Peripheral and Interfacing Laboratory

CSE – 3204

Project: Kitchen Safety Alert

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Objectives:

1. To know about the usage of Arduino UNO
2. To know about other hardware components
3. To alert resident about the leakage in gas line
4. To automate the safety from unexpected fire occurrence

Introduction:

Kitchen Safety Alert is a simple but useful hardware project using Arduino , MQ5 gas sensor , LCD display and other accessories. The main concept of this project is to detect gas that is emitted from the leaked gas line. This system let the resident know about leaks in the gas line.

Equipments:

1. Arduino UNO
2. MQ5 gas sensor
3. LCD Display
4. 6V dc motor
5. Breadboard
6. Fan
7. Buzzer
8. Jumper Wire
9. 10k Registor
10. 10k Potentiometer
11. 220 ohm Registor
12. PN2222 Transistor
13. 1N4001 Diode
14. 270 ohm Registor

Details of important equipments:

1. Arduino UNO:

Arduino is an open-source computer hardware and software company, project and user community that designs and manufactures microcontroller-based kits for building digital devices and interactive objects that can sense and control objects in the physical world.

The project is based on microcontroller board designs, manufactured by several vendors, using various microcontrollers. These systems provide sets of digital and analog I/O pins that can be interfaced to various expansion boards ("shields") and other circuits. The boards feature serial communications interfaces, including USB on some models, for loading programs from personal computers. For programming the microcontrollers, the Arduino project provides an integrated development environment (IDE) based on the Processing project, which includes support for the C and C++ programming languages.

2. MQ5 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.

3. LCD Display:

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on.

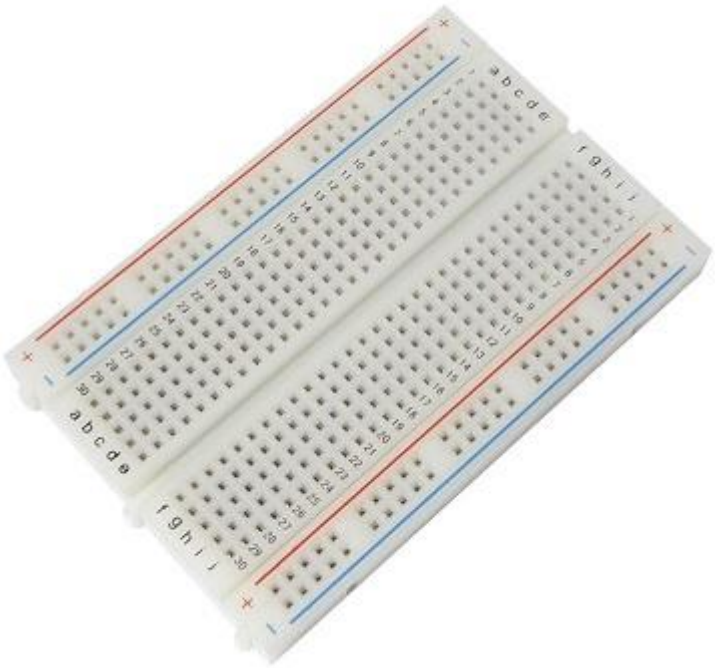
A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data.

The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be

displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD. Click to learn more about internal structure of a LCD.

4. Breadboard:

A **b**readboard is a construction base for prototyping of electronics. Originally it was literally a bread board, a polished piece of wood used for slicing bread. In the 1970s the solderless breadboard (AKA plugboard, a terminal array board) became available and nowadays the term "breadboard" is commonly used to refer to these. "Breadboard" is also a synonym for "prototype".



Because the solderless breadboard does not require soldering, it is reusable. This makes it easy to use for creating temporary prototypes and experimenting with circuit design. For this reason, solderless breadboards are also extremely popular with students and in technological education. Older breadboard types did not have this property.
A stripboard (veroboard) and similar prototyping printed circuit boards, which are used to build semi-permanent soldered prototypes or one-offs, cannot easily be reused. A variety of electronic systems may be prototyped by using breadboards, from small analog and digital circuits to complete central processing units (CPUs).

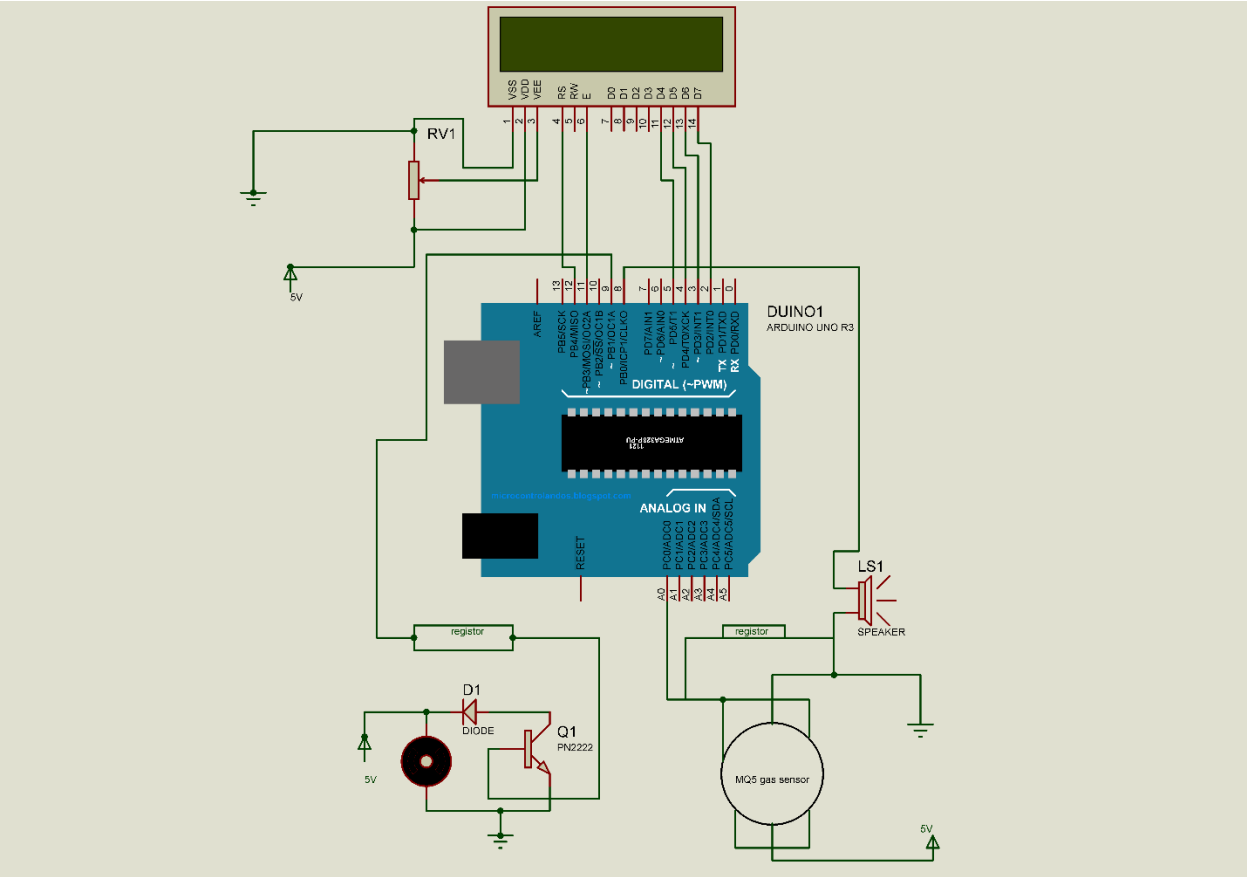
5. 6V dc motor:

A DC motor is any of a class of electrical machines that converts direct current electrical power into mechanical power. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current flow in part of the motor. Most types produce rotary motion; a linear motor directly produces force and motion in a straight line.

6. Buzzer:

A **buzzer** or **beeper** is an audio signalling device which may be mechanical, electromechanical, or piezoelectric. Typical uses of buzzers and beepers include alarm devices, timers and confirmation of user input such as a mouse click or keystroke.

Circuit Diagram:



Project Description:

Vital damages can cause by gas leakages in kitchen gas line. The main Purpose of this project is to prevent this accidental leakages by alarming user and taking various automated steps to blow out remaining gas from kitchen and keeping the amount of gas non-threatening. An MQ5 gas sensor is used to sense the amount of gas in kitchen and An LCD display is used to provide information about kitchens current safety status. An Arduino controls all those components. When the gas sensor detects high amount of gas in kitchen it triggers an alarm message

“WARNING!! GAS DETECTED” in LCD display and continuously creates a sound to notify user to take steps. Then the adjust fan of kitchen will be turned on so detected gas can be removed from the kitchen. Thus this project prevents user from facing accident from gas leakages in kitchen automatically.

Conclusion:

Kitchen Safety Alert will help people by ensuring safety from unexpected fire occurrence which is created from the leakage of gas line. It was great to do such type of project. It helps us to learn about the details of hardware components.