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Recommendation Machine for Gas Outflow in LPG Cylinder

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Abstract: ***Liquefied petroleum gas (LPG) is commonly used in hotels and homes for all cooking purposes. Furthermore, despite the fact that many explosions have occurred as a result of LPG outflow, it is very user friendly to all users. We have implemented a module in our system to address these societal issues. In this system that includes a gas sensor to detect gas outflow. If the sensor detects the level of gas outflow and compares it to the threshold value previously set in the software. If it exceeds the fixed threshold value, the buzzer activates and the relay connected to the circuit turns on. The entire power supply will then be turned off. People nowadays are unaware of their daily gas usage, which causes a delay in refilling the LPG cylinder. To overcome such difficulties, our system has one more module. The load sensor is used to continuously monitor the gas level. The load cell's output is connected to the microcontroller. The microcontroller manipulates the data so that the weight of the gas cylinder, the level of gas leakage, and the amount of gas used per day are displayed on the LCD. If the gas cylinder's level falls dangerously low, a new cylinder is automatically booked and the status is transmitted to the user via the Wi-Fi module.***
Keywords: GSM, LCD, LPG Cylinder, Sensors, IoT, Wi-Fi module.

I. INTRODUCTION

The LPG cylinder is essential in our daily lives. The LPG cylinder is used in a variety of settings, including households, businesses, and industries. The domestic class of LPG cylinder contains 14.2 kilogram's of LPG. Similarly, the business and industrial LPG cylinders contain 19.0 and 35 kilo of LPG, respectively. Many accidents have occurred in recent decades, and in order to prevent this type of major explosion, we devised a solution in which if the gas leaks, it is detected using a gas sensor. As an input, send it to the microcontroller. The microcontroller manipulates the input and trigger to activate the buzzer; at the same time, the relay is activated, and the total power supply is turned off. As a result, we may be able to avoid societal explosions. Another example is the use of a load cell to continuously monitor the level of a gas cylinder. The same information is shown on the LCD. Not only does this feature exist, but the day-to-day usage of the gas is also continuously monitored and displayed. The gas leakage is also displayed on the LCD. If the gas level falls below a certain threshold, the user is notified, and a new cylinder is ordered.

II. LITERATURE REVIEW

The variation of resistance depends on the depends of the polyaniline, like metal oxides, bimetal oxides (ceramics), etc. conduction, the variation of resistance of the sensing material is either by activity of atmospherically 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. Through out this the gas sensing behavior of polyaniline and polyaniline salt composites unit given.

The gas leakage solution for industrial places. 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 susceptive sources and the readings are evaluated in that spot. These readings are then transmitted to the users or workers through wireless connection.

Characterization of Geometric Leakage Current of GeO2 Isolation and Effect of Forming Gas Annealing in Germanium p-n Junctions. In this letter, we have analyzed the area, perimeter, and corner leakage current components of lateral p^+/n-Ge-based diodes with a GeO_2 isolation layer, which were fabricated at temperatures below 500 °C. In addition, the effects of forming gas anneal are included, which was done to further reduce the leakage current. It was found that corner leakage was the most dominant source of surface leakage. Perimeter leakage is the next major source of leakage, and it is mostly affected by the quality of the passivation layer. Forming gas annealing of 350 $^\circ$ C gave the most beneficial results in overall leakage current reduction.

Micro gas sensor array with neural network for recognizing combustible leakage gases micro gas sensor array, consisting of four porous tin oxide thin films added with noble metal catalysts on a micro-hotplate, was designed and fabricated. The micro-hotplate was designed to obtain a uniform thermal distribution along with a low-power consumption and fast thermal response. The sensing properties of the sensors toward certain combustible gases, i.e., propane, butane, LPG, and carbon monoxide, were evaluated. A multilayer neural network was then used to classify the gas species. The results demonstrated that the proposed micro sensor array, plus multilayer neural network employing a back propagation learning algorithm, was very effective in recognizing specific kinds and concentration levels of combustible gas below their respective threshold limit values.

III. DETECTION OF GAS LEAKS

There are two important modules in our LOBO system; they are Gas outflow detection with brownout Monitoring of gas levels with automatic booking CELL OF LOAD: It's a weight sensor. It transforms a weight into an electrical signal that can be controlled. As the weight functional to the load cell increases, so does the electrical signal. Strain gauges, pneumatic, and hydraulic load cells are the most commonly used types of load cells. The load cell can be used in our system to measure the usage of gas per day by continuous weight measurement. The microcontroller is linked to the load cell. The microcontroller sends the results of its operations to the LCD. There are four major components in LCD. They are the weight of the gas cylinder, the amount of gas used per day, and the level of gas leakage: When the gas leakage level exceeds the fixed value, the microcontroller sends a signal to the buzzer, which activates the relay, and the total power supply is shut down in a specific location, depending on the status of the gas cylinder. If the level of the gas is normal then it displayed the status as "normal", If the level of the gas gets reduced it display the status as "reduced", If the level of gas gets reduced to the critical level then it displays the status as "empty". A new cylinder is also booked automatically via the Wi-Fi module.

IV. SYSTEM ANALYSIS

This detects gas presence in the environment. The sensor generates a consequent potential difference based on the concentration of the gas by varying the resistance of the material inside the sensor, which can be measured as output voltage. The type and concentration of the gas can be predicted based on this voltage value. Metal Oxide based gas Sensor, Optical gas Sensor, Electrochemical gas Sensor, Capacitance-based gas Sensor, Calorimetric gas Sensor, Acoustic based gas Sensor are the various types of gas sensors that are commonly used in various applications. The gas sensor in our LOBO system detects gas outflow from the cylinder. The gas sensor output is combined with a buzzer and a relay. The sensor detects the level of gas outflow and compares it to the threshold value specified in the source code. If the outflow level is high, the buzzer is activated, followed by the relay. This work is required to brownout the total power in a specific location.

V. METHODOLOGY

The sensor's connecting leads are thick so that the sensor can be securely connected to the circuit and sufficient heat can be conducted to the inside part. They are made of copper and are plated with tin. Four of the six leads (A, B, C, D) are used for signal retrieval, while the other two (1, 2) are used to provide adequate heat to the sensing element. The pins are mounted on a Bakelite base, which acts as an insulator and provides a firm grip on the sensor's connecting leads.

Gas sensors use various technologies to measure and indicate the concentration of specific gases in air. Gas detectors are frequently used for safety purposes and are typically used to prevent toxic exposure and fire. They are manufactured as portable or stationary (fixed) units and work by signifying high levels of gases through a series of audible or visible indicators, such as alarms, lights or a combination of signals. While many older, standard gas detector units were designed to detect only one gas, modern multifunctional or multi-gas detectors can detect multiple gases at once. Some detectors can be used as single units to monitor small work areas, or they can be combined or linked together to form a protection system.

The sensor response serves as a reference point or scale as detectors measure a specific gas concentration. When the sensor's response exceeds a predetermined level, an alarm will sound to alert the user. There are many different types of detectors available, and the majority of them serve the same purpose: to monitor and warn of dangerous gas levels. Although gas detectors are generally a dependable technology, with some models lasting up to five years, their proper operation is largely dependent on user maintenance, battery inspection, and calibration. Calibration is a safety procedure that is carried out to ensure that detectors measure the correct level of gas. Furthermore, the lifespan of gas detectors is frequently determined by the amount of gas vapours to which they are exposed. Contaminated sensors may not register dangerous gas levels, which is why frequent calibration is essential

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Figure 1. Load Cell

A load cell is a type of transducer that converts force into an electrical signal. This transformation is indirect and occurs in two stages. The force being sensed deforms a strain gauge via a mechanical arrangement. Because strain changes the effective electrical resistance of the wire, the strain gauge measures the deformation (strain) as an electrical signal. A load cell is typically made up of four strain gauges connected in a Wheatstone bridge configuration. There are also load cells with one strain gauge (quarter bridge) or two strain gauges (half bridge). [Citation required] The electrical signal output is typically in the millivolt range and must be amplified by an instrumentation amplifier before it can be used. The transducer's output is fed into an algorithm, which calculates the force applied to the transducer.

VI. POWER SUPPLY

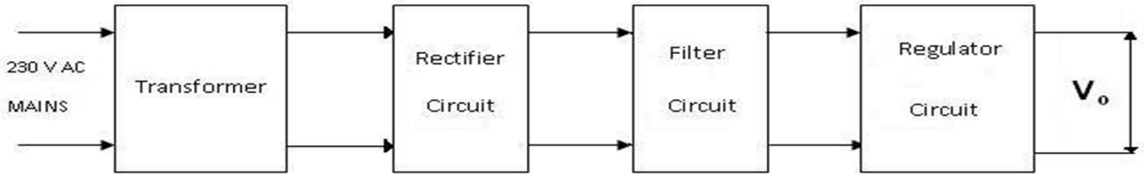

Figure 2. Power supply Unit with Input and Output

A transformer is an electro-magnetic static device that transfers electrical energy from one circuit to another at the same or different voltage but at the same frequency. Rectifiers convert alternating current (AC) current or voltage to direct current (DC). In most rectifier circuits, a full wave bridge rectifier is used. The Filter is used to remove pulsated alternating current. A capacitor and an inductor are used in a filter circuit. The capacitor's function is to block the DC voltage while bypassing the AC voltage. The function of the inductor is to block the AC voltage and bypass the DC voltage. Voltage regulators are an essential component of any electronic system's power supply section. The main advantage of regulator ICs is that they regulate or keep the output constant despite variations in the input supply.

VII. LINE REGULATION

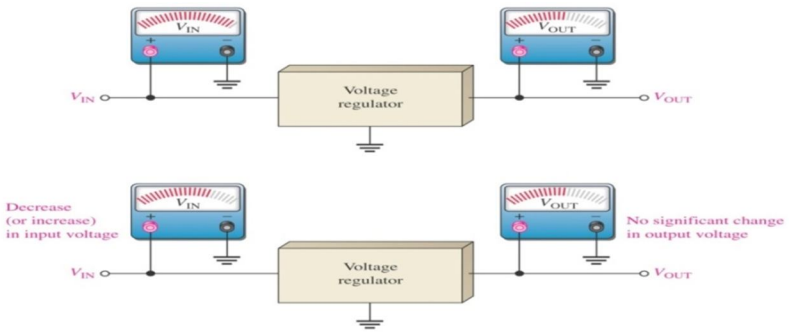

Figure 3.Line Regulation

Load regulation is when a change in load current (due to varying RL) has almost no effect on a regulator's output voltage (within certain limits) Load regulation is the percentage change in output voltage from no-load (NL) to full-load (FL) (FL). Line regulation is a measurement of the power supply's or SMU's ability to maintain the output voltage in the face of changes in the input line voltage. Line regulation is expressed as a percentage of the change in output voltage relative to the change in input line voltage.

VIII. LIQUID-CRYSTAL DISPLAY

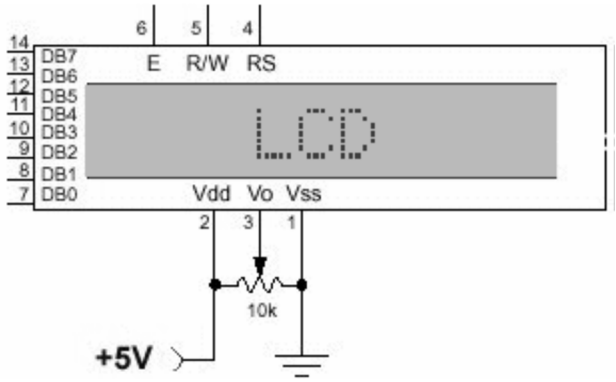

Figure 4. Pin Diagram of LCD

A liquid-crystal display (LCD) is a flat-panel display or other electronically modulated optical device that makes use of liquid crystals' light-modulating properties. Liquid crystals do not emit light directly, but rather use a backlight or reflector to produce colour or monochrome images. LCDs can display arbitrary images (as in a general-purpose computer display) or fixed images with low information content that can be shown or hidden, such as preset words, digits, and 7-segment displays (as in a digital clock). They both use the same basic technology, with the exception that arbitrary images are composed of a large number of small pixels, whereas other displays have larger elements.

LCDs are used in a variety of applications such as computer monitors, televisions, instrument panels, cockpit displays in aircraft, and indoor and outdoor signage. Small LCD screens are widely used in portable consumer devices such as digital cameras, watches, calculators, and mobile phones, including smartphones. LCD displays are also found in consumer electronics such as DVD players, video game consoles, and clocks. In almost all applications, LCD screens have replaced heavy, bulky cathode ray tube (CRT) displays. LCD screens are available in a wider range of screen sizes than CRT and plasma displays, ranging from tiny digital watches to massive, big-screen television sets.

Because LCD screens do not use phosphors, they do not experience image burn-in when a static image is displayed on a screen for an extended period of time (e.g., the table frame for an aircraft schedule on an indoor sign). LCDs, on the other hand, are prone to image persistence. The LCD screen uses less energy and can be disposed of more safely than a CRT screen. Because of its low electrical power consumption, it can be used in battery-powered electronic equipment more efficiently than CRTs. By 2008, annual sales of LCD televisions had surpassed sales of CRT units worldwide, rendering the CRT obsolete for most purposes.

IX. RESULTS AND DISCUSSIONS

Internet of Things has gained widespread popularity in recent years, paving the way for a smoother, safer, and easier way of life for humans. One such area of application is gas booking and gas leak detection for both domestic and commercial purposes. Though there are several techniques for this, gas leak detection is always a major concern and a challenge. This paper thus proposed a new system, a microcontroller-based application of gas booking and gas detection systems using IOT. This paper thus proposed a new system, a microcontroller-based application of gas booking and detection systems using IOT. The sensor in this model can sense and detect gas leakage, and the user receives notifications about the remaining percentage of gas in the cylinder, as well as certain actions that can be taken to pre-book the new cylinder without any barriers. For added convenience, this unit can be easily integrated into an alarm system or a visual indicator of LPG awareness. This proposed system could be useful in marketing sectors such as hotels, shops, and so on. The primary goal of this work is to ensure a safe and simple method of booking gas and detecting gas leaks in order to avoid disasters caused by negligence.

X. FUTURE ENHANCEMENT

IOT technology to improve on current safety standards. The goal in creating this prototype was to bring about a revolution in the field of safety against the leakage of harmful and toxic gases in the environment and thus eliminate any major or minor hazard caused by them. We used IOT technology to create a Gas Leakage Detector for society, which includes Smart Alerting techniques such as sending text messages to the appropriate authorities and the ability to perform data analytics on the sensor. Using gas sensors, this system will be able to detect gas in the environment. This will keep the major harmful problem at bay.

XI. CONCLUSION

A wireless gas leakage detection system for industrial plants in our work. Multiple sensors are placed around the plant's region of interest in our system architecture. We present an IFTTT-based gas leak detection system with an alerting message feature to the response team. The leak is detected by the Sensing System, and the Alerting System sends a warning message via IFTTT. A gas leakage detection system prototype has been developed and successfully tested with methane, LPG, and benzene. The warning message is successfully delivered to the mobile phone number with minimal delay. The proposed leakage detection with warning message to a single user can be used to send calls/SMS to multiple people and is also directly linked.

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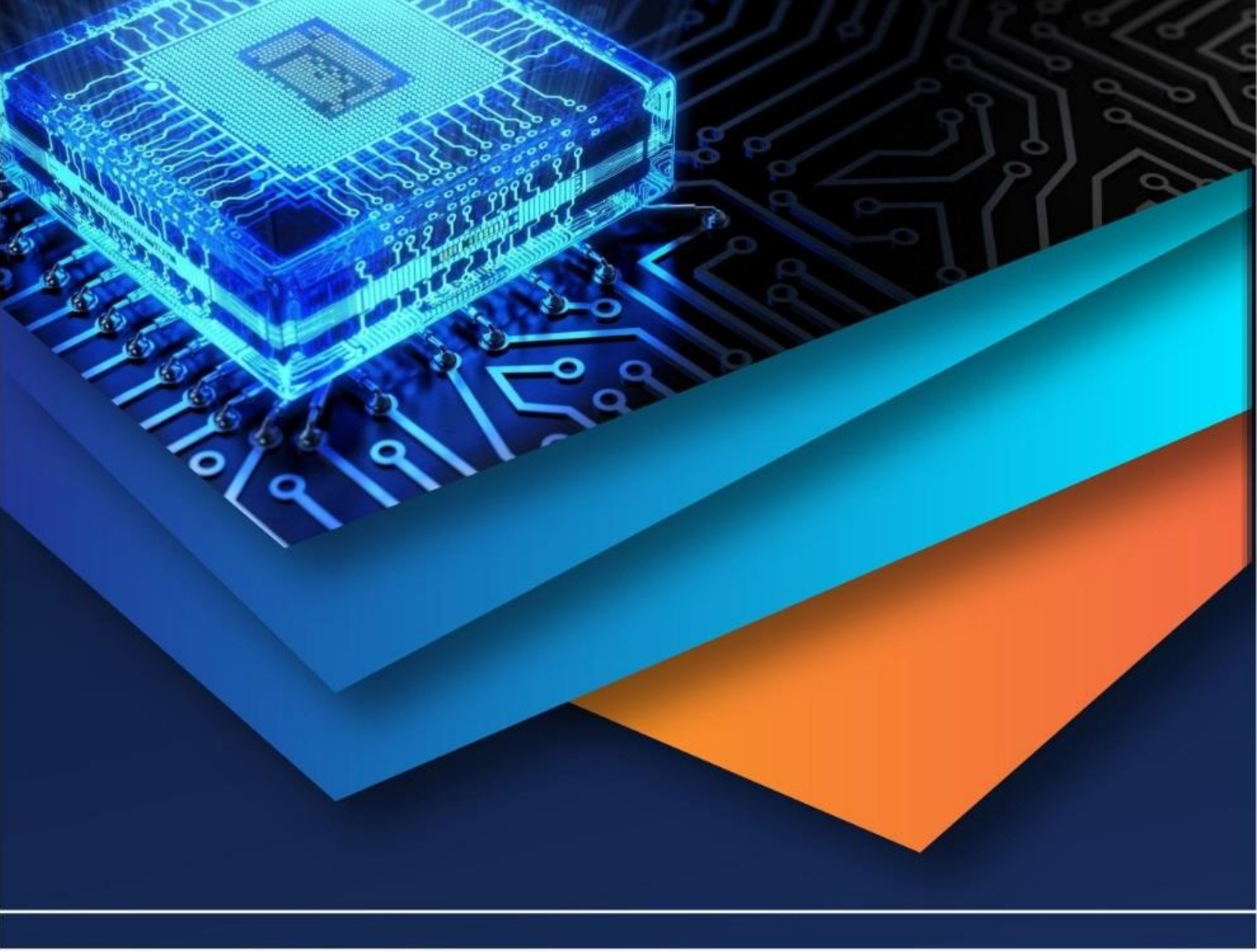

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