



A Real Time Application of Li-Fi Technology in Wireless Communication System

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Abstract: Liquefied petroleum gas leaks can happen inside a home, commercial premises, gas powered vehicle and in gas transportation vehicles. Leakage of this gas can be dangerous as it raises the risk of building fire or an explosion, Catastrophe will be occurred. The causality caused by this hazard is still common news in media. The developed system gives the alarm after detection of the presence of gas, GPS Receiver to locate the location, Gas leakage can be controlled by valve and by using wireless communication module i.e. by using LiFi. Continuous real time monitoring of Leaking Gas.

Keywords: Microcontroller, Global Positioning System, sensors, Li-Fi.

I. INTRODUCTION

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 is highly flammable chemical compounds gas leakage in industries, leakage from gas transport system. The danger of LPG, Co gases arising from two aspects, one is the toxicity of these gases themselves, the other side is that the accumulation of these gases will easy be ignited. The position of gas tank or pipeline is usually fixed, so it is easy to inspect, yet the fire site is random, and it will be difficult for inspection. The danger of the CO gas is the same as the LPG and others dangerous gas in the environment. The rapid growing population and economic development is leading to a number of environmental issues in India because of the uncontrolled growth of urbanization and industrialization, expansion and massive intensification of agriculture, and the destruction of forests. Major environmental issues are forest and agricultural degradation of land, resource depletion (water, mineral, forest, sand, rocks etc.), environmental degradation, public health, loss of biodiversity, loss of resilience in ecosystems, livelihood security for the poor road dust due to vehicles also contributing more and more air pollution.

Plants constructed during the 1960's, during the period of rapid economic growth, have already been operating for several decades. Once aged, main facilities will generally have a higher probability of failure in

their component equipment, increasing the maintenance cost and the risk of production opportunities due to facility shutdown. Thus at manufacturing sites, it has become important to make facility maintenance plans and implement them before failure occurs. It is also important to establish an inspection technology for detecting symptoms of failure at the earliest stage possible.

In recent years, the piezoceramic transducer based active-sensing approach has been developed and demonstrated its promises in real-time damage detection and health monitoring of civil infrastructures [18–28]. Due to its advantages of both actuation and sensing capacities, wide bandwidth, fast response, and low cost, piezoceramic based transducers are used in the active sensing approach to structural damage detection. In the active sensing approach, one piezoceramic transducer is used as an actuator to generate the desired wave to propagate through the host structure, and other distributed piezoceramic transducers are used as sensors to detect the wave response.

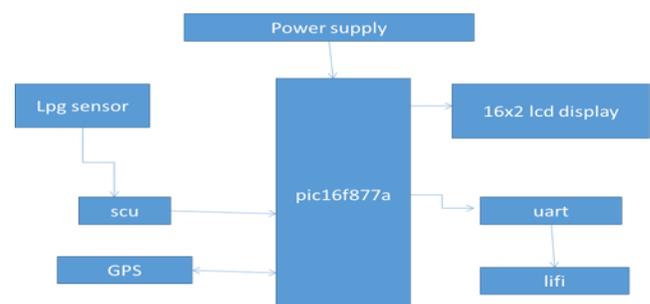




Figure 1: Functional block diagram of transmitter system

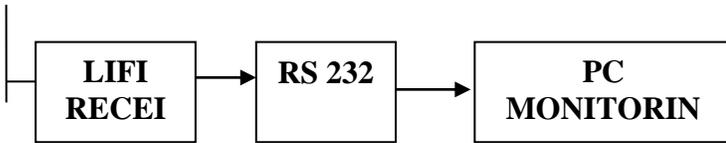


Figure 2: Functional block diagram of receiver system

II. WORKING

The LPG sensor to detect the presence of a dangerous LPG leak in our home or in a service Station, storage tank environment and even in vehicle which uses LPG gas as its fuel. MQ-2 gas sensor is used to sense the poisonous gas and has high sensitivity to LPG and also response to Natural Gas. The sensor has excellent sensitivity combined with a Quick response time. When the target combustible gas exist, the sensor's conductivity is higher along with the gas concentration rising. LPG sensor is fitted to one end of the pipe. LPG gas is sent to the pipe which is moving inside the pipe. When the crack is detected, the information will be send through LIFI using UART port in the microcontroller. Thus, in real time, we can find the crack detection.

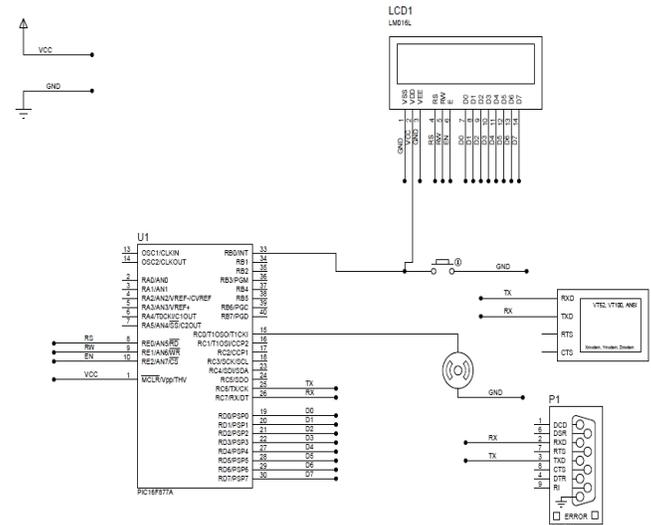
Power supply is given to the microcontroller. The microcontroller is interfaced with the LCD display. UART port acts as a communication medium to transmit data using LIFI. A signal conditioning circuit (SCU) converts the analog signals into digital format. The digitized signals are given to the PIC 16F877a microcontroller. GPS is used to locate the defect in the pipeline.

III. PIC 16F877a DETAILS

This powerful (200 nanosecond instruction execution) yet easy-to-program (only 35 single word instructions) CMOS FLASH-based 8-bit microcontroller packs Microchip's powerful PIC® architecture into an 40- or 44-pin package and is upwards compatible with the PIC16C5X, PIC12CXXX and PIC16C7X devices. The PIC16F877A features 256 bytes of EEPROM data memory, self programming, an ICD, 2 Comparators, 8 channels of 10-bit Analog-to-Digital (A/D) converter, 2 capture/compare/PWM functions, the synchronous serial port can be configured as either 3-wire Serial Peripheral Interface (SPI™) or the 2-wire Inter-Integrated Circuit (I²C™) bus and a Universal Asynchronous Receiver Transmitter (USART) as Figure 1. All of these features

make it ideal for more advanced level A/D applications in automotive, industrial, appliances and consumer applications.

IV. RESULT



The prototype of the gas leakage security system has been shown. This system has been tested by taking a small amount of LPG gas near to the sensor. MQ-2 gas sensor detects the LPG gas and sends a signal to the microcontroller. After that microcontroller sends an active signal to other externally connected devices such as LCD and to the PC using Li-Fi network.

V. CONCLUSION

Gas leakage is one of the major problems in Industrial sectors. Designed System helps in identifying the gas leakage in working atmosphere, in different Gas Tanker which has a fixed position in Industries or in movable gas Tanker on Highways and also gives exact location of that Movable Gas tanker and the intimation is given through a text message including GPS Co-ordinates and transmission of data's are communicated through Li-Fi methodology.

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