

EMBEDDED SYSTEM

INTELLECTUAL HOME SECURITY SYSTEM

-Gas leakage detector

-Fire extinguisher

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INTRODUCTION

In an era where smart technologies are becoming integral to our daily lives, the need for advanced and intelligent home security systems has never been more crucial. This documentation explores the design and implementation of an Intellectual Home Security System, focusing on two vital aspects: Gas Leakage Detection and Fire Extinguisher Integration.

These elements play a pivotal role in creating a secure residential environment by addressing potential risks associated with gas leaks and fire incidents.

Gas Leakage Detection:

The Gas Leakage Detection component utilizes a sophisticated MQ-2 LPG gas sensor interfaced with an Arduino Uno. This sensor continuously monitors the ambient air for any signs of gas leakage, particularly focusing on LPG. Upon detection, the system triggers a response, activating a servo motor to take a predefined action, sounding an alarm through a buzzer, and integrating a CPU fan for additional safety measures.

Fire Extinguisher:

The Fire Extinguisher Integration feature aims to enhance home safety by seamlessly incorporating a fire extinguisher into the security system. The system utilizes an IRF540N MOSFET to control the activation of a CPU fan that is repurposed as a cooling mechanism for the fire extinguisher. This integration ensures rapid response and effective deployment of fire suppression methods in the event of a fire hazard.

Overall, integrating a gas leakage detector and fire extinguisher into your home intellectual security system provides comprehensive protection against gas leaks and fire hazards, contributing to a safer and more secure home environment.

By combining these two critical components, the Intellectual Home Security System provides a comprehensive solution for safeguarding homes against potential threats. The synergy of gas leakage detection and fire extinguisher integration showcases an innovative approach towards intelligent and automated security, contributing to the peace of mind and well-being of homeowners.

This documentation guides users through the setup, configuration, and customization of the system, empowering them to tailor the security measures according to their specific needs.




WHY IT IS IMPORTANT:

The importance of a home intellectual security system with gas leakage detector and fire extinguisher includes:

- ❖ **Early Detection and Prevention:** The gas leakage detector can quickly sense dangerous gas leaks like carbon monoxide or natural gas, alerting you before they reach hazardous levels. This early detection can prevent health risks and property damage.
- ❖ **Enhanced Safety:** Integrating these devices into your home security system enhances overall safety. The system can alert you and emergency services in case of a gas leak or fire, enabling faster response times and potentially saving lives.
- ❖ **Peace of Mind:** Knowing that your home is equipped with advanced safety features gives you peace of mind, especially when you're away from home.
- ❖ **Comprehensive Protection:** Combining a gas leakage detector, fire extinguisher, and home security system offers comprehensive protection against different types of emergencies. It provides a layered defense approach, increasing the overall security of your home.
- ❖ **Insurance Benefits:** Some insurance companies may offer discounts for homes with integrated security systems, including gas leakage detectors and fire extinguishers. This can result in cost savings on your insurance premiums.

Overall, integrating gas leakage detectors and fire extinguishers into your home intellectual security system enhances safety, provides peace of mind, and offers comprehensive protection against potential hazards.

COMPONENTS

COMPONENTS	Description
Arduino Uno 	A microcontroller board based on the ATmega328P. It has 14 digital input/output pins, 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header, and a reset button. It is used for building digital devices and interactive objects that can sense and control the physical world.
Mini Breadboard 	A compact, solderless breadboard for prototyping and testing circuits. It typically has around 170 tie points, allowing components and wires to be easily inserted and removed for experimenting with circuit designs.
Buzzer 	Used in electronic devices as an alarm, timer, or user interface feedback mechanism.
Servo Motor	A rotary actuator or linear actuator that allows for precise control of angular or linear position, velocity, and acceleration. It consists of a motor coupled to a sensor for position feedback.



MQ-2 Sensor



A gas sensor used for detecting a wide range of gases, including LPG, smoke, alcohol, propane, hydrogen, methane, and carbon monoxide. It is used in gas leakage detecting equipment

5V CPU Fan



A cooling fan powered by 5 volts, commonly used to cool computer processors (CPUs). It can be repurposed in projects for cooling electronic components.




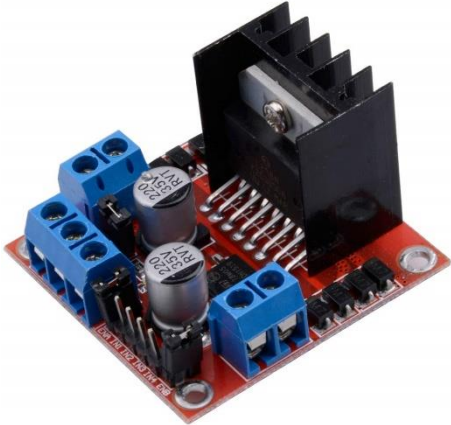
Hookup wire






A type of electrical wire used for making connections between components on a breadboard, within electronic devices, or other wiring applications. It typically consists of a single conductor insulated with a plastic sheath.

IRF540N mosfet

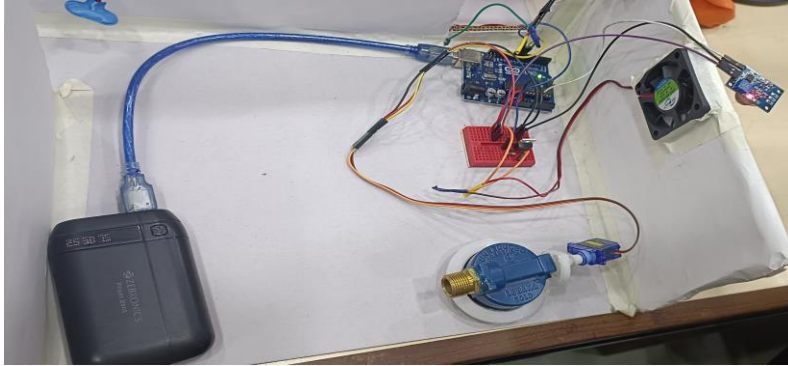
A type of N-channel MOSFET transistor used for switching and amplifying electronic

	<p>signals in various applications, from power supply circuits to motor drives. It is known for its high current and high voltage handling capabilities.</p>
<p>10k Ohm resistor</p> 	<p>A resistor with a resistance value of 10,000 ohms, used to limit current, divide voltages, and perform other tasks in electronic circuits.</p>
<p>Mini DC Submersible water pump</p> 	<p>A compact pump designed to be submerged in water. It operates on DC power and is used for circulating water in small fountains, aquariums, or DIY hydroponic systems.</p>
<p>L298N motor driver module</p> 	<p>A high current, dual full-bridge driver designed to accept standard TTL logic levels and drive inductive loads such as relays, solenoids, DC, and stepping motors.</p>
<p>Flame Sensor module</p>	<p>A broad term that can refer to any module designed to detect changes in the environment, such as temperature, humidity,</p>

	<p>motion, light, sound, and gas levels. It sends the information it detects to other electronics, typically microcontrollers or computers.</p>
<p>9V hw battery</p> 	<p>A 9-volt battery, often used to provide power to small electronic projects and devices. These batteries are known for their rectangular shape and snap connectors.</p>
<p>Jumper wire (M-M,F-M,F-F)</p> 	<p>Wires used to make connections between components on a breadboard or other prototyping boards. "M-M" stands for male-to-male, "F-M" for female-to-male, and "F-F" for female-to-female connectors. These wires are essential for creating temporary circuits for testing and prototyping.</p>

WORKING & CODING:

WORKING:



CODE:

```
#include <Servo.h>

#define gas_sensor A0

#define buzzer 8

#define fan 10

int sensor_value;

Servo servo;

void setup() {
    //Serial.begin(9600);

    pinMode(buzzer, OUTPUT);

    pinMode(fan, OUTPUT);

    servo.attach(9); //servo motor signal pin attached to arduino pin 9

    servo.write(2); //regulator on
}

void loop() {

    sensor_value = analogRead(gas_sensor);

    Serial.println(sensor_value);

    if (sensor_value > 250) // change this value according to sensitivity of gas
    {
        digitalWrite(buzzer, HIGH);

        digitalWrite(fan, HIGH);

        servo.write(130);
    }

    else
```

```
{  
  digitalWrite(buzzer, LOW);  
  digitalWrite(fan, LOW);  
  servo.write(5);  
}  
delay(500);  
}
```

ADVANTAGES AND DISADVANTAGES:

Here's an overview of the advantages and disadvantages of an intellectual home security system incorporating gas leakage detection and fire extinguisher mechanisms:

Advantages:

- **Early Warning.**
- **Enhanced Safety**
- **Protects Health**
- **Property Protection**
- **Reduced Environmental Impact.**
- **Immediate Response.**
- **Versatility**
- **Easy to Use.**

Disadvantages:

- **False Alarms**
- **Maintenance Costs**
- **Dependence on Power Supply**

CONCLUSION:

In conclusion, while an intellectual home security system with gas leakage detection and fire extinguisher mechanisms offers substantial advantages in terms of safety and automation, it also comes with certain challenges, such as initial costs, technical complexities, and potential false alarms. Balancing these factors and addressing challenges effectively can result in a robust and reliable home security solution.