

GAS LEAK DETECTION & CTRL BSD ON WIRELESS ZIGBEE

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ABSTRACT

At present gas leakage becomes a serious problem in household, gas vehicles and industries. Gas leakage leads to various accidents resulting into both financial loss as well as human injuries. In context with these issues, the proposed design is able to detect and control gas leakage. The system detects gas leakage and alerts the subscriber through SMS, alarm and display unit. Simultaneously as primary safety, it will turn off the gas supply and power supply of the respective area. The system uses zigbee module for sending data and relay is used for turning off power supply and gas supply. The proposed work utilizes link to send an alert to the consumer and neighbors through zigbee. The system not only takes the corrective action but also confer the gas re-setting of the system.

KEYWORDS0 : Gas, Lpc2148, Zigbee, Relay

INTRODUCTION

Liquid petroleum gas (LPG) is commonly used in homes for central heating, hot-water, gas-fires, cooking, and in mobile heaters for leisure activities such as boats, caravans and barbecues. This energy source is primarily composed of propane and butane which are highly flammable chemical compounds. LPG leaks can happen, though rarely, inside a home, commercial premises or in gas powered vehicles. Leakage of this gas can be dangerous as it raises the risk of building fire or an explosion. The casualties caused by this hazard are still common news in the media. Since the LPG as such does not have any odour, gas companies/refineries add an odorant such as ethanethiol, thiophene or amercaptan so that leaks can be detected easily by most people. However, some people who

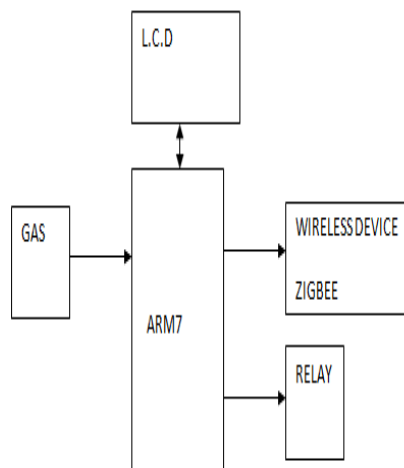
have a reduced sense of smell may not be able to rely upon this inherent safety mechanism. In such cases, a gas leakage detector becomes vital and helps to protect people from the dangers of gas leakage. A number of research papers have been published on gas leakage detection techniques. A wireless home safety gas leakage system has been proposed in where the alarm device provides mobility within the house premises.

The proposed system ensures a continuous monitoring of the gas levels. If the gas level increases above the normal threshold level of 400ppm butane (LPG), the system starts to issue early warning alarms at 100ms interval, which implies low level gas leakage. If the leakage level increases to 575ppm of butane (LPG), the system activates high severity audio alarms at 50ms intervals

warning the occupants to run to safety. To ensure the user's/occupier's safety, the alarm will not switch off until the level of gas reaches the normal value of 400ppm. These gas leakage levels correspond to the UK occupational safety standards using zigbee module

BLOCK DIAGRAM

Gas Leakage Detection & Controlling



LPC2148:

The LPC2141/2/4/6/8 microcontrollers are based on a 32/16 bit ARM7TDMI-S CPU with real-time emulation and embedded trace support, that combines the microcontroller with embedded high speed flash memory ranging from 32 kB to 512 kB. A 128-bit wide memory interface and unique accelerator architecture enable 32-bit code execution at the maximum clock rate.

FEATURES OF ARM PROCESSOR:

- 16/32-bit ARM7TDMI-S microcontroller in a tiny LQFP64 package.

- 8 to 40 kB of on-chip static RAM and 32 to 512 kB of on-chip flash program memory.

128 bit wide interface/accelerator enables high speed 60 MHz operation.

- In-System/In-Application Programming (ISP/IAP) via on-chip boot-loader software.

Single flash sector or full chip erase in 400 ms and programming of 256 bytes in 1 ms.

- Embedded ICE RT and Embedded Trace interfaces offer real-time debugging with the on-chip Real Monitor software and high speed tracing of instruction execution.

- Single 10-bit D/A converter provides variable analog output.

- Two 32-bit timers/external event counters (with four capture and four compare

channels each), PWM unit (six outputs) and watchdog.

- Low power real-time clock with independent power and dedicated 32 kHz clock input.

The ultrasonic wave is spread in the air and hit the nearest object and reflected from the object which is received by the ultrasonic receiver. The received wave is given to amplifier in order to amplify the received weak signal. After the amplification the amplified wave is given to zero adjustment amplifier because the amplified wave is in the range of above 6v level. Then the output is given to comparator in which the wave signal is converted into corresponding square wave signal. Then the square wave signal is given to input of the microcontroller. Now the microcontroller compares the time between the transmitted signal and received signal and generates the corresponding pulse output which is equal to distance of the object. Then the pulse signal is given to input of BC547 transistor.

ZIGBEE COMMUNICATION:

ZigBee is a specification for a suite of high level communication protocols using small, low-power digital radios based on an IEEE 802 standard for personal area networks. Applications include wireless light switches, electrical meters with in-home-displays, and other consumer and industrial equipment that requires short-range wireless transfer of data at relatively low rates. The technology defined by the ZigBee specification is intended to be simpler and less expensive than other WPANs, such as Bluetooth. ZigBee is targeted at radio-frequency (RF) applications that require a low data rate, long battery life, and secure networking. ZigBee has a defined rate of 250 kbps best suited for periodic or intermittent data or a single signal transmission from a sensor or input device. ZigBee based traffic management system have also been implemented. The name refers to the waggle dance of honey bees after their return to the behave.

GAS SENSOR:

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 sensor can also sense iso-butane, propane, LNG and cigarette smoke.

Features:

- High Sensitivity
- Detection Range: 100 - 10,000 ppm iso-butane propane
- Fast Response Time: <10s
- Heater Voltage: 5.0V
- Dimensions: 18mm Diameter, 17mm High excluding pins, Pins - 6mm High

Circuit Description:

The gas sensor is the special sensor which designed for sense the gas leakage. In the gas sensor the supply voltage is given to input terminal. The gas sensor output terminals are connected to non inverting input terminal of the comparator.

Here the comparator is constructed with operational amplifier LM 358. The reference voltage is given to inverting input terminal. The reference voltage is depends on the desired gas intensity. When there is no leakage the non inverting input is grater then inverting input so the output of the comparator is positive voltage which is given to the base of the switching transistor BC 547. Hence the transistor is conducting. Here the transistor is act as switch so the collector and emitter will be closed. The output is taken from collector terminal. Now the output is zero which is given to hex inverter 40106.

When there is gas leakage the inverting input voltage is grater than non inverting input. Now the comparator output is

-12V so the transistor is cutoff region. The 5v is given to hex inverter 40106 IC. Then the final output data is directly given to microcontroller to determine the gas leakage.

RELAY:

Relay is an electrically operated switch. Current flowing through the coil of the relay creates a magnetic field which attracts a lever and changes the switch contacts. The coil current can be on or off so relays have two switch positions and they are double throw (changeover) switches.

Relays allow one circuit to switch a second circuit which can be completely separate from the first. For example a low voltage battery circuit can use a relay to switch a 230V AC mains circuit. There is no electrical connection inside the relay between the two circuits; the link is magnetic and mechanical. There is no electrical connection inside the relay between the two circuits; the link is magnetic and mechanical.

RESULTS



CONCLUSION

In this project work, we have studied and implemented a complete working model using a lpc2148. The programming and interfacing of microcontroller has been mastered during the implementation. This work includes the study of ZIGBEE module using sensors.

GAS is implemented in such a way that it has ZIGBEE module along with this

project. Gas is attached to microcontroller to access relay when gas is detected. It sends data to PC using zigbee to send higher authority person using zigbee and LPC2148.

REFERENCE

- [1].JoaqunGutierrez, Juan Francisco Villa-Medina, Alejandra Nieto- Garibay, And Miguel ngelPorta-Gndara, "Automated Irrigation System Using A Wireless Sensor Network And zigbee module Module", Ieee Transactions On Instrumentation And Measurement, Vol. 63, No. 1, January 2014.
- [2].Vimal.P, Priyanka.V, Rajyasree.M, SanthiyaDevi.P.T,Jagadeeshraja.M, SuthanthiraVanitha.N,"A Novel Approach for Automatic Irrigation and Fertigation Using Embedded System," International Journal of VLSI and Embedded Systems-IjvesVol 05, Article 03257; March 2014.
- [3].Sathiyabama P, Lakshmi Priya C, Ramesh Sm, Preethi B, Mohanaarasi M, "Embedded System Design For Irrigating Field With Different Crops Using Soil Moisture Sensor," International Journal Of Innovative Research In Computer And Communication Engineering Vol. 2, Issue 8, August 2014.
- [4].LiaiGao, Meng Zhang, GengChen,"An Intelligent Irrigation System Based On Wireless Sensor Network and Fuzzy Control, "Journal of Networks, Vol. 8, No. 5, May 2013.
- [5].K.Prathyusha,M.ChaitanyaSuman,"Design of Embedded Systems for the Automation of

Drip Irrigation,” International Journal of Application or Innovation in Engineering Management (Ijaiem) Volume 1, Issue 2, October 2012.

[6] Orazio Mirabella, Senior Member, IEEE, and Michele Brischetto,”A Hybrid Wired/Wireless Networking Infrastructure ForGreenhouse Management,”IEEE Transactions on Instrumentation and Measurement, Vol. 60, No. 2, February 2011.

[7].B.Sivakumar,P.Gunasekaran, T.Selvaprabhu, P.Kumaran, D.Anandan, “The Application of Wireless Sensor Network in the Irrigation Area Automatic System”, IjctaJan-Feb 2012.

[8].S.MuhammadUmair,R.Usman,”Automati on Of Irrigation System Using Ann Based Controller,” International Journal Of Electrical Computer Sciences Ijecs-Ijens Vol: 10 No: 02.May2010.

