

Microcontroller Based Gas Leakage Detector

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Abstract — Gas leakage is a prime problem with commercial zone, residential regions and gas driven cars like CNG (Compressed Natural Gas) buses, cars and so on. One of the preventive techniques to stop injuries associated with the gas leakage is to put in a gasoline leakage detection device at permeable locations. The aim of this project is to increase this type of device which can automatically discover and prevent fuel leakages in the ones permeable regions. The gadget detects the leakage of the LPG (Liquefied Petroleum Gas) using a gasoline sensor and uses the BUZZER to alert the character approximately the fuel leakage. When the LPG attention in the air exceeds a predetermined level, the fuel sensor senses the gas leakage and the output of the sensor goes LOW. This is detected by the microcontroller.

Keywords— *LPG (Liquefied Petroleum Gas), Gas Sensor*
MQ-5, LCD (Liquid Crystal Display), LED (Light Emitting Diode), Buzzer

I. INTRODUCTION

LPG gas is basically a mixture of propane and butane which are extraordinarily flammable chemicals. It is odourless fuel in its natural nation to which Ethyl Mercaptan is added as effective smelling agent, so that leakage can be without difficulty detected. We can hit upon the LPG leakage in the motors, commercial sectors and residential regions the use of an Ideal Gas Sensor. We can without problems put into effect the LPG gasoline leakage detector unit right into a unit that can sound an alarm or provide a visible inspiration of the LPG awareness in a 16x2 LCD show. The sensor used on this undertaking has both admirable sensitivity and speedy reaction time.

This sensor can also be used to experience other gases like isobutane, propane, LNG or even cigarette smoke. The output of the sensor is going LOW as soon as the LPG sensor senses any gasoline leakage. This is detected with the aid of the microcontroller and the LED & buzzer are turned ON. After a put off of few milliseconds, the exhaust fan is also became ON for throwing the gas out and a “GAS LEAKAGE” message is shown on lcd display

II. OBJECTIVE OF THE PROJECT

This is used to Detect Gas Leakage (like LPG, Butane, Methane) or any such petroleum based gaseous substance that can be detected using MQ-5 Sensor. To produce a alarm sound upon gas leak and stop the alarm once gas leak is under control. Display status in an LCD using a 16x2 LCD module.

III. THEORETICAL STUDY

Working principle

The sensing fabric in gasoline sensors is metal oxide, frequently SnO₂. When a metal oxide crystal along with SnO₂ is heated at a sure excessive temperature in air, oxygen is absorbed at the crystal floor with a poor price. Then donor electrons in the crystal floor are transferred to the absorbed oxygen, resulting in leaving effective charges in a area rate layer. Thus, electric powered present day flows through the junction components of SnO₂ micro crystals. Grain boundary floor ability acts as a ability barrier against the electron waft. The electrical resistance of the sensor is imposed to this ability barrier. In the presence of a deoxidizing gas, the floor density of the negatively charged oxygen decreases. Consequently the barrier top within the grain boundary is decreased. As a result, the decreased barrier top decreases sensor resistance.

IV. COMPONENTS DESCRIPTION

Power Supply: As per the power requirement of the hardware of the Density Based traffic light control system, we need a supply of +5V and GND. We use external power supply or use batteries to give power supply.

GAS SENSOR Gas detector is a device that detects the presence of gases in an area, often as part of a safety system. This type of equipment is used to detect a gas leak or other emissions and can interface with a control system so a process can be automatically shut down. A gas detector can sound an alarm to operators in the area where the leak is occurring, giving them the opportunity to leave. This type of device is important because there are many gases that can be harmful to organic life, such as humans or animals. Gas detectors can be used to detect combustible, flammable and toxic gases, and oxygen depletion. This type of device is used widely in industry and can be found in locations, such as on oil rigs, to monitor manufacture processes and emerging technologies such as photovoltaic. They may be used in firefighting. Gas leak detection is the process of identifying potentially hazardous gas leaks by sensors. These sensors usually employ an audible alarm to alert people when a dangerous gas has been detected. methane gas sensor that can sense gases such as ammonia which might get produced from methane. When a gas interacts with this sensor, it is first ionized into its constituents and is then adsorbed by the sensing element. This adsorption creates a potential difference on the element which is conveyed to the processor unit through output pins in form of current. The gas sensor module consists of a steel exoskeleton under which a sensing element is housed. This sensing element is subjected to current through connecting leads. This current is known as heating current through it, the gases coming close to the sensing element get ionized and are absorbed by the sensing element. This changes the resistance of the sensing element which alters the value of the current going out of it. The connecting leads of the

sensor are thick so that sensor can be connected firmly to the circuit and sufficient amount of heat gets conducted to the inside part. They are casted from copper and have tin plating over them.

LCD DISPLAY A liquid-crystal display (LCD) is a flat-panel display or other electronic visual display that uses the light-modulating properties of liquid crystals. Liquid crystals do not emit light directly. LCDs are available to display arbitrary images (as in a general-purpose computer display) or fixed images with low information content, which can be displayed or hidden, such as preset words, digits.

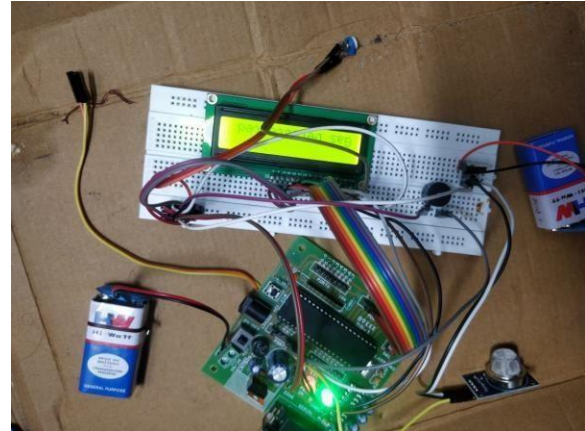
MICROCONTROLLER The Intel 8051 is a very popular general purpose microcontroller widely used for small scale embedded systems. Many vendors such as Atmel, Philips, and Texas Instruments produce MCS-51 family microcontroller chips. The 8051 is an 8-bit microcontroller with an 8-bit data bus and a 16-bit address bus. The 16-bit address bus can address a 64K (2¹⁶) byte code memory space and a separate 64K byte data memory space. The 8051 has 4K on-chip read-only code memory, and 128 bytes of internal Random Access Memory (RAM) organized in Harvard Architecture, the details of which will be discussed in the memory section. The 8051 has two timers/counters, a serial port, 4 general purpose parallel input/output ports, and interrupt control logic with five sources of interrupts. Besides internal RAM, the 8051 has various Special Function Registers (SFR) such as the accumulator, the B register, and many other control registers

SOFTWARE Keil MDK is the complete software development environment for a wide range of Arm Cortex-M based microcontroller devices. MDK includes the μ Vision IDE and debugger, Arm C/C++ compiler, and essential middleware components. ... ULINK debug adapters allow you to program, debug, and analyze your embedded applications.

Homes, Hotels, Factories, LPG Storage, Gas driven Cars etc.

IV. ADVANTAGES AND DISADVANTAGES

There are a few advantages in addition to negative aspects of microcontroller based totally gasoline leakage detector . Advantages are low price, low strength consumption, high accuracy. It additionally detects alcohol so it is used as liquor tester. The sensor has amazing sensitivity combined with a brief response time. Disadvantages are no prevention of fires is feasible with kit. Applicable best as a hallmark or alarming tool. It works most effective whilst 5v energy supply is given. Its sensitivity depends on humidity and temperature. It is a bit touchy to smoke.



V. APPLICATIONS

Domestic gas leakage detector, Industrial Combustible gas Detector, Portable Gas Detector,

VI.CONCLUSION

Finally, we finish in current households, the usage of LPG is taking a massive roll, from the usage of cylinder as much as the usage of petroleum pipelines. The biggest hassle in the usage of this kind of era is protection hassle, and our challenge will strike it out for families and industries. Although the market rate is quite high of this device, but we have attempted to restrict this high rate inside. The leak detecting techniques are categorized into numerous ways for gasoline pipelines. Some strategies were improved because their invention and a few new ones had been designed resulting in development of sensor manufacturing and computing electricity. Leak detection strategies in each category keep some blessings and drawbacks. For instance, all external detection method is performed from outdoor of the pipelines. It not only detects the leakage but the leakage place also. But the detection of this leakage area may be very long. Mathematical model based totally detection of the pipe indicates exact outcomes at excessive drift prices at the same time as for low glide fees a mass stability based totally detection gadget could be more suitable. Hybrid structures take the benefit of the real-time detection capability of a software based totally approach. The excessive localization accuracy of a hardware based totally approach, in conjunction with other precise advantages is meant to be the destiny trend in gas leak detection. Between these sufficient kinds of industrial solutions available is in the long run an movement that has to be taken after comparing the wishes of the system wherein gasoline leak detection is required.

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