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Multiple gas Analyzer and Indicator

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ABSTRACT: *This project is microcontroller based project. A Gas sensor is used to detect dangerous gas leaks in the kitchen or near the gas heater or gas plant producing acetylene and so on. This implies that the gases available are the main raw materials used in gas plants, without which the existence of a gas plant. This unit detects 300 to 5000ppm of Natural Gas. Ideal to detect dangerous gas leaks in the kitchen. Sensor can be easily configured as an alarm unit. The sensor can also sense LPG and Coal Gas. Ideal sensor for use to detect the presence of a dangerous LPG leak in your car or in a service station, storage tank environment. This unit can be easily incorporated into an alarm unit, to sound an alarm or give a visual indication of the LPG concentration. The sensor has excellent sensitivity combined with a quick response time. The project is based on detect of gas concentration from 200 to 1000ppm.It has high sensitivity it consist of heater coil with which is added with resistance and the output is connected to ADC.*

Keywords: *Sensor, Detector, LPG, Coal Gas, Natural Gas*

I. INTRODUCTION

A Gas Detector is a device which detects the presence of various gases within an area, usually as part of a safety system .Using sensor for detection like LPG & Alcohol sensor .This type of equipment is used to detect a gas leak and interface with a control system. It detects gases like common toxic gases like CO, SO_2 & natural gases. Usage for notification leakage in home & environment applications. This type of device is important because there are many gases that can be harmful to organic life, such as humans or animals. Alcohol Detector is used to detect the alcohol gas by use of alcohol sensor. It is highly sensitive and its detection range is 10-1000 ppm. LPG Detector is used to detect the LPG Gas by use of LPG Gas sensor. It is highly sensitive and its detection range is 10-10000 ppm. Natural Gas Detector is used to detect the Natural Gas by use of Natural Gas sensor. It is highly sensitive and its detection range is 300-5000 ppm. It is a known fact that a gas plant is known in accordance with its final output. So we have oxygen gas plant producing oxygen, nitrogen gas plant producing nitrogen, acetylene gas plant producing acetylene and so on. This implies that the gases available are the main raw materials used in gas plants, without which the existence of a gas plant has no meaning. Accordingly the manufacturers and suppliers are involved in the production of certain gases which are useful in various industrial and commercial, including residential applications. There are different types of gases on the basis of which a plant is installed.

II. METHODOLOGY

Gas detector senses the gas in the environment and converts it in form of voltage, this voltage level converted by ADC in digital form. This signal is input of microcontroller which displays the output.

1. HARDWARE DESCRIPTION

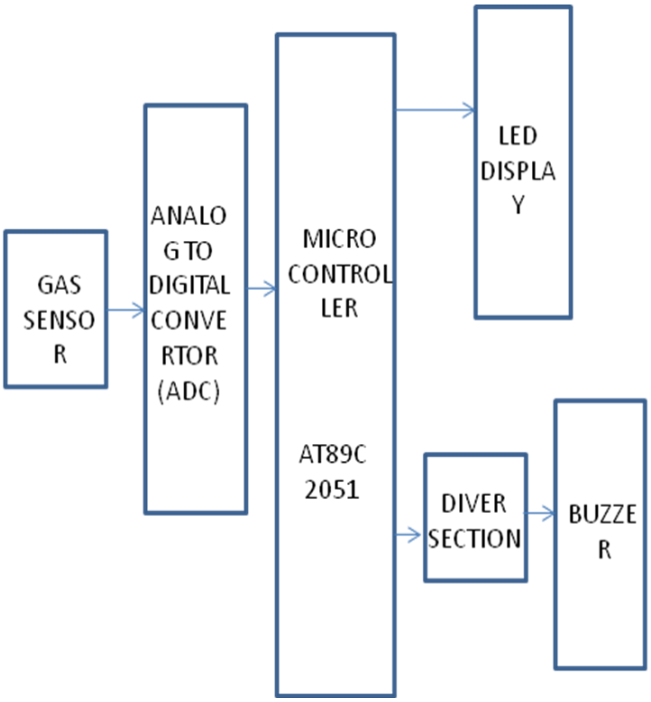

Figure1.Block Diagram.

1. A. Description of Block Diagram

The flow chart describe about the detection of gas firstly through the gas sensor (MQ2) we are detecting the alcohol present in atmosphere. Sensitive material of MQ2 gas sensor is SnO_2, which with lower conductivity in clean air. When the target alcohol gas exist, the sensor's conductivity is higher along with the gas concentration rising. This converted change of conductivity to correspond output signal of gas concentration. The advantage of using this sensor as the microcontroller and the sensor works with the same power supply voltage +5V.This certain amount of reference voltage is set by the sensor. The reference voltage which set by sensor is converted by ADC in the form of digital signal. As ADC 0808/09 we are using easily interface with the microcontroller. The signal which is converted by the ADC is provided to microcontroller through the port. The driver which is connected from the port of microcontroller act as a relay circuit. The driver circuit which helps to drive the buzzer which is connected to driver.

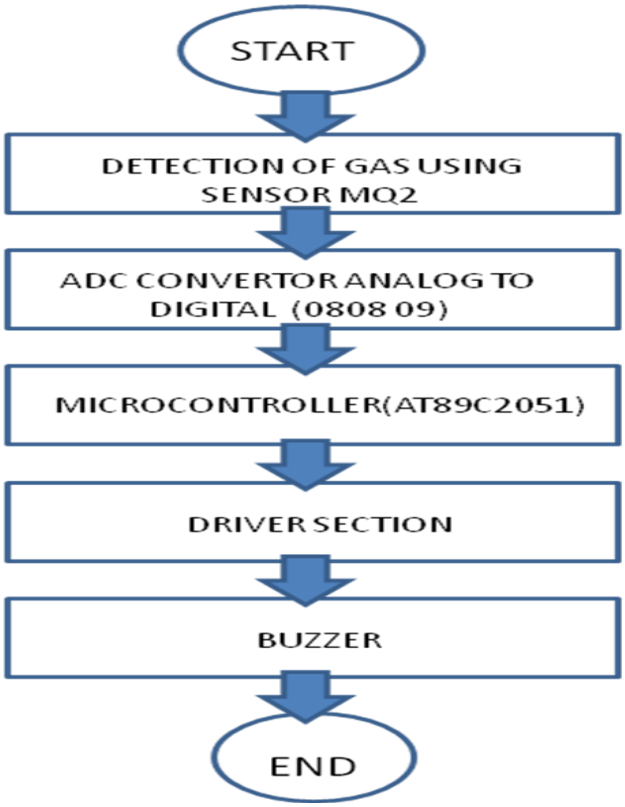

Figure1.Flow Diagram.

2. B. Description of Flow Diagram

The description of flow diagram starts with the detection of gas using sensor MQ2 & MQ3 for detecting multiple gases in our project which includes calibration process for sensors.

After the gas is detected then for further processing the voltage variation is now send to the ADC for converting the analog data to digital for further processing of microcontroller. Hence then microcontroller with different values print the output for detection. An analog-to-digital converter (abbreviated ADC, A/D or A to D) is a device that converts a continuous quantity to a discrete time digital representation. An ADC may also provide an isolated measurement. A ramp-compare ADC produces a saw-tooth signal that ramps up or down then quickly returns to zero. When the ramp starts, a timer starts counting. When the ramp voltage matches the input, a comparator fires, and the timer's value is recorded. Timed ramp converters require the least number of transistors. The ramp time is sensitive to temperature because the circuit generating the ramp is often just some simple oscillator. After the conversion it is sent to the microcontroller ports for further proceedings. Microcontrollers are used in automatically controlled products and devices, such as automobile engine control systems, implantable medical devices, remote controls, office machines, appliances, power tools, toys and other embedded systems. By reducing the size and cost compared to a design that uses a separate microprocessor, memory, and input/output devices, microcontrollers make it economical to digitally control even more devices and processes. Mixed signal microcontrollers are common, integrating analog components needed to control non-digital electronic systems. A driver typically communicates with the device through the computer bus or communications subsystem to which the hardware connects. When a calling program invokes a routine the driver issues commands to the device. Once the device sends data back to the driver, the driver may invoke routines in the original calling program. Drivers are hardware-dependent and operating-system-specific. They usually provide the interrupt handling required for any necessary asynchronous time-dependent hardware interface. A device driver simplifies programming by acting as translator between a hardware device and the applications or operating systems that use it. Programmers can write the higher-level application code independently of whatever specific hardware device. A buzzer or beeper is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric. Typical uses of buzzers and beepers include alarm devices, timers and confirmation of user input such as a mouse click or keystroke. A display device is an output device for presentation of information in visual or tactile form (the latter used for example in tactile electronic displays for blind people). When the input information is supplied as an electrical signal, the display is called an electronic display.

2. PROBLEM IDENTIFICATION

The problem which we have faced during this project is basically the calibration process and sensitivity adjustment as describe below.

2. A. Calibration of Gases

Gas sensors need to be calibrated and periodically checked to ensure sensor accuracy and System integrity. It is important to install stationary sensors in locations where the calibration can be performed easily. The intervals between calibrations can be different from sensor to sensor. It is quite unlikely that you will ever use an absolute method for gas detection. Rather, you will employ any one of dozens of "relative" [or "reference," but not necessarily EPA Reference] methods that is, methods that produce some output that must be calibrated against a known standard. Even though proper calibration is 90% of successful gas detection, it is a subject that has been neglected often purposely by the majority of instrument manufacturers. There's a good reason for this, of course: Proper calibration can often be difficult and expensive. But, we're getting a bit ahead of ourselves.

2. B. Sensitivity Adjustment

In a gas sensor sensitivity adjustment create a problem because of different gas sensor module have different sensitivity adjustment. For gas sensor to work properly sensitivity adjustment is required to be full filled. Sensitivity adjustment was necessary, without this we cannot use this sensor in a desired way. In this project we can use two gas sensor modules MQ2 and MQ3.

Its sensitivity adjustment is given below:

- Resistance value of MQ-2 is difference to various kinds and various concentration gases. So, when using these components, sensitivity adjustment is very necessary. We recommend that you calibrate the detector for 1000ppm liquefied petroleum gas<LPG>,or 1000ppm iso-butane<i-C4H10>concentration in air and use value of Load resistance that (RL) about 20 KΩ (5KΩ to 47KΩ)

- Resistance value of MQ3 is difference to various kinds and various concentration gases. So, when using these components, sensitivity adjustment is very necessary. We recommend that you calibrate the detector for 0.4mg/L (approximately 200ppm) of Alcohol concentration in air and use value of Load resistance that (RL) about 200 KΩ (100KΩ to 470 KΩ).

III. EXPERIMENTAL RESULT

Here Shows the working of our project in proteus where we simulate it and run it before assembling the part.

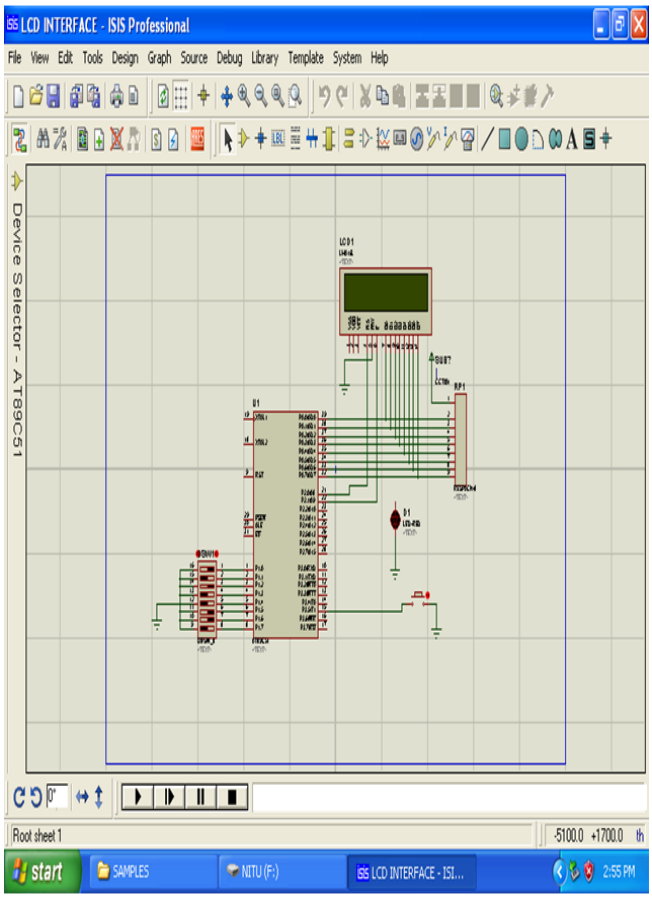

Figure6.1 -Result for describing the detection of gas

The above shows the software processing of our project in which the we simulate before assembling the hardware parts of our project in which after simulation the output shows whether the gas is detected or not and which type of gas id detected the sensor before assembling include the calibration process. Gas sensors need to be calibrated and periodically checked to ensure sensor accuracy and System integrity. It is important to install stationary sensors in locations where the calibration can be performed easily. The intervals between calibrations can be different from sensor to sensor. Generally, the manufacturer of the sensor will recommend a time interval between calibrations. However, it is good general practice to check the sensor more closely during the first 30 days after installation. During this period, it is possible to observe how well the sensor is adapting to its new environment. Also, factors that were not accounted for in the Design of the system might surface and can affect the sensor's performance. If the sensor functions properly for 30 continuous days, this provides a good degree of confidence about the installation. Any possible problems can be identified and corrected during this time. Experience indicates that a sensor surviving 30 days after the initial installation will have a good chance of performing its function for the duration expected. Most problems such as an inappropriate sensor location, interference from other gases, or the loss of sensitivity will surface during this time. During the first 30 days, the sensor should be checked weekly. A typical calibration schedule for a fixed system may be quarterly, bi-annually or even annually with some of the more robust units. A typical calibration schedule for a portable gas detector is a daily bump test accompanied by a monthly calibration.

IV. CONCLUSION

The importance of gas sensing is set to grow with increasing requirements for safety and environmental protection across many industries. The current range of any gas sensing technologies has served us well but the future holds many new possibilities. Power and size reductions and an improvement in ruggedness will allow a new generation of body worn devices. These Ways will be developed to improve performance whilst at the same time reduce cost; new sensors will be targeted at enhancing environmental protection. For these purpose we have designed the Gas Detector for LPG senses and alcohol sensing where it detects the gas and sense it for printing the result and alerting through a buzzer. By use of Gas Detector we can detect multiple gases like CO, LPG, Natural gases like methane, propane.

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