RESEARCH ARTICLE   OPEN ACCESS

AUTOMATIC GAS BOOKING SYSTEM USING INTERNET OF THINGS

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Abstract:

Gas Booking is a major requirement in every individual life. The need of this project is to save time while booking the gas. When we call to the gas distributor call may not be connected. In this project the level of gas will be monitored at all the time and we get message when gas is about to complete. In this project we would like to advocate a micro-controller-based system in which we use weight sensor, and load cell. This unit is integrated into an alarm unit supply a visual indication when the LPG is completed. If gas completion is identified, message to the lawful candidate or family member will be sent. Amount of gas less than or equivalent to 10kg the cylinder is booked mechanically by sending textual content message to a provider. Additionally, when the cylinder has a weight of 0.5kg or less, it alerts the lawful candidate by sending a notification to refill the cylinder.

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I.   INTRODUCTION

The need of this project is to save time while booking the gas. When we call to the gas distributor our request may not be recorded or call may not be connected. These all waste the person time. If we haven't noticed the completion of gas we need to book it in black for more money. By this project the level of gas will be monitored at all the time and we get message when gas is about to complete.It includes micro-controller (ATMEGA 16A), weight sensor (Load Mobile-L6D), gas sensor, GSM module (SIMCOM300), and display(s). Internet of things stage takes an essential role around the prevention to the human life. LPG is a flammable gas, which is basically connected to the family unit and cooking hotel management situations. The greatest part of the mankind in our country uses Liquefied Petroleum Gas is used as burnable for cooking purpose. The alarming framework can obstinately decide the discharge of gas with the records of the sensors. This method can be an initiative for the public administration about the

state before the danger occurs through a message. Using the GSM the people are alert by the message when the gas is leaked or get to empty. Internet of things based Gas leakage Recognition Framework, Expectation and Smart Cautioning will recognize gas leakage using MQ5 gas sensor, which is used for recognizing LPG, flammable gas oil, vaporous oil, town gas, and keep up a vital separation from the spread of alcohol and cooking vapor and smoke. In order of extension it also alerts the gas distributor and consumer of the gas.

II. LIQUIFIED PETROLEUM GAS

Auto gasoline has a volatile problem of 1.8 and 9.5 percentage container of gasoline in form of air. This is all together smaller than other regular vaporous powers. Gas in addition with other oil different can be joined with sustainable power sources to give more eminence resolute quality while as yet achieving some decrease in CO2 transmission. Gas vapors can keep functioning for long partings along the ground and can gather in the Channel or Cylinder can ignite whenever engaged in a fire. The

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state of hazardous gas can make cool ingests the skin and it can go about as an insentience at high concentrations [10] Discontinuity cause a negative impact to the state of being with the end goal that the hydrocarbons and different man-made mixtures of the Gas causes long rest. It likewise causes anxious respiratory tract, nostril and eyes power.

III.   PROBLEM STATEMENT

To explore Gasoline leakage and alerting the people about the leakage who are located away and remote location through this system analyses by oil institutions found that various LPG consumers are unfamiliar of security checks of gasoline chambers [10] .Another reason is unauthorized filling of gasoline barrel likewise causes misadventures. There is a need for an agenda to detect and additionally avoid leakage of LPG.

- To detect the exploration of LPG.
- To check the weight of the gasoline in cylinder.
- To send normal message alert to related person.
- To request the gasoline distributor for another cylinder.

RELATED WORKS

a) "IOT BASED SMART GAS MANAGEMSony Shrestha 1, V. P. Krishna Anne 2, R. Chaitanya3 1, 20, 3Department of CSE, Koneru Lakshmaiah Education Foundation, Vaddeswaram, AP, IndiaENT SYSTEM"

CONTENT: The problem of gas leakage and intensity is frequently come upon in our day-to-day life. Liquefied Petroleum Gas is highly flammable gas used as fuel in heating appliances. Leakage of this gasoline increases the risk of catching fire, blockage or a burst. The mentioned problem can be solved with the advancement of trustworthy techniques to detect gasoline and flammable gas leakage. Once gas leakage is detected, consumer will be alerted via mobile SMS and phone call so that the related person/consumer can switch off gas regulator from anywhere in their work place or wherever they are. The issue of flame and fire at kitchen and cooking place can be supervised with the help of fire sensor. The buzzer starts beeping whenever fire is sensed. In addition to these, it is frequently found that a person be unable to remember to book gasoline cylinder due to his/her tiring program. The main objective of this paper is to design an IOT based Smart Gas Management System that will be able to detect gasoline and flammable explosion and fire. With the help of load sensor, automatic booking of a gas cylinder is also facilitated. Notification message alert is sent to the booking agency/gasoline distributor to book a gasoline cylinder whenever load cell detects that the weight of gas cylinder has reached below a threshold value. At the same time, user will be notified about gas cylinder going empty.

b) "GAS LEVEL DETECTION AND AUTOMATIC BOOKING USING IOT" Tamizharasan.V, Ravichandran.T, Sowndariya.M, Department of Electronics and Communication Engineering SNS College of Technology Coimbatore, India.

CONTENT: LPG is commonly used for cooking in many countries for economic causes, for simplified accessibility or due to the preference of fuel source. This paper targets on the usage of the IOT which is used for computing and indicating the gasoline content present in domestic LPG cylinder and in hotels and this is helpful in automatic booking of new LPG cylinder to the distributor and also detect the gas leakage. Customarily the capacity of LPG in Cylinder is not resolute, so we are going to demonstrate the level of LPG. The level of LPG is supervised using load sensor (SEN-10245). The output of the load sensor is connected with Arduino R3 board. By use of GSM Module, the records are sent to user by SMS (short messaging service) and also automatic booking is done by dialing the registered gasoline booking number. Then the gasoline leakage is detected by gas sensor (MQ-6). With this technique, we can monitor the level of LPG and it is constantly displayed on the LCD. We can see the weight of LPG usage from the date of

fixation. By use of IOT the authorized consumer is notified by sending the message to their mobile phone when the LPG level is below the threshold level (below 20%). Automatic booking of new LPG by auto dialing of gas booking number/distributor and by this we avoid pre-booking and late booking. Then by become aware of the gasoline leakage we can preclude the LPG gas burst accidents in the home environment, industries and hotels.

c) "HAZARDOUS GAS DETECTION AND NOTIFICATION SYSTEM ", Maribelle JUALAYBA, Kristian REGIO, Harold QUIOZON, Adrian DESTREZA Technological University of the Philippines.

CONTENT: Menacing gases like propane and methane are ignitable and could cause detonation if cramped in a close room. The reading characterized in this paper embraces a technique that involves detection and report of menacing gases present in a zone. The system has three types of sensors; the hydrogen sensor, Liquefied Petroleum Gas (LPG) sensor, and methane sensor that serve as switches with different set-points. Each level of gas is detected and sent to the Arduino that functions as the controller to evaluate the level of gas present. The controller is also in charge for triggering the lamp, exhaust fan, buzzer, Liquid Crystal Display (LCD) monitor and Global System Mobile (GSM) module. The system of detection has three bedside lamps that indicate the level of gas being detected. Green light means "safe level", yellow light means "medium level", and red light for "danger level". The buzzer is activated as the controller detects danger level which is synchronized with the lighting of the red light. The LCD monitor displays the level of gas being detected and the GSM module sends Short Message Service (SMS) as notification to concern people. The system was tested and is capable of detecting LPG, methane gas and hydrogen gas with a maximum distance of 50, 30 and 30 inches, respectively.

d) "IOT Based Industrial Plant Safety Gas Leakage Detection System "Ravi Kishore Kodali, Greeshma, R.N.V. , Kusuma Priya

Nimmanapalli , Yatish Krishna Yogi Borra , Department of ECE National Institute of Technology, Warangal WARANGAL, INDIA .

Most of the burst-explosives in industries are due to gas outflows. These cause horrible destruction to the equipment, human life becoming reason to injuries, deaths, and environment hazards. Currently available leakage detectors alert the people around using on-site alarms. So, this project proposes a leakage detector which sends the alert message to the concerned people through SMS. This leakage detector senses the presence of harmful gases particularly, LPG, Methane and Benzene. LPG and Methane gases are easily combustible. Benzene is carcinogen affecting the health of workers and people around it, if inhaled in higher absorptions. This low cost project includes MQ6, MQ4 and MQ135 gas sensors which detect flammable gases and uses ESP-32 as a Wi-Fi module. The absorption levels of the gases are uploaded in the UBIDOTS cloud and the login details are contained within the warning message. The pattern of the proposed system creates a sound alarm to alert using buzzer on recognition of a perilous leakage and sends an SMS to the concerned person using IFTTT web service. Different color LEDS are used to specify the gas leakages.

e) "Compact open-path detection of N2O gas with low concentration of ppb level based on QCL", Byoung-Uk Sohn, Peng Xing and Dawn T. H. Tan* Photonic Devices and Systems Group, Singapore University of Technology and Design 8 Somapah Rd. Singapore 487372, Singapore .

CONTENT: In this we measured nitrous oxide (N2O) gas as low as 2ppb employing a multi-pass gas cell (MPGC) with a path length of 10metre. The quantum cascade laser (QCL) was scanned within the range from 4529.4nm to 4531nm having the strongest linear absorption cross-section of area 67·10sq.cm to 18 sq.cm, where the spectral absorption region of CO and CO2 is evaded. The immersion levels at spectral lines of 4529.80nm and

4530.22nm were dignified to demonstrate a relation with distinction of absorption of N2O. This strategy may be employed in low power of laser with a limit of power detector using linear absorption spectacles.

A. PROPOSED METHOD

The automatic Gas booking system continuously monitors the weight of the gas in cylinder.When the weight of the gas falls below the threshold value i.e. 10k.g, a logic high pulse is fed to a port pin of microcontroller. As this pin goes high, microcontroller will send a booking message to distributor through IOT. When the weight of the gas goes below 0.5 kg another logic high pulse is fed to another port of microcontroller through a relay circuit as discussed in truth table. As this port pin goes high, microcontroller will send an alert message through a GSM module to cell numbers of the required members and to the gas agency.
System of automatic gas booking using IOT
Fig (a) represents the block diagram of automatic gas booking system.
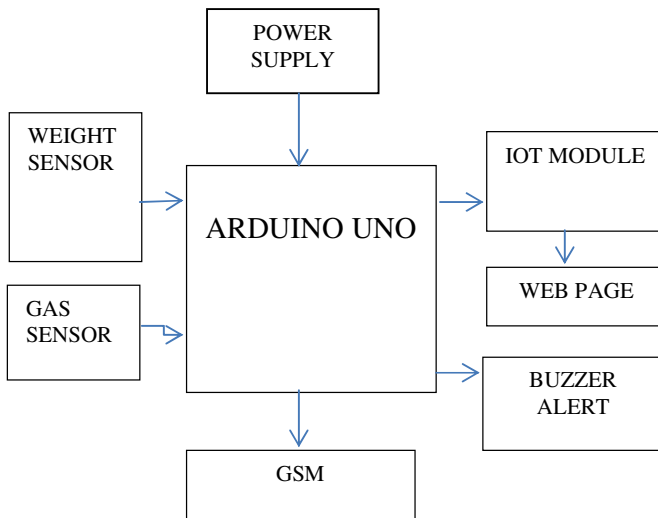
OPERATING MODULES

1. ARDUINO UNO

Arduino UNO is a microcontroller board for the ATMEGA 328P microchip, which a type of single chip microcontroller. It composes of 14 digital and analog input and output pins that are connected to many other circuits or boards.

FEATURES:
- Can be operated in 5V.
- The allowed input range is 7V-12V.
- Number of input pins is 6- Analog pins.
- Number of input/output pins is 14- Digital.
- SRAM -2KB.
- EEPROM-1KB.
- CLK speed – 16MHz.

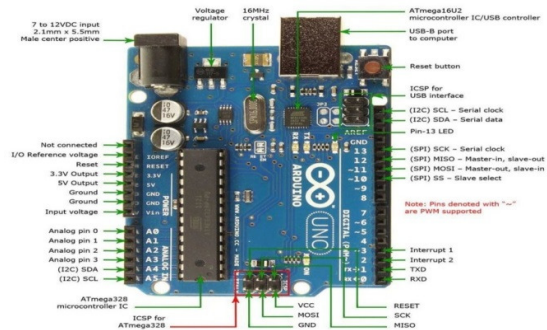Fig (b) represents the Arduino UNO board pin configuration.

Fig (b) Arduino UNO board pin configuration.

1. MQ-6 GAS SENSOR:

Gas sensor is a gas detecting device is used to detect the occurrence of toxic or flammable gas in a particular predefined area. MQ-6 type gas sensor detects the spread level of gas wherever from the range of 200ppm – 10000 ppm. This is high sensitive and fast reactive in time.

Some types of Gas sensors and their measure of gas

TYPE OF SENSOR	MEASURE OF GAS
MQ – 2	LPG, Methane, Smoke, Butane.
MQ – 3	Alcohol, Ethanol, Smoke.
MQ – 4	Methane, CNG.
MQ – 5	Natural gas, LPG.
MQ – 6	LPG, Butane.
MQ - 7	CO.
MQ – 8	Hydrogen gas.
MQ – 9	CO, Flammable gas.
MQ – 131	Ozone.

Fig (c) represents the structure of Gas sensor.

Fig (c) MQ-6 Gas sensor

2. BUZZER:

Buzzer is an electromechanical, electromagnetic, electro-acoustic or piezo electric audio alerting/alarming device. Here in this project we use piezo-electric buzzer, which beeps or alerts the people around it with sound frequency of 2 – 4 kHz and it works within the electric range of 3 - 12 Volts DC.

Application of Piezo-electric buzzer:
- Used in Electronic metronomes.
- Can be used in Household appliances.
- Handy sound generator used in electronic circuits.

3. GSM:

GSM (Global System for Mobile communication) is a digitalized mobile network. It is an open digital technology used for communication. It used TDMA narrow band to transmit data/signal. In our project, we use GSM to send message to the gasoline consumer and distributor when the weight is decreased, and when the gas is detected as leaking, to send message to the consumer/authorized person. Fig (d) represents the configured structure of GSM modem.

Fig (d) GSM Modem

Features of GSM:
- It supports new network services.
- Allows international roaming network without any interference or distortion.
- It provides Fixed Dialling Number (FDN).
- Operated in range 850/900/1800/1900 MHz

4. WEIGHT SENSOR:

The weight sensor is a kind of transducer, precisely a power transducer. It transforms forces such as tension, compression, pressure, or torque into an electrical signal that can be measured and standardized. As the force applied to the load cell increases, the electrical signal changes proportionally. The most common types of load cell used are hydraulic, pneumatic, and strain gauge.

Fig (e) represents the image of Weight sensor.

Fig (e) Weight sensor

5. IOT MODULE:

A system of interrelated computing device. It comprise of sensor/ modules which connects to the cloud. When the content of data/information is transferred to the cloud then the software designed in the cloud makes them into action/process similarly alerting the people by sending SMS or any other alerting technique. It doesn't require internet because it also works in presence of WIFI connection.
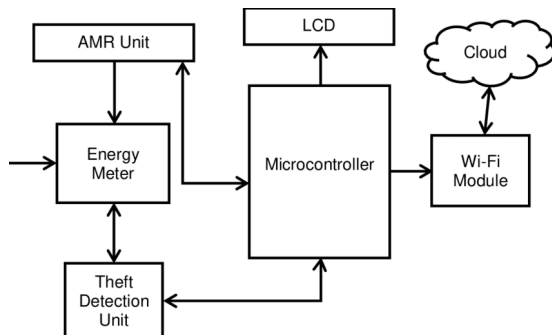
Fig (f) represents the block diagram of IOT.

Fig (f) Block diagram of IOT

The above block diagram clearly explains how it works.

Fig (g) represents the configuration figure of the IOT Module.
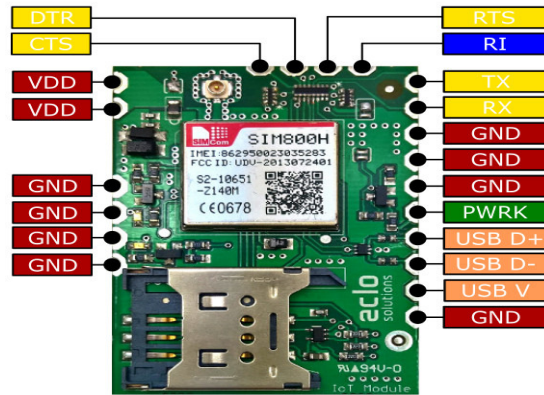
Fig (g) Configuration of IOT Module

CIRCUIT CONNECTION OF WORK MODEL:

The following figure (h) provides the clear representation of circuit connection of our project module of Automatic gas booking system using IOT.
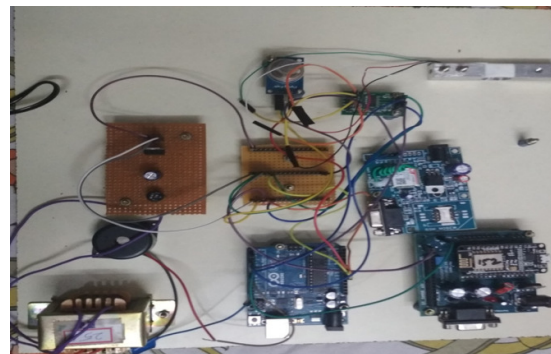

Fig (h) Overall Circuit connection of Automatic Gas booking system using IOT

SOFTWARE MODULE:

The software module for our project is done with Embedded C and Arduino IDE.

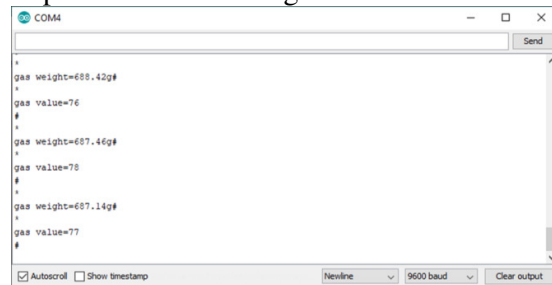Fig (i) represents the Value logs of our implementation of weight sensor.

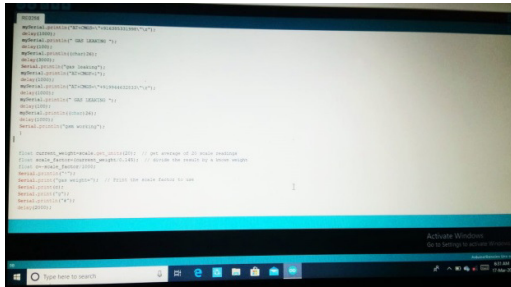Fig (i) Value logs of the Gas cylinder

SOURCE CODE:

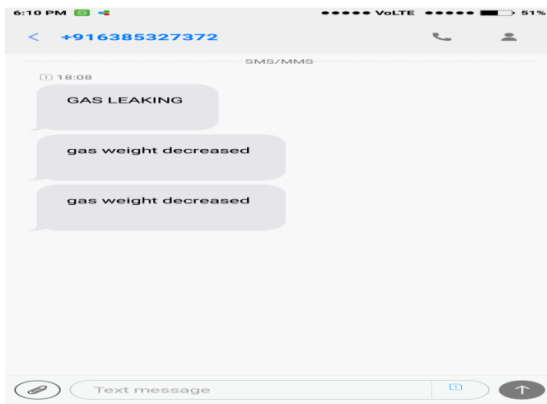Fig (j) code in Arduino

OUTPUT:
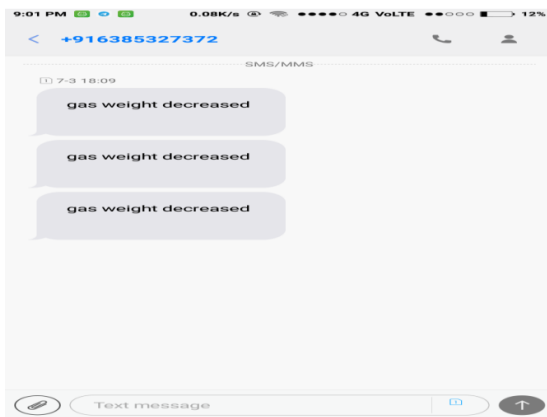

Fig (k) Message to authorised person

Fig (l) Message to gasoline distributor

Fig (k) and (l) Represents the output that the message had been sent for Authorised person and Gasoline distributor about gas leakage and about weight of gas.

IV.   CONCLUSIONS

The developed model saves the time and saves from hazardous gas leakage. It also reduces the manual work of booking gas to distributor. It alerts the gas leakage through buzzer and alert message to respective person and the gas distributor. When compared to others work, it reduces the manual work and it saves the precious time of people.

REFERENCES

1. Tamizharasan.V, Ravichandran.T, Sowndariya.M, Sandeep.R , Saravanavel, gas level detection and automatic booking using IOT International Conference on Advanced Computing & Communication Systems (ICACCS) 2019 5th.

2. G. B. C. V. K. G. S. V. H., B. N. V. Abhishek, P. Bharath, "Automation of LPG cylinder booking and leakage monitoring system," International Journal of Combined Research and Development (IJCRD), pp. 693–695, 2016.

3. Fraiwan, Luay, Khaldon Lweesy, Aya Bani-Salma, and Nour Mani. "A wireless home safety gas leakage detection system." In Biomedical Engineering (MECBME), 2011 1st Middle East Conference on, pp. 11-14. IEEE, 2011.

4. Lopes dos Santos P; Azevedo-Perdicoúlis, T.- P.; Ramos, J.A.; Jank, G.; Martins de Carvalho, J.L.; Milhinhos, J., "Gas pipelines LPV modelling and Identification for leakage detection", Proc. of American Control Conference, pp. 1211-1216, 2010.

5. National Research Council (US). Committee for Pipelines, Public Safety, Scoping Study on the Feasibility of Developing Risk-Informed Land Use Guidance near Existing, and Future Transmission Pipelines. Transmission Pipelines and Land Use: A Risk-informed Approach. Vol. 281. Transportation Research Board, 2004.

6. K. M. c. Chet Sandber, Jim Holmes and H. koppitsch, "The application of a continuous leak detection system to

pipelines and associated equipment", IEEE Transactions on Industry Applications, Vol. 25, 2018.

7. S. K. K. T. K. R. R.Naresh Nuke, P.Siva Nagendra Reddy, "Arduino based LPG gas monitoring, automatic cylinder booking with alert system," IOSR Journal of Electronics and Communication Engineering (IOSR-JECE), Vol. 11, 2016.

8. S. K. D. P. S. R. Abid Khan, Neju K. Prince, "GSM based automatic LPG ordering system with leakage alert" IJRET, Vol. 3, 2014.

9. A. Gupta, "LPG leakage detector and auto shut-off system using Arduino UNO ATmega328,"International Journal of Innovative Research in Science, Engineering and Technology, Vol. 6, 2017.

10. A. M. B. Denis Spirjakin, "Internet connected wireless combustible gas monitoring system for apartment buildings," Proceedings of the Conference on Computer Science and Information Systems, Vol. 11, 2018

11. V. Pruthvi M.R, "Centralized LPG cylinders theft detection system with security alerts,"

12. International Journal of Computer Science and Information Technology Research 8, vol. 4, 2016.

13. P. K. P. Avinash M, Sathwik Rai M.S, "Smart home for elder care,"IJARCET, vol. 6, 2017.

14. C. M. Raju and N. S. Rani, "An android based automatic gas detection and indication robot," International Journal of Computer Engineering and Applications, Vol. 8, 2014.