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GAS LEAKAGE DETECTION AND CONTROL

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ABSTRACT : *The aim of our project is to provide wireless LPG leakage monitoring system for home safety. LPG (Liquefied Petroleum Gas) is a popular cooking fuel. LPG gas is a flammable mixture of hydrocarbon gases(composed of mostly propane and butane) used as a fuel in house appliances and vehicles and in industries. This project detects the leakage of the LPG and alerts the customer about the leakage and control it. The leakage is detected by the gas sensor that is fitted with the cylinder. It alert customer using a GSM module, while activating the alarm and exhaust fan. It automaticallycontrols the leakage of gas using solenoid valve by closing its knob.By this, the exhaust fan is also turned on for throwing the gas out and the main power supply is turned off. The buzzer gets on thus used to alert the neighbour and safeguard the life of humans. The additional advantage of the system is that it continuously monitors the level of the LPG present in the cylinder using load cell .The weight of the gas is displayed in the LCD fitted to the gas. When the weight of the gas goes below 2 Kg it automatically books the cylinder using GSM module. The device ensures safety and prevents suffocation and explosion due to gas leakage. This project is implemented using ARM7 processor and simulated using KEIL software.*

Keywords: .*Gas sensor, Weight module, GSM, ARM microcontroller, Buzzer, Solenoid valve.*

I. INTRODUCTION

Nowadays the use of liquefied petroleum gas (LPG) is rapidly increasing in developing countries like India as it produces low smoke and less soot. The LPG is a flammable mixture of hydrocarbon gases like propane and butane. LPG is finding wide usage in homes, industries and in automobiles because of its desired properties which include high calorific value and produce less smoke. Natural gas is another widely used fuel in homes. Both burn to produce clean energy, however there is a serious threat about their leakage. The gases being heavier than air do not disperse easily and may lead to suffocation when inhaled. The number of death due to explosion of gas cylinders has been increased in recent years. There is a need for a system to detect and also prevent leakage of LPG. For this three main units are being used. A sensor unit is used to sense the leakage of the gas. For that a gas sensor mq6 is used that detects the presence of gas leakage. As the leakage of the gas is detected the information is sent to the microcontroller unit which provides the information to the user about the leakage using GSM module. Meanwhile the solenoid valve is being fitted that controls the flow of the gas by closing its knob. Hence it is very useful method as it controls the leakage of the gas completely even when the customer is not available in the home at that time. In addition to this several provisions are done for external safety like fitting a buzzer that is used to produce alarm while leakage occurs that is used to alert the neighbour for their safety. GSM is used to provide the information to the gas agency to book the cylinder automatically when the weight of the cylinder goes below 2Kg.The rs-232 cable is used as a source of communication between the microcontroller and the GSM which is helpful to deliver the information shortly.

LITERATURE SURVEY:

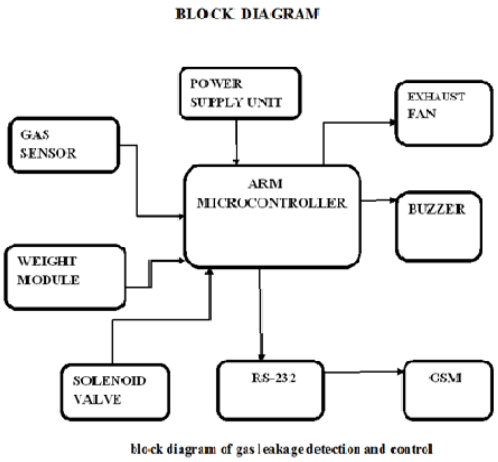
[8].In this paper, the leakage of dangerous gas can be detected using gas sensor unit. This can be detected by the microcontroller and the buzzer is turned on. After a delay of few milliseconds, the exhaust fan is also turned on for throwing the gas out and the main power supply is turned off.

[9].In this paper, this system detects the leakage of gas and alert the customer by an SMS and as an emergency measure the system will turn off the power supply, while activating an alarm. The additional advantage is that it continuously monitors the level of LPG present in the cylinder using load sensor. In this paper, the gas sensor senses the gas and the information send to the microcontroller which can turn off the power supply.

[10].In this paper, it insist that is to present such as design that can automatically detect and stop gas leakage in vulnerable places. Gas leakage system consist of GSM module that warns by sending SMS. One of the preventive methods to stop

accidents associated with gas leakage is to install gas leakage detection kit at vulnerable places. The industrial sector, residential premises and gas powered vehicle like CNG(Compressed Natural Gas) buses and cars.

[11].In this paper, the gas leakage resulting into fatal inferno has become a serious problem in household and other areas where household gas is handled and used. It alerts the subscriber through the alarm and the status display besides turning off the gas supply valve as a primary safety measure.



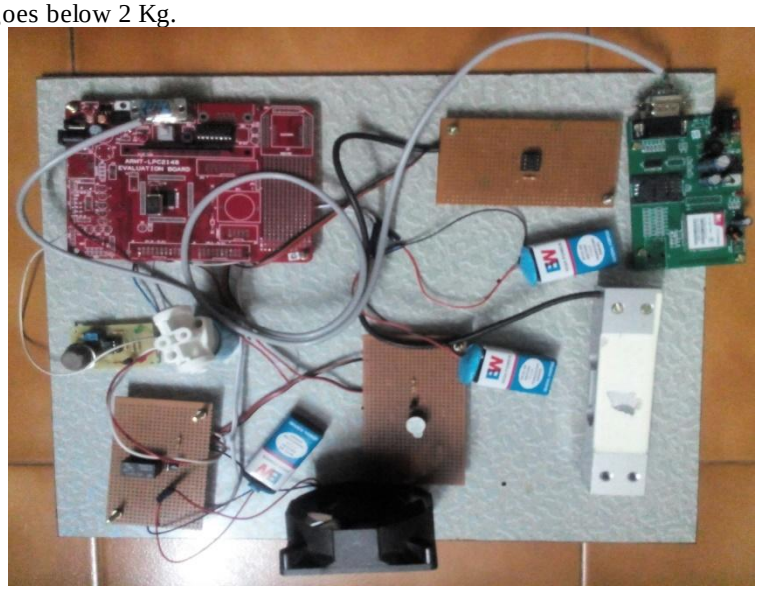
block diagram of gas leakage detection and control

In this block diagram, there are two sections transmitter and the receiver.But here both are present in the same system.Here the gas sensor,weight module ,the power supply unit,ARM microcontrollerand the solenoid valve act as the transmitter section whereas the exhaust fan, buzzer GSM and the RS-232 cable act as receiver.Here 18v power supply is used to control the entire set up.Initially the power supply is given to the microcontroller and the gas sensor and the GSM.There is also a relay that is fixed which is used to regulate the power supply to the necessary component.There also uses a 555 timer that is used to control the delay that occurs in the circuit. When the gas leaks, the gas detector present in the gas sensor detects it and send the information to the microcontroller. The LPC2148 microcontrollers are based on 32/16 bit ARM7 TDMI-S CPU core .They have real time emulation and embedded trace support that combines the micro-controller with embedded high speed flash memory of 512kB.A 128-bit wide memory interface and unique accelerator architecture enable 32-bit code execution maximum clock rate. The ARM is a 32-bitreduced instruction set computer(RISC) instruction set architecture (ISA) developed by ARM Holdings .It was known as the Advanced RISC Machine, and before that as the 32-bit ISA in terms of numbers produced.The ARM7TDMI-S is a general purpose 32-bit microprocessor, which offers high performance and very low power consumption .The ARM architecture is based on Reduced Instruction Set Computer(RISC) principles, and the instruction decode mechanism set and related decode mechanism are much simpler than those of microcontroller programmed complex Instruction set computers(CISC).This simplicity results in a high instruction throughput and impressive real time interrupt response from a small and cost-effective processor core .The microcontroller gives the information to the solenoid valve to close its knob.The solenoid valve consist of a disc that is in contact with the spring. When the gas leaks the disc comes in contact with the spring so that it stops the flow of gas. After all the gases are thrown out the disc moves so that the gas flows.At that time the buzzer starts alarming thereby to alert the neighbours. A Buzzer or beeper is a signaling device, usually electronic, typically used in automobiles, household appliances such as microwave oven or game shows. It most commonly consist of number of switches or sensors connected to a control unit that determines if and which button was pushed or preset time has lapsed, and usually illuminates a light on the appropriate button or control panel, and sounds a warning in the form of a continuous or intermittent buzzing or beeping sound .Initially this device was based on an electromechanical system which was identical to an electric bell without the metal gong (which makes the ringing noise).Often these units were anchored to a wall as a sounding board. Another implementation with some AC-connected devices was to implement a circuit to make the AC current into a noise loud enough to drive a

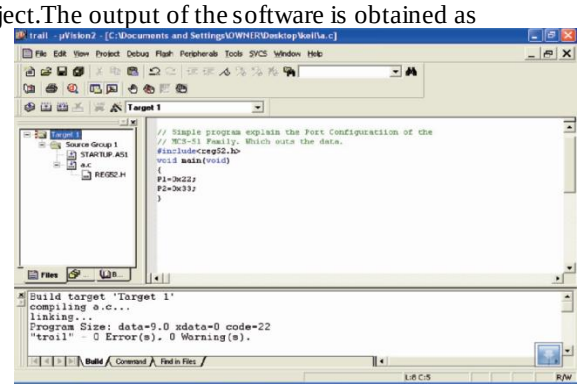
loudspeaker and hook this circuit up to a cheap 8-ohm speaker. At the same time the message about the leakage is also sent to the consumer through the GSM. For this a RS-232 cable is used that transfer the information from the microcontroller to the GSM. Initially thenetwork is divided into three major systems: the switching system(SS), The base station system (BSS) ,and support system (OSS). A GSM modem is a wireless modem that works with a GSM wireless network. A wireless modem behaves like a dial-up modem. The main difference between them is that a dial-up modem sends and receives data through a fixed telephone line while a wireless modem sends and receives through radio waves.GSM modems and dial-up modems support a common set of standard AT commands. In addition to this it also support extended set of AT commands. These extended AT commands are defined in the GSM standards. It helps in reading, writing , deleting and sending SMS messages.This is used to convert the information in the parallel communication to the serial communication.In parallel communication only one message can be transmitted at a time.But in serial communication all the messages are transmitted simultaneously.For a safety measure the exhaust fan is also on so that it throws out all the gases in the room.The GSM is also used for automatic booking of the cylinder.When the weight of the gas goes below 2 Kg the message is sent for the gas agency for automatic booking of the cylinder.This is done with the help of the weight sensor that continuously monitor the weight of the cylinder by placing the cylinder above the weight module.Thus the gas leakage is detected and by continuous transmission of the information they are controlled.

RESULT AND DISCUSSION:

Here as soon as the gas leaks the gas sensor senses and pass it to the microcontroller and then it sends the information to close the knob of the solenoid valve.The exhaust fan also gets on so as to remove the gases in the room.The buzzer also gets on thereby the neighbour gets alert.Then the GSM sends the message to the customer about the gas leakage so that this helps them to take necessary steps to control it.With additional to this it is also used to book the cylinder when the weight of the cylinder goes below 2 Kg.



This output is executed using kEIL IDE software.Here four software are used Flash Programmer is used to convert the embedded c language into the machine language.ORCAD is used to design the circuit board. Embedded c is used to program the necessasarycodings for the project.The output of the software is obtained as



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