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Creation of Gas Leakage Detection and Automatic Gas Shut Off Device for Wireless Sensor Network with SMS Warning

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Abstract: Undetected Gas Leakage in Pre-Detection Situations Triggers Most LPG Explosions. This includes the device of LPG detection. This machine is aimed at tracking, neutralizing and stopping gas leakage. Due to incorrect control installation, the gas leakage may occur or the hose is destroyed. The identification does not operate in one place only since gas will spill from and from the gas regulator. The Wireless Sensor Network (WSN) is therefore one of the methods suited to detect gas leakage in the broader field. In two or three positions around the gas tube and the delivery grid, this approach uses two or more sensors for detecting gas leakage. WSN is based on MQ-6 gas sensor and Bluetooth HC-05 wireless module. Explosion control operates based on warning, exhaust and automatic gas control system for explosion protection. When the gas leaks, the sensor transfers the data to Arduino wirelessly. This will then trigger the explosive protection system. The machine triggers the alarm, unlocks the gas regulator automatically and does not vent air with the exhaust fan. Arduino platform can completely monitor all devices.

Keywords: GSM, LPG, Gas sensor, Stepper motor driver IC (ULN2003A), Security, Alert.

1. Introduction

LPG consists of an extremely flammable blend of propane and butane. It is odorless gas which makes it easy to detect leakage by adding ethanol as a powerful odorant. LPG is one of the other oils that have been used for days now [1]. LPG, LPG, Industrial Gas etc. can also be used as liquefied petroleum gas. This gas is used widely in heating, hot water, cooking and other applications [2]. LPG is now used in cars as renewable fuel, as oil and diesel prices increase. Some individuals have low smell, may or may not respond to low gas leakage levels. In this situation, protection for gas leakages has been a crucial element in defending against gas leakage incidents [3]. Several research papers on the gas leakage protection system have been published. In the literature, an embedded device for dangerous gas detection and alerting suggested. If, the gas is concentrations reach the normal level, when the warning is automatically triggered. A gas leakage crash in India has been a case in point in the Bhopal gas drama. That worst manufacturing disaster in the history of gas leakage [4]. Detection of gas leakage is not only important but it is equally important to avoid leakage. This article includes a cost-effective and very detailed device that senses not only gas leakages but also alarms (beep) and disconnects

main power supplies and gas and sends an SMS. The GSM module is used to alert the user to an SMS [5].

The MQ-6 gas sensor has been used to have high precision. In industry, heating systems, household appliances and cars, poisonous and flammable gases are commonly used. Carbon gasses, such as propane, ethane, butane, methane, ethylene, etc. In the pressurized bottles, propane or butane, also called liquefied petroleum gas (LPG), is typically contained in liquid form and vaporized at natural temperatures [6]. A leak could set off and lead to explosion. In recent years, leakage detection of gases, particularly in the areas of defense, manufacturing, environmental and control, has thus become increasingly interesting [7]. A traditional gas leakage system uses detectors on site to alert people to the leakage. In the absence of an on-site first-response team, it is a downside of the traditional leakage scheme [8]. Therefore a device is required to identify the leakage and transmit information via wireless media to the first response team. In the absence of people on the premises, a leak detection system which initiates an alarm call or SMS would be more successful [9].

2. Literature Survey

The gas leak detector suggested that complies with UK workplace and health requirements. Carbon pollution is a big problem for transportation vehicles for residential, business and gas [10]. The installation of a gas leak detector at vulnerability is one of the prevention steps in preventing danger associated with the gas leak. The purpose of this work is to create an inexpensive, automated warning device to detect the leakage of liquid petroleum gas in different locations.

The system proposed is composed of three major components, one GSM and one PIC modular, one leak detector module and one safety circuit. Proposed a Gas Cylinder maintenance integrated system [11]. The gas leakage sensing module sends SMS to the consumer via GSM. The GSM module is used to send short messages on the potential for gas leaks, and as an additional feature it can reserve a recharging cylinder or program a device to reserve the cylinder automatically via SMS [12]. The load cell interfacing into the microcontroller controls the weight of the cylinder.

The wireless LPG leakage control system developed for home protection. The suggested device detects the LPG's leakage and tells the customer using the GSM about the leakage [13]. This method also has the characteristic that the intake is represented by total weight roughly. Whenever the device senses a spike in LPG leakage, it warns automatically by enabling a warning and transmitting message simultaneously to the cell phones in question [14]. The ventilator is turned on to the gas and a secured, LPG valve is closed to the cylinder by signals to prevent further leakage. The unit ensures stability and avoids explosion.

Developed a device based on a microcontroller, using a gas sensor (MQ6) to detect LPG leakage. The unit is often integrated with an alert unit to sound an alarm or to provide a description of the leak. With fast response time at an inexpensive rate, the sensor has great sensitivity [15]. If leakage is detected, a message is sent immediately to the individual person or family member using the GSM mobile network. The LPG cylinders are also weighed in weight and seen in the LCD view. The gas quantity of less than 10 kg requires that the new cylinder be sent to a distributor automatically with the text message. It alerts the user by sending a request to refill the cylinders when the weight of the cylinder lies below or equal to 0.5 Kg.

3. Proposed System

After the identification of 0.001% of LPG leakage, the proposed system takes an automatic control step. This automatic control action provides a mechanical stepper motor handle for the valve closure. The closure of the cylinder button stops the gas flow and the eruption of flames. The combination of a relay and the stepper motor that will shut down the house's electricity enhances human comfort. Figure 1 shows the block diagram of the system.

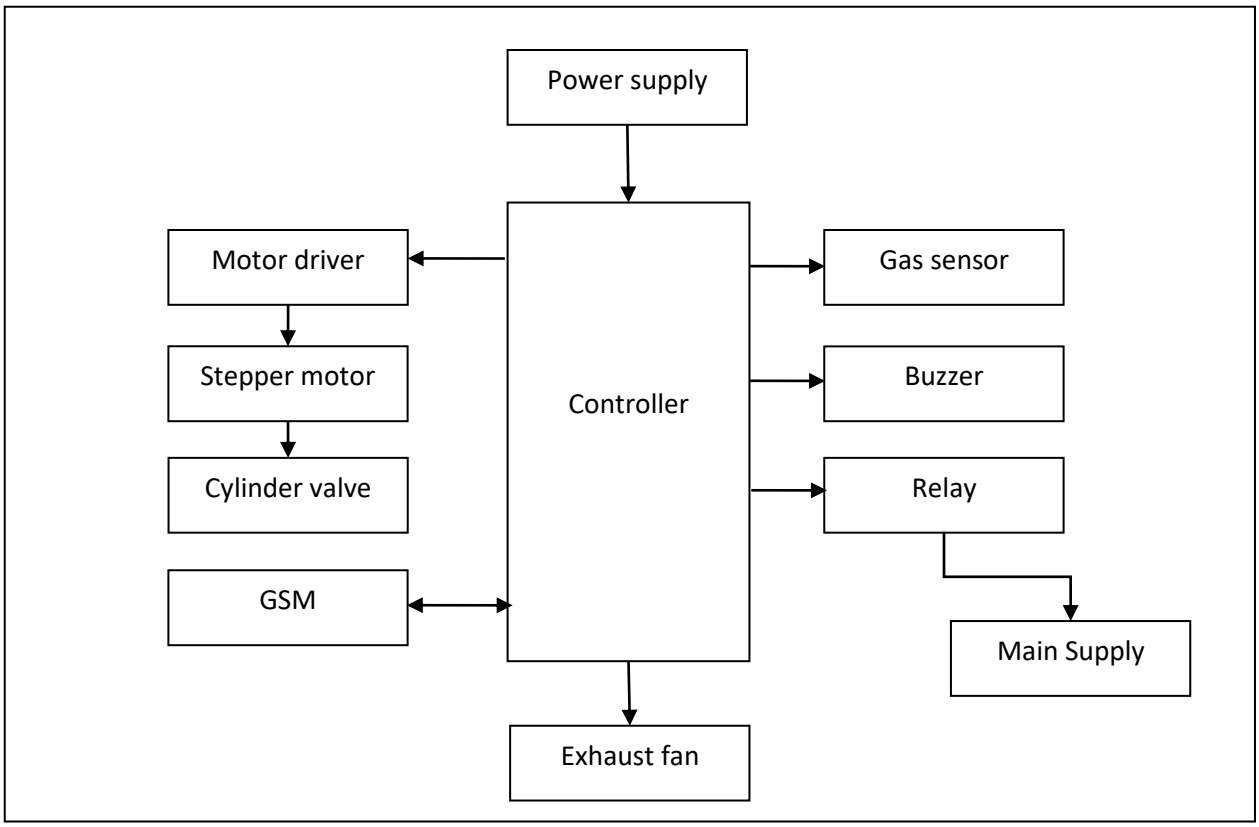

Figure 1: Design of the system

We often send a warning message (SMS) to notify users of an LPG leakage by using a GSM module, and a buzzer is issued to alert neighbors in the absence of user to an LPG leakage. The aim of this method is to reduce the risk of a gas leakage explosion. The biggest benefit of this method is that it automatically executes the whole process and has a quick response time.

4. Results

The experiments conducted by releasing LPG into the sensor's atmosphere. It is possible to detect the gas detector and reaction device. The test results for the concentration of the gas in the air around the sensor are carried out on the system at various times and days. The MQ6 gas sensor senses the leakage of LPG gas. The micro controller provides an analog output from the gas sensor and translates it into digital form with a built-in ADC. The instructions are predefined. The exhaust fan is now allowed. Therefore, gas concentration is reduced within the room. The stepper engines are then rotated to close the cylinder button and the main power supply. This means that the gas leakage stops the stream flow. The relay is shut off the house power supply. The buzzer triggers a warning to demonstrate the gas leakage. The user is then told via the GSM module using an SMS.

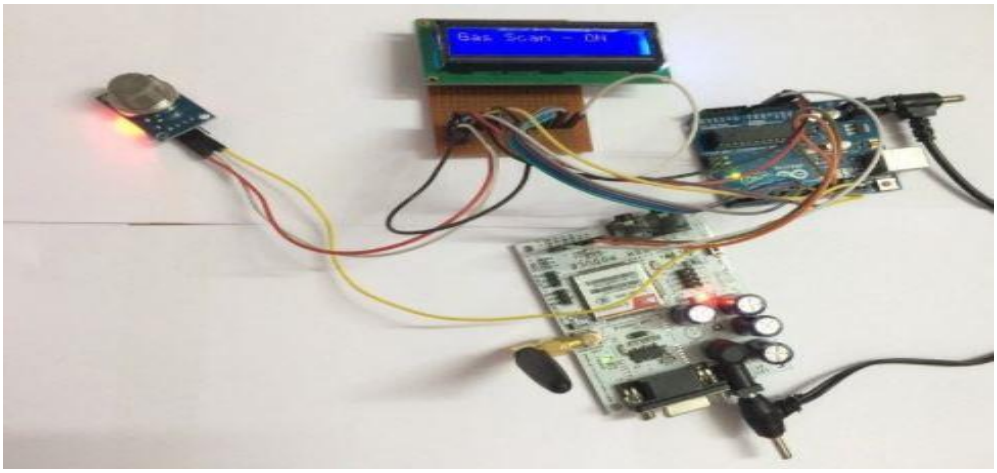

Figure 2: Hardware design of the system

A constant lap due to heavy gas accumulation is the last four values. The experiment tested to place the LPG device from a gas supply at varying distances. Figure 2 shows the hardware design of the system.

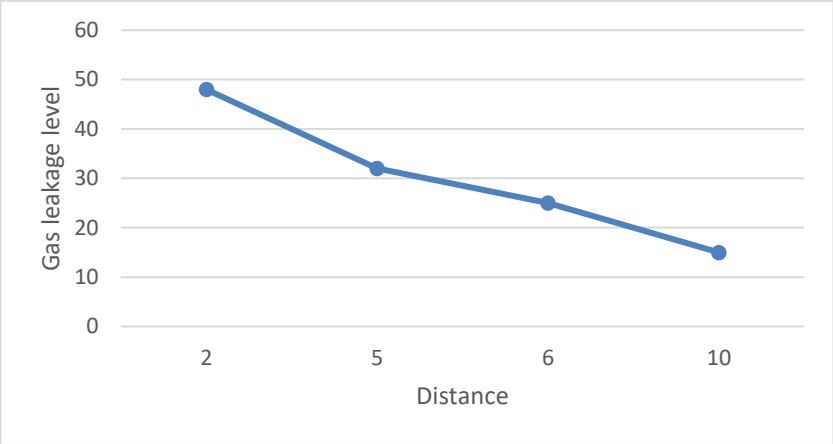

Figure 3: Gas leakage level

The reaction time of the LPG machine is shortened by the distance from gas source when the LPG unit checked at various distances of the gas source. The sensitivity of the gas sensor in clean air also found to be very high. The sensitivity of the gas sensor ranged from temperature to reference voltage over time. Figure 3 shows the gas leakage level.

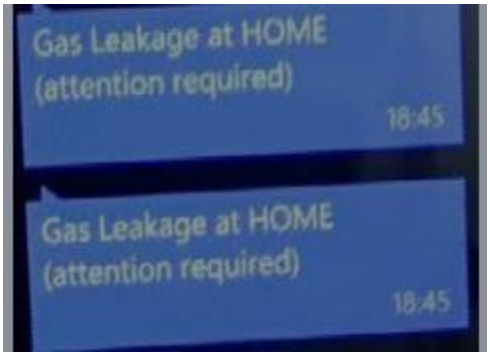

Figure 4: Alert message

The perceived voltage is still stable in constant gas concentration. The gas sensor reacts rapidly to gas so the gap in time between test results at the same concentration is very limited when it is very large. Figure 4 shows alert message.

5. Conclusion

The article used IoT technology to improve existing security standards. The creation of prototype has revolutionized in the field of leak protection. Hazardous and toxic gases are to the environment, negating any major or minor hazards because of them. Send text messages are to

the appropriate authorities; and Ability to perform data analysis on sensors. The system can detect gases in the environment. With a gas sensor, doing this will prevent significant harmful problems from occurring. Fire sensing and warning devices can be combined with other building systems to improve fire protection in the building. The fire warning system is capable of coordinating with other building devices, discerning fire and non-fire danger accurately, determining the approximate location of the fire in the building and making ongoing assessments of fire- and smoke distribution inside the building. The integration technologies will however, also generate new risks. For example, sensor technology must be durable sufficient to avoid alarms and to ensure that key information, such as occupant's location, is not lost due to saturation of fire data. In addition to granting fire protection priority over other construction operations, automated building systems would have to be planned to prevent fire emergencies from crashing into the building service structure.

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