

# **SafeFlow: Intelligent Gas Safety Monitoring and Management System**

## **MENTORS**

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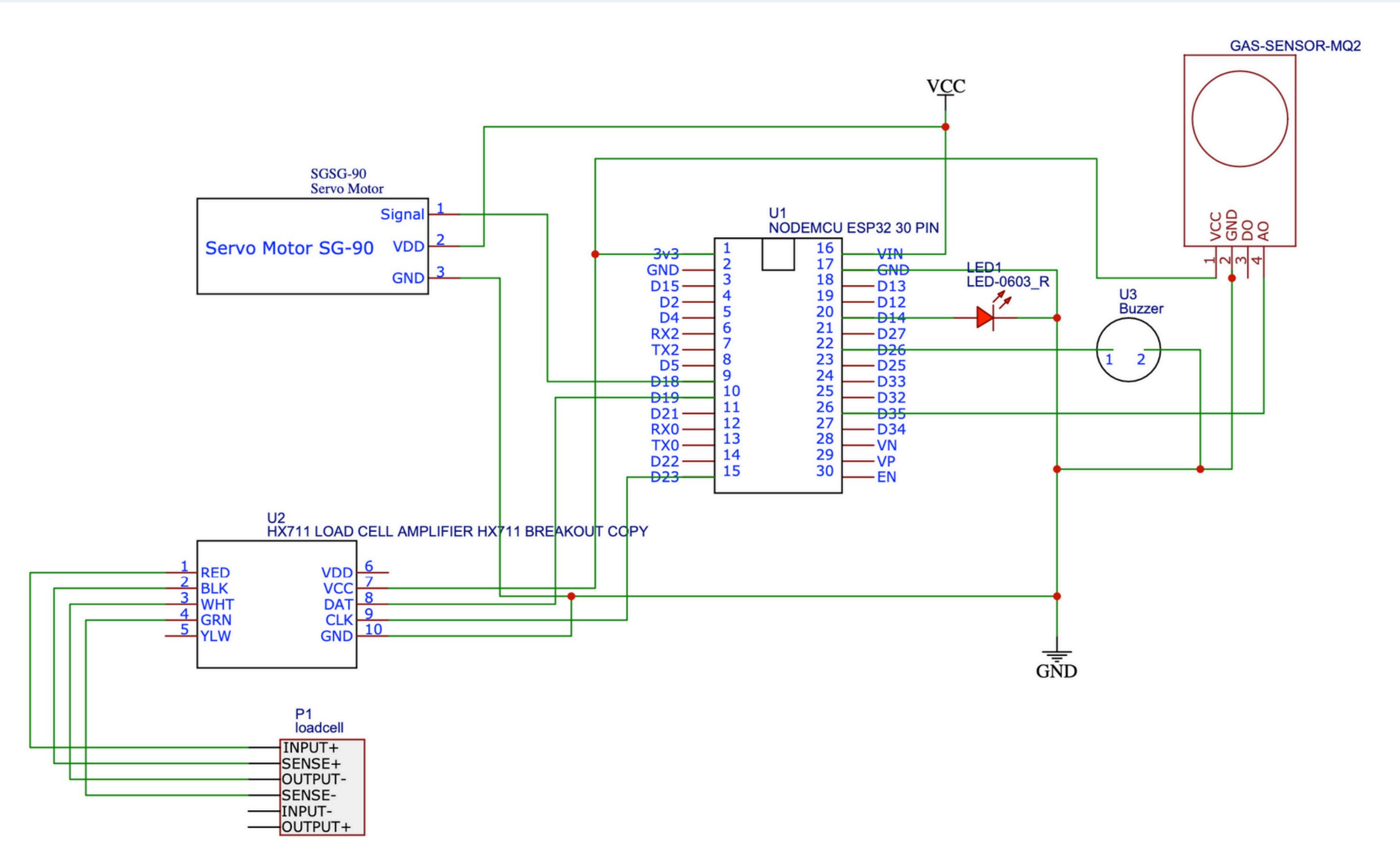
# INTRODUCTION

- LPG is widely used for cooking and heating but poses severe risks if mishandled, especially when the regulator is not turned off during leaks.
- Current systems detect leaks but lack efficient automated valve shut-off solutions, while alternatives like exhaust fans are not universally effective and fail to address the root cause.
- The proposed device enhances safety by detecting leaks, automating valve shut-off, and simplifying cylinder management through weight monitoring and automated booking notifications.

# SCOPE/OBJECTIVES

The aim of our project is to develop a compact and efficient system that integrates gas leakage detection, automatic valve closure, real-time weight monitoring, and automated booking alerts for enhanced safety and convenience.

# SAMPLE CIRCUIT DIAGRAM



# METHODOLOGY

## Objective Definition

- Objective: Detect gas leakage, measure weight, and control a servo motor.
- Components: ESP32 (NodeMCU), MQ2 gas sensor, HX711 load cell amplifier, SG90 servo motor, LED, and buzzer.
- Power Supply: Ensure a reliable power source compatible with ESP32 and connected modules.
- Specifications: Define measurable thresholds for gas leakage detection and load-cell calibration.

# METHODOLOGY

## Hardware

- Circuit Verification: Confirm connections in the schematic:
- MQ2 sensor outputs analog/digital signals to ESP32.
- HX711 connects to the load cell and communicates with ESP32 via I2C or other supported protocols.
- Servo motor and LED are controlled through GPIO pins.
- Buzzer activation aligns with the gas detection logic.
- Power Management: Check voltage levels for all modules (e.g., MQ2 needs 5V, HX711 operates with 3.3–5V).
- Prototyping Platform: Use a breadboard for initial assembly before soldering onto a PCB.

# METHODOLOGY

## Software

- Development Environment: Using Arduino IDE or ESP-IDF for coding.
- Libraries: Install and configure:
  - MQ2 sensor library for gas detection.
  - HX711 library for weight measurement.
  - Servo.h for motor control.
  - buzzer and LED libraries .

# METHODOLOGY

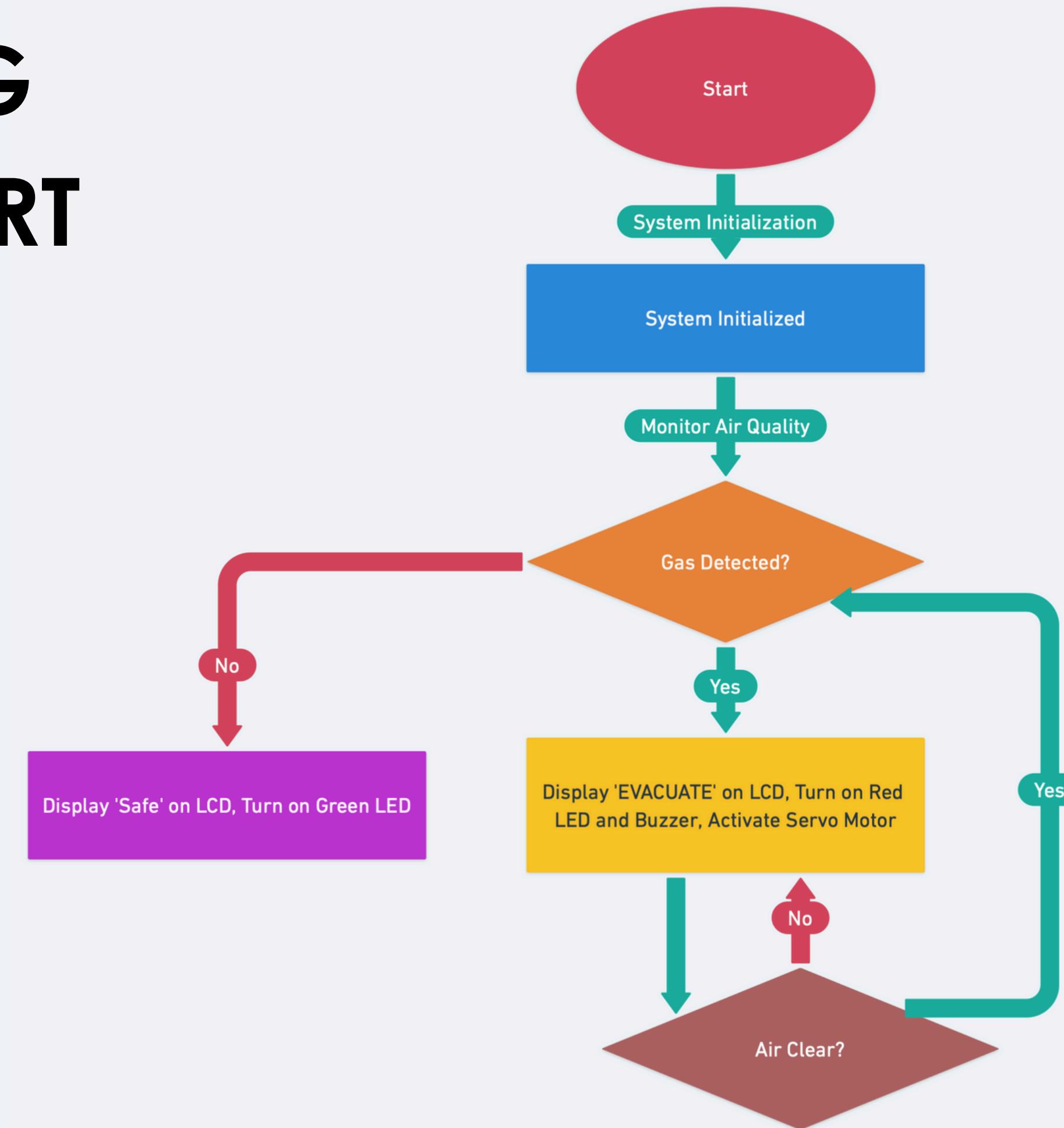
## Hardware Implementation

- Assemble all components on a PCB or breadboard as per the schematic.
- Test connections for stability and performance.

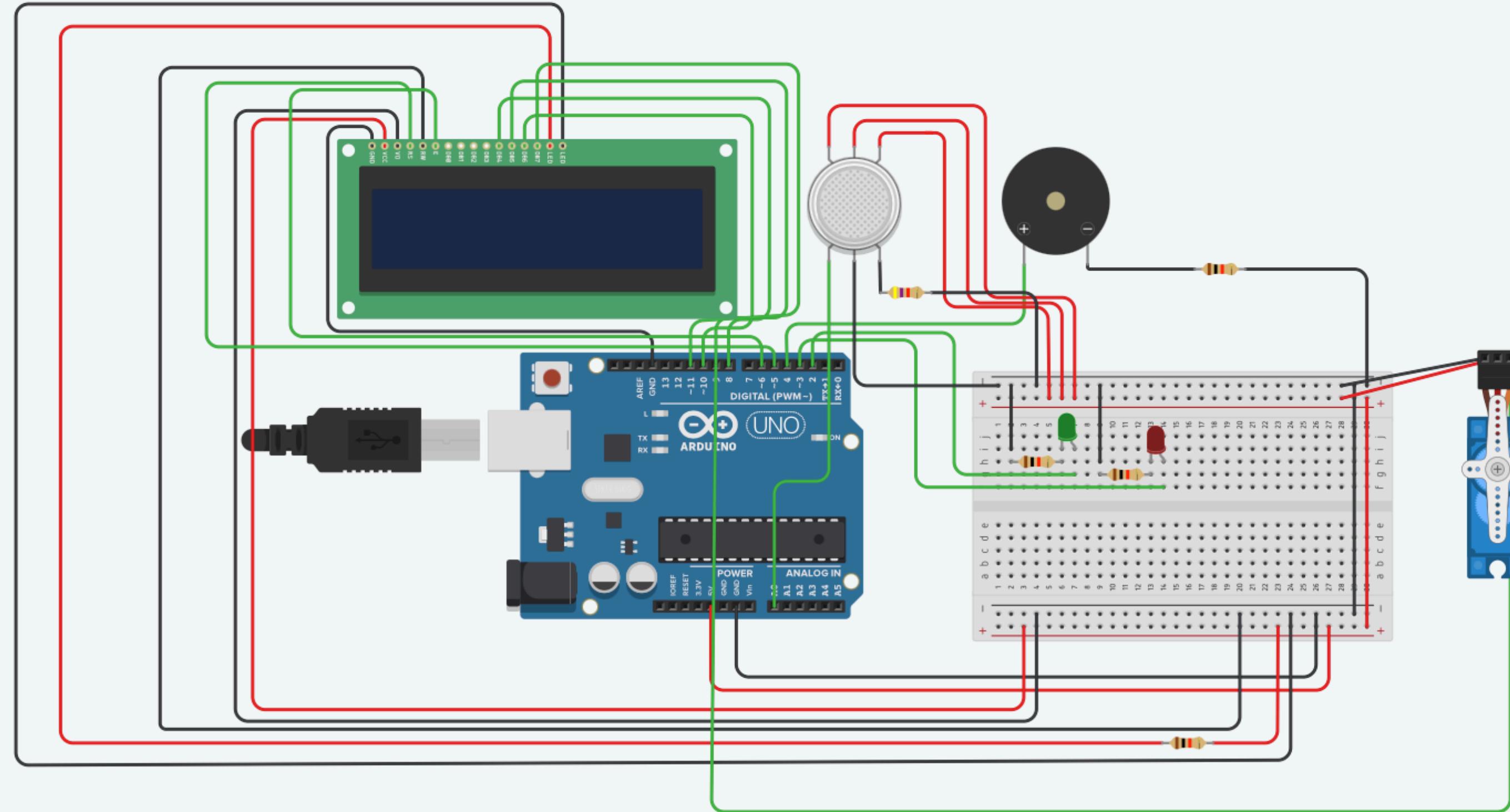
## System Testing

- Test with various gas concentrations to verify the MQ2 sensor's accuracy.
- Ensure all alerts (LEDs, buzzer) activate properly upon gas detection.

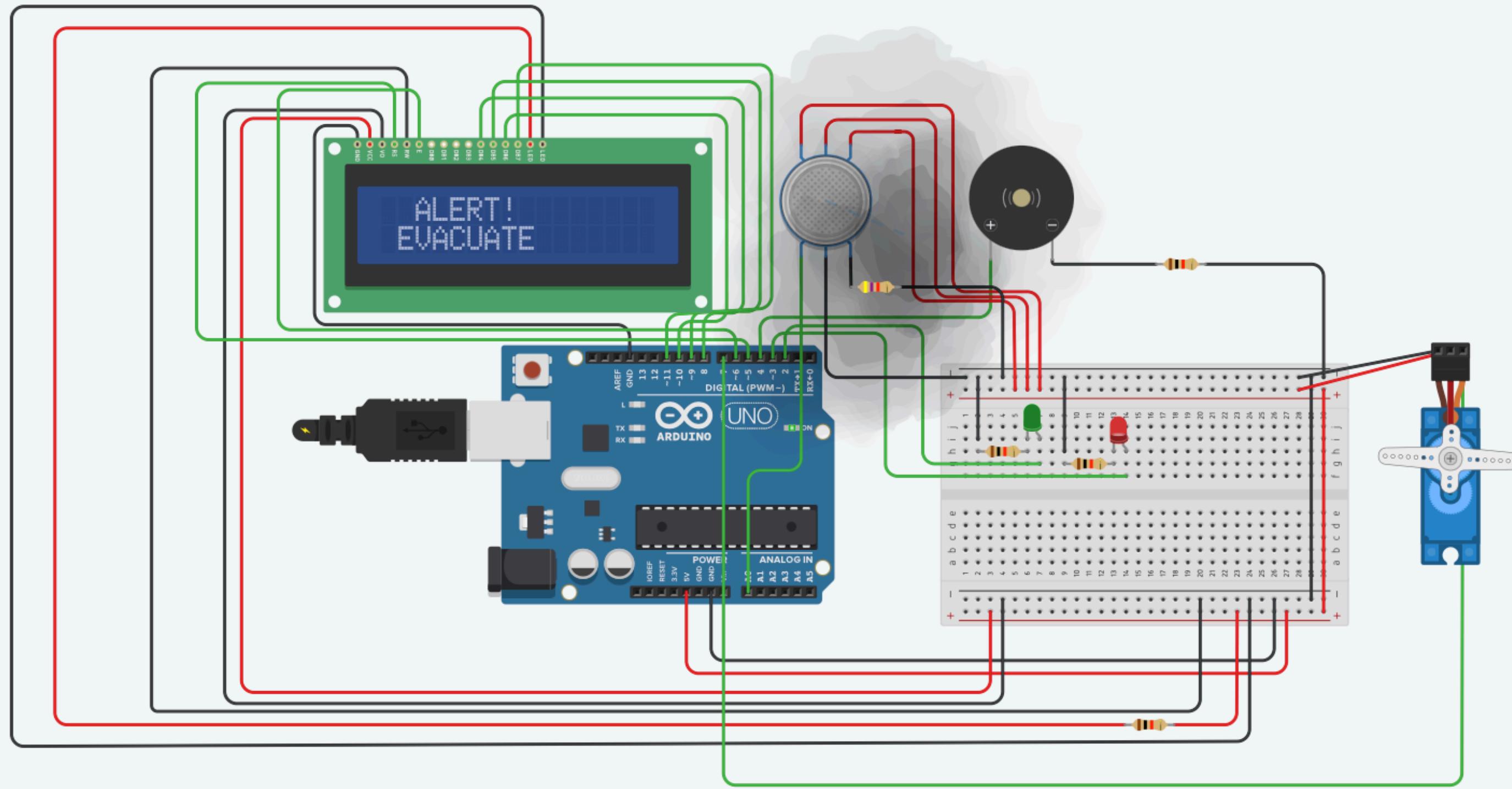
# WORKING FLOWCHART



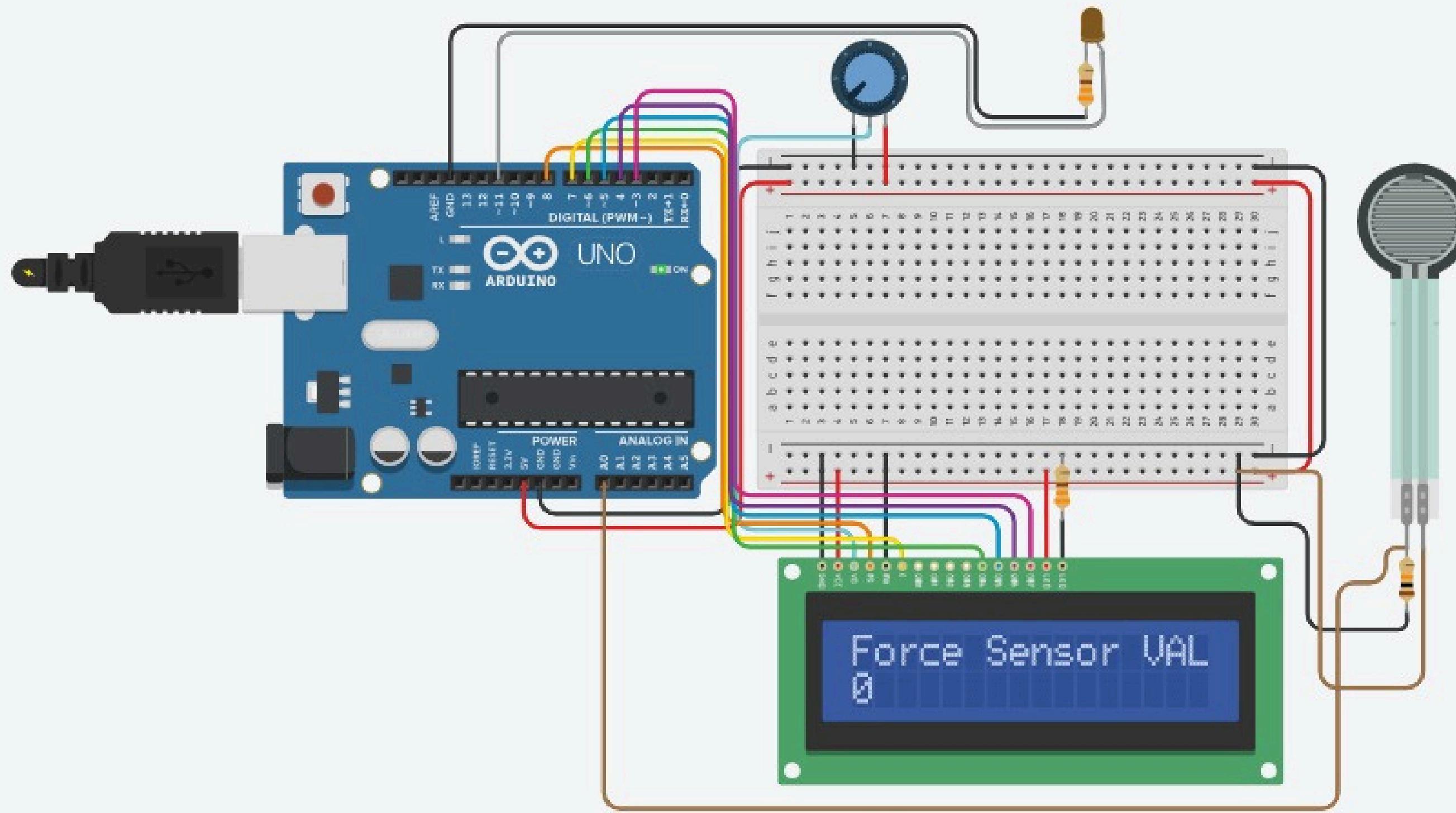
# TINKERCAD SIMULATION



# TINKERCAD SIMULATION RESULT



# TINKERCAD SIMULATION FORCE SENSOR



# WEBSITE FOR LIVE MONITORING



The image shows a website layout for 'Safe Flow'. At the top left is the 'Safe Flow' logo. To its right is a navigation bar with links: Home (highlighted in orange), Live Monitoring, Booking Dashboard, and About Us. Below the navigation is the main title 'Smart Gas Monitoring & Safety Automation' in large, bold, black and orange text. Underneath the title is a slogan: 'Stay Smart, Stay Safe – Choose SafeFlow!'. At the bottom center is a red-to-orange gradient button with the text 'Live Monitoring' on the left and 'Gas Booking' on the right. The background features stylized, abstract tree-like shapes in dark grey, black, and orange.

**Safe Flow**

Home Live Monitoring Booking Dashboard About Us

 Safe Flow

## Smart Gas Monitoring & Safety Automation

Stay Smart, Stay Safe – Choose SafeFlow!

Live Monitoring Gas Booking

# WEBSITE DASHBOARD

The screenshot shows a website dashboard for a gas monitoring system. At the top, there's a dark header bar with the URL "safeflow12.wixsite.com". Below it is a navigation bar with links for "Live Monitoring | Safe Flow", "Telegram Web", and a "Start Now" button. The main content area features a logo with "o w" and a menu with "Home", "Live Monitoring" (which is highlighted in orange), "Booking Dashboard", and "About Us". A large green button displays a checkmark and the text "System Normal". Below this, a white box contains timestamp, weight, and status information.

This site was designed with the **WIX**.com website builder. Create your website today. [Start Now](#)

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## Gas Monitoring System

**✓ System Normal**

**Timestamp:** 2025-04-24 10:38:12

**Weight:** 3.48 kg

**Status:** Safe

# WEBSITE DASHBOARD WHEN GAS LEAK DETECTED

The screenshot shows a website interface for a 'Gas Monitoring System'. At the top, there's a dark header bar with the URL 'safeflow12.wixsite.com' and navigation links for 'Live Monitoring | Safe Flow' and 'Telegram Web'. Below the header, a message from WIX.com encourages users to create their own website. The main content area has a dark background and features a large orange button with the text 'Gas LEAK DETECTED!' and a small flame icon. To the left of this button, the text 'Gas Monitoring System' is displayed with a small flame icon. Below the button, three pieces of information are listed: 'Timestamp: 2025-04-24 10:38:05', 'Weight: 3.48 kg', and 'Status: Leak'. The overall design is modern and professional.

# WEBSITE DASHBOARD WHEN AUTOMATIC REFILL

The screenshot shows a website interface for a 'Gas Monitoring System'. At the top, there's a dark header bar with the URL 'safeflow12.wixsite.com' and navigation icons for Live Monitoring, Telegram Web, and a menu icon. Below the header, a banner from WIX.com encourages users to create their own website. The main content area features a logo with 'o w' and a navigation bar with links to Home, Live Monitoring (which is highlighted in orange), Booking Dashboard, and About Us. The central part of the page displays a red alert box with the text '⚠️ LOW GAS! Automated refill initiated'. Below this, a white card provides detailed information: **Timestamp:** 2025-04-24 10:38:19, **Weight:** 2.00 kg, and **Status:** Safe.

safeflow12.wixsite.com

Live Monitoring | Safe Flow

Telegram Web

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Home Live Monitoring Booking Dashboard About Us

⚠️ **LOW GAS!** Automated refill initiated

**Timestamp:** 2025-04-24 10:38:19

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Live Monitoring | Safe Flow

Telegram Web

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Home Live Monitoring Booking Dashboard About Us

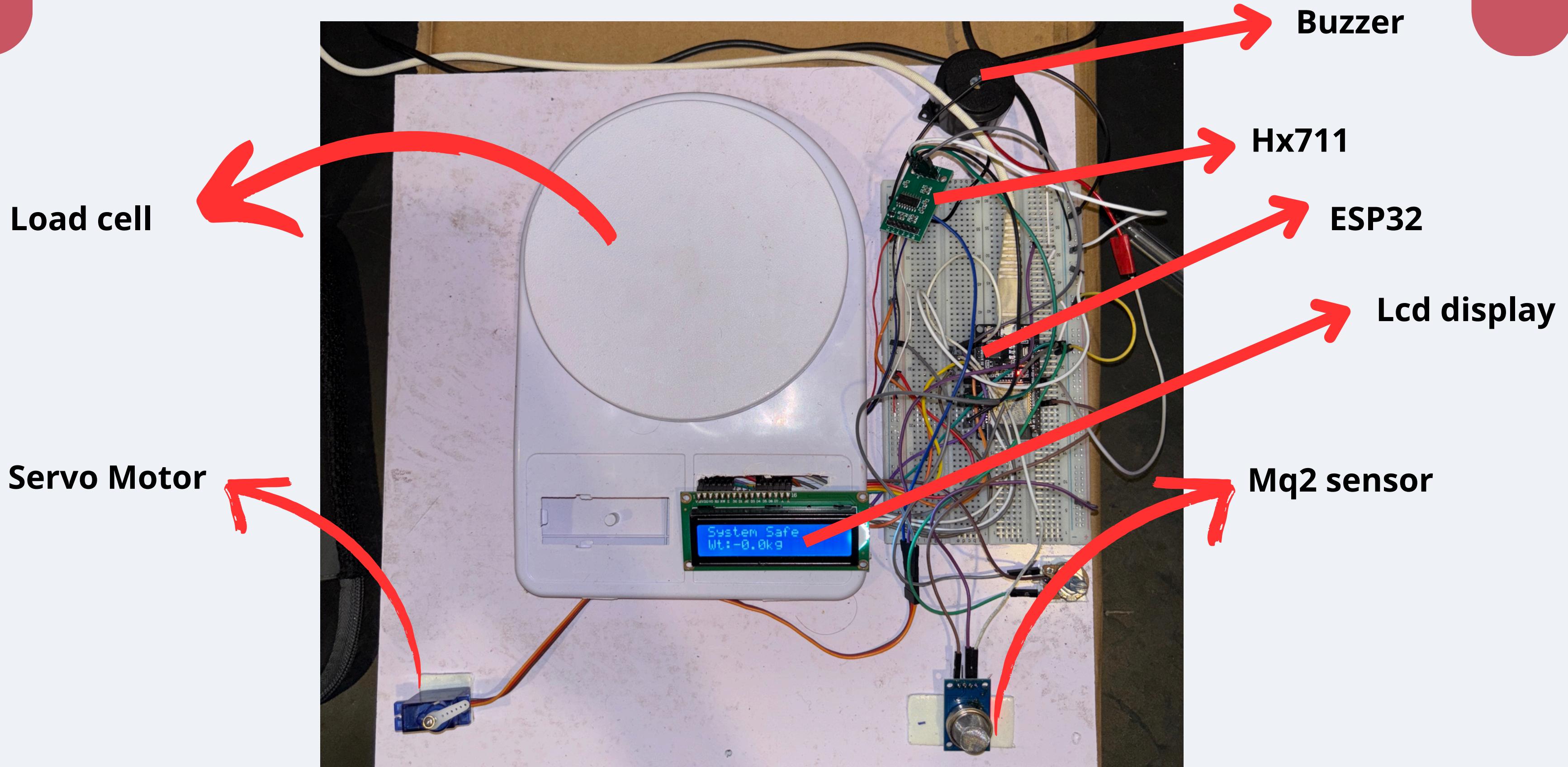
⚠️ **LOW GAS!** Automated refill initiated

**Timestamp:** 2025-04-24 10:38:19

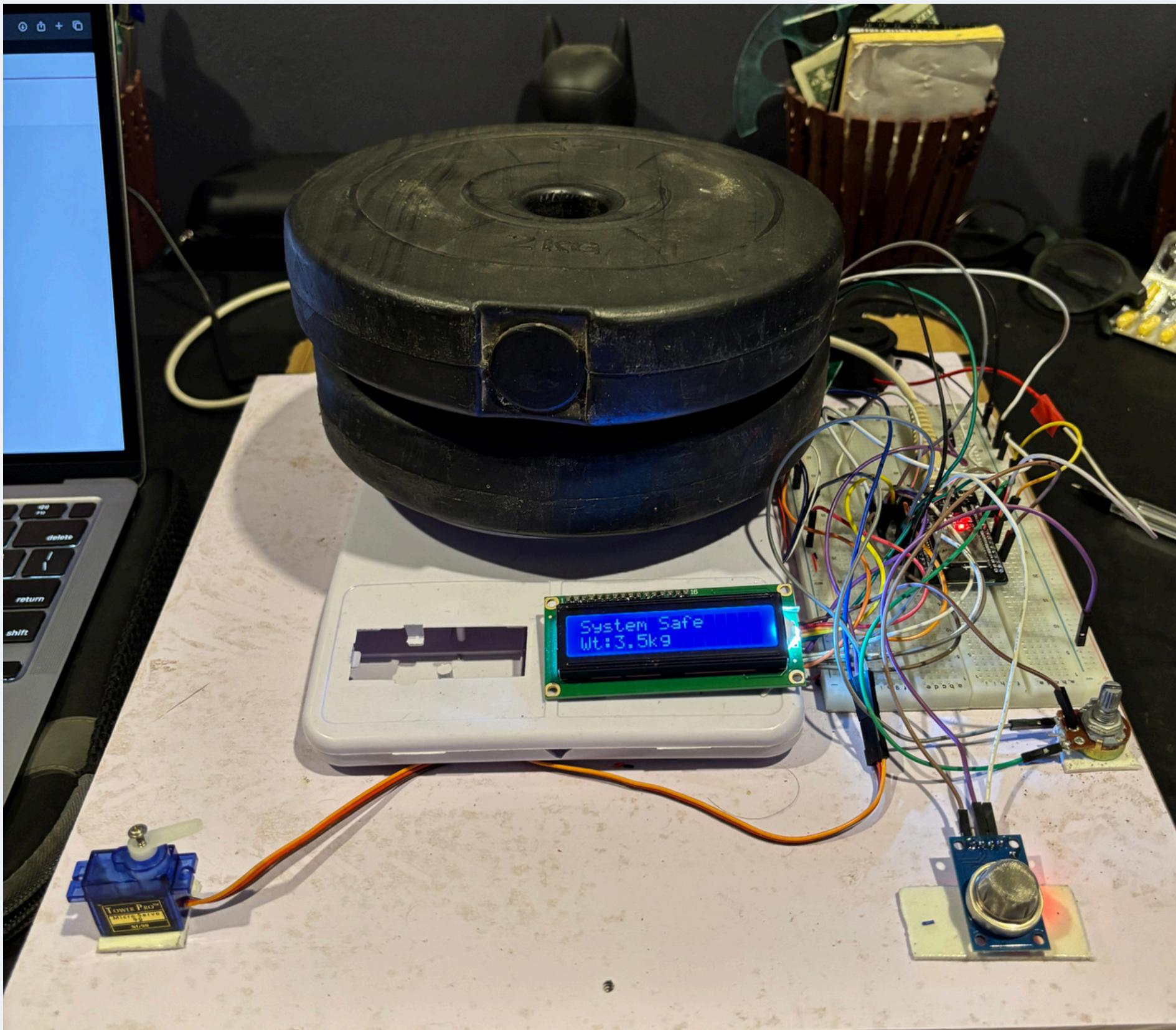
**Weight:** 2.00 kg

**Status:** Safe

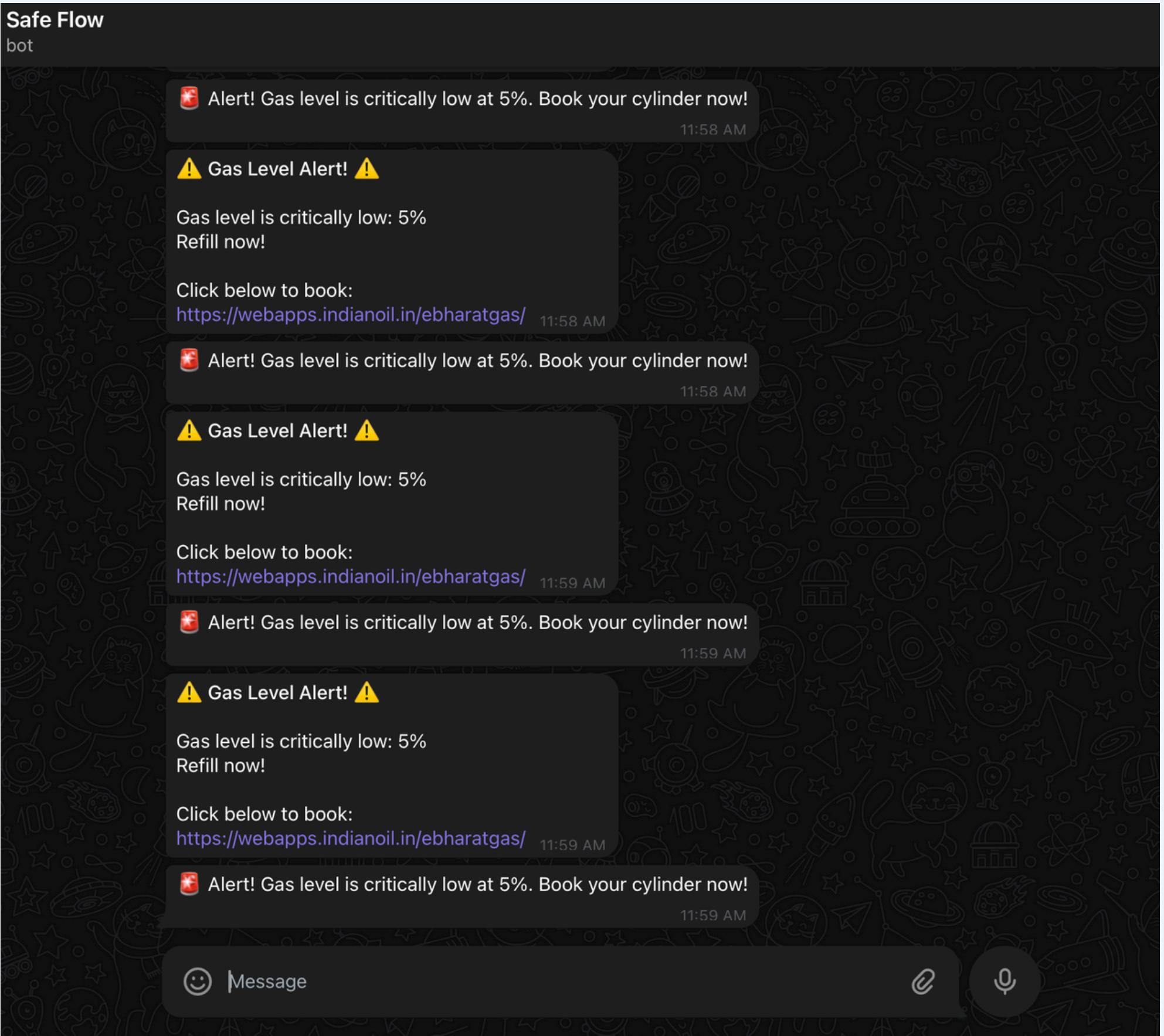
# HARDWARE



# HARDWARE WORKING



# TELEGRAM BOT



# TIME PLAN

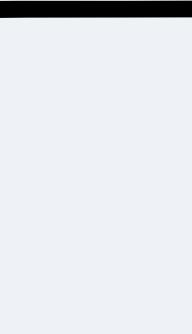
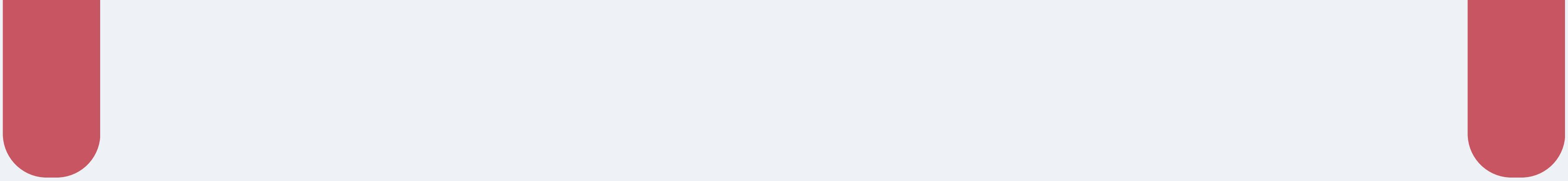
- Small Modifications of hardware if any.
- Complete Testing and validation: April.
- Finish hardware and paper by May

# WORK DONE BY EACH MEMBERS

- Ambadi - Circuit Diagram and hardware
- Sreehari – Simulation and website
- Akash – Simulation and hardware

# REFERENCES

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**THANK YOU**

