

Gas Accident Prevention with GSM Alert

Saurav Kumar¹, Anurag Sharma², Aditya Mishra³, Khsitij Gharat⁴, Prof. Jyoti Mali⁵

Department: - Electronics and Telecommunications (EXTC)

Atharva College of Engineering

Malad, Mumbai, India

Abstract--Gas leakage tragedies and accidents have lead to heavy losses over the years. So it is very important to detect any gas leakage and prevent any accidents. We here propose to build the system using a MQ6 gas detection sensor and interface it with 8051 family microcontroller along with GSM modem. Our system uses the gas sensor to detect any gas leakages. The signal from gas sensor is applied to microcontroller as soon as it encounters a gas leakage. And we also used the Fire sensor to detect the fire level, Temperature sensor LM35 and LDR also used. The microcontroller processes this signal and sends out a signal to the GSM modem with required message details. The GSM modem now sends out an alerting SMS to the authorized people so that they may handle the issue.

Keywords:- Gas Sensor, LCD Display 16*2, Light Dependent Resistor, Comparator, GSM Modem Sim900, Microcontroller, Heat Detector, IR Module Max232, Buzzer, Relay, Inductor, RS 232 Converter

I. INTRODUCTION

Gas leakage tragedies and accidents have lead to heavy losses over the years. So it is very important to detect any gas leakage and prevent any accidents. We here propose to build the system using a MQ6 gas detection sensor and interface it with 8051 family microcontroller along with GSM modem.

The gas leakages are detected by gas sensor, the signal from gas sensor is applied to microcontroller and we also used the Fire sensor to detect the fire level, Temperature sensor LM35 and LDR also used. The microcontroller processes this signal and sends it to the GSM modem. The GSM modem now sends out an alerting SMS to the authorized people so that they may handle the issue.

II. BLOCK DIAGRAM DISRIPTION

The block diagram provided by Atmel™ above that showed the architecture of 89S52 device seemed a bit complicated. A simpler architecture can be represented below.

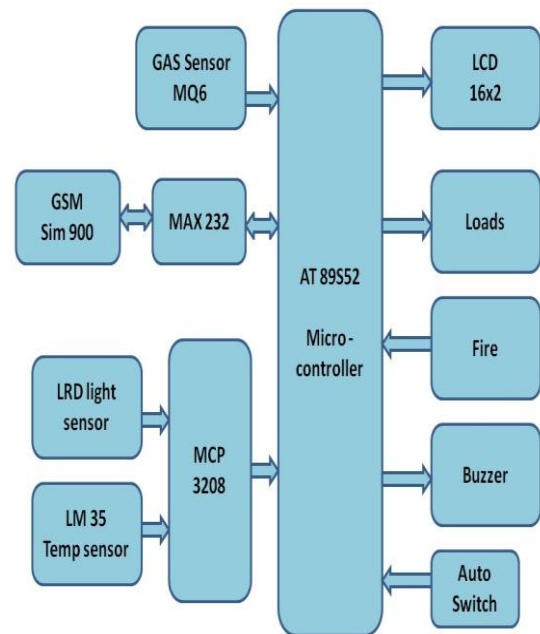
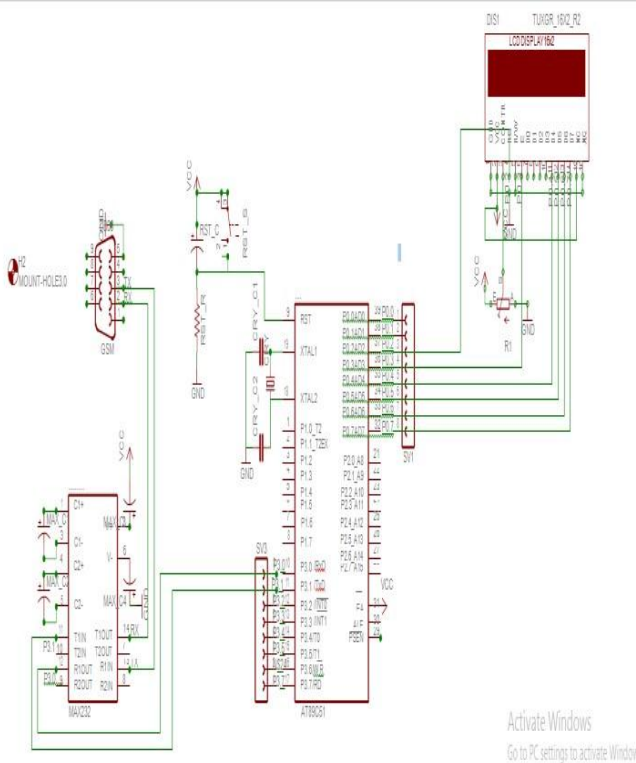


Fig 1. Block Diagram

The 89S52 has 4 different ports, each one having 8Input/output lines providing a total of 32 I/O lines. The gas sensor and fire wo purposes sensor are connected to pin 0 and 1 of port1 with the help of comparator, the temperature sensor and LDR are connected to port 1 using analog to digital converter. LCD is connected to port0 having 6 pin all of this 4 is for data and 2 pins are for controlling. GSM modem is connected to port 3 of microcontroller with max232. Buzzer is connected to pin6 of port0

III. CIRCUIT DIAGRAM AND DESCRIPTION



I. GAS Sensor

A gas detector is a device that detects the presence of gases in an area, often as part of a safety system. A gas detector can sound an alarm, giving them the opportunity to leave. This device is of great importance as there are gases which are harmful to organic life. This type of device is used widely in industry to monitor manufacture processes and emerging technologies like photovoltaic.

Gas leak detection is the process of identifying potentially hazardous gas leaks by sensors. Exposure to toxic gases can also occur in operations such as painting, fumigation, fuel filling, construction, landfill operations. Common sensors include combustible gas sensors, photo ionization detectors, infrared point sensors, ultrasonic, electrochemical and semiconductor sensors. All of these sensors are used for a wide range of applications and can be found in paper pulp mills, aircraft and shipbuilding facilities etc.

A. LCD Display 16*2

The display of LCD is of electronic type module and find a wide range of applications. These modules are preferred over seven segments LEDs.

A 16x2 LCD means it can display 16 characters. In this LCD each character in this LCD display 5x7 matrix. Command and Data are the two registers in LCD display.

The command given to LCD is stored by command register. A command is an instruction given to LCD to do a predefined task for initializing it.

B. Light Dependent Resistor

A Light Dependent Resistor is also called as a photoresistor which is sensitive to resistivity of electromagnetic radiation,. Hence, they are light sensitive devices. They are also called as photo conductive cells or photocell. They are made up of semiconductor materials having high resistance. Photo conductivity is the principle on which light dependent resistor works. When light falls i.e. when the photons fall on the device, the electron which are present in the valence band of the material are excited to the conduction band.

These photons in the incident light should have energy greater than the band gap of the semiconductor material. Hence when light having enough energy strikes on the device, more and more electrons gets excited in the conduction band which results in large number of charge carriers.

C. COMPARATOR

A comparator as a name suggests is a device that compares two voltages or currents and produces the outputs in a digital signal form.

It has two analog input terminals and one binary digital output. They are commonly used in devices that measure and digitize analog signals, such as analog-to-digital converters (ADCs), as well as relaxation oscillators.

General-purpose operational amplifier is generally slower than the dedicated voltage comparator pressed into service as a comparator. A dedicated voltage comparator chip such as LM35 is designed to interface with a digital logic interface. The output is a binary state often used to interface real world signals to digital circuitry. If there is a voltage source which is fixed for example, a DC adjustable device in the signal path, a comparator is just the equivalent of a cascade of amplifiers. Analog signals will enter the digital domain with unpredictable results. The circuit consists of mainly Bipolar transistors. For very high frequencies, the input impedance of the stages is low. Fast small Schottky diodes, like those found in binary logic designs, improve the performance. Slew rate has no meaning for these devices.

D. GSM Modem Sim900

This is a GSM compatible quad band cell phone which works on different frequencies and which can be used not only to access the Internet, but also for oral communication and for SMSs. Externally, it looks like a big package with L-shaped contacts on four sides. Internally, the module is managed by an AMR926EJ-S processor, which controls phone communication, data communication and through an UART and a TTL serial interface the communication with the circuit interfaced with the cell phone itself.

The TTL serial interface is in charge not only of communicating all the data relative to the SMS already received but also of receiving the circuit commands that can be either AT standard or AT-enhanced SIM Com type. The module is supplied with continuous energy and absorbs a maximum of 0.8 A during transmission.

E. BUZZER

A buzzer or beeper is an audio signaling device, which may be electromechanical, piezoelectric. Buzzers and beepers are of great importance which include alarm devices, timers, and confirmation of user input such as a mouse click or keystroke.

F. RELAY

A relay is an electrically operated switch. Relays are used where several circuits must be controlled by one signal. Long distance telegraph circuits was the first one to use first relays as amplifiers: they transmit signal coming in from one circuit and re-transmitted it on another circuit. Solid-state relays control power circuits with no moving parts.

Magnetic latching relays require to move their contacts in one direction, and another, redirected pulse to move them back. Magnetic latching relays are useful in many applications.

On a single coil device, the relay will operate in one direction when power is applied with one polarity and vice versa

G. MICROCONTROLLER

A microcontroller is a type of small computer which contains a processor core, memory and programmable input or output peripherals. Program memory in the form of NOR flash or OTP ROM is also often included on chip, as well as a typically small amount of RAM. Microcontrollers are greatly used in devices, such as automobile engine control systems, implantable medical devices, remote controls, office machines and other system. Some microcontrollers may operate at frequencies as low as 4 kHz, for low power consumption (single-digit milliwatts or microwatts). They will generally have the ability to retain functionality. Power consumption while sleeping may be just nanowatts. Other microcontrollers serve where they may need to act more like a digital signal processor, with higher clock speeds and large power consumption

H. HEAT DETECTOR

A heat detector is a fire alarm device designed to respond when thermal energy which is convicted increases. The thermal mass and conductivity of the element synchronize the rate flow of heat in the element. Heat detectors have two main classifications of operation, "rate-off rise" and "fixed temperature. It is used to reduce damage in property. It is triggered when temperature increases.

I. IR MODULE

Infrared (IR) flame detectors monitor the infrared spectral band. These are sensed using a specialized fire-fighting thermal imaging camera (TIC), a type of thermo graphic camera. False alarms can be caused by others. Water on the detector's lens will greatly reduce the accuracy of the detector, as will exposure to direct sunlight. A IR flame detector is sensitive to wavelengths around 4.4 micrometers, which is a spectral characteristic peak of hot carbon dioxide as is produced in a fire. The usual response time of an IR detector is 3–5 seconds.

J. MAX232

The MAX232 is an integrated circuit first created in 1987 by Maxim Integrated Products that converts signals. The MAX232 is a dual transmitter / dual receiver that typically is used to convert the RX, TX and other signals. The drivers provide TIA-232 voltage level outputs (about ± 7.5 volts) from a single 5-volt supply by on-chip charge pumps and external capacitors.

TIA-232 inputs, which may be as high as ± 25 volts, to standard 5 volt TTL levels. These receivers have a typical threshold of 1.3 volts. The MAX232 replaced an older pair of chips MC1488 and MC1489 that performed similar RS-232 translation. MC1489 quad receiver chip required 5 volt power. The main disadvantages of this older solution was the power requirement, only supported 5 volt digital logic, and two chips instead of one.

K. RS232 CONVERTER

RS232 is a standard for serial communication transmission of data. It formally defines the signals connecting between a Data Terminal Equipment such as a computer terminal and a DCE, such as a modem. The RS-232 standard is commonly used in computer serial ports. An RS-232 serial port was once a standard feature of a personal computer used for connections to modems, printers, mice, data storage. However, RS-232 is hampered by low transmission speed, large voltage swing. In modern personal computers, USB has displaced RS-232 from most of its peripheral interface roles. Many computers do not come equipped with RS-232 ports and must use an internal expansion card with one or more serial ports to connect to RS-232 peripherals. Image preprocessing includes Image acquisition, Iris Localization and Normalization The first processing step consists in capturing the image of the eye and locating the inner and outer boundaries of the iris. Iris normalization is done in order to rectify the orientation of the image.

IV. CONCLUSION

LP gas which used in many applications because of its desirable properties like homes, hostels, industries, vehicles so we can use this device if there is any gas leakage in the system. This system is capable of detecting gas leakage and if leakage exceeds certain level this system automatically alert the people by sending the message and alert the people at home by activating the LED Buzzer

V. FUTURE SCOPE

We can work on increasing the features of this device by using various other sensors. We can reduce the cost of this device by replacing some components with its cheaper alternative components. We can also use a buzzer as an emergency alarm in the neighboring area.

VII. ACKNOWLEDGMENT

We are grateful to ATHARVA COLLEGE OF ENGINEERING for giving us the opportunity to do this project work in the Department of Electronics and Telecommunication Engineering.

We feel privileged to express our deepest sense of gratitude to our project guide Prof. Dr. Jyoti Mali for her continuous support and guidance throughout our project work as well as our principal DR. SHRIKANT KALLURKAR who gave us the golden opportunity to present this wonderful project at ICIATE-2017. We don't have words to express our gratitude towards our parents for their encouragement and confidence on us which shaped our carrier in its present form.

REFERENCES

- [1] GSM:” Architecture, protocols and services” by JorgEberspacher, Christian, Hansjoergvogel, Christian Hartmann, John Wiley Son Ltd, 2009
- [2] Fraiwan, Luay, et al. "A wireless home safety gas leakage detection system." 2011 1st Middle East Conference on Biomedical Engineering. IEEE, 2011.
- [3] Hanwei Electronics Co. Ltd, MQ 5 sensor Datasheet
W. Chung, and D. Lee, "Real time multi-channel gas leak monitoring system using CPLD chip," Sensors and Actuators B, Vol. 77, pp. 186- 189, 2001