational sector (school and colleges using LPG cylinders for laboratory purpose) and public sector. It is panic that these cylinders get empty without any intimation. In these days where the refilling is not an easy task, these cylinders get empty at unexpected situation. Another major problem is the leakage of LPG which may lead bursts resulting in heavy loss of life and wealth. Hence the project outlays the protection systems from hazards due to LPG leakage and fire, using special components like gas sensor and weight sensor. Each and every individual wants to be secured, Hence the security system has to be managed in the kitchen and the entire place where LPG is used. Unfortunately none of existing security systems have all the attributes i.e. leak detection, weight detection along with protection and alarm. This project is aimed at providing indication of gas content remaining in the LPG cylinder while it is in use so that it is helpful to the user to place the order for the new cylinder at an appropriate time and cylinder refill alert message is sent to the users mobile numbers. The security system incorporated consists of leak detection and fire detection unit along with alarm unit. Further on detecting leak, the signal is transferred to GSM and the Microcontroller sends signal to the solenoid valve to cut off the further gas supply. Simultaneous GSM switches off the A.C mains of the kitchen and sends the alert message to the users mobile numbers and also makes the alert calls to the users mobile numbers until they are attended at regular. In this way "LPG cylinder regulation and security system" provides a complete security for LPG cylinder users. LPG is the abbreviation or short form for liquefied petroleum gas. Like all fuels, fossil it is a non-renewable energy source. It is extracted from crude oil and natural gas. The main composition of LPG is hydrocarbons. The main components of the LPG are propane, butane. As we all know the hazards due to LPG is increasing day by day. The hazards are such as explosion, blast. The hazards may be due to gas leakage, fire occurrence. We all know every human being wants to be secured with these hazards. The life of an each individual is very precious. So in order to avoid such hazards due to LPG leakage, fire occurring. Hence we need to provide security system to the LPG. Now a day's the use of LPG or the requirement of LPG is increasing day by day. In every field the use of LPG is there such as in vehicles, kitchen, hospital, industries etc. So the regulation of LPG is essentially required. In order to regulate the LPG the wastage or leakage of LPG should be reduced. If the leakage or wastage of LPG is increased, in future use we may not get it. Hence the regulation of LPG is required.

## 1. INTRODUCTION

The IOT has a large role to play in future smart cities. The IOT can be used in practically all scenarios for public services by governments. Sensor-enabled devices can help monitor the environmental impact of cities, collect details about sewers, air quality, and garbage. Such devices can also help monitor woods, rivers, lakes, and oceans. Many environmental trends are so complex, that they are difficult to conceptualize. The Internet of Things (IOT) is a recent communication paradigm that envisions a near future, in which the objects of everyday life will be equipped with microcontrollers, transceivers for digital communication, and suitable protocol stacks that will make them able to communicate with one another and with the users, becoming an integral part of the Internet. An urban IOT can provide means to monitor the quality of the air in crowded areas, parks, or fitness trails. The realization of such a service requires that air quality and pollution sensors be deployed across the city and that the sensor data be made publicly available to citizens. Present innovations in technology mainly

focus on controlling and monitoring of different activities. These are increasingly emerging to reach the human needs. Most of this technology is focused on efficient monitoring and controlling different activities. An efficient environmental monitoring system is required to monitor and assess the conditions in case of exceeding the prescribed level of parameters. When the objects like environment equipped with sensor devices, microcontroller and various software applications becomes a self-protecting and self-monitoring environment and it is also called as smart environment. In such environment when some event occurs the alarm or LED alerts automatically. Human needs demands different types of monitoring systems these are depends on the type of data gathered by the sensor devices. Initially the sensor devices are deployed in environment to detect the parameters while the data acquisition, computation and controlling action. Sensor devices are placed at different locations to collect the data to predict the behaviour of a particular area of interest. Now a day's every one want a facility which reduce their efforts, time and provide a way to do their work more easily For cooking

food we all uses LPG gas. It produced in 1910 by 'Dr. Walter Snelling. LPG is a mixture of commercial propane and commercial butane having saturated as well as unsaturated hydrocarbons. LPG having versatile nature so its demand raise day by day. It mostly uses in domestic fuel, industrial fuel and automobile fuel. In INDIA gas distributor uses SMS or ONLINE booking for LPG which are time consuming methods in fast running life. We find uneducated people are not able to do these task and busy schedule people they haven't sufficient time to do all the activity. Also safety plays the important role. As we all know that much accident happens due to gas leakage.

There are approximately 30crore LPG users in the country in which mostly 40% of the population. The Several standards have been implemented for the gas leakage detection system. The existing systems provides an alarm system which is mainly meant to detect an Gas leakage in the house and commercial premises The objective of the proposed system is to continuously measure the weight of the cylinder and as soon as it reaches the minimum threshold it will automatically sends an SMS alert to the user as well as Authorized LPG agent so that they can act accordingly. This system also designed to detect LPG gases such as propane and butane. These gases can catch fire easily. LPG is used as propellant, fuel and as a refrigerant. When a leak occurs, the leaked gases may lead to explosion. The number of deaths occurring due to explosion of gas cylinders has increased. So the leakage should be controlled to protect people from danger. Bhopal gas tragedy is an example for accidents due to gas leakage. Gas leakage detection is not only important but controlling the leakage is also important. An odorant is added to LPG, so that leaks can be detected easily by most people. However, some people who have a reduced sense of smell may not be able to rely upon this inherent safety mechanism. In such cases, a gas leakage detector becomes vital and helps to protect people from the dangers of gas leakage. The main aim of this project is to monitor for liquid petroleum gas (LPG) leakage to avoid major fire accidents and also facilitating safety precautions where security has been an important issue and automatic cylinder booking without human intervention. The system detects the leakage of the LPG using gas sensor and alerts the consumer about the gas leakage by sending SMS. The system measure the weight of cylinder by using weight sensor and display corresponding weight in LPG display. The proposed system uses the GSM Modem to alert the person about the gas leakage via SMS and status of automatic cylinder booking.

## 2. PROPOSED SYSTEM

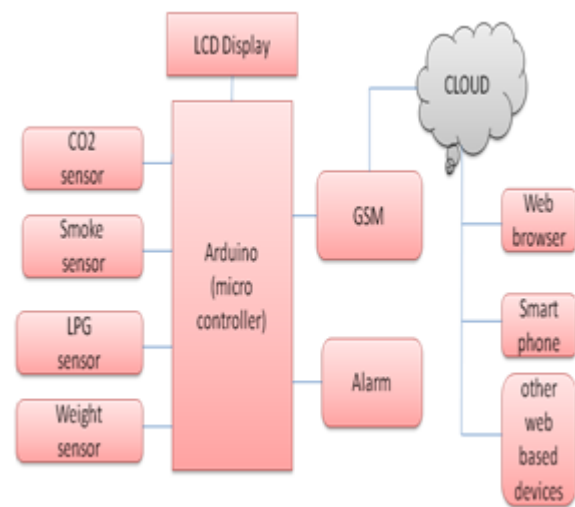
The goal of building a smart city is to improve quality of life by using technology to improve the efficiency of services and meet residents' needs. Information and Communication Technology allows city officials to interact directly with the public to tell what is happening in the city, how the city is evolving, how to secure from hazards like leaking LPG cylinder and how to enable a better quality of life. A Smart City is one with at least one initiative addressing one or more of the following six characteristics: Smart Governance, Smart People, Smart Living, Smart Mobility, Smart Economy and Smart Environment. We are going to develop an app that is going to bear a hand in this campaign. Consider an area that is being surveyed for estimating how much the area is affected by pollution. The constituents of air along with its proportion are calculated and if it is higher than normal then the officials are

intimated about it. Then the people are evacuated to a safe place.

## 3. OBJECTIVES

The main objective of the work is designing microcontroller based toxic gas detecting LPG leakage detecting and alerting system. This work mainly aims to design and develop reliable, efficient, flexible, economical, real time and realistic wellness sensor networks for smart home systems. To provide healthy and secure life for human. We develop an application that collects the sensor data and alerts the user to enhance the security. The main objectives of the proposed research work can be briefed as following: To implement the GSM technology. To build a cost effective system.

## 4. METHODOLOGY



**Modules: We are using three modules: Sensor module:**

**CO2 sensor:** CO2 is a major air pollutant present in the air. Level of the CO2 is measure by the this sensor.

**Smoke sensor:** The other renaming air pollutants like smoke are measure by these sensors.

**LPG Sensor:** It is gas leakage sensing unit. The LPG sensors used to detecting presence LPG gas in air. When gas leakage it gives signal to the microcontroller (MC).

**Weight sensor:** It is used to measure LPG cylinder weight with the LPG weight. This is used to provide user with an alert in case the LPG level goes below the set level.

**Microcontroller:** This is the controlling unit. It takes the signal from sensing And detecting units and gives controlling signal to the GSM and AC mains off circuit.

**Communication module:** GSM (Global system for mobile communication): This system receives the signal from MC and sends information (alerts, status of the units) to the user's mobile number.

**Application module:** Alarm: This unit has an audio annunciation unit generally called as Piezo buzzer which beeps in case of LPG leakage or Fire alerts. It receives the signal from MC, when leakage or fire detected.

**Display:** This consists of 16 characters and 2 lines type

JHD162A Display. continuously displays the air pollution level, weight of the gas and status of the sensors. It also signal from MC.

## 5. APPLICATION

The proposed Air Quality Monitoring System provides real-time information about the level of air pollution in various regions.

1. The proposed model is established at the various locations or nodes of a city.
2. The Air Quality Monitoring System used in industrial and traffic area.
3. The LPG Regulation and Security System used in home automation system, in industrial area, hotels, schools, and various areas. This system can be implemented in various areas either in domestic area such as places of educational institute, residential and industrial areas which avoids endangering of human lives.

## 6. CONCLUSION

This study uses wireless sensor network technologies to acquire and record monitoring data for the goal of completely automatic air-quality monitoring. On the hardware side, we integrate sensor nodes with the CO sensors to perform air-quality-monitoring tasks. The sensor nodes are able to communicate with each other based on the ZigBee protocol. Dependence & Power consumption of sensor nodes need to be minimized and functionality of the each step should be optimized. The selection of sensor and material used in construction of the sensor should select such that the there should be minimum changes in the accuracy of the system. As well As we shorted out the problems faced by LPG gas consumers so we come up with some solutions to meet the few requirements of them, as we made our system is completely automate the process of refill booking without human intervention. Our system is also reasoned to help customers to upgrade their safety norms, act in accordingly with minimum requirements on environmental issues and mostly the basic function being prevented by major disasters and protect life and property from reputed Accidents. The primary objective of our project is to measure the gas present in the cylinder when weight of the cylinder is below the fixed load, this can be done using the weight sensors. The gas retailer gets the order for a new cylinder and the house owner receives the message regarding the status and the secondary objective is to provide any malfunction in gas servicing system in order to prevent damage or explosion of LPG. Thus the system developed by us will somehow help the LPG Gas Consumers to lead a comfortable life.

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