

Gas Leakage Monitoring and Alerting System for Industries

PROJECT NAME	GAS LEAKAGE MONITORING & ALERTING SYSTEM FOR INDUSTRIES
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Abstract:-

In recent years, gas leakage of any kind has been a problem, whether it occurs in a home, a place of business, a cafe, or a canteen. The construction of a gas waste monitoring, leakage detection, and warning system using the Internet of Things is suggested in this study. This essay elaborates on the design of an accident-prevention system that will help save petrol. The system and the cooker must be interconnected. Ultrasonic sensors built into the technology determine whether or not the cooker is being used for cooking. The gas supply is shut off automatically by the system if it is determined that the cooker is not in use. Users will be notified via SMS via GSM as soon as a gas leak is suspected, allowing them to address the situation as quickly as feasible. Through a flame sensor, the system will monitor flame and fire. The buzzer starts to make noise when a fire is found. In addition, the system offers cloud storage capabilities. With the help of this cloud storage option, the daily gas consumption for each user may be monitored. This process will ultimately help in determining natural gas usage per user. The system has been tested, and it can track gas leakage and wasting while also sending the user an SMS. The performance that followed showed how effective it was in preventing a sizable amount of household gas waste.

Introduction :

The home safety detection system is becoming very crucial for people's protection. Since everyone in the household works every day, it is impossible to check on the household appliances, particularly the LPG gas cylinder, wired circuits, etc. Liquefied petroleum gas (LPG) and natural gas demand has significantly increased during the past three years. LPG and natural gas are recommended to meet this high level of energy demand and to substitute oil or coal due to those fuels' negative environmental effects. Large-scale applications for these gases include industry, heating, home appliances, and motor fuel. The system has a MQ6 gas sensor to monitor this leakage gas. This sensor detects how much leak gas is there in the environment around it. Explosions or being harmed by gas leaks could be avoided in this way.

Objective :-

An warning and control system-equipped sensor-based automatic gas leakage detector has been presented. This equipment for detecting gas is reasonably priced, uses less power, is lightweight, portable, safe, easy to use, effective, and has a straightforward system. Not only will gas leak detection be important for our health, but it will also help our economy grow because gas leaks not only contaminate the atmosphere but also waste gases, which is bad for business. Over the next few years, the market is anticipated to be primarily driven by the requirement to ensure worker safety.

Problem Formulation:

Any gaseous molecule that escapes from a stove, pipeline, cylinder, etc. is considered a gas leak. This may happen on purpose or even accidentally. We are all aware that these types of leaks are harmful to human health, and when they explode, they pose a serious threat to everyone's safety as well as that of

The Bhopal Disaster and the Vizag Gas Leak are only a couple of the significant disasters that occurred as a result of gas leaks. As far as industrial accidents go, the Bhopal disaster is considered the worst. From this insecticide plant, over 45 tonnes of methyl isocyanate escaped. Methyl isocyanate is an organic molecule that can be found in insecticides that contain carbamates. The colourless, lethal, and flammable liquid must be kept out of reach of people.

Vizag Styrene that was allowed to escape after being left neglected for a long Time caused a gas leak. This greasy liquid has no colour and can be spread by fumes. Therefore, a detector needs to be built in a way that it can pick up any type of gas, fume, leak, smoke, etc. Despite how harmful and dangerous it may be, the detector may have some parameters attached that could aid in problem prevention.

List of Components :-

S. No	Name of the Component	Quantity
1.	Arduino UNO R3	1
2.	Breadboard	1
3.	LED	2
4.	Resistor	5
5.	Piezo	1
6.	Gas Sensor	1
7.	LCD 16*2	1

Arduino UNO R3 :-



One type of ATmega328P-based microcontroller board is the Arduino Uno R3. It comes with everything needed to support the microcontroller; all you need to do is use a USB cable to connect it to a computer and provide power using an AC-DC adapter or a battery to get things going. The word "Uno" was chosen to signify the launch of the Arduino IDE 1.0 software. "Uno" is Italian for "one." The third and most latest version of the Arduino Uno is called the R3. The reference versions of the Arduino board and IDE software are currently being updated. The Uno-board is the first USB-Arduino Board in a series and the standard model created for the Arduino platform.

Breadboard :-



A breadboard is a common tool for circuit design and testing. Using a bread board eliminates the necessity for soldering wires and components together to form a circuit. Component mounting and reuse are simpler. Components are not soldered together, allowing for easy circuit design changes at any time. It consists of a collection of metallic clips that are both conductive and insulated from one another, all contained in a box made of white ABS plastic. The plastic box has numerous holes that are organised in a specific way. Two different regions, sometimes known as strips, make up a traditional bread board pattern. Bus strips are frequently employed to supply the circuit with electricity. It has two columns: one for ground and the other for power voltage. The majority of the components in a circuit are held in place by socket strips. It typically has two portions, each with five rows and 64 columns. Each column has an internal electrical connection.

LED :-



An optoelectronic LED (Light Emitting Diode) operates on the electro-luminescence principle. The ability of a substance to transform electrical energy into light energy and then emit that light energy is known as electro-luminescence. The semiconductor in an LED operates similarly, emitting light when an electric field is present. The P-N Junction diode and outward arrow symbols are combined to create the LED symbol. These arrows pointing outward stand in for the light that the LED emits.

Resistor :-



A passive electrical device that has two terminals and is employed in electrical circuits to limit or regulate the flow of current.

Piezo :-



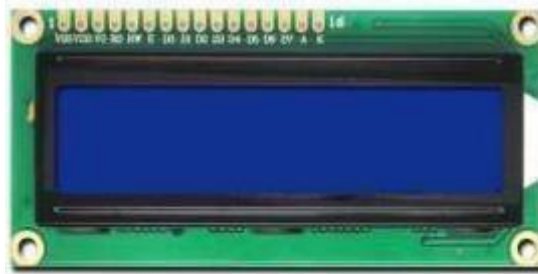
A piezo is a device that deforms when electricity is applied or produces a voltage when force is applied.

Gas Sensor :-



A device that detects the presence or concentration of gases in the atmosphere is called a gas sensor. By altering the resistance of the material inside the sensor, the sensor generates a corresponding potential difference based on the gas concentration, which may be recorded as output voltage. The type and concentration of the gas can be inferred from this voltage value.

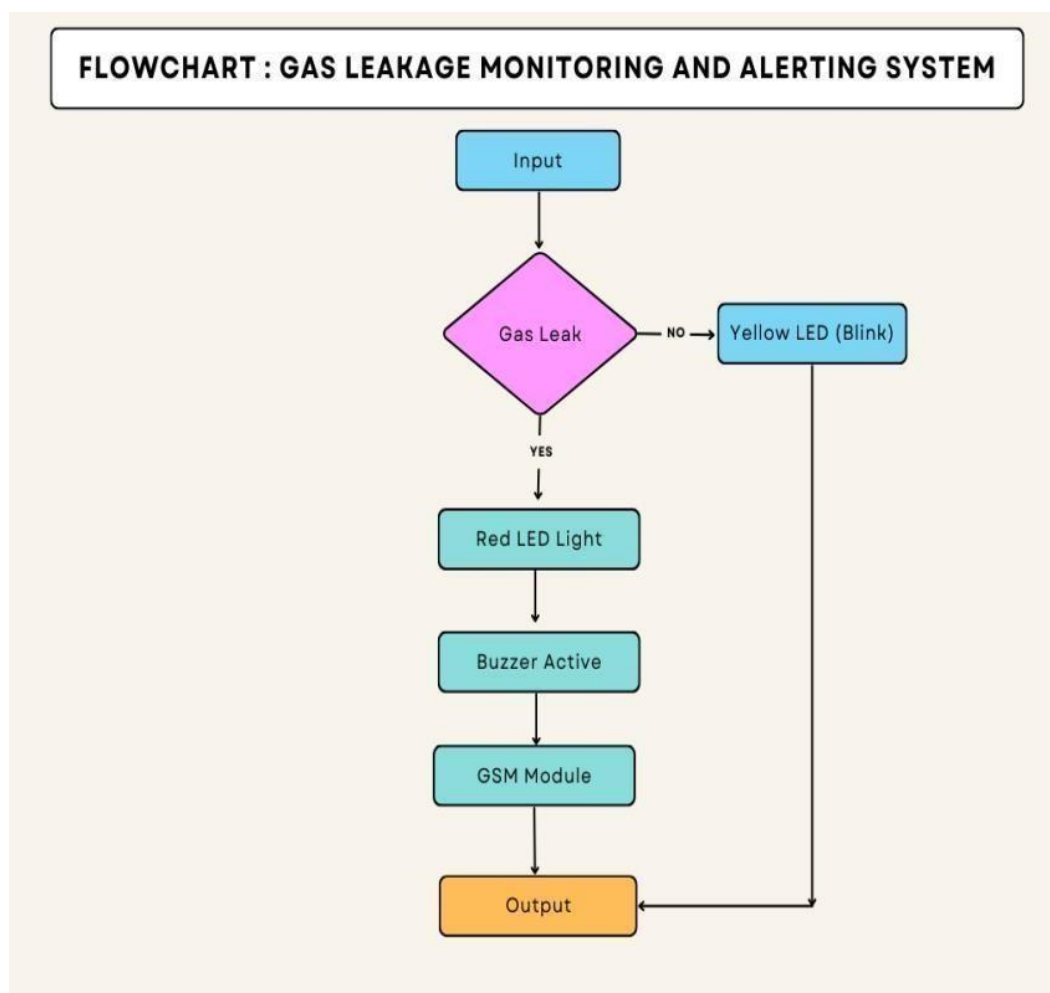
LCD 16*2 :-

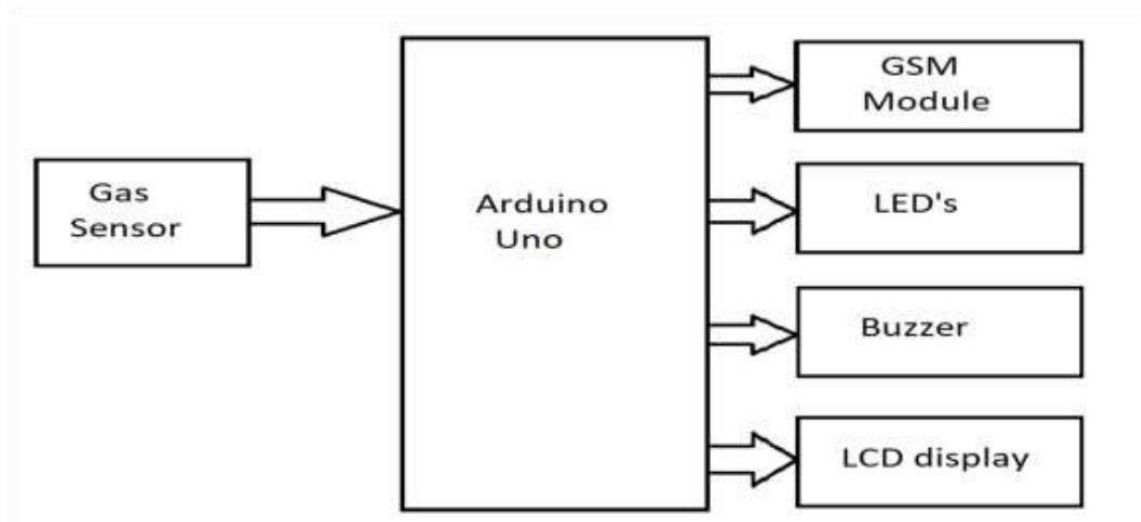


One type of electronic gadget utilised to display the message and data is a 162 LCD. Liquid Crystal Display is the term's full name. Because it has 16 Columns and 2 Rows, the display is known as a 162 LCD. It can display a total of (16×2) 32 characters, each of which is composed of 5×8 pixels. The basic technology behind these displays is multi-segment light emitting diodes. There are several different display configurations on the market, including 81, 82, 102, 161, and others, but the 162 LCD is the most popular. Since these LCD modules are inexpensive and easy to programme, they are frequently utilised in DIY embedded applications.

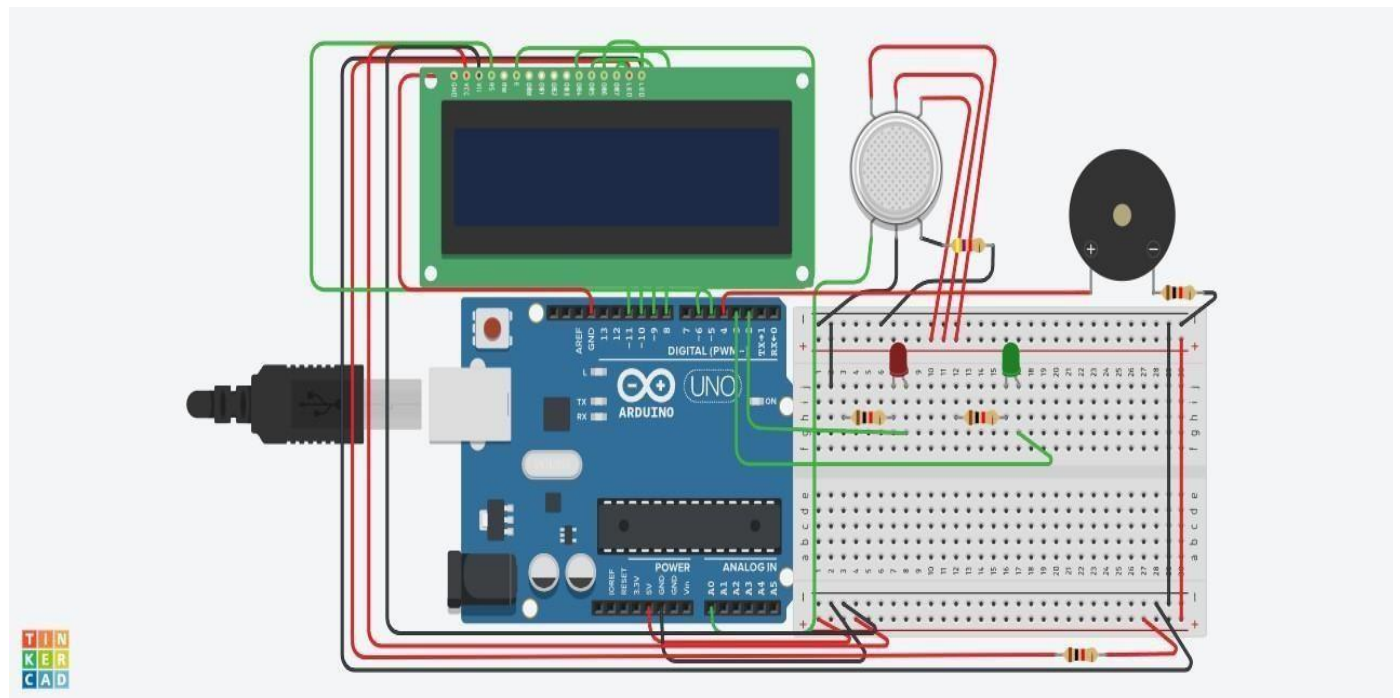
Proposed Method :-

The core component of the system, the Arduino UNO (Atmega-328), carries out the following functions. The output signal of the sensor, which serves as input to Arduino, performs signal conditioning. Results of the detection were shown on LCD. warns individuals of risk at work, in factories, and at home. There is buzzer activity and a beep (siren) sound. Additionally, using a GSM modem, send an alarm SMS to the plant manager whose phone number is saved on the SIM card. The SMS you receive is based on whether there is a gas leak in the sensor's field of detection.





Circuit Diagram :-



Solution Statement :-

The system might be viewed as a modest attempt to link up the principal gas detection techniques now in use with a mobile platform coupled with IoT platforms. One metre around the rover, the gases are detected, and the sensor output data is continually sent to the nearby server. Stray gases are also detected because of the sensors' subpar precision, which introduces some inaccuracy into their results, particularly in the case of methane. Additionally, the storage and availability of hazardous gases like hydrogen sulphide makes it difficult to test the integrated gear. The complexity of system maintenance and material selection for the system in the event of corrosive gases is decreased because the system runs outside the pipeline. The technology can only be utilised as a major indicator of leakage inside a plant at this point.

Conclusion :-

We can infer from the project's performance that the system's detection of LPG gas leakage is remarkable. Useful for both residential and commercial purposes. We can use this technique to save lives in dangerous situations. The GSM module indicates an alert. Propane, CO₂, and other gases are detected by a sensor node. Power usage and transmission range estimates are made. The sensor was constructed using straightforward techniques and an Arduino UNO Micro controller.