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LPG Gas Leakage Detection and Alert System using Arduino

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Abstract: ***LPG gas leakage leads to various accidents resulting in both material loss and human injuries. The risk of explosions, firing, suffocation are based on their physical properties such toxicity, flammability, etc. The number of deaths due to gas cylinder explosions has been increasing day by day. The reasons for such explosions are worn-out regulators, old valves and lack of awareness in handling gas cylinders. So to preventing such type of accidents we are going to develop an Arduino based LPG gas leakage detection and alert system. If gas leakage occurs, the system will detects it and makes an alert by buzzing the buzzer attached with circuit. This system will also contain GSM module which can be used to send the alert message to the user. GSM is a mobile communication modem and it is widely used mobile communication system in the world so with the help of GSM module or Nodemcu we can also control the home appliances with the help of Arduino microcontroller***

I. INTRODUCTION

Liquefied petroleum gas is mixture of a variety of hydrocarbon gas use in fuel or heating appliances for household purpose. Forms of LPG sold-out and bought embrace mixtures that area unit primarily fuel (C3H8), primarily fuel (C4H10) and, most ordinarily, includes both fuel and fuel, looking on the applying. Not like gas, LPG is denser than air, and therefore can flow on floors and have a tendency to settle in lower spots, like basements. LPG are often kept in an exceedingly type of ways. LPG like alternative fuel will be combined with renewable power sources to produce larger dependableness whereas still achieving some reduction in greenhouse gas emissions.

II. PROBLEM MOTIVATION

Gas outpouring results in varied accidents ensuing into each loss also as human injuries. In human's everyday life, atmosphere provides the foremost vital impact to their health problems. The danger of firing, explosion, suffocation all area unit supported their physical properties such flammability, toxicity etc. the amount of deaths thanks to the explosion of gas cylinders has been increasing in recent times. The explanation for such explosion is thanks to substandard cylinders, old valves, done in regulators and lack of awareness victimization gas cylinders boost the risks. Inspections by oil firms found that many LPG customers area unit unaware of safety checks of gas cylinders. One more reason is illegal filling of gas cylinder conjointly causes accidents. There's a requirement for a system to detect and conjointly stop outpouring of LPG.

III. OBJECTIVE

The objective of this project is to detect leakage of LPG based home appliance (Cylinder). If gas leakage occurs with the help of system we can detects it and makes an 4 alert by buzzing the buzzer attached with circuit. This system will also contain GSM module which can be used to send the alert message to the user. With the help of GSM module or NodeMCU we can also control the home appliances with the help of Arduino microcontroller. For displaying message LCD of 16x2 will also be there. Such sensors, nowadays, found conjointly in applications involving air quality control systems and pollution watching. Today's sensors, whereas that includes a high sensitivity to a good gases selection, terribly compact in size and have considerably reduced their power consumption to higher adapt to transportable solutions.

IV. METHODOLOGY

We are going to use a LPG gas sensor module (MQ2) to detect LPG Gas. When LPG Gas leakage will occur, it will give a HIGH pulse on its A0 pin and Arduino continuously read A0 pin. When Arduino will get a HIGH pulse from LPG Gas module it will show LPG Gas Leakage alert message on LCD display and activates buzzer which beeps again and again till the gas detector module doesn't sense the LPG gas in environment. With the help of GSM module alert message will send to registered mobile number. When LPG gas detector module will give LOW pulse to Arduino, then LCD will show No LPG Gas Leakage message. We can also control electrical appliances of our home with the help of GSM module or NodeMCU. When LPG gas leakage will occur then Arduino microcontroller will also cut off the connection of electrical appliances which is connected to relay module

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V. DATA FLOW DIAGRAM-

Data Flow diagram (DFD) is a traditional demonstration of the view of information flowing within a system. A clean and clear DFD can clearly show the right amount of system requirement. It can be manual, automatic, or a combination of both. Indicates how data enters and leaves the system, what changes the data, and where the data is stored. The purpose of the DFD is to indicate the size and parameters of the entire system. It can be used as a communication tool between a program analyst and any person who plays a role in an order that serves as the starting point for program rebuilding. DFD is also called data flow graph or bubble chart

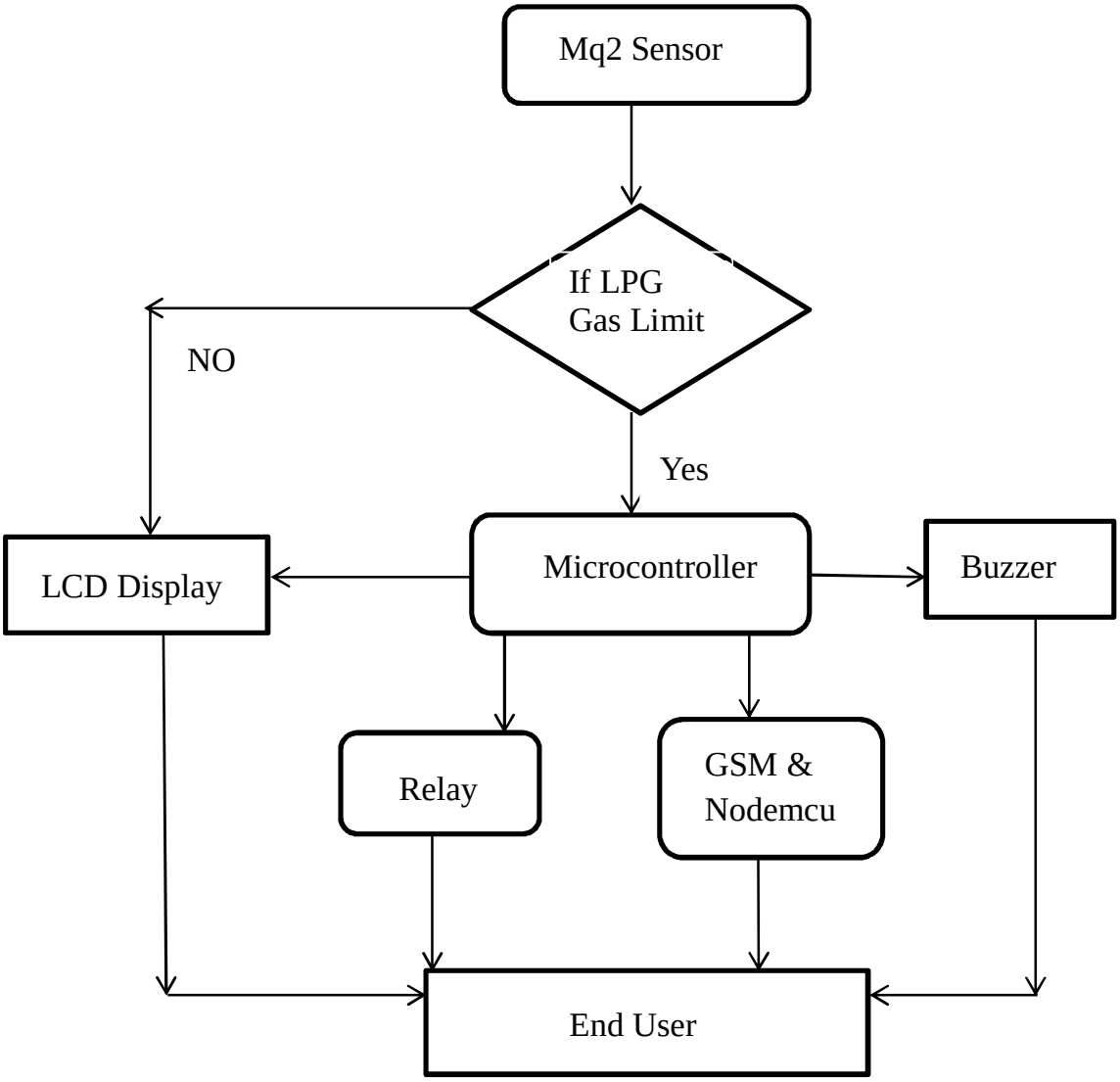

Fig 4.2 Data Flow Diagram

VI. SYSTEM ARCHITECTURE

System design defines its main components, their relationships (structures), and how they work together. Software design and construction incorporates a number of contributing factors such as Business strategy, quality attributes, human capabilities, design, and IT environment. System Architecture serves as a blueprint for a system.

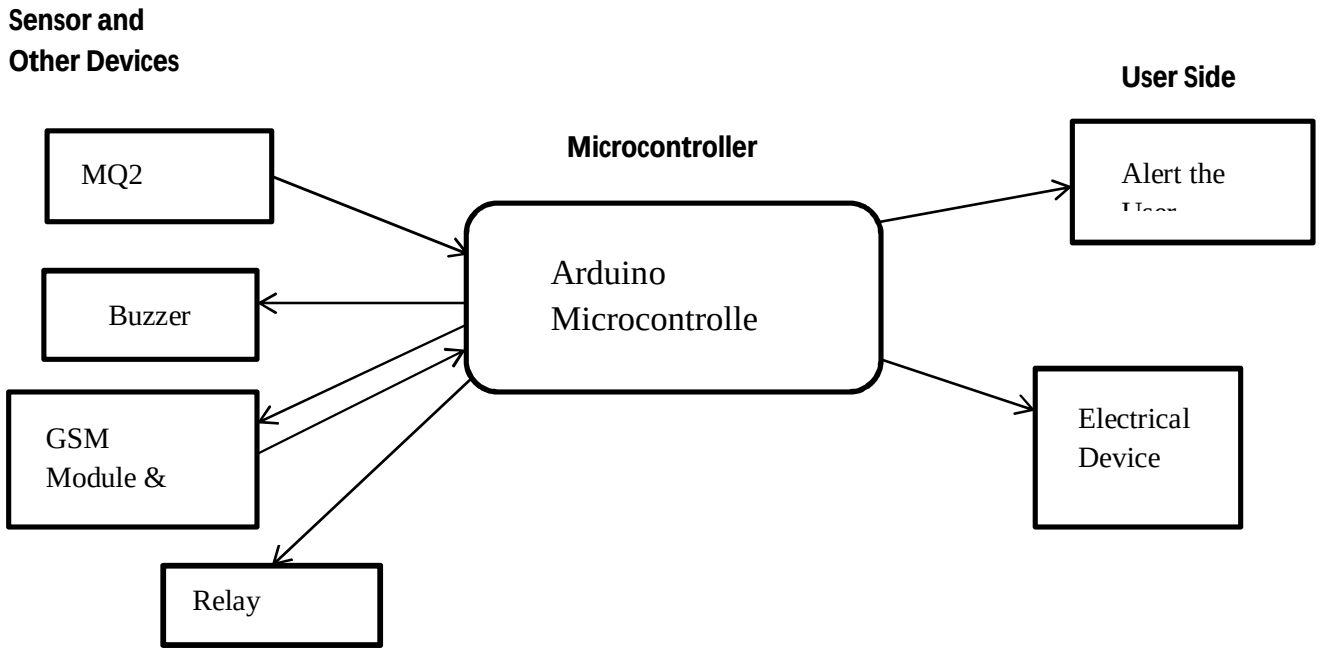

Fig 4.1- System Architecture

VII. HARDWARE REQUIREMENT

1) *Arduino:* Arduino is a single-board microcontroller that is widely used to create various types of digital devices, block diagram shown in Figure. You can control and interact with various electronics components such as sensors, actuators and much more. It has its own fixed RAM and stores data quickly memory and EEPROM. It uses languages such as C, C ++, and Java.

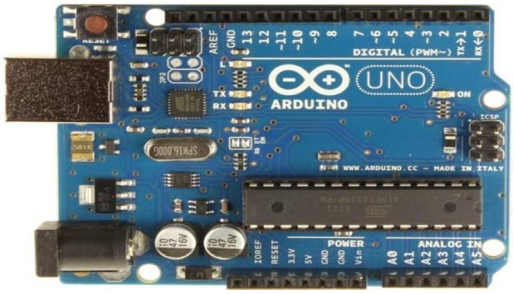

Fig-Arduino

2) *Gas Sensor:* Gas Sensor (MQ5) module is useful for gas leakage detection (in home and industry). It is suitable for detecting H2, LPG, CH4, CO, Alcohol. Due to its high sensitivity and fast response time, measurements can be taken as soon as possible. The sensitivity of the sensor can be adjusted by using the potentiometer.

Fig- Gas Sensor

3) *Buzzer:* Buzzer or Beeper is an audio signing tool, which can be mechanical, electromechanical, or piezoelectric. Buzzer and beepers is widely used in include alarm devices, timers, and user input verification such as mouse clicks or keys

Fig- Buzzer

4) *GSM Module:* GSM module is a hardware device that uses telephony technology to provide a data connection in a remote network. From a mobile phone network view, they look exactly like a normal cell phone, including the need for a self-identifying SIM network. GSM modems typically provide a TTL-level serial interface to their Host. They are often used as part of an embedded system.

Fig- GSM Module

5) *Relay Module:* The Relay module is an electrical switch used by an electromagnet. The electromagnet is opened by a low-power signal that differs from a small controller. When activated, the electromagnet pulls on or off the electrical circuit.

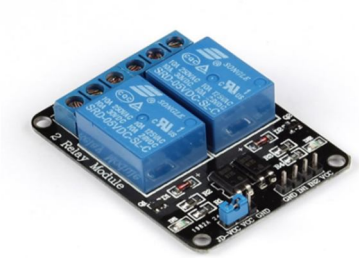

Fig- Relay Module

6) *NodeMCU:* NodeMCU is an inexpensive open source platform. Originally included firmware running on ESP8266 Wi-Fi SoC from Espressif Systems, as well as Hardware based module ESP-12.Later, support for ESP32 32-bit MCU was added.

Fig-NodeMCU

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VIII. FUTURE SCOPE

The Project aims to establish a gas leak detection system and an LPG that will ensure safety. This is an IOT-based program that can be easily stored for the user. In this project we will continue to expand this program in online mode again.

IX. CONCLUSION

Its ability to alert its user to LPG gas leaks. Future features of this system include a GSM module that enhances system efficiency and provides additional security for users. This program is easy to use and inexpensive product. Another advantage of this system is that even when no one is in the house and there is a gas leak, the GSM module is there to send immediate messages to owner regarding gas leaks and thus reduces the risk of accidents. The GSM module and NodeMCU on this device ensures better safety with respect to gas leaks.

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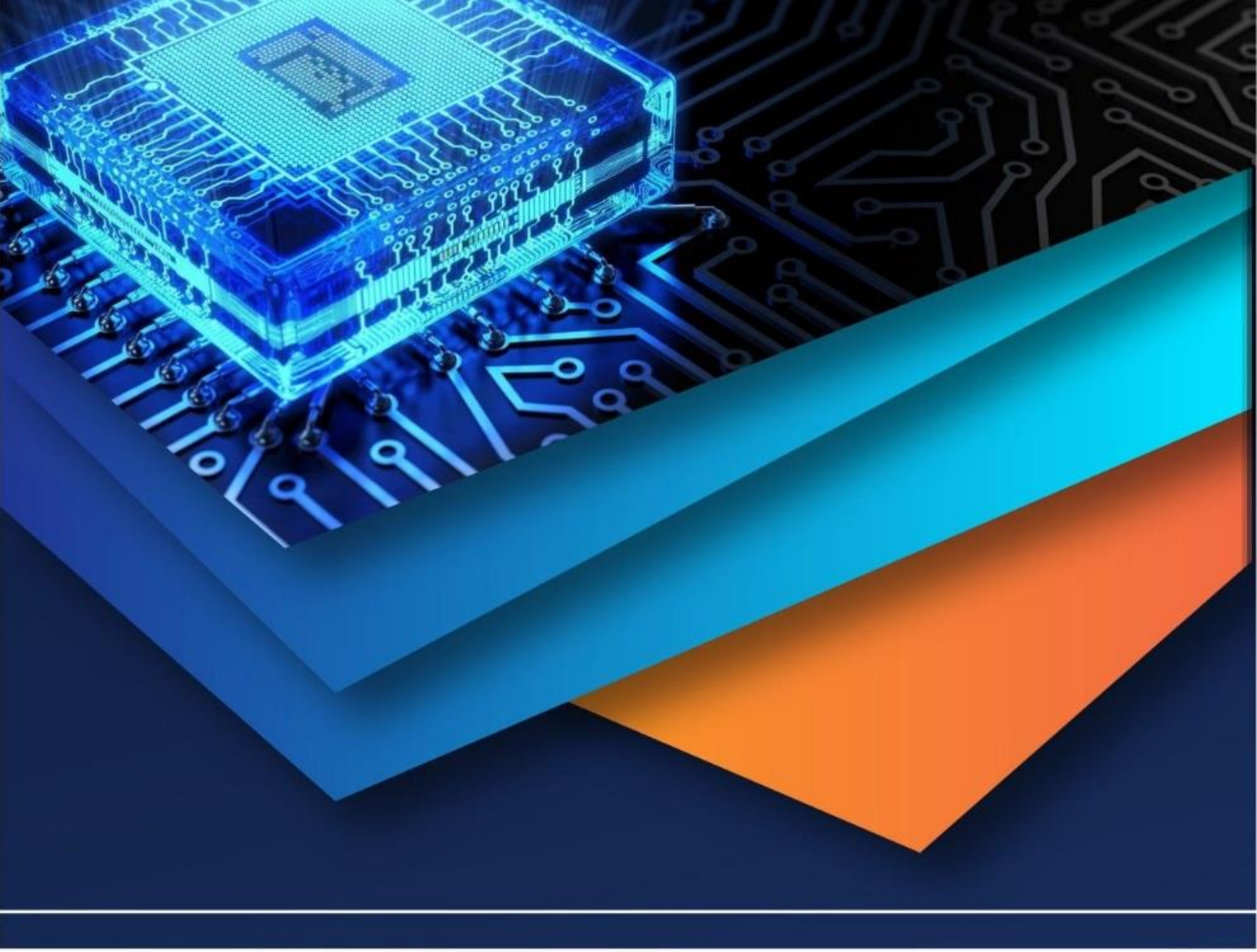

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