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Wireless Monitoring and Detecting of LPG Gas Using Zigbee Module

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ABSTRACT: Gas leakage is 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 monitoring gas leakage. The system detects gas leakage and alerts the subscriber through alarm the report consists of a background into the area of PIC16F877A microcontroller and Zigbee Module, how they are communicating to each other.

KEYWORDS: PIC16F877A, Zigbee Module, MQ2 Sensor, PC

I. INTRODUCTION

This system helps you to upgrade your safety standards. Most importantly protect life and property from disaster by preventing accidents. Its detect the malfunction of a pressurized gas system, so that accumulation of combustible gases and their explosion can be prevented. It also detects the leakage of gas into the area of an appliance when it is in a shutdown condition and not in operation. This system provide gas detection and monitoring which is economical to manufacture and which may be readily installed in conventional trailers and boats which are normally dependent upon a stored supply of pressurized gas.

II. RELATED WORK

Microcontroller based LPG Gas Leakage Detectors Zigbee Module is the system where lot of researcher working on it for its developments from all over the world. Since then, many systems and devices have been developed to detect, monitor, and alert the leakage of a wide array of gases. In the existing method, different gas sensing technology is used. This gas leakage is detected by the semiconductor sensor. Nowadays LPG accidents are occurring mostly. The main reason of these accidents is due to the leakage of LPG. This leakage of LPG starts whenever main regulator valve is forget to close. This is the basis of these kinds of accidents. Already there are some sorts of remedial measures such as when the leakage is detected; message is sent to the fire station and the owner. We can also detect the leakage when exhaust fan is switched on. The first mentioned method has the drawback that there is no control action taken, which need manual control which increase risk to human handling .The second method has the disadvantage that if the wiring of the exhaust fan is not proper then it will directly cause the explosion due to the flow of AC. In all these mentioned method above, there is only detection rather than control.

LPG Gas Leakage Detector has uses such as protection from any gas leakage in homes, cars, hospitals, industries etc. Its act as a safety guard from gas leakage in heating gas fired appliances like boilers, domestic water heaters. Safety from gas leakage in cooking gas fired appliances like ovens, stoves etc. This system has lot of future scope in coming years.

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III. SYSTEM DEVELOPMENT

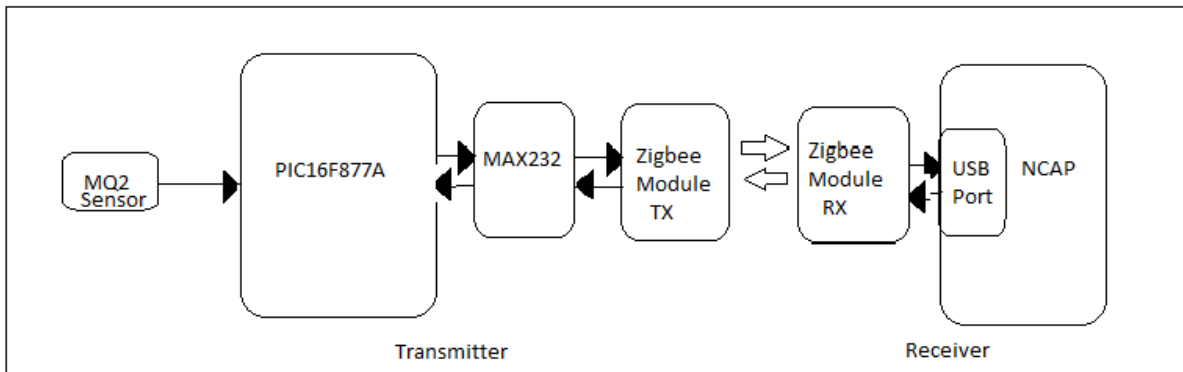


Fig: 1 Block Diagram of Wireless Environment monitoring System

The above block Diagram shows the environment monitoring system by using wireless communication. In this system we monitor/record the Butane, LPG, gases a by using the gas detecting sensor such as MQ2. This sensor interface to PIC16F877A. PIC16F877A will process these sensors inputs by performing operation of A/D conversion. Data sampling, Data analysis etc. Then PIC16F877A output transfer to MAX 232, it converted TTL logic to RS 232 level .then it transfer to zigbee module it means zigbee transmitter. This is used to transmit data to receiver side, receiver attached to PC. Data receives from receiver is used for gas monitoring, recording and controlling purpose.

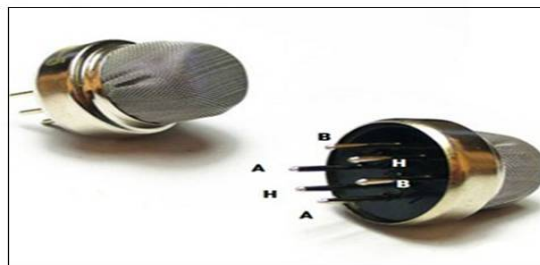


Fig:2 (MQ-2) GasSensors

MQ-2 gas sensor has high sensitivity to Natural gas, Methane and could be used to detect both Methane and Propane. The sensor could be used to detect different combustible gas especially Methane, its low cost and suitable for different application. Sensitive material of MQ-2 gas sensor is SnO₂, which with lower conductivity in clean air. When the target combustible gas exist the sensors conductivity increases higher along with the gas concentration rising. They are used in gas leakage detecting equipment's in family and industry, are suitable for detecting of LPG, i-butane, propane, methane, alcohol, Hydrogen, smoke.

Technical Specifications:

- High sensitivity to Combustible gas in wide range
- High sensitivity to Natural gas Methane, Coal gas, CO etc gas
- Fast response
- Wide detection range
- Stable performance, long life, low cost
- Simple drive circuit.

Applications:

- Gas leak alarm, Gas detector
- Domestic gas leakage detector

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- Industrial Combustible gas detector
- Portable gas detector.

IV. PERFORMANCE ANALYSIS

Hardware Performance

The system performance analysis consists of used sensor specification, graphical representation of gases present in atmosphere and actual database of sensor readings.

Sensor Specification:

MQ2 Sensor

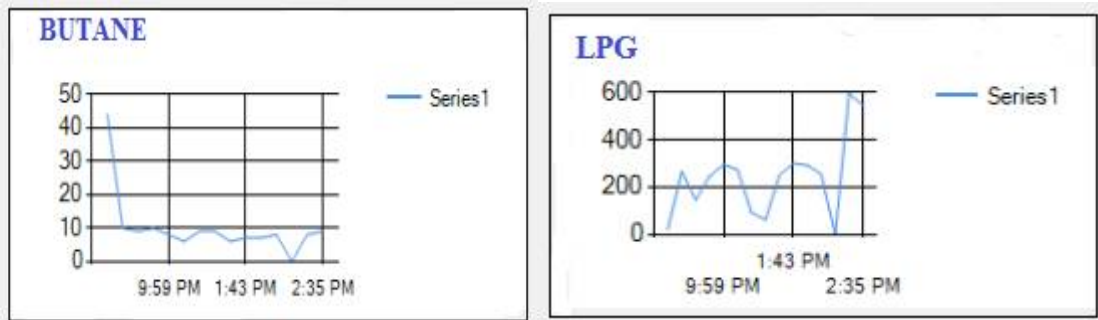
The MQ-2 gas sensor is sensitive to LPG, butane. It could be used in gas leakage detecting equipment's in family and industry. The resistance of the sensitive component changes as the concentration of the target gas changes.

Circuit voltage $5V \pm 0.1$

Heating voltage $5V \pm 0.1$

Load resistance can adjust

Graphical Representation of LPG:



Reading of LPG and Butane:

Time	LPG
14:22	042
16:56	027
17:49	027
10:06	026

Time	Butane
14:22	008
16:56	009
17:49	008
10:06	009

The power consumption of the WEM system is far less than the other available systems. The total cost of the developed WEM system is very less as compared to the existing system

V. STIMULATION RESULT

The simulation studies involve graphical representation of environmental gases. Which is based on proposed system, this systems algorithm is implemented in .NET. This is run in Microsoft Visual Studio, is integrated development environment (IDE) software developed by Microsoft. It can be used to develop console and graphical user interface applications along with Windows Forms applications, web sites, web applications, and web services in both native code together with managed code for all platforms supported by Microsoft Windows, Windows Phone, Windows CE, NET Framework, .NET Compact Framework and Microsoft Silverlight. Result shown by the graph when sensor transmits



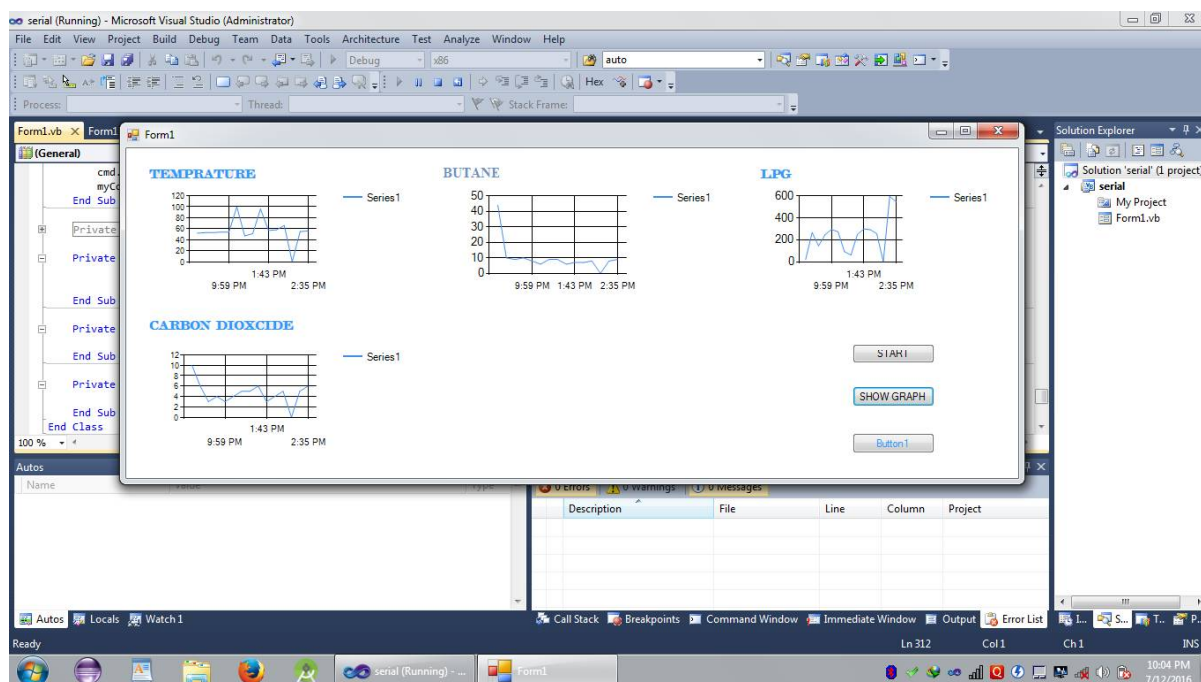
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real time data by using zigbee module which is connected PC, having Microsoft Visual Studio software which shows the result in graphical form.



VI. CONCLUSION

Implementation of this system using zigbee module for monitoring and detection of gas is done. it can used in outdoor application means gas agency, climate monitoring.

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