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LPG gas leakage and weight detection and automatic booking using embedded system

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ABSTRACT

Today embedded system has been rapid development in technology which has made human life easier in several aspects. LPG is a need of every household for domestic requirement but many accidents happening every day due to domestic gas leakage, so it should be used carefully. As safety is the most important factor, the LPG monitoring and gas leakage detection system is proposed. The status of gas level in gas cylinder needs to be maintained at minimum level to avoid interrupts in domestically usage, which leads to situation of high stress for house managing people, therefore alerting system and automated gas cylinder booking system are adopted for avoiding above situation. This will ensure uninterrupted gas usage in houses. The other problem is safety, which is ensured by LPG leakage detection and smart control system at different point ensures the maximum safety inside the house. The project includes automated booking of LPG cylinder and leakage detection with smart control system overcome safety and interrupt of gas supply problem efficiency.

INTRODUCTION

Technologyhas not merely established our lives simpler, but also offers a high level of safety and security wherever required. Technological devices area unit on the market that provides refuge for all the world. In our daily lives, we all use cooking fuel for cooking our daily meals, but if this fuel gets leaked due to some or the other way and then there's an outsized change of a tragedy to occur around. Hazards because of gas leak area unit dangerous will cause loss of consciousness or may be death. Overall health of an individual is badly affected inflicting symptom, fatigue, nausea, headache, irregular breathing. If timely actions are not taken then there is possibility of fire which can damage property and contents sometimes a human loss may take place. Also, the fulminant completion of LPG cylinder is additionally drag associated with LPG that creates inconvenience in our existence. Several standards are enforced for the gas leak detection system. There are a unit several existing systems which may sight leak victimization totally different gas sensors. Developed systems have used Arduino UNO, MQ-2 gas sensor, and some other components. For automatic cylinder booking there is an existing system that goes booking using Bluetooth.

Systems developed till date has either a gas detection module or automatic cylinder booking module. We have developed a prototype which is having both the features that are of leakage and weight detection and gas booking. The main objective of this project is to monitor for LPG leakage to avoid major fire accidents and also provides safety, and sending SMS to the user about cylinder requirement.

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PROBLEM INDENTIFICATION

To develop a system which continuously monitoring the leakage of LPG gas and alerts the user regarding the leakage to avoid major accidents. If temperature reaches threshold value, then it will detect fire and takes necessary actions like opening window and turning on the exhaust fan. In addition to leakage detection feature is sending SMS to the user for the book of cylinder is added. System continuously measures the weight of cylinder and sends SMS if weight is below threshold value.

PROPOSED SYSTEM

Proposed System overcomes the shortcomings of existing system. Idea focuses on providing functionalities like detecting gas leakage and weight alert to informing user if there is possibility of leakage and current status of the gas.

FLOW OF WORKING

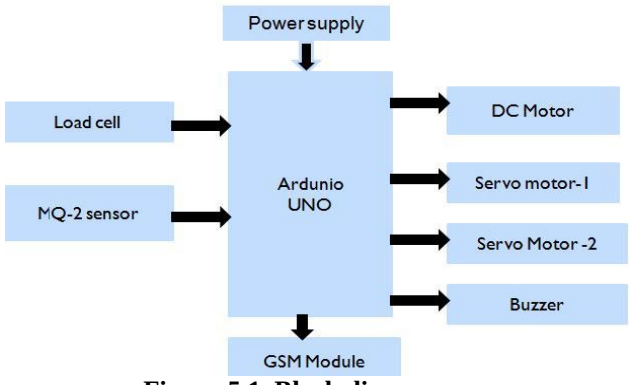

Figure-5.1. Block diagram

Figure shown in 5.1The operating of any advanced system is especially obsessed on the microcontroller that controls the whole functioning of the device. In this case the Arduino Uno microcontroller acts sort of a conditional switch. It performs 2 set of action relying upon the condition gift. It triggers the buzzer and also the LCD show digital display alphanumeric display to display the message “Gas Leak” once the leak of the gas is detected by the device. The other action is to show the message on alphanumeric display “No Gas Leak” once the leak of the gas isn't detected by the device. If the sensor detects the presence the gas in the vicinity the GSM module will send “Gas Leak” and “weight of gas” alert message to the relevant contacts. If no gas is detected by the device within the section then the GSM module won't send any messages. Bluetooth Module is enclosed during this device to create the stakeholder’s privy to the leak of gas going down at their house in their absence in order that necessary actions are often enforced forthwith to stop associate in nursing accident.

IMPLEMENTATION

Proposed example provides a device that is principally meant to sight a Gas leak within the house and business premises. The objective of the system is to unceasingly live the burden of the cylinder and as shortly because it reaches the minimum threshold it'll mechanically.

Sends an SMS alert to the user moreover as approved. System conjointly provides feature like gap windows victimization DCmotor and turning on fan victimization servo motor

Flow chart

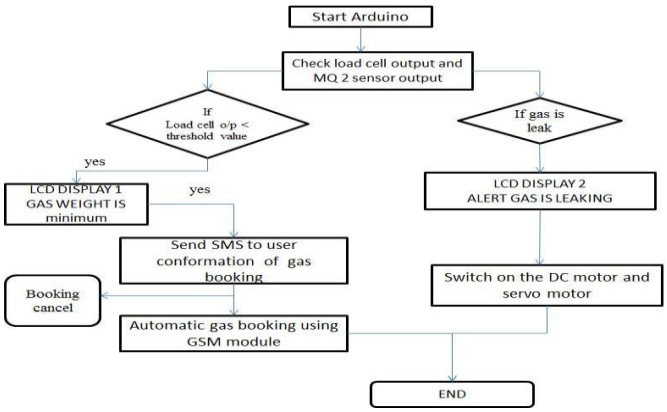

Figure-5.1 Flow chart

Arduino uno microcontroller

The Arduino Uno could be a microcontroller board supported the ATmega328.Arduino is Associate in Nursing ASCII text file; prototyping platform and its simplicity makes it ideal for hobbyists to use similarly as professionals. The Arduino Uno has fourteen digital input/output pins (of that half dozen are often used as PWM outputs), half dozen analog inputs, a sixteen-rate oscillator, a USB association, a power jack, associate ICSP header, and a reset button. It contains everything need to be support the microcontroller, simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to induce started. The Arduino Uno differs from all preceding boards therein it doesn't use the FTDI USB-to-serial driver chip. Instead, it options the Atmega8U2 microcontroller chip programmed as a USB-to-serial device. Uno suggests that one in Italian and is known as to mark the forthcoming unharness of Arduino one. The Arduino Uno and version one.0 are the reference versions of Arduino, moving forward. The Uno is that the latest in an exceedingly series of USB Arduino boards, and also the reference model for the Arduino platform.

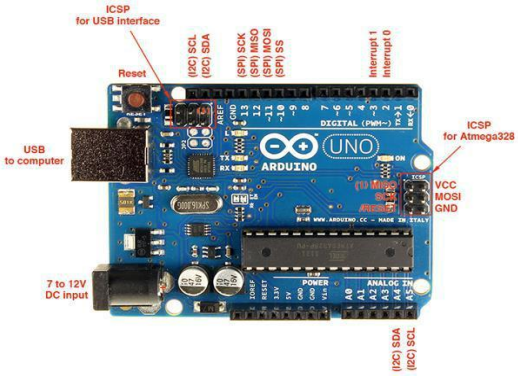

Figure-5.2 Arduino UNO Microcontroller

Figure-5.2 shown in it contains everything required to support the microcontroller; merely connect it to a laptop with a USB cable or power it with an AC-to-DC adapter or battery to urge started. The Arduino Uno differs from all preceding boards therein it doesn't use the FTDI USB-to-serial driver chip. Instead, it features the Atmega8U2 microcontroller chip programmed as a

USB-to-serial device. No means one in Italian and is named to mark the upcoming release of Arduino 1.0. The Arduino Uno and version 1.0 will be the reference versions of Arduino, moving forward. The Uno is that the latest during a series of USB Arduino boards, and therefore the reference model for the Arduino platform.

Gas sensor

Gas sensor MQ-2 Sensor is the back bone of this device and it senses the presence or absence of the LPG gas.

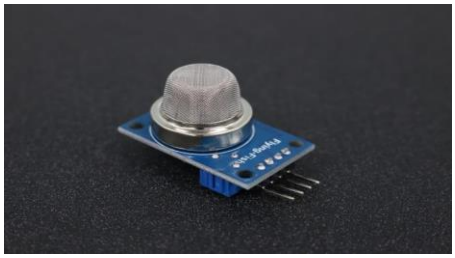

Figure-5.3 MQ-2 gas sensor

Figure-5.3 shown in this detector features a quick reaction and induces a stable and long period. It provides high sensitivity not only to LPG but also to iso-butane, H2, LPG, CH4, CO, Alcohol, Smoke and propane. It has terribly low sensitivity to alcohol and smoke. The basic height of the sensing element is 23±5hitter millimetres and it's a dimension of twenty ± five-Hitter millimetre. The one will detect the gas concentrations anyplace from two hundred p.m.to 10000 p.m. It detects concentration of gas in air. We set threshold value 270 ppm. If sensing element reading is bigger than threshold then run detected otherwise run note detected.

Load cell sensor

Figure-5.4 shown in Load cell sensing element is device want to live weight. It is a passive electrical device or sensing element that converts applied force into electrical signals. Theyare also referred to as Loadtransducers. We area unit mistreatment Loadcell sensing element for mensuration weight of cylinder. Loadcell sensing element unceasingly live weight of cylinder if weight of cylinder is below specific level then it will send sensor value to Arduino board com 3 port from where we fetch the data come from sensor and using Text Local API, we automatically book gas cylinder using number store in memory and conjointly send message to owner. For a 120Ω gauge, this is a change of only 0.12Ω. 0.12Ω is a very small change, and, for most devices,couldn't actually be detected ,let So we are going to want another Device HX711 that could be an electronic equipment and this electronic equipment readyaccurately live super tiny changes in resistance.

Figure-5.4 Load cell sensor

Gsm module800

Figure-5.5 shown in This GSM electronic equipment will settle for any GSM network operator SIM card and act a bit like a mobile with its own distinctive telephone number. Advantage of victimization this electronic equipment is that you just will use its RS232 port to speak and

develop embedded applications. Applications like SMS management, knowledge transfer, remote and work may be developed simply. GSM/GPRS electronic equipment could be a category of wireless electronic equipment devices that are designed for communication of a computer with the GSM and GPRS network. It desires a SIM (Subscriber Identity Module) card a small amount like mobile phones to activate communication with the network. Also, they have IMEI (International Mobile Equipment Identity) number similar to mobile phones for the identification.

Figure-5.5GSM module 800

Servo motor

Figure-5.6 shown in Servo Motor is used to open and close window in emergency situation. If gas run or hearth is detected then it mechanically opens the window. Its operating voltage is 4-6 volt. Servo motor consist 3 pin VCC, GND and signal pin. Initial position of servo motor is 0 degree. If gas or hearth is detected hence it'll be turned by nominal angle so as to open or shut window.

Figure-5.6 servo motor

Dc motor

We are using DC motor for exhaust fan. It has a pair of pins one for ground and different for sign. Ground is connected to GND of Arduino and input pin is connected to Arduino D7 pin no 6 Future Scope. This observance system is often additional increased by victimization local area network in Bluetooth module so as to work from anyplace, which supports another real-time application. For industrial purposes, robot can be developed for detecting multiple gas concentrations and fire. Instead of loadcell detector we are able to even be used as pressure detector that detects quantity of gas within the cylinder and additionally detects pressure of gas in Cylinder pipe, alerting by victimizations automaton device from any remotelocation.

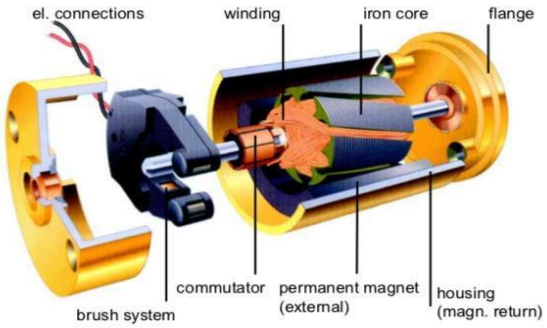

Figure-5.7 DC motor

ACKNOWLEDGEMENT

I feel great pleasure in my deepest sense of gratitude and sincere thanks to my guide Prof. Prabhakaran for his valuable time during the project work without which it would have been very difficult task to implement this project.

CONCLUSION

Our system is helps 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. This project is fully automated so no human attention is required. It avoids the problematic scenario or the difficulty caused thanks to inaccessibility of gas cylinder. This project avoids the accident or the hearth that is caused thanks to outpouring of LPG gas. The gas retail merchant gets the order for replacement cylinder and therefore the house owner (consumer) receives the message relating to the standing and therefore the secondary objective is to supply any malfunction in gas service system so as to stop harm or explosion of LPG.

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