Estimation And Prediction Of Lpg Gas Using Data Analytics

M. Abishek , B .Divya, S. Jeevanantham, G. Surendar
U. G Student-Department of Electrical and Electronics Engineering
Knowledge Institute of Technology, Kiot Campus Salem-637 504.
Affiliated to Anna University, Chennai.

Mentor-Mr. Jagadeeshraja.M Assistant Professor
Department Of Electrical And Electronics Engineering,
Knowledge Institute of Technology, Kiot Campus Salem-637 504.
Affiliated to Anna University, Chennai.

***JUSTIFICATION*— Our project focuses on the application of the IOT which is used for measuring and displaying the LPG gas content present in the household and commerical gas cylinder**

***ABSTRACT* - This is helpful in booking of new LPG cylinder and also detect the gas leakage using the gas sensor and rate of flow of gas and alert the user in the mobile. We can estimate the current LPG level and it continuously displayed on mobile phone. We can know the validity of LPG usage from the initial. By use of IOT the user is alerts.**

Keywords—Node MCU, Google firebase ,Gas sensor, load sensor, MIT App.

1. INTRODUCTION

LPG, first produced in 1910 by Dr. Walter Snelling is a mixture of Commercial Propane and Commercial Butane having saturated as well as unsaturated hydrocarbons. Because of the versatile nature of LPG it is used for many needs such as domestic fuel, industrial fuel, automobile fuel, heating, illumination etc and the demand for LPG is on an exponential raise day by day. 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. Thus there is a need for a system to detect and also prevent leakage of LPG. Before the development of electronic household gas detectors in the 1980s and 90s, gas presence was detected with a chemically infused paper that changed its colour when exposed to the gas. Since then, many technologies and devices have been developed to detect, monitor, and alert the leakage of a wide array of gases.

Today, booking an LPG cylinder is now just a text message away. Petroleum companies have launched the customer-friendly service called as IVRS (Interactive voice Response) technique for their customers. Hence the requirement of an efficient system to measure and display the level of LPG is inevitable, which may be used for domestic purposes. Here we intend to propose a Node MCU based system where a gas sensor, Load sensor is used to detect dangerous gas leaks. This unit is incorporated into an alarm unit, to sound an alarm or give a visual indication of the LPG leakage. The sensor has good sensitivity combined with a quick response time at low cost. If leakage is detected, message to the authorized person or family member using cellular network is sent automatically. It also provides a feature to measure weight of LPG cylinder and display in the mobile application. A gas quantity of less or equal to 50kg books the cylinder by sending text message to a dealer. Also when cylinder weighs less than or equal to 0.5 Kg, it informs the family members by sending a message to refill the cylinder.

LITERATURE SURVEY

[1]. SANDEEP.R et al. GAS LEVEL DETECTION AND AUTOMATIC BOOKING USING IOT

5th International Conference on Advanced Computing and Communication System & 2019 (IEEE)

Designed on the application of the IoT which is used for measuring and displaying the gasoline content present in household LPG cylinder and this is helpful in automatic booking of new LPG cylinder and also detect the gas leakage. Usually the capacity of LPG in Cylinder is not determined, so we are going to display the level of LPG. The level of LPG is measured using load sensor (SEN-10245). The output of the sensor is connected with Arduino R3. By use of GSM Module, the information is sent to user by SMS (short messaging service) and also automatic booking is done by dialing the registered gas booking number. Then the gas leakage is detected by gas sensor (MQ-6). By using this, we can detect the current LPG level and it is continuously displayed on the LCD. We can know the validity of LPG usage from the date of initialization. By use of IOT the user is alerted by giving the message to their mobile phone when the LPG level is critically low (below 20%). Automatic booking of new LPG by auto dialing of gas booking number and by this we prevent pre-booking and late booking. Then by detecting the gas leakage we can prevent the LPG gas burst accidents in the home.

[2]. SHIVALINGESH.B.M et al, LPG DETECTION, MEASUREMENT AND BOOKING SYSTEM

International Journal Of Research and Scientific Innovation & November 2014 (IEEE)

In this paper we present how to detect the leakage using a gas sensor and book a new cylinder automatically by sending a message to agency. The gas sensor MQ-6 is very sensitive to methane and propane which are main constituents of LPG. A load cell is used to measure the weight of cylinder continuously. The weight of cylinder is displayed continuously and some 4-5 MQ-6 sensors will be placed in different place of room, output of sensor will become high when there is LPG leakage is present. When the sensor output is high buzzer will be switched on and a message will be sent to customer and nearest gas agency via GSM. When the weight of cylinder equal to threshold value a message will be sent to agency to book new cylinder. The same system is implemented using LabVIEW, and a statistical analysis of gas sensor and load cell is done.

[3]. RAGUNATH.S et al, IOT BASED LPG DETECTION AND INTERFACING WITH THINGSPEAK

International Research Journal of Engineering and Technology (IRJET)

Around 50 billion dollars is spent yearly on therapy for low back pain in the United States alone. Low back pain is one of the most common reasons for doctor visits. Having poor posture has been found to be a main cause of lower back pain as it impacts the transverses abdominis muscle. Maintaining a good posture and changing one's position from time to time is considered to significantly improve and maintain one's health. The world has witnessed a vast amount of smart monitoring devices that are used to enhance the quality of life by providing different types of support. Smart wearable technology has been the main focus of this century, specifically in the medical field, where the advances range from heartbeat monitors to hearing aids. This report highlights the design, development and validation process of a compact wearable device that uses multiple sensors to measure the back posture of a user in real time and notify them once poor posture is detected.

[4]. NARESH NAIK et al, ARDUINO BASED LPG GAS MONITORING & AUTOMATIC CYLINDER BOOKING WITH ALERT SYSTEM

IEEE, IOSR Journal of Electronics and Communication Engineering (IOSR-JECE) & (Jul-Aug .2016)

There is a rapid development in technology which influencing the human life in several aspects due to rapid development in different fields but we still need to adopt that technology such that we can make human life more easier to live. In our Country it is not possible to supply LPG through Pipes to each and every home as production of LPG is too short. At present we are having a system Advance LPG cylinder booking through IVRS or online which is most difficult for the illiterate and busy schedule people to book the LPG cylinder in advance. Another Major problem LPG cylinder users facing is "They don't know exactly the status of LPG gas completion" makes even more delay in booking the cylinder which is uncomfortable most of the times. Now a days we are having a IVRS system in which customer needs to go through few steps in accordance with the Automatic voice which also includes selecting options. Most of the illiterate people can't even complete the booking due to this reason and also most of the times these landline phones are either busy due to congested calls or phones not working due to some technical issues. This paper proposes a system that will make entire LPG cylinder booking procedure automated without human intervention. This system continuously measures the weight of the cylinder and once it reaches minimum threshold it will automatically sends message to the authorized LPG Agent so that they can deliver the LPG cylinder in time. Along with the Automated cylinder booking we also designed feature related to the safety of the user in which it continuously monitor the leakage of LPG gas and alerts the user regarding leakage to avoid major accidents which costs human lives mostly.

[5]. MEENAKSHI VIDYA P et al, Automatic LPG Booking, Leakage Detection And Real Time Gas Measurement Monitoring System

International Journal of Engineering Research & Technology (IJERT), April – 2013

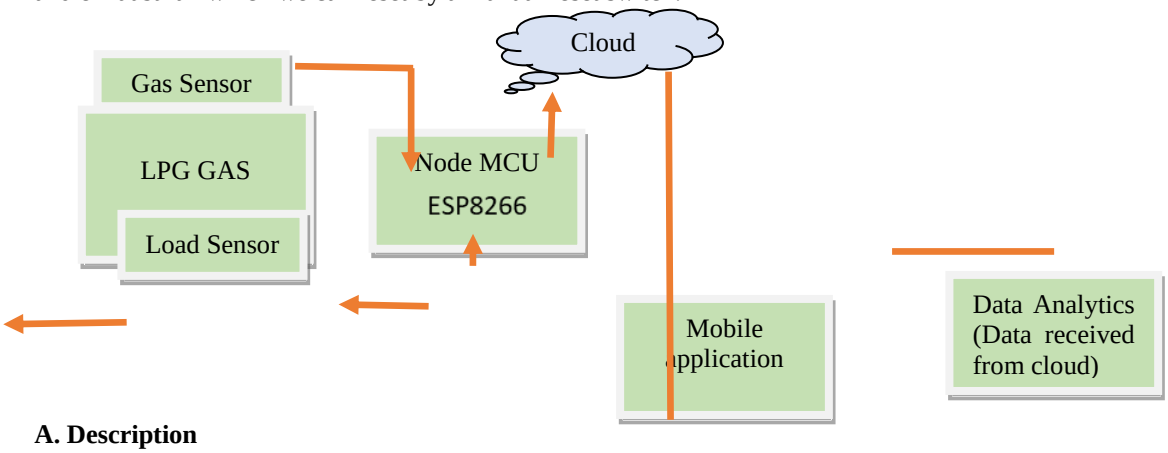
A cost-effective, automatic Liquefied Petroleum Gas (LPG) booking, leakage detection and real time gas monitoring system is proposed in this paper. In this system, the LPG leakage is detected through the sensor and information is sent to the user by Short Message Service (SMS) and simultaneously alerts the customer using a GSM module, while activating the alarm and exhaust fan. The additional advantage of the system is that it continuously monitors the level of the LPG present in the cylinder using weight sensor and automatically books the cylinder using a GSM module.

3. EXISTING SYSTEM

Internet of Things (IOT) is the major revolution in this industry 4.0 trend. Its applications are spread through various fields, including Coal and Gas industries. In the Coal and Gas industries, the leakage of LPG is detected and constantly monitored using a microcontroller called Arduino-uno, ESP8266 Wifi module and LPG sensor (MQ-5). The aim of this project is to detect and monitor gas leakage effortlessly. It detects LPG using MQ-5 module. This automatically sends ALERT/SMS and e-mail to the control engineer, when the leakage is detected. The leakage recordings will be updated over ThingSpeak which can viewed by the respective control engineer in that industry.

4. PROPOSED SYSTEM

In this prototype, gas leakage detection has been given a highest priority. MQ6 placed in the vicinity of the gas cylinder. In the advent of leakage, the resistance of the sensor decreases increasing its conductivity. Corresponding pulse is fed to node MCU and simultaneously switches on the buzzer and exhaust fan which we can reset by a manual reset switch.



A. Description

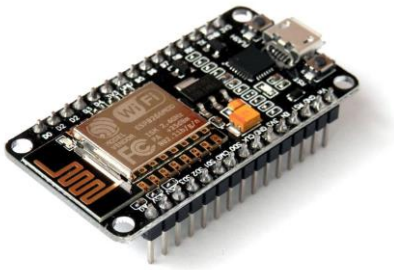
a . Load Sensor

A load cell is an electronic sensor for measuring weight and force. When a force is applied to it, a weak electrical signal at the millivoltage level appears on its output wires. In fact, the load cell is a transducer which converts force into measurable electrical output. A load cell consists of a metal core and a set of electrical resistances that transform when a force is applied to it. But after the force is removed, it returns to its original state. The reversibility of this material determines the quality and accuracy of the load cell. The equivalent electrical circuit of a load cell follows:

Fig. Load Cell

b. Node Mcu ESP8266

NodeMCU is an open source IoT platform.It includes firmware which runs on the ESP8266 Wi-Fi SoC from Espressif Systems, and hardware, which is based on the ESP-12 module. The term “NodeMCU” by default refers to the firmware rather than the dev kits. The firmware uses the Lua scripting language. It is based on the eLua project and built on the Espressif Non-OS SDK for ESP8266. It uses many opensource projects, such as Lua-cjson and spiffs. LUA based interactive firmware for Expressif ESP8622 Wi-Fi SoC, as well as an opensource hardware board that contrary to the $3 ESP8266 Wi-Fi modules includes a CP2102 TTL to USB chip for programming and debugging, is breadboard-friendly, and can simply be powered via its micro USB port. pressure sensor



b. Gas Sensor

Gas sensors are generally understood as providing a measurement of the concentration of some analyte of interest, such as CO, CO_2, NO_x, SO_2, without at this point dwelling on the plethora of underlying approaches such as optical absorption, electrical conductivity, electrochemical (EC), and catalytic bead (see Section 3). However, and as discussed in Section 2, many other gas sensors measure a physical property of the environment around them, such as simple temperature, pressure, flow, thermal conductivity, and specific heat, or more complex properties such as heating value, super compressibility, and octane number for gaseous fuels. The latter may require capital-intensive (engines) or destructive testing, for example, via combustion, or involve the measurement of a number of parameters to serve as inputs to a correlation with the complex property of interest.

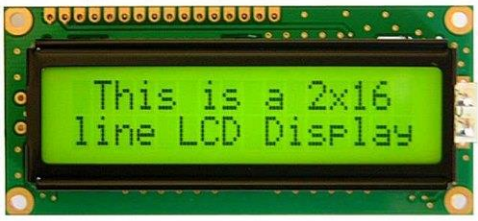
Gas Sensor

c. Buzzer

The buzzer is a sounding device that can convert audio signals into sound signals. It is usually powered by DC voltage. It is widely used in alarms, computers, printers and other electronic products as sound devices. It is mainly divided into piezoelectric buzzer and electromagnetic buzzer, represented by the letter "H" or "HA" in the circuit. According to different designs and uses, the buzzer can emit various sounds such as music, siren, buzzer, alarm, and electric bell.

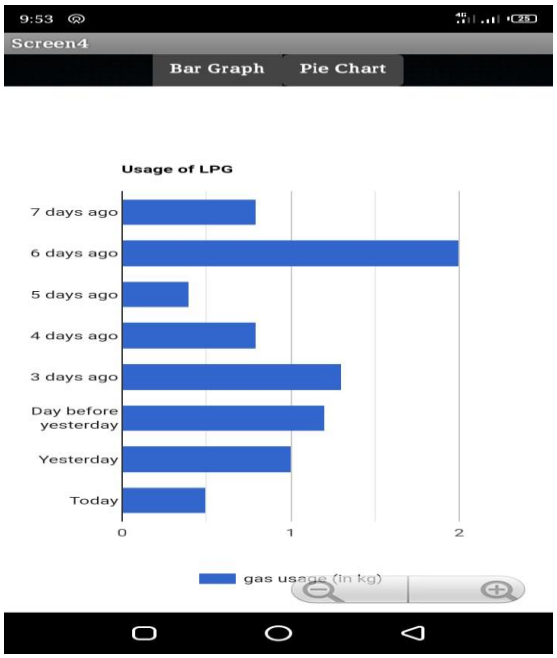
d. LCD Display

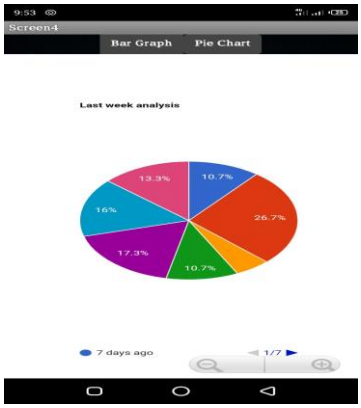
LCD (Liquid Crystal Display) is a type of flat panel display which uses liquid crystals in its primary form of operation. LEDs have a large and varying set of use cases for consumers and businesses, as they can be commonly found in smartphones, televisions, computer monitors and instrument panels.LCDs were a big leap in terms of the technology they replaced, which include light-emitting diode (LED) and gas-plasma displays. LCDs allowed displays to be much thinner than cathode ray tube (CRT) technology. LCDs consume much less power than LED and gas-display displays because they work on the principle of blocking light rather than emitting it. Where an LED **emits light, the liquid crystals in an LCD produces an image using a backlight.**



LCD DISPLAY

5. RESULT





7.CONCLUSIONS

In this paper we have two modules like hardware kit with all the security sensors like gas, load, Node UNO for monitoring the LPG cylinder time to time, the second module is android app when the users can register, login in to the application can check the values on app, and based on notification he/she can book the LPG cylinder from over app, end user will get SMS notification using in over hardware kit, to user mobile phone.

8 . REFERENCES

[1] SANDEEP.R et al. GAS LEVEL DETECTION AND AUTOMATIC BOOKING USING IOT , *5th International Conference on Advanced Computing and Communication System & 2019 (IEEE)*

[2] SHIVALINGESH.B.M et al, LPG DETECTION, MEASUREMENT AND BOOKING SYSTEM International Journal Of Research and Scientific Innovation & November 2014 (IEEE)

[3] RAGUNATH.S et al, IOT BASED LPG DETECTION AND INTERFACING WITH THINGSPEAK International Research Journal of Engineering and Technology (IRJET)

[4] NARESH NAIK et al, ARDUINO BASED LPG GAS MONITORING & AUTOMATIC CYLINDER BOOKING WITH ALERT SYSTEM IEEE, IOSR Journal of Electronics and Communication Engineering (IOSR-JECE) & (Jul-Aug .2016

[5] MEENAKSHI VIDYA P et al, Automatic LPG Booking, Leakage Detection And Real Time Gas Measurement Monitoring System International Journal of Engineering Research & Technology (IJERT), April – 2013

[6] *AUTOMATIC LPG IN CYLINDER MONITORING & BOOKING OVER ANDROID European Journal of Molecular & Clinical Medicine ISSN 2515-8260 Volume 7, Issue 4, 2020 (IEEE).*

[7] S.,Koushanfar, F., Kosterev, A., Tittel, F., "LaserSPECks: Laser SPECtroscopic Trace-Gas Sensor Networks - Sensor Integration and Applications", Information Processing in Sensor Networks, 2007. IPSN 2007. 6th International Symposium on, April 2007, p. 226 - 235, ISBN 978-1-59593-638.

[8] P. M. Vidya, S. Abinaya, G. G. Rajeswari, and N. Guna, "Automatic lpg leakage detection and hazard prevention for home security," in Proceeding of 5th National Conference on VLSI, Embedded and Communication & Networks on April, vol. 7, 2014.

[9] N. S. G. B. D. Jolhe and P. A. Potdukhe, "Automatic lpg booking, leakage detection and real time gas measurement monitoring system," International Journal of Engineering Research & Technology (IJERT), vol. 2, April-2013

[10] Mathivanan, S., K. M. Arunraja, and M. Viswanath. "Experimental Investigation on Aluminum Metal Matrix Composite." International Journal of Engineering Research & Technology, ISSN (2018): 2278-0181.

[11] Yasin, J., Selvakumar, S., Kumar, P. M., Sundaresan, R., & Arunraja, K. M. (2022). Experimental study of TiN, TiAlN and TiSiN coated high speed steel tool. Materials Today: Proceedings.

[12] Ponmurugan, M., M. Ravikumar, R. Selvendran, C. Merlin Medona, and K. M. Arunraja. "A review on energy conserving materials for passive cooling in buildings." Materials Today: Proceedings (2022).