GAS LEVEL DETECTION AND AUTOMATIC BOOKING NOTIFICATION USING IOT

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Abstract - IOT based gas level detection and automatic booking notification. Now a day's LPG is a major cooking fuel as it is cost effective also. So, it is the most preferred fuel source. LPG cylinder has to be pre-booked every time. This booking process is not much efficient nowadays, because users of LPG have increasing day by day. Due to large pool of requests every day the system cannot record every request and serve. This project cares about this issue and gives additional effectiveness to it. As this project monitor's the gas level in the cylinder and if the gas level is lesser than certain level then it automatically sends a notification to both user and the gas agency using mobile network. This project uses microcontroller-based system in which a weight sensor or load sensor are used to find the gas level in the cylinder. This reading is passed to LCD module to show the gas content in the cylinder. If the gas level is less than the fixed value then GSM module sends the notification to the mobile and also informs the gas agency to record the booking on confirmation with customer. This project also ensures safety near the cylinder by detecting if any gas leakage and if any fire occurs. If any of these detected a buzzer will ring and also an exhaust fan will be turned on. The user will also be notified regarding this.

Keywords: IOT, Gas level Detection, LCD module, GSM Module, Weight Sensor

I. INTRODUCTION

The project IOT-based gas level detection and automatic booking notification was proposed to save the time and lives of the people. LPGis a byproduct in the extraction of petroleum. LPGis used in differentfields as a fuel. Like in cooking, welding, etc., LPG usage is increasingsteeplyday by day.Now-a-days bookingan LPG cylinder is an uncertain process. When we make a call to gas agency our call may not be connected or booking cannot be recorded. This creates more doubts in people's mind. If we noticed well before the completion of gas, we don't need to buy in black which save money. If any gas leakagedetects or firewe have given a buzzer sound with a notification to the mobile and exhaust fan will be turned on.

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II. PROBLEM SOURCE

Gas cylinder in home for cookingcan be empty all of sudden. This creates lot of problems if there is no extra cylinder at home. At that time booking for cylinder and getting confirmation from gas agency will take days of time. So to monitor the LPG level in the cylinderand getting notified is necessary. So this project is designed for the same. This project also sends booking notification to gas agency directly with the customer ID. So the booking for new will be done automatically before completion of existing LPG cylinder. And this project also notifies the user on any gas leakage and fire detection near the cylinder and gives buzzer sound with turning the exhaust fan on. Gas leakage leads to various problems like capital loss and as well as human lives.

III. RELATED WORK

The Load cell is used everywhere for weighing the products and to get the electrical input to the microcontroller [1,2]. Load cells are used in several measuring, instruments like laboratory balances, platform scales, industrial scales, universal testing machines etc., Then on in all the weighing projects load cell is being used to calculate the weight of the component and using those electrical signals input is fed to microcontroller. MQ-4 gas sensor is one of the types of gas sensors. Specific gas sensor will be made to detecting a specific type of gas. For example, MQ-2 is for measuring Methane, Butane, LPG and Smoke. Likewise, for measuring different types of gases different types of sensor are used. Some types of sensors are metaloxide based, optical, Electrochemical etc., Proposed project and related projects will use MQ-4 because of low cost compared to others and specific to gas [3]. Different gas sensors manufacturing processes have different things used in different quantities likesemiconductors and properties like Oxidation, catalytic, photo ionization, infraredetc., LM -335 temperature sensor is also one of the types of Temperature sensors. Every temperature sensor will have different boundary values for temperatures. Like LM-335 has -40°c to 100°c. Every Temperature sensor will have specific property apart from others.

Disadvantages of Existing System

The major drawbacks of existing systems are:

1. It takes long time to getresponsefrom gas agencies.
2. So the LPG providence to the customer will be delayed.
3. Long time of response even after gas leakage detectiondue tono intimation.
4. No initial precaution for fire detection. Due to fire accidents more capital loss and life loss will happen.

IV. COMPONENTS AND ITS DESCRIPTION

- Arduino UNO (microcontroller)
- Load cell
- MQ-4 gas sensor
- LM -335 temperature sensor
- GSM module
- LCD Display
- Alarm buzzer

Arduino UNO (microcontroller)

Arduino is a type of microcontroller used to read the input from surrounding environment using sensors and generates the output signals based on the code fed to it [4].
It can accept the inputs from different sensors like touch sensor, Light sensor, Gas sensor, etc., And the output can be detected by different ways like LED's, communication modules like GSM etc.,

GSM Module

GSM stands for Global System for Mobile Communication. GSM Modules are commonly used communication modules in embedded systems [5].GSMModule is used to do communication between a microcontroller and the Mobile Network. It will have a Mobile network SIMcard in it. Though that mobile network it will communicate the message to users and gas agencies. Make sure the specific mobile network used in it has good amount of signal strength at that area.

Sensors

Sensors [6] are used to detect or measure a physical property and records, indicate, or otherwise respond to it. In this work three types of sensors namely fire sensor (LM-335 temperature), gas sensor(MQ-4 gas sensor), weight sensor (load cell)are used.

Fire sensor (LM-335 temperature)

LM335 [7] is a low-cost temperature sensor and gives highly accurate results. Itsoperationis like a two terminal Zener diode. Itstemperature detectionrange is -40 degree Celsius to 100 degree Celsius. It can be used in HVAC, home appliances, power supplies etc. In this project it is used to detect the fire occurrencearound the cylinderarea and should pass the electrical input to microcontroller as input.

Gas sensor(MQ-4 gas sensor) :

MQ-4 gas sensor [8] has high sensitivity to Methane, also to Propane and Butane. This sensorcan be used to detect different combustible gasses, especially methane. It isa low cost sensor and suitable for different applications. In this project it is used to detect the LPG leakage from cylinder and should pass the electrical input to microcontroller as input.

Weight sensor(Load cell) :

Load cell [9] is also known as weight sensor. It is used to weigh the LPG in the cylinder. It is a sensor or a transducer that converts a load or force acting on it into an electronic

signal. This electronic signal can be a voltage change, current change or frequency change depends on circuitry used. It monitors the LPG level in the cylinder and if the LPG is less than the fixed level then it will pass the respective signal to the microcontroller as an input.

V. PROPOSED WORK

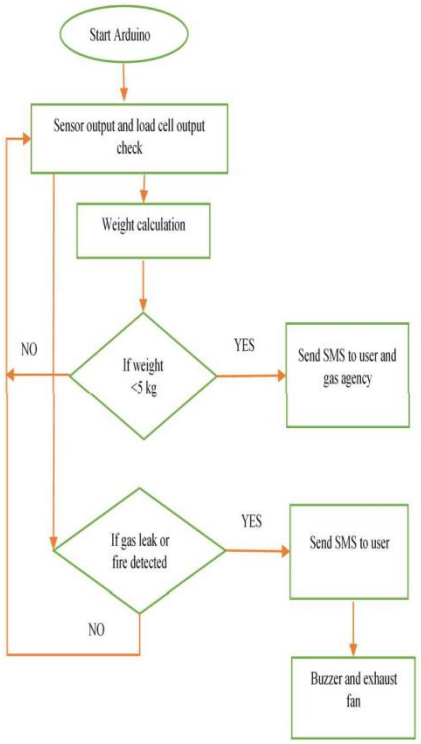

Fig. 1 Flow Diagaram of Proposed Work

In gas level detection and automatic booking notification system, load cell regularly checks the weight of LPG in the cylinder and sends the information about weightto Arduino Uno.Every time the new input arrives microcontroller will process the input and checks the conditions given in the code fed to it by substituting input. And also the weight will displayed on the LED display. If the weight of LPG is less than 5kg then the microcontroller will invoke GSM module to communicate this message to user and also to gas agency for booking LPG on the given customer ID. MQ-4 gas sensor will detect the leakage of LPG. If any leakage is detected then the input signal will be given to microcontroller. Then microcontroller invoke GSM module to communicate gas leakage message to user mobile and also invokes the alarm buzzer. Like the same if at all any fire detected around the cylinder area then LM-335 temperaturesensor will send the input signal to microcontroller and microcontroller makes GSM module to communicate the fire detection message to user mobile and also invokes alarm buzzer and turns the exhaust fan on.

VI. EXPERIMENTAL SETUP

Fig 2. Experimental Setup

The above picture depicts the components used in the proposed project. The big module available at bottom-right corner is load cell and it is for measuring the LPG level. The module present at the top center is microcontroller. LCD display is to display the current LPG weight. MQ-4 gas sensor is for detecting gas leakage and LM -335 temperature sensor is for detecting fire. If any of these sensors detects gas or fire then buzzer will ring. And if fire is detected then exhaust fan will be turned on.

VII. RESULTS AND DISCUSSION

TABLE I:LPG LEVEL

INPUT	OUTPUT
Weight >5 KG	---
Weight <5 KG	**User will get a message** " your gas level is less then 5 Kg. Please pre-book LPG. ". **Gas agency message** "customer id: 994378 Gas level: less then 5 kg Register mobile no: 8975357984 Contact above number to confirm the booking."

TABLE II: GAS LEAKAGE:

INPUT	OUTPUT
Gas leakage detected	**User will get a message** "Gas leakage detected in your gas cylinder area".
Gas leakage not detected	----

TABLE III: FIRE DETECTION

INPUT	OUTPUT
Fire detected	**User will get a message** "Fire detected in your gas cylinder area".
Fire not detected	**----**

VIII. CONCLUSION AND FUTURE SCOPE

As we sorted out the problems faced by LPG gas consumers, we come up with some solutions to meet the few requirements of them. We made our systemcompletely automatic booking system. Whenever the gas level is less than 5 kg, then automatically a message will besent to user and the gas agency for booking of the LPG. The cost of the proposed system is less thanthe price of fuel detectors in the present society. The proposed system not only monitors gas level but also ensures the safety. By detecting gas leakage and fire occurrence, the proposed system is can be further developed. A mobile application can be created for controlling and monitoring the weight of the LPG cylinder. The water mist system can be used whenever fire accident happens, at the same time proposed system can send the GPS location of fire accident to the fire station as an emergency. When a gas leakage is detected in a smart home then the proposed system can open windows and doors automatically to release the gas out.

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