

Automatic Gas Leakage Detection and Booking Based on Gas Level Using IOT

Dhananjaya M K¹, Kannan S², Arjun N³, Vaishnavi N⁴, Sahana T⁵

Assistant Professor, Department of CSE, R.R Institute of Technology, Bengaluru, India¹

BE Students, Department of CSE, R.R Institute of Technology, Bengaluru, India^{2,3,4,5}

ABSTRACT: Gas leakage is a major problem with industrial sector, residential premises and gas powered vehicles like CNG (compressed natural gas) buses, cars etc and this Problem has been the sole reason for many accidents in the past. 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 design and implement automatic gas accident prevention system that can automatically detect and stop gas leakage in vulnerable premises using MQ 6 gas sensor. In this particular gas sensor has been used which has high sensitivity to LPG and natural gases and it detects the leakage of gas if there is any leakage our system will automatically take the preventive measures to avoid fire accidents like turning off the gas supply by turning off the valve and removing the leaked gas from the premises. For extra precautionary method it turns off the main power supply of house. This system also consists of GSM (Global System for mobile communications) module, which alerts by sending SMS to the owner. 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.

KEYWORDS: LPG, GSM, Load Sensor, IoT

I INTRODUCTION

In daily life 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. With the rising demand for LPG, users have to be compelled to pre book their LPG cylinder a minimum of a month before the delivery of the new LPG cylinder. Most of the days, users find it difficult to figure out what quantity of LPG is left at intervals the cylinder and this causes tons of bother to them. In such a state of affairs, associate degree efficient technique to watch the amount of LPG within the cylinder is needed, so the users are tuned in to the LPG level at intervals the cylinder. This paper deals with the detection of the gas leakage and the level of gas in the cylinder and automatic booking of the new LPG cylinder. The sensor used in this has the high sensitivity and fast response time. The gas sensor detects other gases including cigarette smoke. When the gas is detected the output of the sensor is send to the Micro controller and the buzzer is turned on and when the weight measured using load sensor becomes critically low, the alert is send to the user and the new LPG cylinder is booked. The main application of this proposed system is to overcome the shortcomings such as delay and pre-booking of the LPG cylinder by the consumers.

Paper is organized as follows. Section II describes automatic gas leakage detection using morphological operations, connected component analysis and set of selection or rejection criteria. The method here is designed with various features which is implemented using Arduino -UNO and this device will be a single system with multiple applications for LPG consumers. Experimental results given in Section III. Section IV presents experimental results showing results of images tested. Finally, Section V presents conclusion.

II. RELATED WORK

Since the leakage of gas in the industries are unknown, the gas sensors are kept around the places where the gas leakage is possible. The information from these sensors are then send to the single system. The two techniques used are fixed instrumentation and mobile sensing. The mobile sensors are placed in the susceptible sources and the readings are evaluated in that spot. These readings are then transmitted to the users or workers through wireless connection. But the main drawback is that the localization accuracy is under 5m. Kumar Keshamoni and Sabbani Hemanth planned the sensible Gas Level observance, Booking and Gas outpouring Detector victimization IoT. During this the gas amount within the instrumentation is ceaselessly monitored and it additionally intimates the

various branch so as to position the new LPG cylinder. The Radio frequency module is used in order to make the user to use it easily and this module consists of the transmitter and receiver kit. The transmitter is an encoder kit which is fixed in the main board and the receiver is a decoder kit which is fixed in the sub board. In addition to easy usage, it also have the advantage that it gives the same information. The temperature sensor is also used in order to detect the errors which occurs due to the surrounding environment. The main drawback in this system is that the use of processor instead of the controller and moreover there is no security for the user.

The variation of resistance depends on the dopants of the polyaniline, like metal oxides, bimetal oxides (ceramics), etc. conduction, the variation of resistance of the sensing material is either by activity of atmospheric substance on the sensing surface and/or by direct reaction of lattice substance or gap substance with the check gases unit the gas sensing mechanism. throughout this the gas sensing behavior of polyaniline and polyaniline salt composites unit given.

III METHODOLOGY



FIG 3.1 Block Diagram of Arduino-UNO

The method here is designed with various features which is implemented using Arduino -UNO and this device will be a single system with multiple applications for LPG consumers. The device monitors the load if the gas level and displays it within the alphanumeric display incessantly. It also detects the gas leakage by gas sensor. This includes an additional feature of booking a new LPG cylinder when the gas level becomes critically low. Then this sends an alert to the registered mobile number by a SMS with the help of GSM module and the alert database are displayed in the system monitor.

The main basic Arduino-UNO microcontroller requires the power supply ranging can be either from an ac to dc adapter or battery. The Main platform we are using to build the project is Arduino-UNO Microcontroller which gives us the flexibility to write the code more effectively in convenient way. It also provides us features like Inexpensive, Cross platform, Simpler and clear programming environment, Open source and extensible software easy for beginners. Microcontrollers simply connect it to a computer with a USB cable or power it with a AC to-DC adapter or battery to get started. Another main component we are using in our project is use of Load cell. A load cell is a transducer that is used to convert a applied load (force) into electrical signal, which is used to measure weight of a LPG gas cylinder. In this project, Gas Sensor is use to detect the leakage of the LPG Gas (Methane & Propane) which converts one signal into other form of signal. The LM35 series IC (temperature IC) output which is linearly proportional to the Centigrade temperature. LCD (Liquid Crystal Display) is used to show the output results of Different sensor values. We are using GSM Modem for alert the user by sending SMS (Short Message Service) about Gas Leakage and LPG cylinder booking. GSM uses of time division multiple access (TDMA) and is the most widely used of the technologies (TDMA, GSM, and CDMA). 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.

IV EXPERIMENTAL RESULTS

Microcontroller (AT MEGA328)



FIG 4.1 AT MEGA328

The Arduino-UNO is a micro controller board based on the ATmega328. Arduino is open source, prototyping platform and its simplicity makes it ideal for hobbyists to use as well as professionals. The Arduino Uno has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Arduino Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega832 microcontroller chip programmed as a USB-to-serial converter.

MQ-6 Sensor

Gas sensor is a device which is used to sense gas leakage of its surroundings. The MQ6 gas sensor is highly sensitive to petroleum based gases and less sensitive to alcohol is carbon dioxide. MQ6 sensor works on basis of combustion process, and output is given in variable voltage form. It is analog so we have to convert it from A to D because AtMega328 is digital. So it is connected to port A.

Load Sensor

To book a cylinder from a wholesaler, we should know about the amount of gas present inside the cylinder. Hence, the amount of gas contained in the cylinder must to identify continuously. The load cell having required weighing ability for domestic cylinder is utilized and for assessment reason the weight sensor module is utilized together with the load cell. L6d weight sensor module is equipped in the system. The load cell yield drives a transfer circuit which offers two logical pulses (for ≤ 10 kg and ≤ 0.5 kg), which are correspondingly associated with micro-controller port pins to identify the level of the gas. Strain gauge is used in most of the load cells for the accurate measurement. The driving voltage if the load is about 5 to 10V. This is used to measure the weight of the cylinder. The accuracy rate is less than 0.1% of the full scale.



FIG 4.2 LOAD SENSOR

GSM

Weight sensor offers the gas level in cylinder, and micro-controller will take essential actions. The status of the cylinder should be passed on to the lawful owner of gadget or housemates by LCD display and GSM module. GSM module is helpful to send and get messages based on AT commands. These instructions used to control a modem interfacing it to the micro-controller. GSM/GPRS TTL modems SIM900 quadband GSM/GPRS device, works on frequency 850 MHZ,900HZ,800MHZ & 1900HZ.It is very compact in size & easy to use as plug in GSM Modem. The modem is designed with 3V3 and 5V DC TTL interfacing circuitry, which allows user to directly interface with 5V microcontrollers as well as 3V3microcontrollers.

LCD

LCD include some microwatts for show compared to some mill watts. Liquid crystal display could be a combination of 2 states of matter, the solid and therefore the liquid. Liquid is employed to provide a comprehensible image in liquid crystal display. The liquid crystal display works on the principle of obstruction lightweight. When compared to LED and cathode ray tube, LCD is thinner. Blocking light principle is used for the working of LCD. This is used to display the weight of the gasoline content.

PC Monitor

A personal computer (PC) is a multipurpose computer whose size, capabilities, and price make it feasible for individual use. PCs are intended to be operated directly by an end user, rather than by a computer expert or technician. Computer timesharing models that were typically used with larger, more expensive minicomputer and main frame systems, to enable them be used by many people at the same time, are not used with PCs.

Gas valve

A valve is a device that regulates, directs or controls the flow of a fluid (gases, liquids, fluidized solids, or slurries) by opening, closing, or partially obstructing various passageways. Valves are technically fittings, but are usually discussed as a separate category. In an open valve, fluid flows in a direction from higher pressure to lower pressure.

VRESULTS

Through this paper we have used automatic gas booking with alert system without human intervention. Our system helps customers to upgrade their safety and protect life and property from reputed accidents. The main objective of our system is to measure the gas present in cylinder when the weight of cylinder is below the fixed load by using weight sensor. The gas agency gets the order of new cylinder and owner received the messages regarding the status .Thus the system developed by us will somehow help the LPG Gas consumer to lead a safety life and comfortable life.



VI CONCLUSION

Through this paper we have used automatic gas booking with alert system without human intervention. Our system helps customers to upgrade their safety and protect life and property from reputed accidents. The main objective of our system is to measure the gas present in cylinder when the weight of cylinder is below the fixed load by using weight sensor. The gas agency gets the order of new cylinder and owner received the messages regarding the status. Thus the system developed by us will somehow help the LPG Gas consumer to lead a safety life and comfortable life. Hence this concept can also be widely used in the industries according to their requirements.

Voice feedback system can be included in GSM based LPG weight and LPG leakage detection system. User will get intimation through pre-recorded voice messages like the weight of gas Cylinder in kgs.

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