National Textile University, Faisalabad

Project Documentation

Project Title:

"Gas Leakage Detection"

Group Members:

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Submitted To:

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Introduction:

Gas leaks are a major safety concern in homes, businesses, and labs. Methane, LPG, and other gas leaks can result in explosions, fires, and health issues.

The goal of this project is to use Blynk IoT to detect gas leaks in real-time, notify the user locally, and send notifications remotely.

Objectives:

1. Use the MQ-2 sensor to find gas leaks.
2. Show the gas concentration using an OLED
3. Automatically activate the exhaust fan and buzzer
4. Provide the Blynk app with current gas prices.
5. Use IoT to send out remote alerts

Working:

1. An MQ-2 gas sensor is used by the system to continuously monitor gas levels. In the event that the gas level surpasses a safe threshold:
2. An alarm is sounded by a buzzer.
3. To remove gas, a fan is turned on via a relay.
4. The Blynk mobile app receives a notification.
5. An OLED screen shows the gas values.

Components Used:

1. ESP32
2. OLED Display
3. Relay Module
4. Buzzer
5. Exhaust Fan
6. Jumper Wires
7. Breadboard
8. WiFi Network

Software And Tools:

1. Visual Studio code
2. Wokwi simulator
3. Blynk IOT Platform
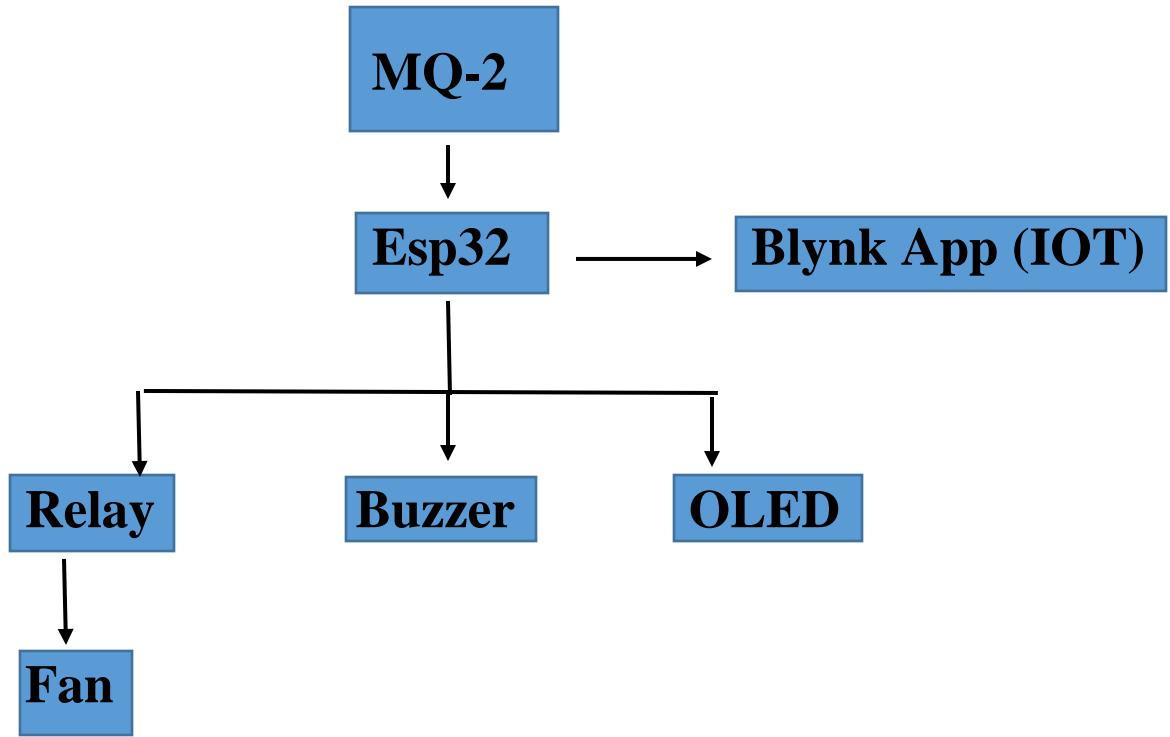
Libraries used:

1. WiFi.h
2. BlynkSimpleEsp32.h
3. Adafruit_GFX.h
4. Adafruit_SSD1306.h

#include <WiFi.h>

#include <WiFiClient.h>

#include <BlynkSimpleEsp32.h>

#include <Wire.h>

#include <Adafruit_GFX.h>

#include <Adafruit_SSD1306.h>

System Architecture

```
                    ┌─────────┐
                    │  MQ-2   │
                    └────┬────┘
                         │
                         ▼
                    ┌─────────┐         ┌──────────────────┐
                    │  Esp32  │────────▶│  Blynk App (IOT) │
                    └────┬────┘         └──────────────────┘
          ┌──────────────┼──────────────┐
          ▼              ▼              ▼
     ┌─────────┐    ┌─────────┐    ┌─────────┐
     │  Relay  │    │ Buzzer  │    │  OLED   │
     └────┬────┘    └─────────┘    └─────────┘
          ▼
     ┌─────────┐
     │   Fan   │
     └─────────┘
```
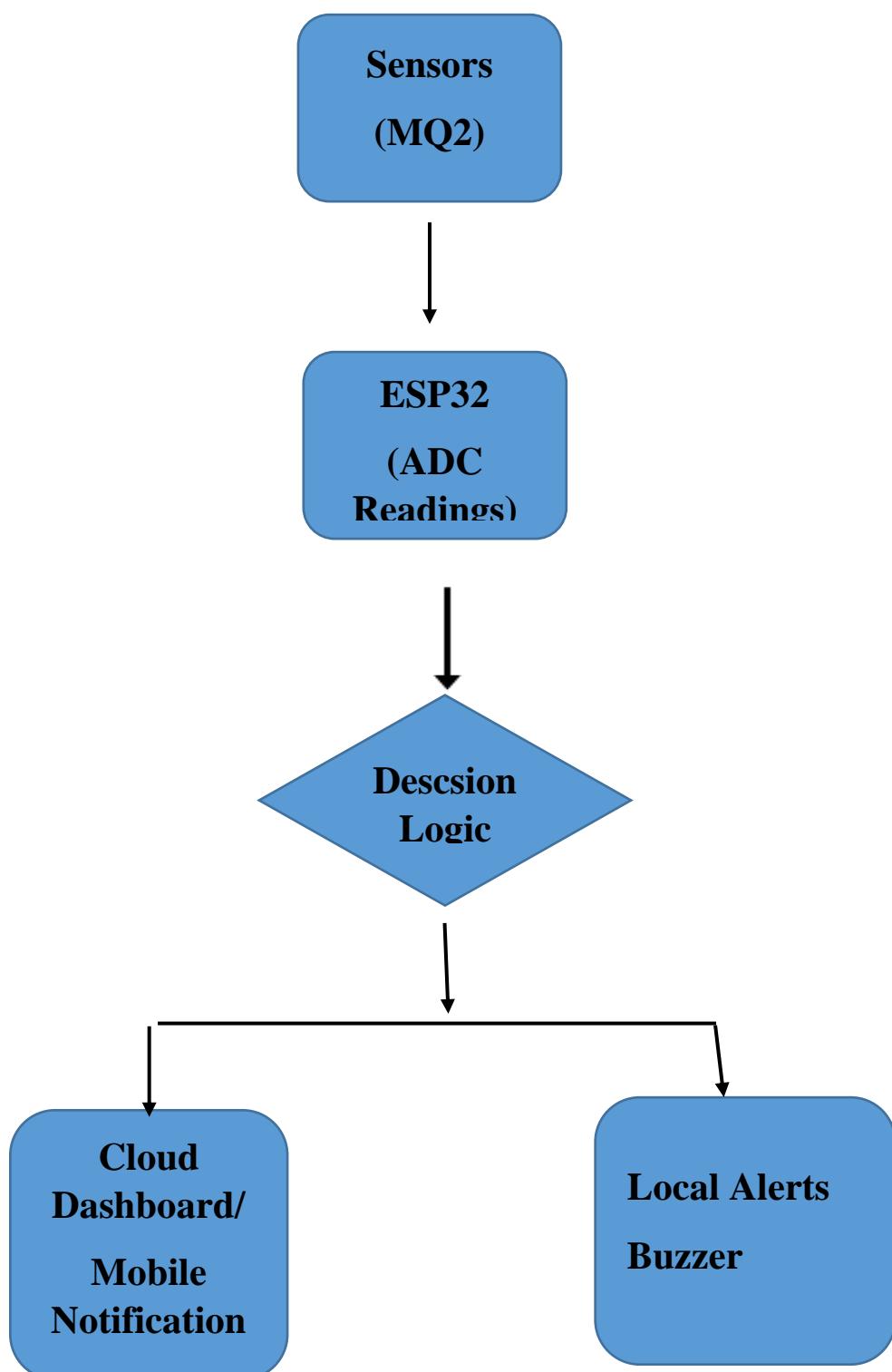
Pin Configuration

MQ-2 Sensor	GPIO	34
Relay Module	GPIO	26
Buzzer	GPIO	27
OLED SDA	GPIO	21
OLED SCL	GPIO	22

Flowchart:

Sensors

(MQ2)

↓

ESP32

(ADC Readings)

↓

Descsion Logic

Cloud Dashboard/

**Mobile Notification**

Local Alerts

Buzzer
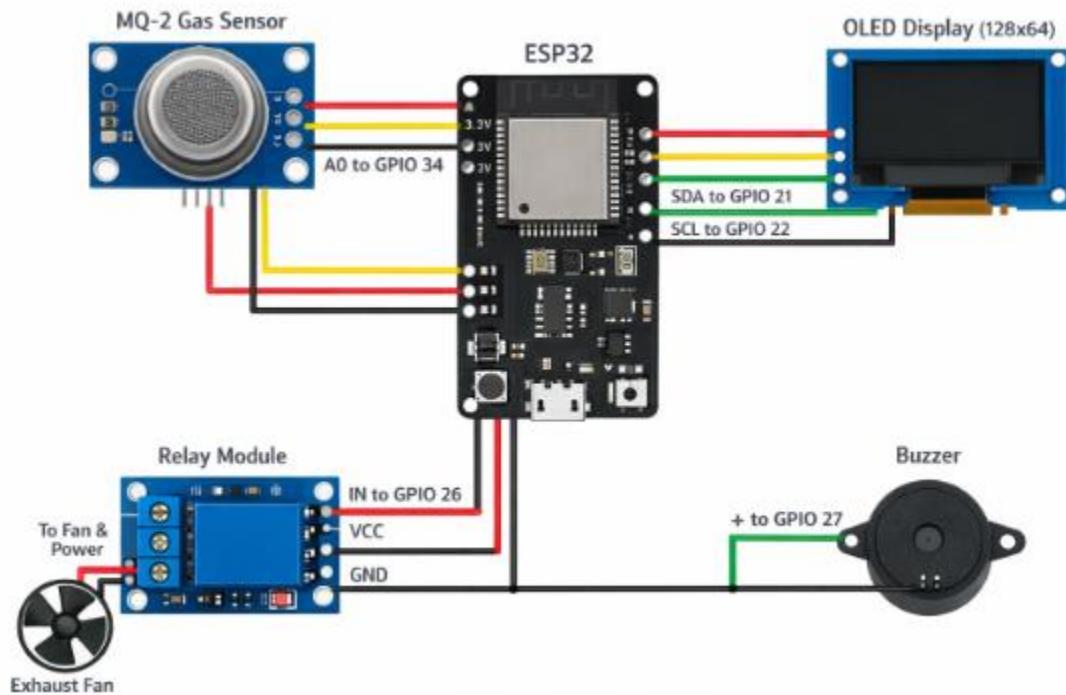
Blynk Integration
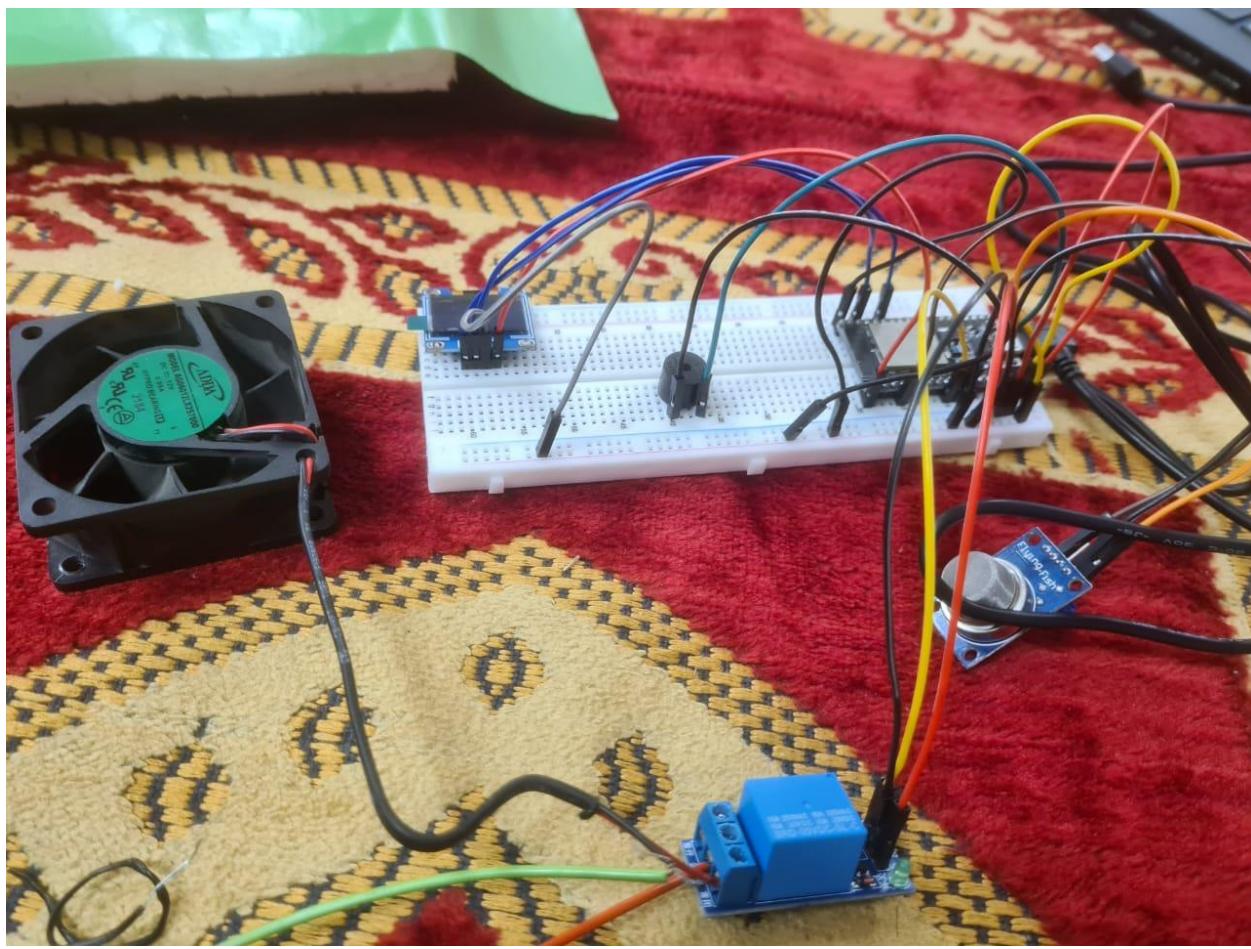
1. Virtual Pin V1 displays gas sensor value
2. Event name: gas_alert
3. Mobile app receives instant alert when gas leakage is detected

Advantages
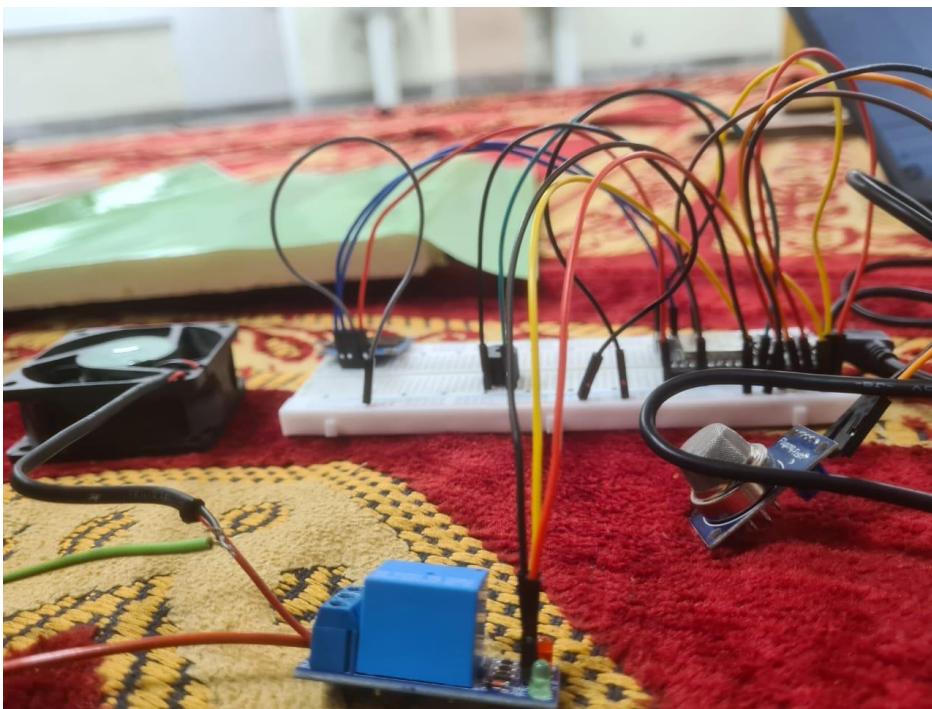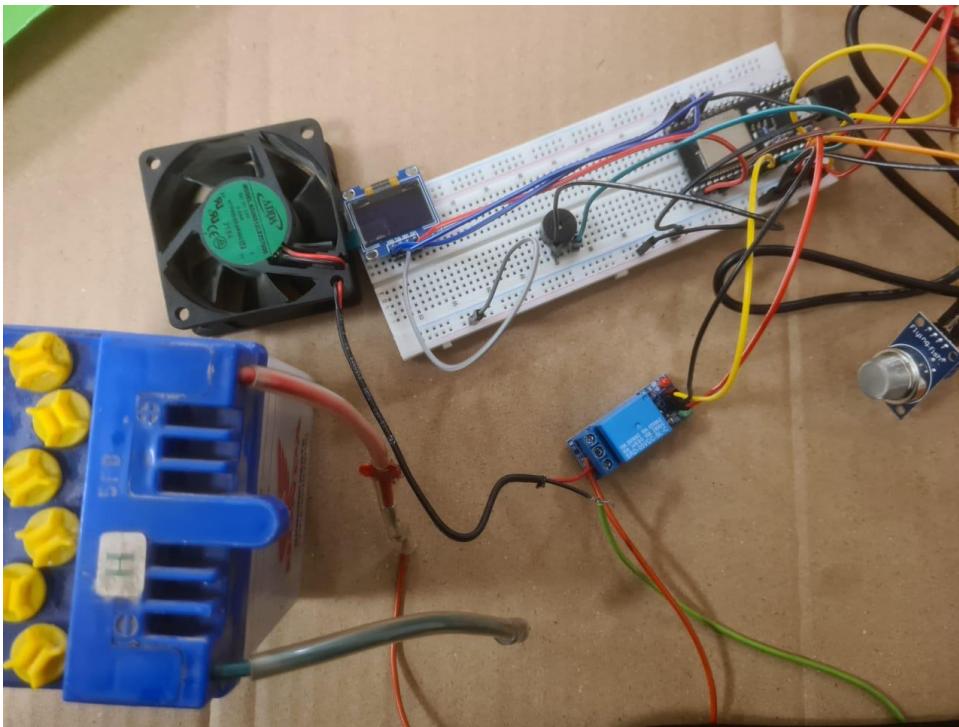
- Real-time
- Automatic safety response
- Remote alert system
- Low cost and efficient
- Easy to expand

Circuit Diagram
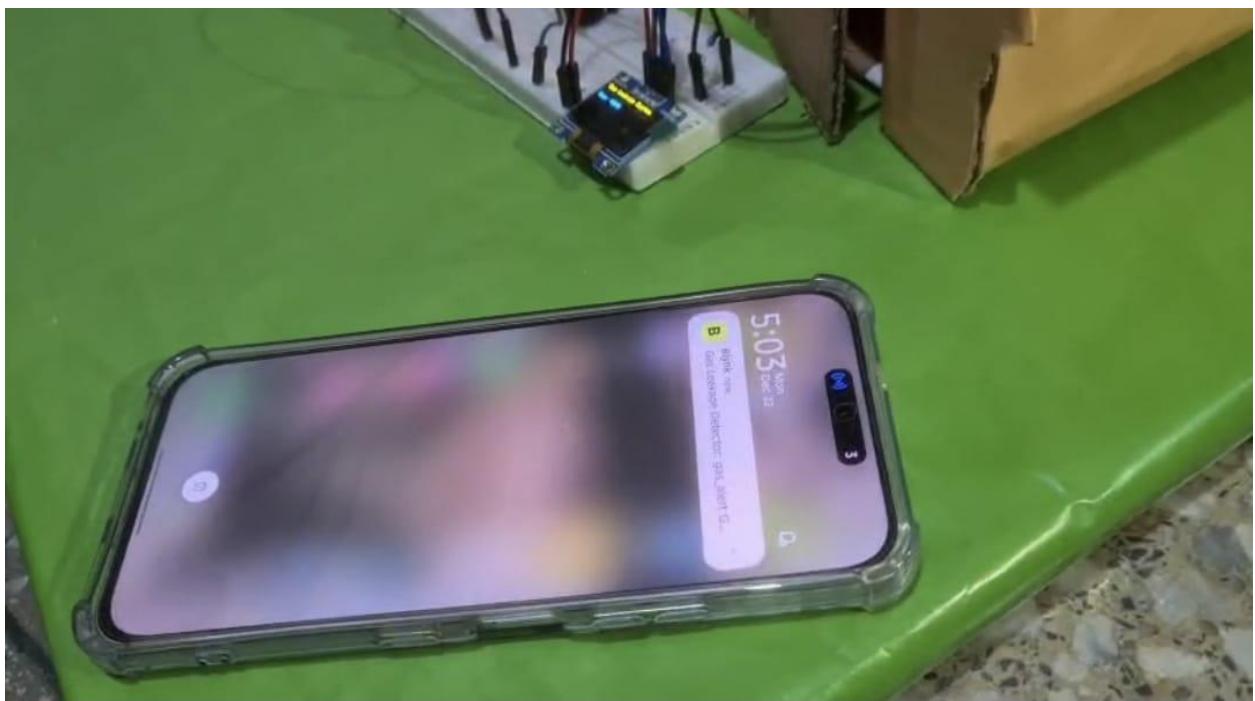
Project Physical Structure:

Prototype Design Pictures:

Blynk Notification and Email ScreenShots:
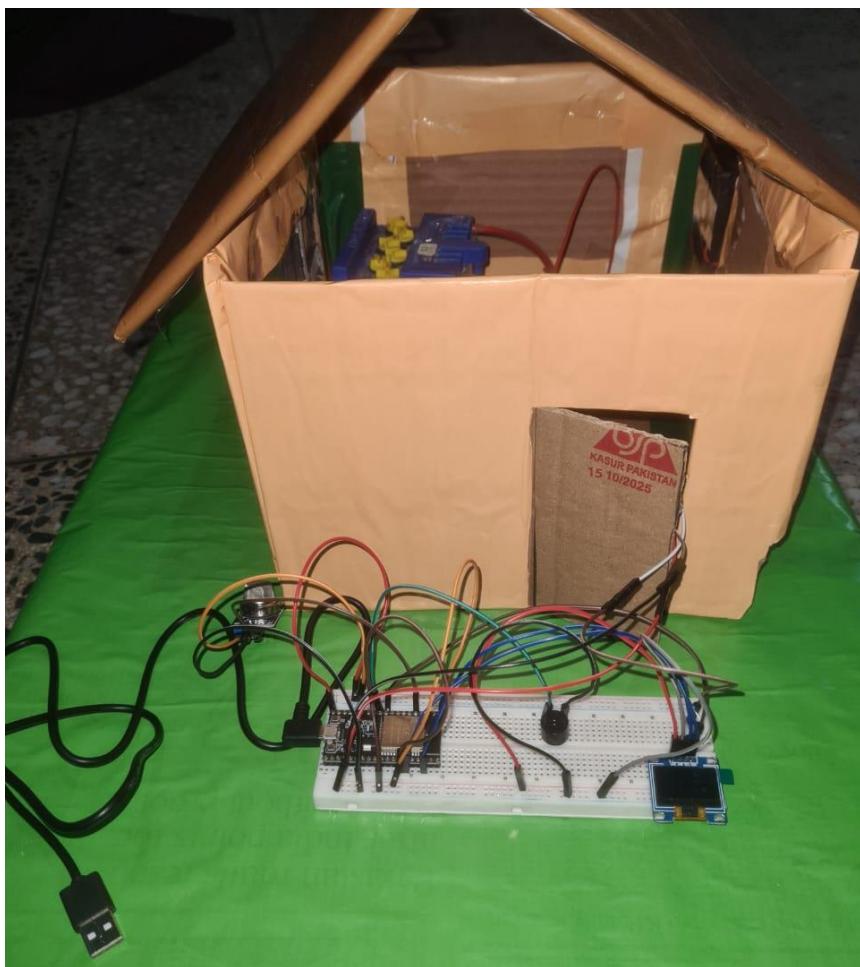
Final Project Design:

Conclusion:

Our project successfully implements a Gas Leakage Detection System using ESP32 and IoT technology. The system continuously monitors gas levels and provides instant alerts through a buzzer, exhaust fan, OLED display, and Blynk mobile application. It ensures quick response to gas leakage, improving safety and reducing the risk of accidents. The integration of IoT allows remote monitoring, making the system reliable and user-friendly.

Future Scope:

In the future, this system can be enhanced by adding SMS or call alerts using a GSM module for areas without internet access. Data logging and graphical analysis can be implemented using cloud platforms. Additional sensors can be integrated to detect different types of gases. The system can also be expanded with AI-based prediction and automatic emergency shutdown features for advanced safety.