

***A STUDY ON
SMOKE AND GAS LEAKAGE DETECTION
SYSTEM***

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ABSTRACT

To develop an arduino-based smoke and gas leakage detector alarm to alert on leakage and prevent any mishappening is taken into consideration here. In this expectation, the design and development of an intelligent real-time monitoring and control system for the kitchen environment are considered. The system mainly monitors parameters of the kitchen environment, such as fire detection, leakage detection and LPG gas level. The system can monitor the condition of the kitchen and if conditions become anomalous, send an e-mail and/or an alert SMS via the GSM system to the relevant powerful mobile phone. This device is broadly utilized in regions where physical presence isn't always possible. The device offers a complete, inexpensive, powerful, and person-friendly way to monitor and remotely manipulate the kitchen in real-time.

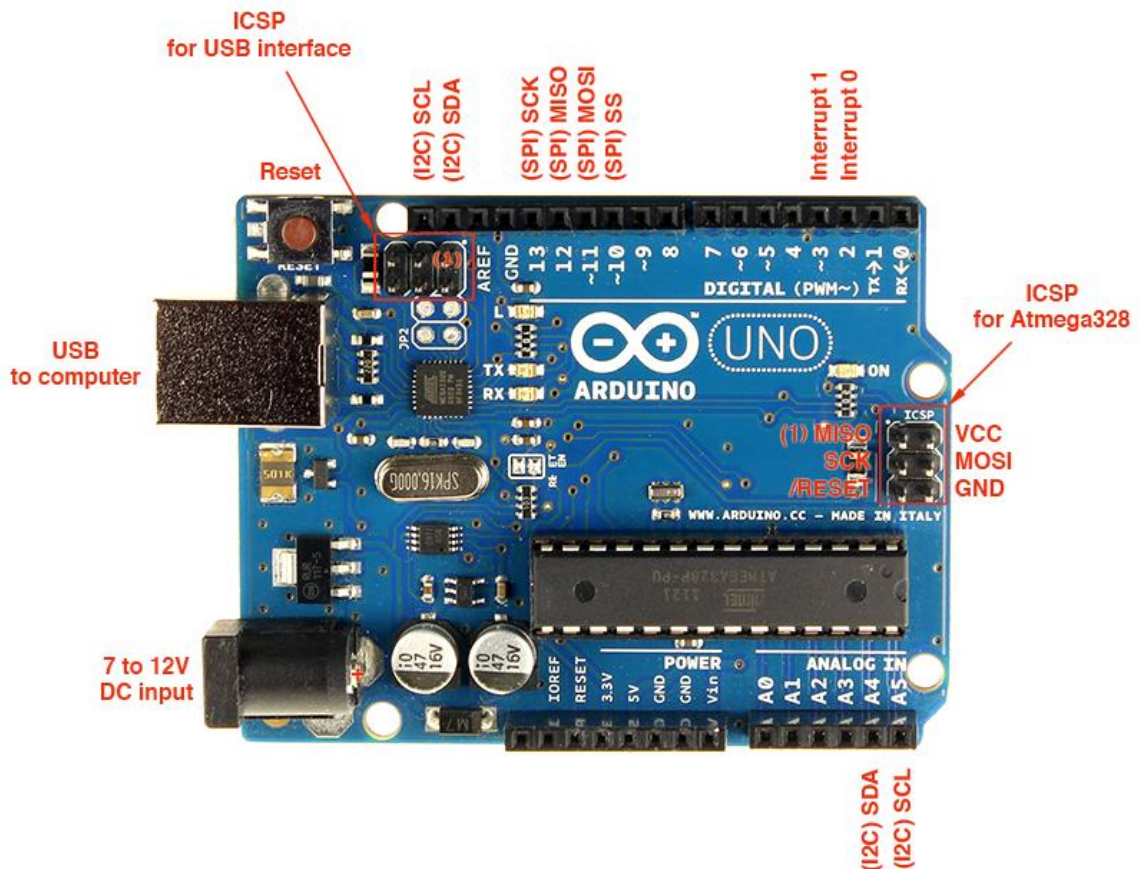
INTRODUCTION

To study the working principle of gas and smoke detector systems is one of major objective here. Main objective of this study is to develop an arduino-based smoke and gas leakage detector alarm to alert on leakage and prevent any mishappening. In addition to an alarm, a warning signal (such as glowing an LED) is also aimed here. Monitoring the kitchen environment is one of the essential measures that need to be checked almost gradually for the well-being, safety, and comfort of the individuals. The MQ-135 gas sensor is used here, **Gas detectors** measure or monitor the depletion of combustible gases, toxic gases, and oxygen within an area as part of a safety system and Can sound an alarm to operators in the area where the leak is occurring. Similarly, A **smoke detector** is an electronic fire-protection device that automatically senses the presence of smoke as a critical indicator of fire and sounds a warning.

Convenience and safety include the ability to monitor the popularity of a smart house and to manipulate internet appliances while away from home. Remote monitoring of residential and commercial properties, notification of emergency services in case of fire, robbery, and a leak of liquid or gasoline.

HARDWARE DESCRIPTION

Arduino UNO: The central unit of the system is Arduino board, where all the components are interfaced externally on the board and programmed as per their functionality to work in synchronization. it's an electronic prototyping platform/ board supported Atmega-328 which is of 8-bit, 16 Mhz. during this serial communication is enabled and has 14 digital input /output pins (out of which 6 are PWM) and 6 analog input pins. It operates at 5V. every pin contains a specific function to control.



MQ-135 gas sensor: The gas sensor module consists of a steel exoskeleton under which a sensing element is housed. This sensing element is subjected to the current

through connecting leads. The gases coming close to the sensing element get ionized and are absorbed by the sensing element. This changes the resistance of the sensing element, which alters the value of the current going out of it.

Features: wide detecting scope.

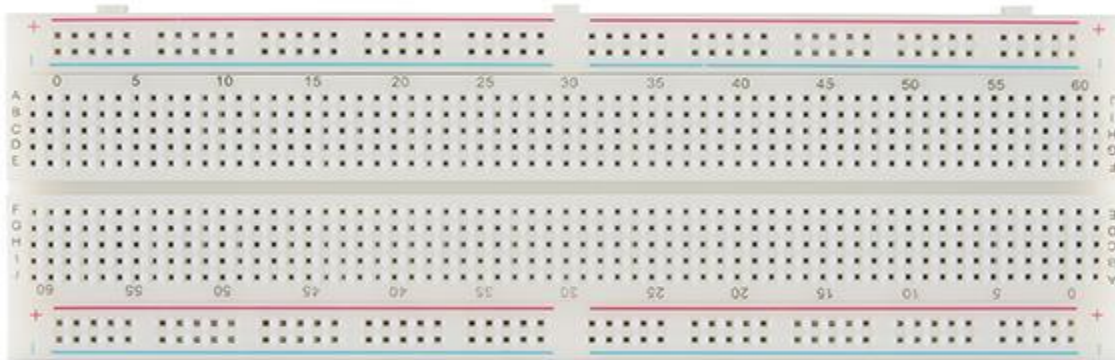
- Fast response and High sensitivity.
- Stable and long-life Simple drive circuit.
- Used in air quality control equipment for buildings/offices, is suitable for detecting NH₃, NO_x, alcohol, Benzene, smoke, CO₂, etc.
- Size: 35mm x 22mm x 23mm (length x width x height).
- Working voltage: DC 5 V.
- Signal output instruction.
- Dual signal output (analog output, and high/low digital output).
- 0 - 4.2V analog output voltage. The higher the concentration the higher the voltage.



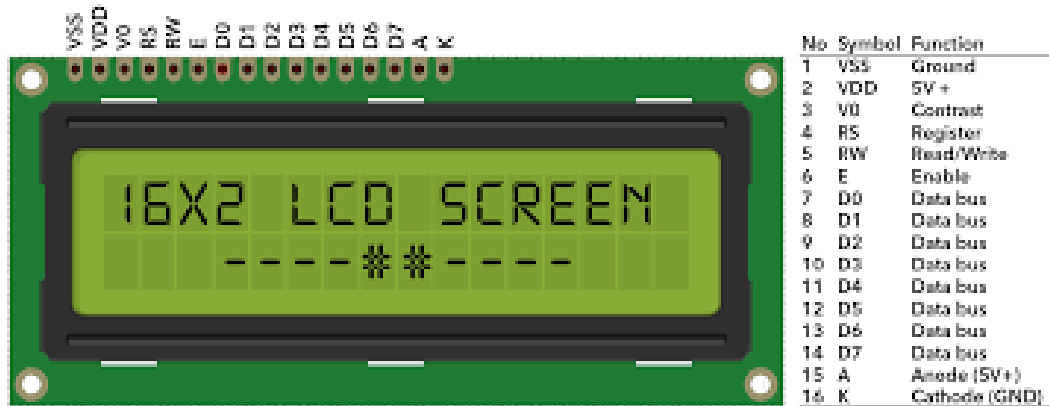
Buzzer: Buzzer is used to alarm the beep sound to indicate and warn the danger to the people working around. The buzzer is the output of the system. The sound of the buzzer is beep-beep, which indicates the danger.



Breadboard: A breadboard, solderless breadboard, protoboard, or terminal array board is a construction base used to build semi-permanent prototypes of electronic circuits.



LCD: LCD is employed for displaying the message indicating that " gas detected at zone" into the display, which is initially coded in program to display the danger. The message been displayed on the LCD, data and command both are register of LCD and it's shown in the fig. The register selects is employed to modify the registers. data register $RS=1$, whereas for the command register $RS=0$ is employed.

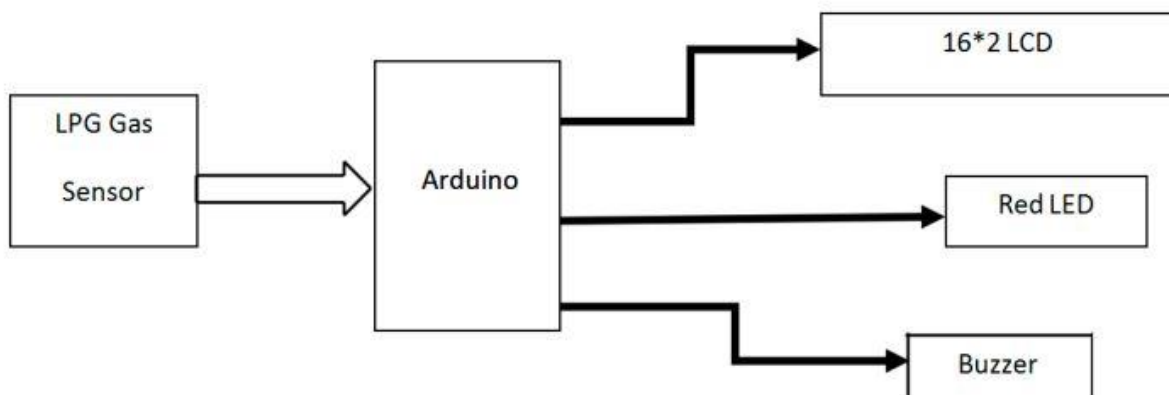


METHODS

This system is based on the Arduino UNO R3 and MQ-135 gas sensor.

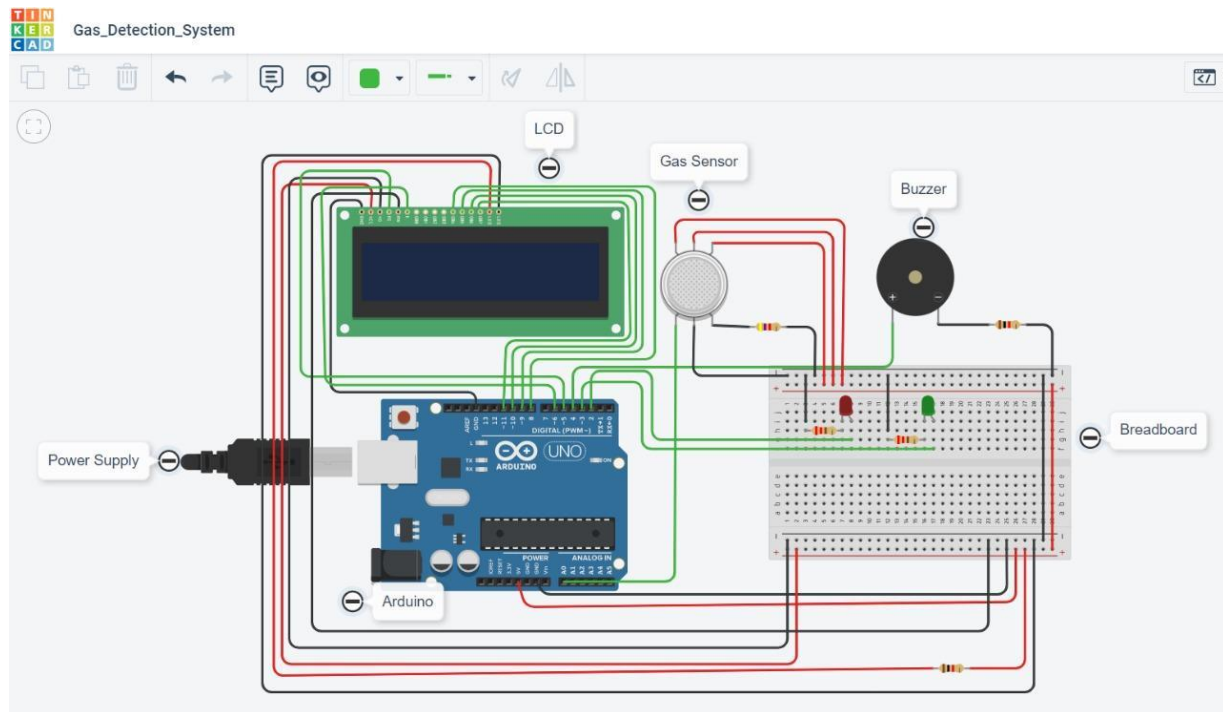
- When the sensor detects gas in the atmosphere, it will give digital output 1 and if gas is not detected the sensor will give digital output 0. Arduino will receive the sensor output as digital input.
- If the sensor output is high, then the buzzer will start tuning along with the LCD that will show that “EVACUATE”.
- If the sensor output is low then buzzer will not be tuning, and the LCD will show that “SAFE”.

Block diagram of gas leakage detection and alert system.



RESULTS AND ANALYSIS

Following Figure shows the schematic diagram of our project. This technique has been tested by leak of gas almost about sensors, MQ135 gas sensor sends the signal to the Arduino UNO after detecting the gas leakage. Arduino to other externally connected device such as LCD and buzzer. In practice, results for are noticed by the people surrounding by the area are displayed in the LCD and buzzer sound indicate the danger to the people by making beep sound.



FUTURE WORK

Overall, software and hardware parts of the systems have been developed and tested. I've designed and implemented a compact wireless sensor network. In future I will be looking to setup up a GSM-based or Wi-Fi-based alert mechanism for remote monitoring of this device. It will be enhanced to automate the electrical cut-off process to prevent short circuits. It will be enhanced to measure specific gas levels for industrial applications.

CONCLUSIONS

The design of a sensor-based automatic gas leakage detector with an alert and control system has been proposed and discussed in this paper. This is a low-cost, low power, lightweight, portable, safe, user friendly, efficient, multi featured and simple system device for detecting gas. Gas leakage detection will not only provide us with significance in the health department but it will also lead to raise our economy.

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