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ARM BASED GAS MONITORING SYSTEM

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***Abstract*: -** This paper deals with the gas leakage detection and control system using arm microcontroller, and also to present a new system automatically books the cylinder when the gas is about to empty by sending a notification to the gas agency using a GSM module. Nowadays gas leakage has become a major problem in the industrial sector and in residential sector, so it is necessary to have good safety system in such place. So this system detects, monitor and control the leakage of LPG gas using gas sensor and alerts the person by using buzzer and by sending messages, to take the necessary action it automatically switches on the exhaust fan and sprinkler to decrease the gas concentration in air. GSM module is used to provide the information to the gas agency to book the cylinder automatically when the weight of the gas cylinder goes below 2 kg.

Keywords: ARM Microcontroller, GSM Module, LPG gas Sensor.

I. Introduction

The usage of LPG gas has become vast in today's world. LPG is used for various purpose in home, in industries and in other commercial areas.

LPG is inflammable mixture of hydrocarbon gases like propane and butane. The loss of this gas can be dangerous and these gases have to be monitored. It is odorless gas due to which Ethanol is added as powerful odorant, so that leakage can be easily detected.

Gas leakages are one of the major reasons behind fire accidents. The system automatically detects gas leakages. The system efficiently avoids the chances of any fires accidents which could have been caused due to gas leakage. We use ARM cortex along with gas sensor to detect CNG/LPG gas presence along with fan, buzzing alert, stepper motor and display based circuitry interfaced to Arm cortex to develop this accident avoider system.

Here we propose an automated gas detection and accident avoider system. The system automatically detects gas leakages. If the leakage is detected, then this system automatically switches on the exhaust fans. One exhaust is used to push the gas out of the room. While another fan is used to pull in fresh air from outside at the same time sending out an alert message to turn off the gas supply. This system efficiently avoids the chances of any fires accidents which could have been caused due to gas leakage.

We use ARM cortex along with gas sensor to detect lpg gas presence along with 2 fans, buzzing alert and display based circuitry interfaced to Arm cortex to develop this accident avoider system.

The ARM Microcontroller have less number of transistors and these are cost sensitive and high performance devices. One of the most advanced form of these microcontrollers is a cortex controller, it is mostly used in wireless communication technologies and other embedded system due to benefits such as low power consumption, etc.

ARM Cortex is enhanced for low cost an energy efficient Microcontroller. It is a high performance 32-bit processor which offers significant benefits to the developers. The ARM Microcontroller runs at 100 MHz frequency and high performance therefore it supports the high level languages

Fig.1. Gas leakage schematic diagram

II. Hardware and Working Model

1. Power Supply

Here we use power supply of +5v, it is a 3 terminal linear fixed voltage regulator is a popular choice for creating either

positive or negative voltages. There are many varieties of 3 terminal voltage regulators available in a standard TO-220 package with the most popular fixed voltage regulator being the 78XX series positive regulators which the range from the 7805, +5v fixed voltage regulator.

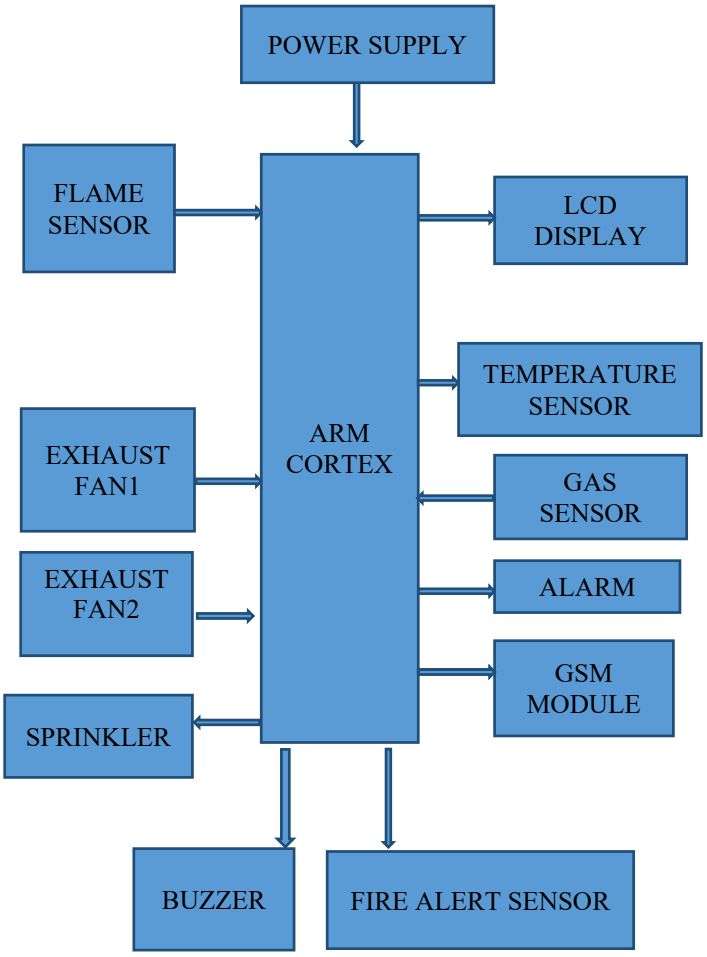


Fig.2. Hardware configuration of the working Model.

2. *Flame Sensor*

The sensor which is sensitive to a normal light is known as flame sensor. With response to the detected flame it includes sounding an alarm by deactivating fuel path and by activating fire suppression system. It is built using an electronic circuit. It detects the flame within the range of 70nm-1100nm wavelength.

3. *Exhaust Fan*

Exhaust fan is a device which is used to suck or push air into or out of the room

Exhaust Fan1

With the detection of leakage, the exhaust fan1 is used to push the air out of the room.

Exhaust Fan2

exhaust fan2 is used to pull the air into the room by letting the leakage gas outside room.

4. *Sprinkler*

A fire sprinkler system it is used to protect from fire accidents. The fire sprinkler system consisting of a water supply system. They are designed to be heat sensitive so that the sprinklers activate when temperature rises to 155-165 degrees. These systems are used worldwide, over 90% of fires were controlled by fire sprinklers alone.

5. *Buzzer*

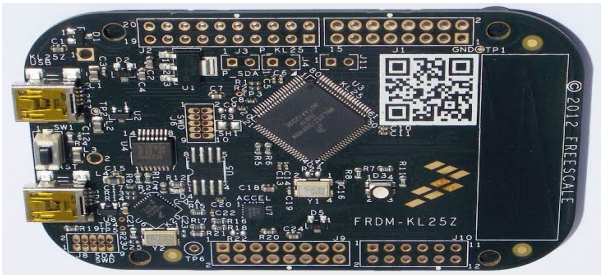
A buzzer is an audio signaling device which may be mechanical, electromechanical or piezo electric. Early devices were based on electro mechanical devices which is identical to an electric bell. Door bells are one of the mechanical type of buzzer. When the leakage occurs it shows warning by giving a buzzer sound.

6. Fire Alert Sensor

Automatic fire alert sensors get activated by detecting fire smoke or heat. These devices respond to high temperatures. After activation the device it will send a signal to the alarm system to perform.

7. ARM CORTEX

ARM cortex is a processor. ARM is the name of the manufacturer that creates these processors. These processors are basically used for embedded system processing applications for example your smartphones. These processors are highly efficient. Also the master card sized computer Raspberry pi also uses the ARM processors. These are used for technical computing for an example controlling any real world application with the assistance of computer. The clock speed of the processor has a great importance because the speed of the clock helps to determine the speed of the processor. More is that the clock speed more fast is that the processor. The clock speed 1.3 Ghz processor.

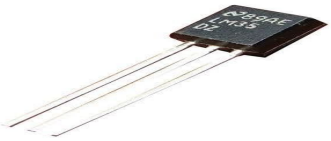


8. LCD Display

LCD is an electronic display module which uses liquid crystal to provide a clear image. The 16*2 LCD display is a very basic module commonly used in DIY.

9. Temperature Sensor

A thermometer is a device that measures temperature gradient. Thermometer increasingly use electronic means to provide a digital display or input to a computer. Constant volume thermometry and Radiometric thermometry. Based on physical quantity a thermometer is called as primary or secondary.



10. Gas Sensor

Here the main role of gas sensor is to detect the leakage of LPG gas. The gas detectors can be used to detect combustible, flammable and toxic gases and oxygen depletion. Nowadays MOS plays a vital role in environmental gas detectors. These sensors are used to detect the amount of LPG gas leakage.

11. Alarm

Alarm is used to give an alert to an individual when gas leakage occurs.

12. GSM Module

Global System for Mobile Communications. In Practical the GSM Specification supports 35kilometers.GSM networks operate a different carrier frequency ranges network in 900MHZ bands. The transmission power in handset is limited to a max of 2watts in GSM 850/900 and 1 watt in GSM 1800/1900.GSM module provides information to the gas agency to book the cylinder automatically.

III. RESULTS

In this Proposed system it takes the input from the gas sensor and sends each data to the ARM cortex. ARM manipulates the data and sends the manipulated data to all the sensors, buzzer, LCD, exhaust fan, GSM module, which alerts us about the leakage of gas and we can prevent the leakage of gas.

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