`A
Project Report
On

Smart LPG Gas Level Monitoring and Leakage Detection System using IOT

Submitted to

Sant Gadge Baba Amravati University, Amravati

Submitted in partial fulfillment of

the requirements for the Degree of

Bachelor of Engineering in

Electronics and Telecommunication Engineering

Submitted by

Kalyani Bhagwat	**Sanket Yende**
(PRN: 203120433)	(PRN: 193120115)
Namrata Damare	**Bhavesh Shah**
(PRN: 203120447)	(PRN: 193120447)

Under the Guidance of
Prof. V.M. Umale
Asst.Prof., E & TC Dept.

Department of Electronics & Telecommunication Engg.
Shri Sant Gajanan Maharaj College of Engineering,
Shegaon – 444 203 (M.S.)
2022-2023

Certificate

This is to certify that the project report entitled **"Smart LPG Gas Level Monitoring and Leakage Detection System using IOT"** is hereby approved as a creditable study carried out and presented by

Kalyani Bhagwat(PRN:203120433)

NamrataDamare(PRN:203120447)

Sanket Yende (PRN:193120115)

Bhavesh Shah (PRN:193120125)

in a manner satisfactory to warrant of its acceptance as a pre-requisite in a partial fulfillment of the requirements for the degree of Bachelor of Engineering in Electronics & Telecommunication Engineering of Sant Gadge Baba Amravati University, Amravati during the Session 2022-23.

Prof. V.M.Umale
Project Guide

Dr. M. N. Tibdewal
Professor & Head, E & TC Dept.

Dr. S. B. Somani
Principal

Internal Examinar

Prof._____
External Examiner

SSGMCE, Shegaon

Abstract

LPG Gas is a widely used fuel for cooking. However, it poses some common problems such as running out of gas during peak cooking hours, not knowing the current status of the gas cylinder, and not being able to predict its working days. To reduce the danger, constant vigilance is required. This system detects LPG leakage and sends an alert message to the user. It also detects the gas leakage status and helps customers know if they are being cheated by the gas agency. The system notifies the user of the current status and booking notifications via LORA module on their mobile phones. This is cost-effective. The system works towards making the LPG chamber booking system more automated without any human intervention. It registers your booking through LORA technology by sending an SMS to the distributor company and alerts the user at the same time. This system is helpful for elderly people who live alone and are dependent on others, making them independent and secure from any kitchen hazards.

Acknowledgment

We would like to take this opportunity to express our heartfelt thanks to our guide Prof. V.M. Umale for his esteemed guidance and encouragement, especially through difficult times. His suggestions broaden our vision and guided us to succeed in this work. We are also very grateful for his guidance and comments while designing part of our project and learnt many things under his leadership. Also, we would like to thank to Dr. M. N. Tibdewal, Head of Electronics and Telecommunication Department, all teaching and non-teaching staff of EXTC Department for their encouragement and suggestions for our project.

We extend our thanks to Dr. S. B. Somani, Principal, Shri Sant Gajanan Maharaj, College of Engineering, for his valuable support.

We sincerely thank to all our friends, who helped us directly or indirectly in completing our project work. We would like to express our appreciation for the wonderful experience while completions of this project work.

Kalyani Bhagwat

Namrata Damare

Sanket Yende

Bhavesh Shah

Abbreviations

IOT : Internet of Things

LoRa : Long Range

LCD: Liquid Crystal Display

List of Figures

Contents

1. INTRODUCTION

Now days, LPG is used for many needs such as industrial fuel, automobile fuel, heating and domestic fuel. Mainly LPG is used in homes for cooking purpose. Advantage of using LPG is that it has high calorific value, produces less soot and it is less smoky and mainly does not cause any harmful effect to the environment. As we know that these gases are heavier than air so it doesn't disperse easily and may lead to suffocation when invoked and then may be reason to fire explosion when there is any leakage on ignition. As the age of person increases, he/she tend to forget basic things like switching off cylinder regulator or the main ignition button, and then gas leakage can be very dangerous. It causes suffocation and explosion due to any spark. Risk of accidents increases day by day as number of LPG consumers increases. This developed system will help such people by switching off regulator immediately on gas detection like fire alarm. As additional advantage, The weight of cylinder is measured using load cell sensor it continuously measures the weight and the send the electric pulse to the microcontroller i.e. Arduino. When system detects the weight of cylinder below particular level, it alerts the user for cylinder booking, and place a refill order in the respective branch. It also provides additional features such as notifying the current status of gasoline present in the container and predicting the working days of the gasoline content[3]. The proposed system uses a LoRa Module for the connection of an android device with the system. The main application of this proposed system is to overcome the shortcomings such as delay and prebooking of the LPG cylinder by the consumers.

The weight of cylinder is measured using load cell sensor which intern works on the principle of piezoelectric sensor. It continuously measures the weight and the send the electric pulse to the microcontroller i.e. Arduino. When system detects the weight of cylinder below particular level, it alerts the user for cylinder booking, and place a refill order in the respective branch. It also provides additional features such as notifying the current status of gasoline present in the container and predicting the working days of the gasoline content. The proposed system uses a LoRa Module for the connection of an android device with the system. The main application of this proposed system is to overcome the shortcomings such as delay and pre-booking of the LPG cylinder.

Figure 1.1 : Smart LPG Trolley

2. LITERATURE REVIEW

1) Nagib Mafuz , Shawan Karmokar , Md. Ismail Hossain Rana , Smart Gas Level Monitoring, Booking & Gas Leakage Detector over IoT "IEEE 7th International Advance Computing Conference" issue-1-3 2017

• This paper approaches a smart technique for monitoring the leakage of LPG Gas using IOT. This system can trigger an alarm if the gas leakage.

• It has good performance , Accurate output measured from LPG sensor.

• Low maintenance and low operating costs.

• The sensor has excellent sensitivity combined with a quick fast response time.

• Due to GSM cost of product will increased and using Arduino does not contain wifi module.

2) M.Anitha , A . Reethika Shree , R . Manjula Devi Smart Lpg Gas Monitoring and Automatic Cylinder Reservation System "International Journal of Recent Technology and Engineering(IJRTE)" ISSN:2277-3878,Volume-9 Issue-1 May 2020

• Proposed methodology will perform by this technology is detecting LPG leakage , displaying the weight of cylinder through which we can determine in how many days it cylinder will be out of gas.

• LPG weight measurement and display the level of Gas Remaining and leakage detection is having 90% accuracy.

• LPG Leakage and Weight detection This help to customer to analyze there cylinder and easily conclude how many gas remaining.

• Due to GSM the cost of product will be increased and also maintenance charge will increased and we have to provide two batteries which will increased the cost.

3) Ajay Kumar, Mukesh Kumar , Design and Implementation of smart LPG Trolley With Home Safety "2016 2nd International Conference on Next Generation Computing Technology(NGCT-2016)" Issued on 16 October 2016.

• Weight measuring and display weight using along with automatic booking. The desired outputs and results are displayed and notified to the user through this mobile application.

• Weight Measurement and Display of value is accurate with no delay.

• Automatic booking and display the remaining gas status in LPG cylinder.

• No leakage detection, Due to Bluetooth range is short.

4) Jayesh Gupta, Abhijit Patil, Smart LPG Monitoring and Automatic Booking System using IOT " International Journal of Engineering Research & Technology (IJERT)" ISSN: 2278-0181 Vol. 9 Issue 04, April-2020

• Proposed methodology will perform certain actions simultaneously on detection of gas leakage and also help customer to lessen the burden of booking the cylinder to Distributor Company

• Accurate weight measurement ,leakage detection and system is reliable .

• Gas detection Fire alarm SMS sending to agency if gas finished before .

• No cloud data based will stored Due to raspberry pie and GSM cost of product will increased so not efficient for normal customers as well as agency.

• Maintenance cost also will increased this is not affordable.

3. OBJECTIVES

• Detection of LPG gas level within the cylinder and sending the notification by SMS to user.

• Real time gas observation system.

• Automatically book the Gas cylinder.

• LPG leak is detected through the sensor and information is sent to the user by SMS.

• Users don't need to enter any info manually as all the specified information is stored.

•To give daily statistics of gas consumption to user.
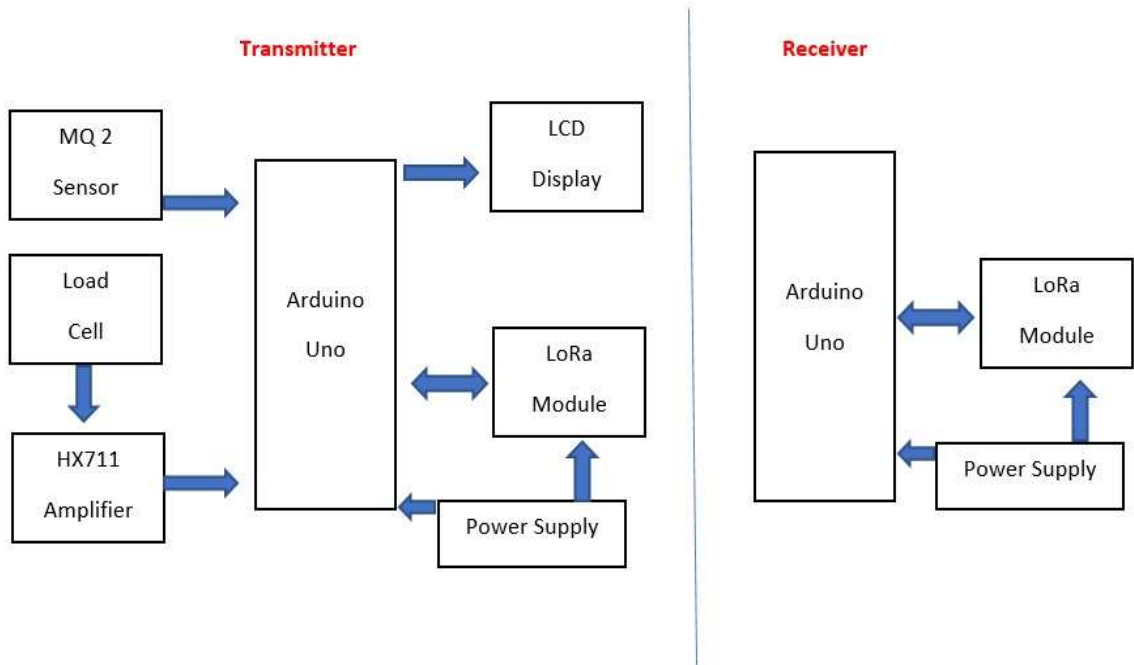
4. METHODOLOGY

Fig. 4.1 Block Diagram

The methodology of the Smart LPG Gas Level Monitoring and Leakage Detection System using IoT involves the following steps:

Sensor installation: The first step is to install the gas level sensor and the leakage detection sensor at appropriate locations, typically near the LPG cylinder or the gas pipeline.

Connectivity: The sensors are connected to a microcontroller or a gateway device that is capable of sending and receiving data over the internet.

Cloud platform: The data from the sensors is sent to a cloud platform that stores the data and processes it. This platform is used to monitor the gas level and detect any leaks.

Application: A mobile application or a web-based dashboard is used to visualize the data and receive alerts in case of gas level drops or leakages. The user can also remotely monitor the gas level and turn off the gas supply in case of emergency.

Machine Learning: In order to increase the accuracy of the gas level monitoring, machine learning algorithms can be used to predict the gas level based on historical data and other factors such as temperature and humidity.

Alerts and notifications: The system can send alerts and notifications to the user in case of any gas leakage detected or when the gas level falls below a certain threshold. This ensures timely action can be taken to avoid any mishaps.

Overall, the Smart LPG Gas Level Monitoring and Leakage Detection System using IoT is a combination of hardware, software, and cloud-based technologies that work together to provide real-time monitoring and control of LPG gas levels and detect gas leakages, ensuring the safety of the users.
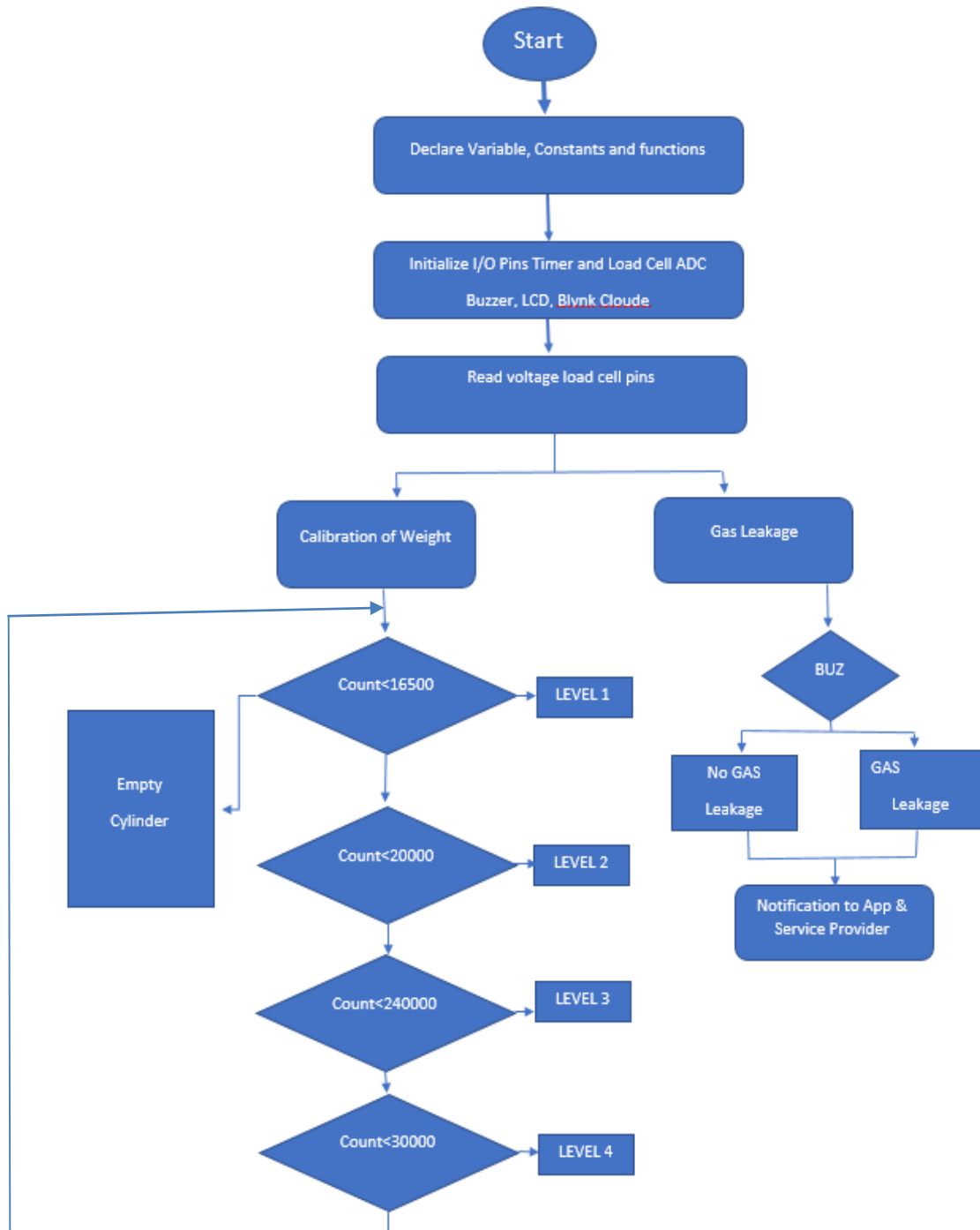
5. ALGORITHM

Figure 5.1 .Algorithum of code

6. HARDWARE AND SOFTWARE REQUIREMENT

6.1 HARDWARE ASPECTS

- **Lcd:**

Fig. 6.1 LCD Display

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on.

• 5 x 8 dots with cursor

• Built-in controller (KS 0066 or Equivalent)

• + 5V power supply (Also available for + 3V)

• 1/16 duty cycle

• B/L to be driven by pin 1, pin 2 or pin 15, pin 16 or A.K (LED)
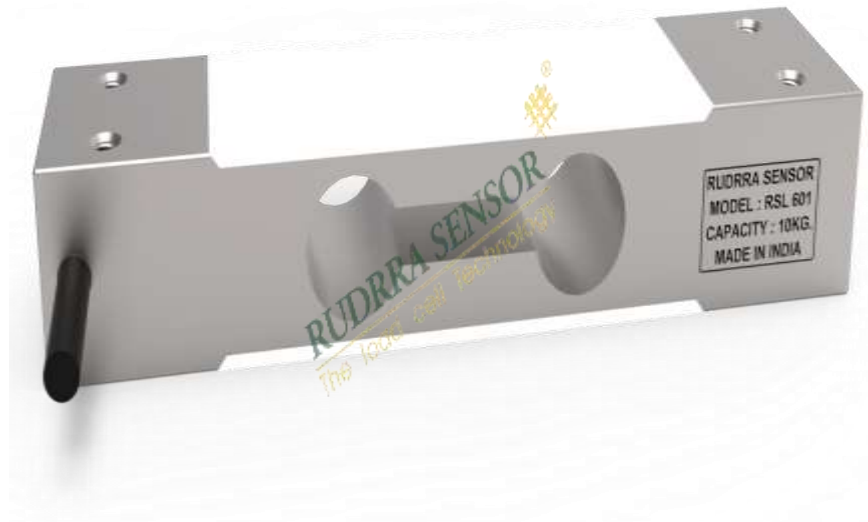
• N.V. optional for + 3V power supply

- **Load cell**

Fig.6.2 Load Cell

Our one of the best Table Top Load Cell RSL 601 is manufactured from high quality material which issourced from reputed and reliable venders in the market. In the product range our product is available for various applications such as Bench, Counting.

- Single Point Off-center Load Measuring Capability
- Economical and Low Profile Cell
- Aluminium-alloy, Colorless anodized
- Glue sealed

- **HC-12 Wireless serial post communication module**

Fig. 6.3 HC-12

HC-12 wireless serial port communication module is a new-generation multichannel embedded wireless data transmission module. Its wireless working frequency band is 433.4-473.0MHz, multiple channels can be set, with the stepping of 400 KHz, and there are totally 100 channels. The maximum transmitting power of module is 100mW (20dBm), the receiving sensitivity is -117dBm at baud rate of 5,000bps in the air, and the communication distance is 1,000m in open space.

- Long-distance wireless transmission (1,000m in open space/baud rate 5,000bps inthe air)
- Working frequency range (433.4-473.0MHz, up to 100 communication channels)
- Maximum 100mW (20dBm) transmitting power (8 gears of power can be set)
- Three working modes, adapting to different application situations
- Built-in MCU, performing communication with external device through serialp
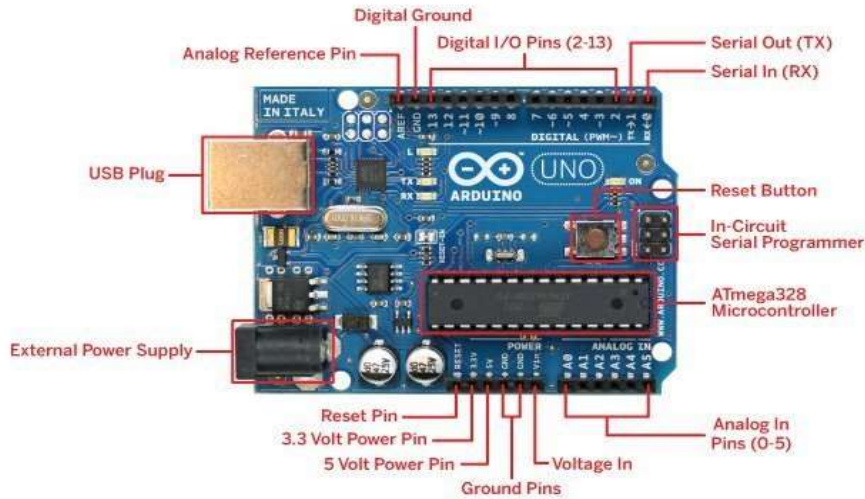
- **Arduino**

Figure 6.4 Arduino Board

The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter.

- Microcontroller : ATmega328

- Operating Voltage:5V

- Input Voltage (recommended): 7-12V

- Input Voltage (limits): 6-20V

- Digital I/O Pins: 14 (of which 6 provide PWM output)

- Analog Input Pins: 6

- DC Current per I/O Pin: 40 mA

- DC Current for 3.3V Pin: 50 mA

- Flash Memory: 32 KB (ATmega328) of which 0.5 KB used by bootloader

- SRAM: 2 KB (ATmega328)
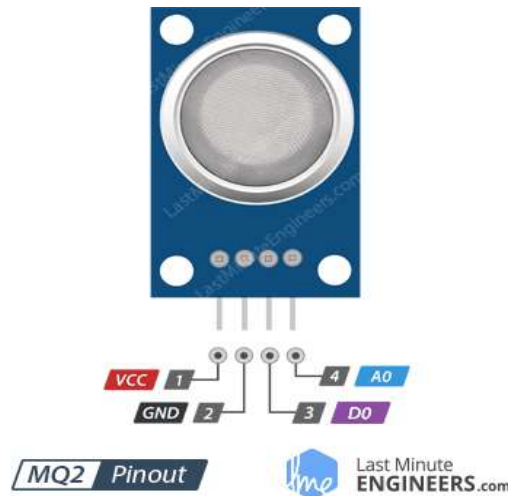
- **MQ-2 Sensor**

Figure 6.5 MQ-2 Sensor

The MQ-2 gas sensor is a versatile and affordable sensor that is widely used for gas detection applications. It is a semiconductor sensor that detects various gases such as LPG, propane, hydrogen, methane, and carbon monoxide. The MQ-2 gas sensor is based on the principle of metal oxide semiconductor (MOS), which changes its resistance when it comes in contact with the target gas.

- High sensitivity: The MQ-2 gas sensor is highly sensitive and can detect a wide range of gases in concentrations as low as 100ppm.
- Wide detection range: The MQ-2 gas sensor can detect a wide range of gases including LPG, propane, hydrogen, methane, and carbon monoxide.
- Fast response time: The MQ-2 gas sensor has a fast response time, typically within 10 seconds, making it suitable for real-time gas detection applications.
- Low power consumption: The MQ-2 gas sensor consumes very low power, typically less than 1W, making it ideal for battery-powered devices.
- Easy to use: The MQ-2 gas sensor is easy to use and can be interfaced with microcontrollers such as Arduino or Raspberry Pi using analog or digital outputs.
- Low cost: The MQ-2 gas sensor is affordable and readily available, making it a cost-effective solution for gas detection applications.
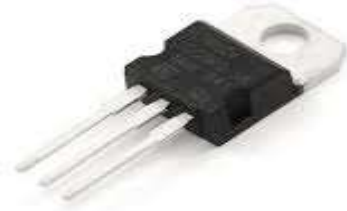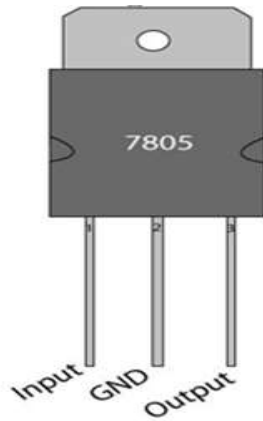
- **Voltage Regulator (7805)**

Figure 6.6 IC 7805

It is a member of 78xx series of fixed linear voltage regulator ICs. The voltage source in a circuit may have fluctuations and would not give the fixed voltage output. The **voltage regulator IC** maintains the output voltage at a constant value. The xx in 78xx indicates the fixed output voltage it is designed to provide. 7805 provides +5V regulated power supply. Capacitors of suitable values can be connected at input and output pins depending upon the respective voltage levels.

- 5V Positive Voltage Regulator
- Minimum Input Voltage is 7V
- Maximum Input Voltage is 25V
- Operating current(I_Q) is 5mA
- Internal Thermal Overload and Short circuit current limiting protection is available.
- Junction Temperature maximum 125 degree Celsius
- Available in TO-220 and KTE package
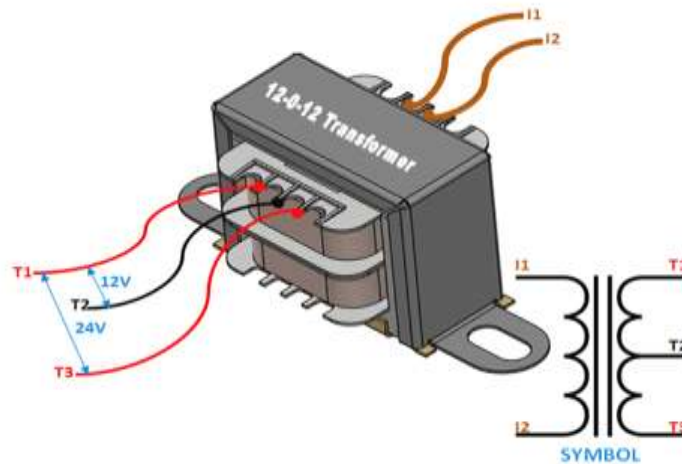
- **Transformer**

Figure 6.7 Center tapped transformer

The operation and theory behind a Center tapped transformer is very similar to a normal secondary transformer. A primary voltage will be induced in the primary coil (I1 and I3) and due to magnetic induction the voltage will be transferred to the secondary coil. Here in the secondary coil of a centre tapped transformer, there will be an additional wire (T2) which will be placed exactly at the center of the secondary coil, hence the voltage here will always be zero.

If we combine this zero potential wire (T2) with either T1 or T2, we will get a voltage of 12V AC. If this wire is ignored and voltage across T1 and T2 is considered then we will get a voltage of 24V AC. This feature is very useful for the function of a full wave rectifier.

Let us consider the voltage given by the first half of the secondary coil as Va and the voltage across the second half of the secondary coil as Vb as shown in the diagram below

- Step-down Centre tapped Transformer
- Input Voltage: 220V AC at 50Hz
- Output Voltage: 24V, 12V or 0V
- Output Current: 1A
- Vertical mount type
- Low cost and small package

6.2 SOFTWARE ASPECTS

This project was built using multiple programming languages and technologies, addressing different parts and modules.

In the following sections, the software implementation is explained, alongside the used technologies for each module.

• IOT Cloud with Blink:

Blink is a cloud-based IoT platform that provides an easy and secure way to connect and manage IoT devices. It offers a range of services such as device management, data processing, and analytics to help businesses and developers build IoT applications quickly and easily.

IoT (Internet of Things) refers to a network of physical devices, vehicles, appliances, and other objects that are embedded with sensors, software, and network connectivity. These devices can collect and exchange data, enabling them to be controlled and monitored remotely.

Figure 6.8 Blynk app mobile interface

- **Arduino IDE**

  Arduino IDE is used for the coding purpose of the hardware. All the coding part for the Node MCU was done using this software.
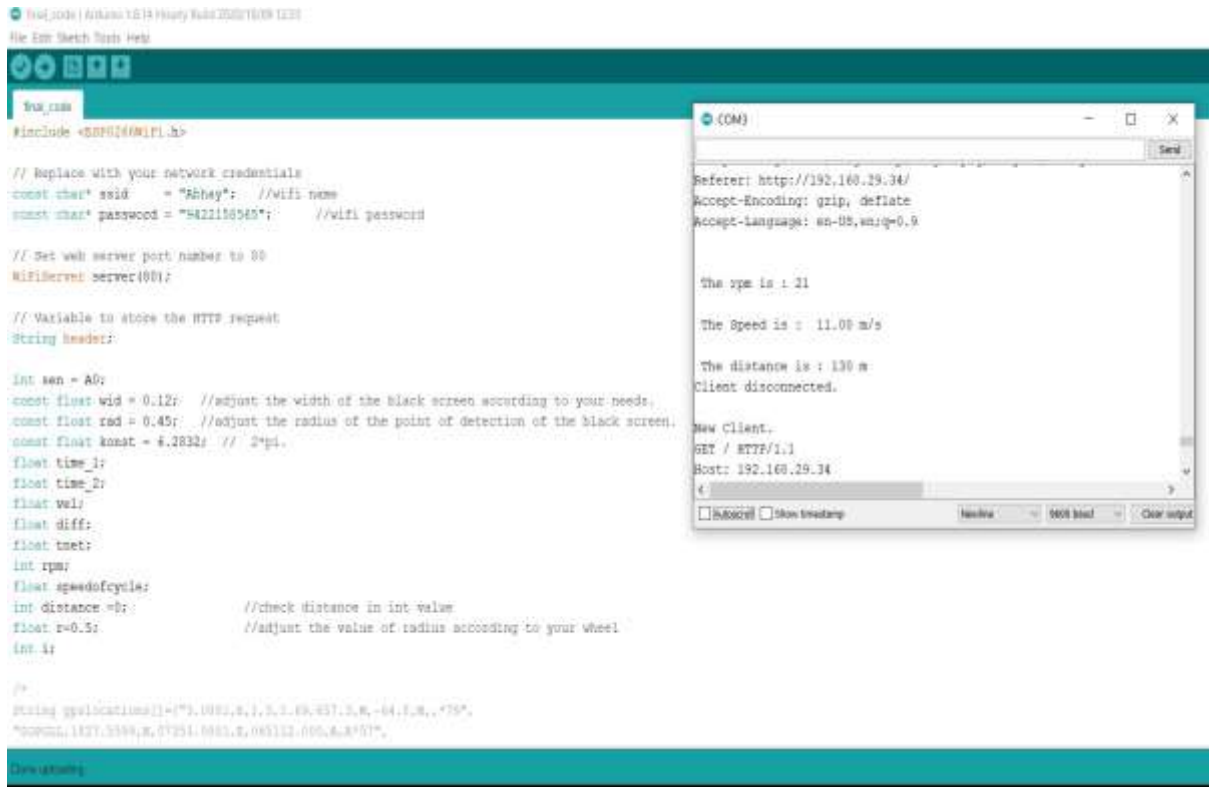

  Figure.6.9 Arduino IDE

  There are many parameters that can be used to evaluate the performance of an image sensor, including its dynamic range, its signal-to-noise ratio, its low-light sensitivity, etc. For sensors of comparable types, the signal-to-noise ratio and dynamic range improve as the size increases.
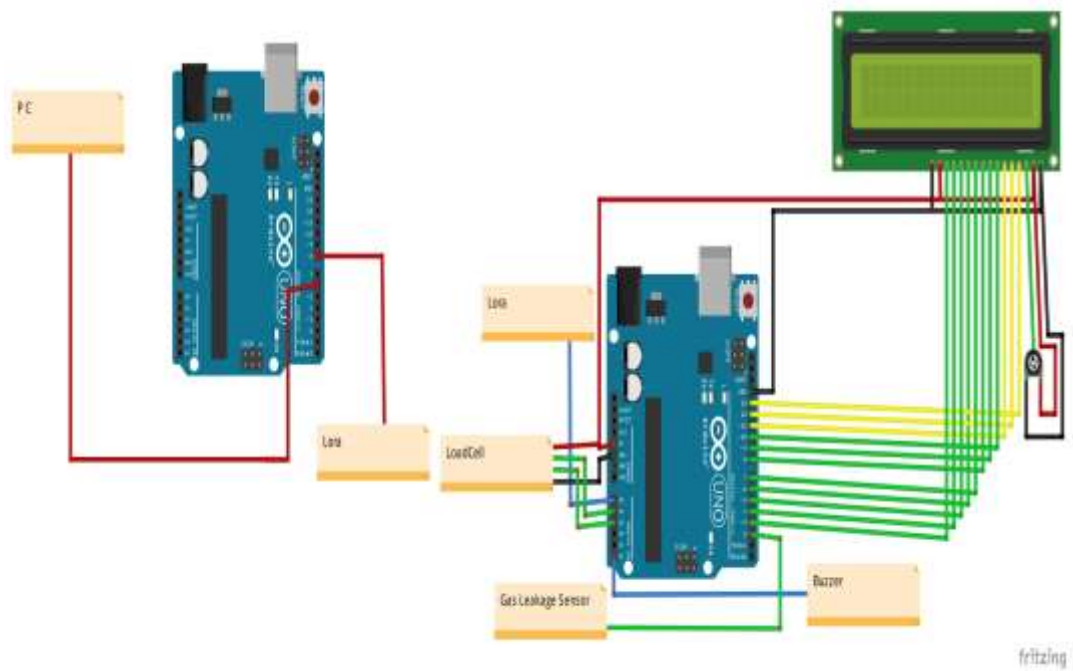
7. Circuit Diagram

Figure 7.1 Circuit Diagram of project

Step 1: Power Supply Connection
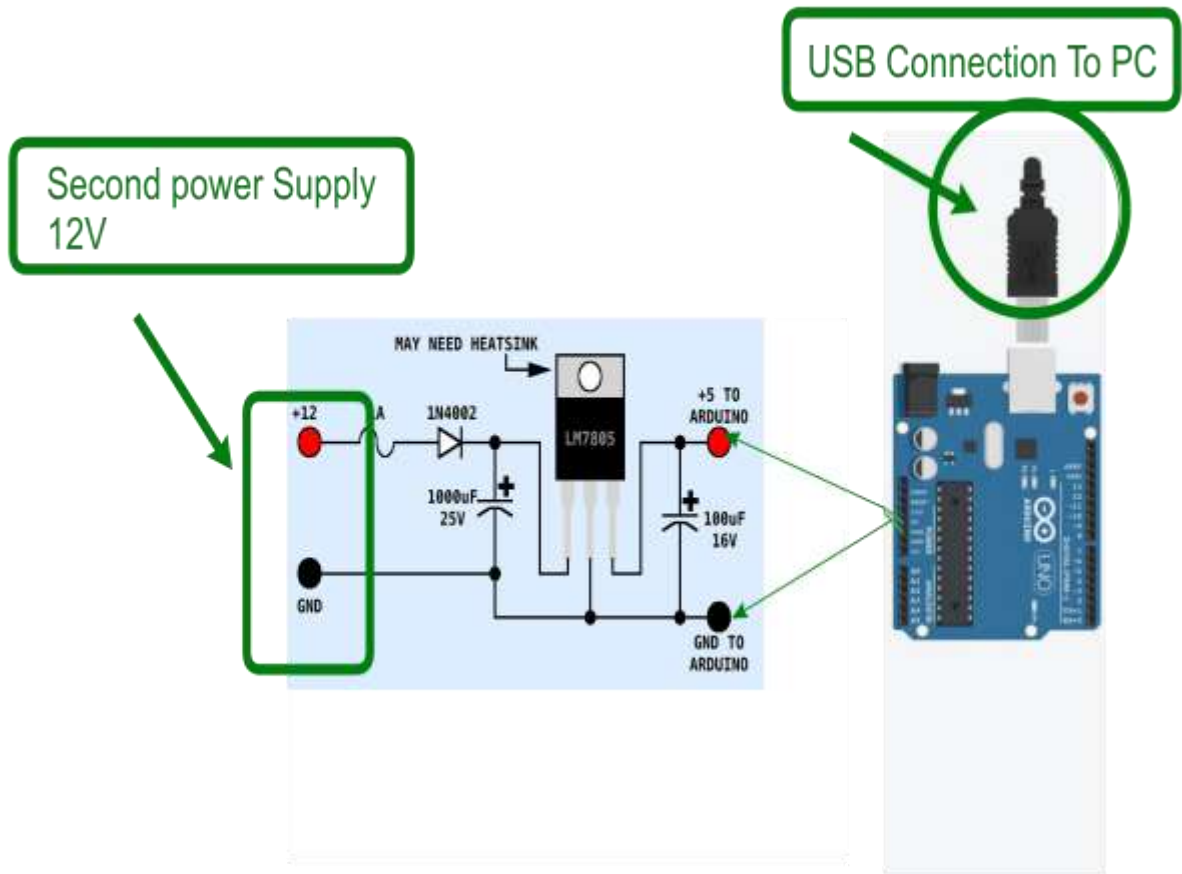
Figure 7.2 Power supply connection

- 230 V 50 Hz AC Connected to the primary winding of transformer.
- Secondary winding connect with Arduino board through rectifier circuit.
- LM7805 used as a voltage regulator.

Step 2: Load cell connection
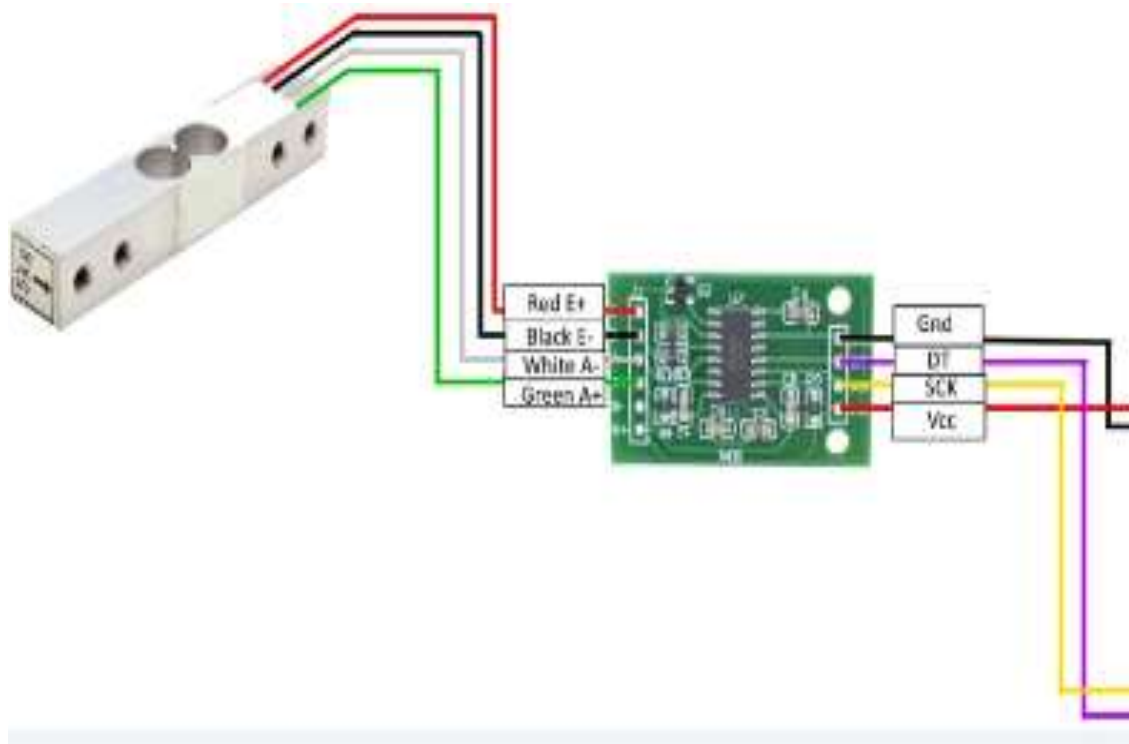
Figure 7.3 Load cell connection with HX711 Ic

HX711 Connection

- RED Wire is connected with E+
- Black Wire is connected with E-
- White is connected with A-
- Green is Connected with A+

- GND Connected with GND.
- DT Connected to A1.
- SCK Connected to A2
- VCC Connected to VCC

Step 3: Gas Sensor connection
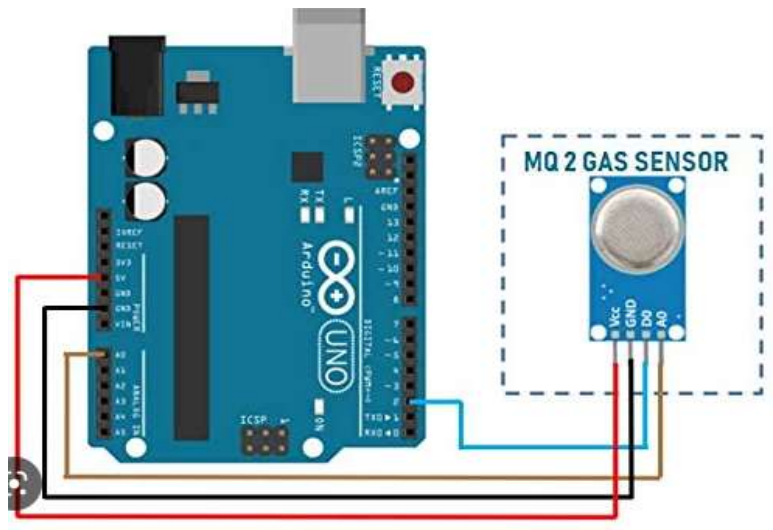
Figure 7.4 MQ-2 connection with Arduino

MQ 2 Sensor & Buzzer connections

- VCC Wire is connected with Arduino 5V
- GND Wire is connected with GND
- D0 connect with digital pin Arduino.
- Positive pin of Buzzer is connected to A5.
- Negative pin is Connected to GND of Arduino.

Step 3: LoRa connection
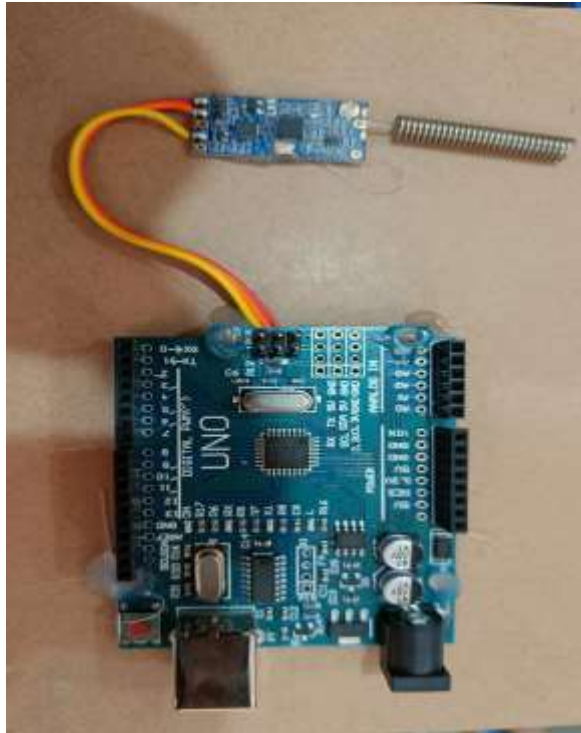
Figure7.5 Lora Module connection

LORA Connection TX Side

- Orange wire (GND) Connected with GND
- RED Wire (VCC) is connected with 5V
- Yellow Wire (RXD) connect with TX

  LORA Connection RX Side

- Orange wire (GND) Connected with GND
- RED Wire (VCC) is connected with 5V
- Yellow Wire (TXD) connect with D2

Step 3: LCD Display on Board
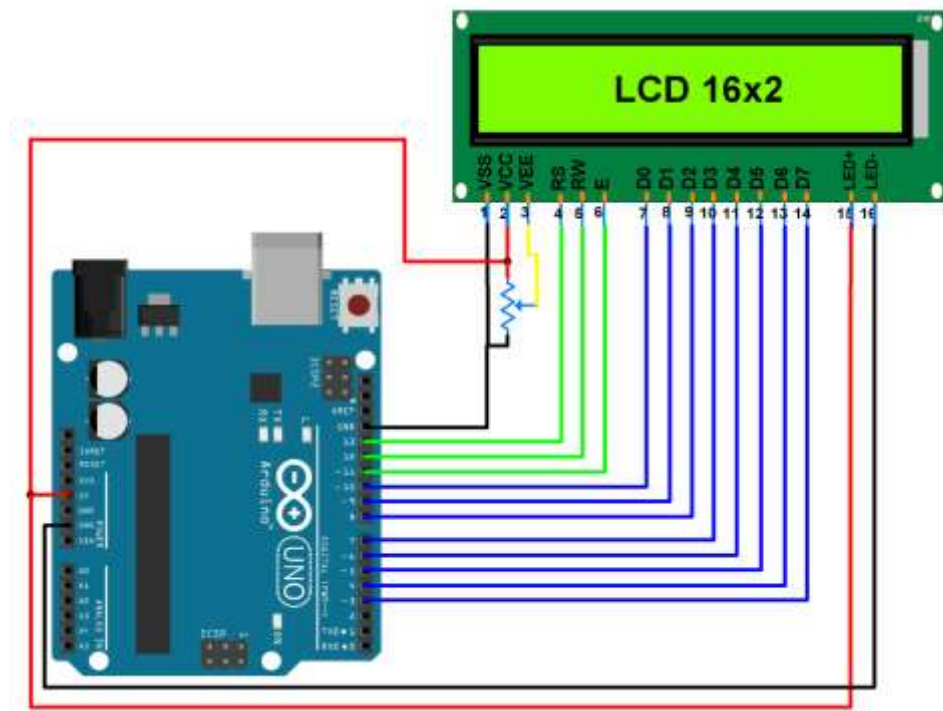
Figure 7.6 LCD Connection

LCD Display on Board

- D3-D10 Digital Output pins Connect with D0 – D7 Pin of LCD.

- LED+ and LED - Connected to Potentiometer.

- Enable Connect with D11.

- RW(Read/Write) Connect with D12.

- RS(Register Select) Connect with D13.

- VEE Regulate the potentiometer Voltage.

- VCC pin is Connected to Input Voltage 5V

- VSS Pin is Connected to Ground

8. Code

- **Software Code**

☐ *#import modules*
```
from urllib.request import Request, urlopen
from tkinter import *
import os
import time
import serial

s  = serial.Serial('com5', baudrate = 9600, timeout = 2)
dt = s.readline()

from time import strftime

s.close()
global k
k=0
def customer1():
    global login_screen
    global tm
    login_screen = Toplevel(main_screen)
    login_screen.title("Login")
    login_screen.geometry("300x450")
    Label(login_screen, text="Customer1").pack()

    global username_verify
    global password_verify
    global cylender_book
    global l1
    global time_var
    username_verify = StringVar()
    password_verify = StringVar()
    cylender_book = StringVar()
    time_var = StringVar()

    global username_login_entry
    global password_login_entry


    Label(login_screen, text="Gas Likage * ").pack()
    username_login_entry = Entry(login_screen, textvariable=username_verify)
    username_login_entry.pack()
    Label(login_screen).pack()
    l1 = Label(login_screen,text="Cylender Level")
    l1.pack()
```

```python
    password_login_entry = Entry(login_screen, textvariable=password_verify)
    password_login_entry.pack()
    Label(login_screen, text="").pack()

    l2 = Label(login_screen,text="Cylender Booking Status")
    l2.pack()
    cylender_booking = Entry(login_screen, textvariable=cylender_book)
    cylender_booking.pack()
    Label(login_screen, text="").pack()

    l3 = Label(login_screen,text="Time")
    l3.pack()
    tm = Label(login_screen)
    tm.pack()
    Label(login_screen, text="").pack()
    #Button(login_screen, text="Login", width=10, height=1, command =
login_verify).pack(
    username_verify.set("No gas Leakage")
    Button(login_screen, text="Start", command = time).pack()

def customer2():
    global login_screen
    global tm
    login_screen = Toplevel(main_screen)
    login_screen.title("Login")
    login_screen.geometry("300x450")
    Label(login_screen, text="Customer2").pack()

    global username_verify
    global password_verify
    global cylender_book
    global l1
    global time_var
    username_verify = StringVar()
    password_verify = StringVar()
    cylender_book = StringVar()
    time_var = StringVar()

    global username_login_entry
    global password_login_entry


    Label(login_screen, text="Gas Likage * ").pack()
    username_login_entry = Entry(login_screen, textvariable=username_verify)
    username_login_entry.pack()
    Label(login_screen).pack()
    l1 = Label(login_screen,text="Cylender Level")
    l1.pack()
```

```python
password_login_entry = Entry(login_screen, textvariable=password_verify)
password_login_entry.pack()
Label(login_screen, text="").pack()

l2 = Label(login_screen,text="Cylender Booking Status")
l2.pack()
cylender_booking = Entry(login_screen, textvariable=cylender_book)
cylender_booking.pack()
Label(login_screen, text="").pack()

l3 = Label(login_screen,text="")
l3.pack()
tm = Label(login_screen)
tm.pack()
Label(login_screen, text="").pack()
username_verify.set("No gas Leakage")
Button(login_screen, text="Start", command = time).pack()


def time():
    print("hello")
    global k
    global tog
    global tog1
    global tm
    s.open()
    dt = s.readline()
    print(dt)
    string = strftime('%H:%M:%S %p')

    if(dt == b'3\r\n'):
        st = "Cylender Empty"
        password_verify.set(st)#lb5.config(text = st)
        st = "Need to Book"
        cylender_book.set(st)
        stu=0
        url =
'https://blr1.blynk.cloud/external/api/update?token=O4ihfrzllgpb9b0a8EXlxd3MXRCNYrK
2&v3='
        req = Request(url + str(stu), headers={'User-Agent': 'XYZ/3.0'})
        print(stu)
        response = urlopen(req, timeout=2).read()
        print(response)
        if(tog1 == 0):
            url =
'https://blynk.cloud/external/api/logEvent?token=O4ihfrzllgpb9b0a8EXlxd3MXRCNYrK2
&code=gas_leak'
            req = Request(url, headers={'User-Agent': 'XYZ/3.0'})
```

```python
            response = urlopen(req, timeout=2)
            print("Notified")
            tog1 = 1
    elif(dt == b'4\r\n'):
        st = "level 1"
        password_verify.set(st)
        st = "No Need"
        cylender_book.set(st)
        stu=1
        url =
'https://blr1.blynk.cloud/external/api/update?token=O4ihfrzllgpb9b0a8EXlxd3MXRCNYrK
2&v3='
        req = Request(url + str(stu), headers={'User-Agent': 'XYZ/3.0'})
        print(stu)
        response = urlopen(req, timeout=2).read()
        print(response)


        url =
'https://blr1.blynk.cloud/external/api/update?token=O4ihfrzllgpb9b0a8EXlxd3MXRCNYrK
2&v2=0'
        req = Request(url, headers={'User-Agent': 'XYZ/3.0'})
        response = urlopen(req, timeout=2).read()
        print(response)
    elif(dt == b'5\r\n'):
        st = "level 2"
        password_verify.set(st)
        stu=2
        url =
'https://blr1.blynk.cloud/external/api/update?token=O4ihfrzllgpb9b0a8EXlxd3MXRCNYrK
2&v3='
        req = Request(url + str(stu), headers={'User-Agent': 'XYZ/3.0'})
        print(stu)
        response = urlopen(req, timeout=2).read()
        print(response)
    elif(dt == b'6\r\n'):
        st = "level 3"
        password_verify.set(st)
        stu=3
        url =
'https://blr1.blynk.cloud/external/api/update?token=O4ihfrzllgpb9b0a8EXlxd3MXRCNYrK
2&v3='
        req = Request(url + str(stu), headers={'User-Agent': 'XYZ/3.0'})
        print(stu)
        response = urlopen(req, timeout=2).read()
        print(response)
    elif(dt == b'7\r\n'):
        st = "Cylender Full"
        password_verify.set(st)
```

```
        stu=4
        url =
'https://blr1.blynk.cloud/external/api/update?token=O4ihfrzllgpb9b0a8EXlxd3MXRCNYrK
2&v3='
        req = Request(url + str(stu), headers={'User-Agent': 'XYZ/3.0'})
        print(stu)
        response = urlopen(req, timeout=2).read()
        print(response)
        tog1  = 0
    elif(dt == b'1\r\n'):
        st = "No gas Leakage"
        username_verify.set(st)
        stu=0
        url =
'https://blr1.blynk.cloud/external/api/update?token=O4ihfrzllgpb9b0a8EXlxd3MXRCNYrK
2&v1='
        req = Request(url + str(stu), headers={'User-Agent': 'XYZ/3.0'})
        print(stu)
        response = urlopen(req, timeout=2).read()
        print(response)
        tog = 0
    if(dt == b'2\r\n'):
        st = "Gas Leakage"
        username_verify.set(st)
        stu=1
        url =
'https://blr1.blynk.cloud/external/api/update?token=O4ihfrzllgpb9b0a8EXlxd3MXRCNYrK
2&v1='
        req = Request(url + str(stu), headers={'User-Agent': 'XYZ/3.0'})
        print(stu)
        response = urlopen(req, timeout=2).read()
        print(response)
        if(tog == 0):
            url =
'https://blynk.cloud/external/api/logEvent?token=O4ihfrzllgpb9b0a8EXlxd3MXRCNYrK2
&code=gas_leak'
            req = Request(url, headers={'User-Agent': 'XYZ/3.0'})
            response = urlopen(req, timeout=2)
            print("Notified")
            tog = 1
    StringVar().set(string)

    url =
'https://blr1.blynk.cloud/external/api/get?token=O4ihfrzllgpb9b0a8EXlxd3MXRCNYrK2&
v2'
    req = Request(url, headers={'User-Agent': 'XYZ/3.0'})
    response = urlopen(req, timeout=3).read()
    print("booking status = ",response)
```

```python
    if(response == b'1'):
        st = "Cylender Booked"
        cylender_book.set(st)

    s.close()
    if(k < 250):
        tm.after(1000, time)
        k = k+1
    print(k)


def main_account_screen():
    global main_screen
    global tog1
    tog1 = 0
    main_screen = Tk()
    main_screen.geometry("300x250")
    main_screen.title("Account Login")
    Label(text="Select Your Choice", bg="blue", width="300", height="2", font=("Calibri",
13)).pack()
    Label(text="").pack()
    Button(text="Customer1", height="2", width="30", command = customer1).pack()

    Button(text="Customer2", height="2", width="30", command = customer2).pack()

    main_screen.mainloop()


main_account_screen()
```

- Arduino Code

```
#include <LiquidCrystal.h>
LiquidCrystal lcd(12, 11, 5, 4, 3, 2);

#define DT A0
#define SCK A1
#define sw 9
#define buz A5

int G ;
float w;
long sample=0;
float val=0;
long count=0;

unsigned long readCount(void)
{
unsigned long Count;
unsigned char i;
pinMode(DT, OUTPUT);
digitalWrite(DT,HIGH);
digitalWrite(SCK,LOW);
Count=0;
pinMode(DT, INPUT);
while(digitalRead(DT));
for (i=0;i<24;i++)
{
digitalWrite(SCK,HIGH);
Count=Count<<1;
digitalWrite(SCK,LOW);
if(digitalRead(DT))
Count++;
}
digitalWrite(SCK,HIGH);
Count=Count^0x800000;
digitalWrite(SCK,LOW);
return(Count);
}

void setup()
{
Serial.begin(9600);
pinMode(SCK, OUTPUT);
pinMode(sw, INPUT_PULLUP);
lcd.begin(16, 2);
```

SSGMCE, Shegaon

```
lcd.print(" Gas Weight ");
lcd.setCursor(0,1);
lcd.print("Measurment ");
delay(1000);
pinMode(buz,OUTPUT);
lcd.clear();
calibrate();
}

void loop()
{
G = digitalRead(A2);
count= readCount();
Serial.println("count value is :");
Serial.println(count);
Serial.println("sample value is :");
Serial.println(sample);
Serial.println(" val is :");
Serial.println(val);

w=(((count-sample)/val)-2*((count-sample)/val))/1000;
w=w*2.1;

Serial.println(" value of w is :");
Serial.println(w);

lcd.setCursor(0,0);
lcd.print("Gas Weight");
lcd.setCursor(0,1);
lcd.print(w);
lcd.print(" kg    ");
//lcd.print("1");
if(G==0){
Serial.println("2");
digitalWrite(buz,1);
delay(1000);
}
else{
Serial.println("1");
digitalWrite(buz,0);
delay(200);
}
if(w<16.3){
Serial.println("3");
//delay(2000);
}
```

```
else if(w >= 16.3 && w < 20.0){
Serial.println("4");
delay(200);
}
else if(w >= 20.0 && w < 23.0){
Serial.println("5");
delay(200);
}
else if(w >= 23.0 && w < 26.0){
Serial.println("6");
delay(200);
}
else if(w >= 26.0){
Serial.println("7");
delay(200);
}

if(digitalRead(sw)==0)
{
val=0;
sample=0;
w=0;
count=0;
calibrate();
}
}

void calibrate()
{
lcd.clear();
lcd.print("Calibrating...");
lcd.setCursor(0,1);
lcd.print("Please Wait...");
for(int i=0;i<100;i++)
{
count=readCount();
sample+=count;
}
sample/=100;
lcd.clear();
lcd.print("Put 100g & wait");
count=0;
while(count<1000)
{
count=readCount();
count=sample-count;
```

```
}
lcd.clear();
lcd.print("Please Wait....");
delay(2000);
for(int i=0;i<100;i++)
{
count=readCount();
val+=sample-count;
}
val=val/100.0;
val=val/100.0; // put here your calibrating weight
lcd.clear();
}
```

9. RESULT AND DISCUSSION

The main distinguishing features of the system are presented in the following:

•The architecture of the project allows the system to be divided into dedicated modules, each implementing both data computing and transmission operations. This approach offers the advantage of reducing computational demand on a single module by distributing specific operations such as conversions or scaling to each module separately;

•By using a Arduino UNO data calculation and processing is done, a clear definition of the tasks and their separation according to the fixed duration are obtained.

•The transformer generate 12 V AC then it is converted into DC by using rectifier circuit and regulated by voltege regulator . Voltage regulator is a circuit consist of resistors , IC 7805 and other components. These produces 5V supply to the whole circuit components.

•The load cell is a transducer which is used to measure the weight of the cylider in mili – volt range , these output is amplified by using IC HX711 which is analog to digital converter and amplifier. It send the data to the Arduino board.

•Gas leakage status is measured by using MQ-2 sensor .

•Arduino Board collect the data from Load cell and MQ-2 sensor.

•Calculated output of load cell is compared with the threshold value and send the signal to the LCD to display the weight of cylinder.

•All the result is notified to the user through blynk applicaton .

The LPG leakage is detected by MQ-2 sensor, according the distance of sensor from regulator the voltage value of the output of sensor is varied. The safe status or unsafe status, which may be displayed on the LCD display and audible via the buzzer, can be determined from the results of tests that have been performed. The sensor voltage test is performed to establish the functioning voltage of the sensor both in standby and during a gas leak. The microcontroller is programmed as necessary for this test, and it then displays the sensor output on the LCD[2]. Table 4.1 is below this and shows the test results.

Voltage Sensor (volt)	Display on the LCD
0.24	"No Gas Leakage"
1.73	"No Gas Leakage"
2.18	"No Gas Leakage"
2.33	" Gas Leakage"
3.38	" Gas Leakage"

Sensor output displayed on LCD

The load cell determined the cylinder's weight, and in accordance with that weight, an alarm message appeared on the LCD and a notification is sent to the user's mobile app.

| Sr No	Weight Cylinder	Levels	Result
1.	Below 15.5 kg	Level0	Display massage Cylinder is empty
2.	16.3 kg	Level 1	Display alert massage
3.	20.3 kg	Level 2	Display alert massage

. Result displayed on LCD

We have used Arduino Uno, Load cell, HX711 Driver Board,LCD, and MQ Gas Sensor[6] in smart LPG gas monitoring and programmed cylinder reservation system to continuously monitor the heaviness of the cylinder and that will automatically send notification to the gas company agent when it exceeds the minimum threshold value[7], which helps in delivering cylinder on time. Additionally, we have a user safety precaution that also detects gas leakage.
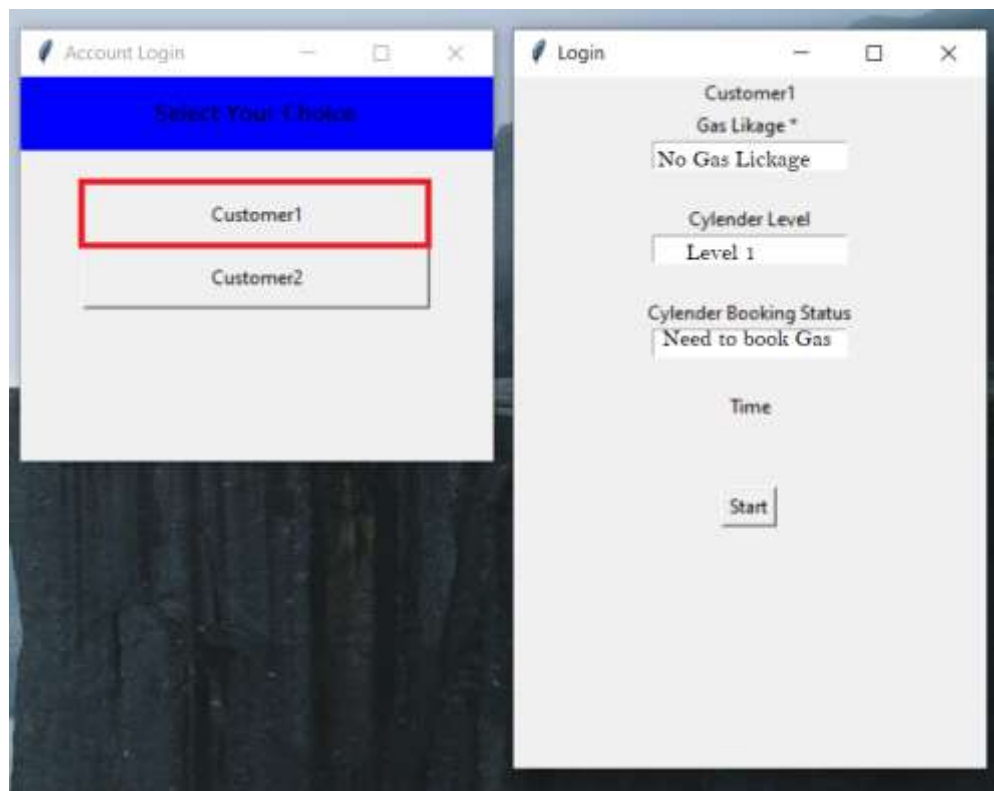
- Blynk App Interface on Customer Mobile Device

- Agency Software Interface
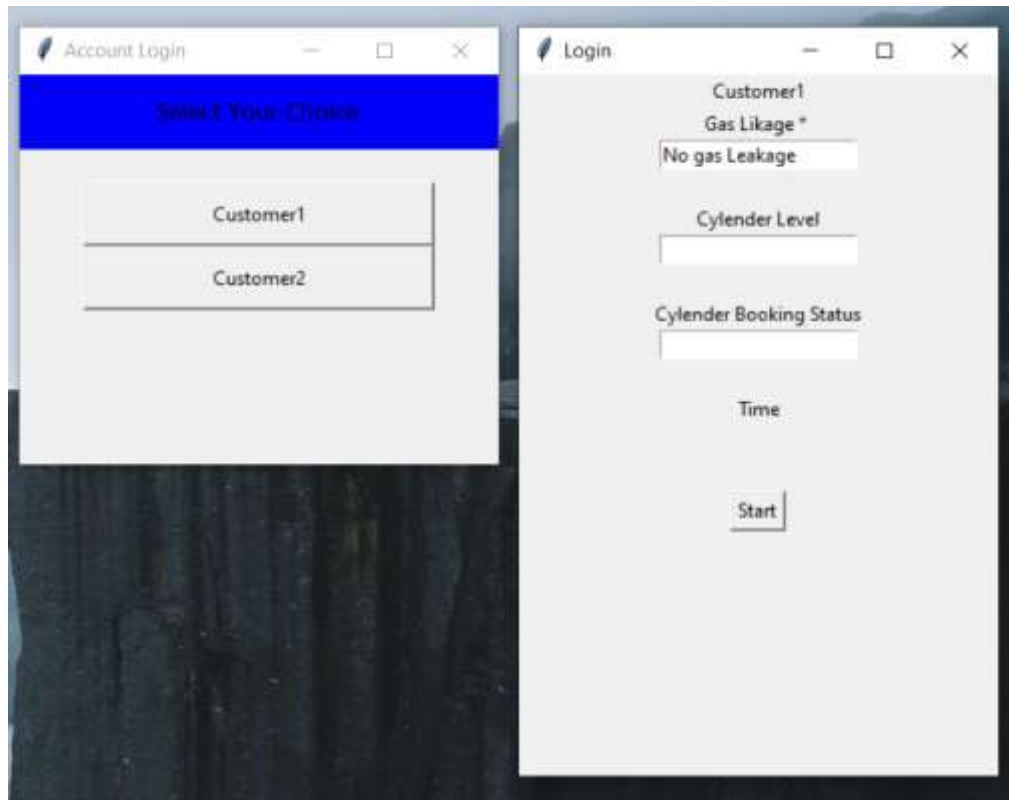
- Customer 1

10. APPLICATIONS

- This device is also use in the Gym to measure the weight of peoples and suggest the daily routine for them.
- In Hospital for BMI calculation.
- In Shops for product list.

10. FUTURE SCOPE

- Voice feedback system can be included in detection system. This will notify the user through pre- recorded voice messages about the weight of cylinder.

- The app can be linked with the online database and instead of Bluetooth module, wi-fi module can be used to transfer the daily recorded readings to the online database, this will help identifying the daily uses trends.

- By using Machine Learning daily usage can be calculated and suggested the user for next upcoming usage of gas content and cylinder required.

11. CONCLUSION

The method that was suggested looked at many factors relating to the technology employed for gas level sensing. It began with an explanation of the problems encountered and the difficulty brought on when an LPG cylinder runs out while being used for cooking. The results of the survey showed that while the various technologies were expensive, they had the same mindset. Designing a straightforward and workable strategy to address the issue was crucial. The cost-effective gas level detection system that was suggested and successfully implemented as a result of the use of IOT also provides a method for determining the current quantity of gas left in the cylinder and forecasting the working days.

By using this technique, any inconveniences caused by cylinder booking delays are avoided.

12. REFERENCES

[1] Mr. Akshay D. Prabhu, Mr. Ashwin D. Pathak, "Gas Leak Detector using Arduino UNO Microcontroller", International Journal for Research in Applied Science & Engineering Technology (IJRASET),
Volume 5, July 2017

[2] Al-Karaki, J. N. and A. E. Kamal (2004). "Routing techniques in wireless sensor networks: a survey." Wireless communications, IEEE11(6): 6-28.

[3] S. Rajitha, T. Swapna, "Security alert system using GSM for gas leakage"
International Journal of VLSI and Embedded Systems- IJVES

[4] Ravindra R. Hiwase, Priya K. Kewate, Sushmita P. Tajane, JitendraWaghmare "Automatic LPG Cylinder Booking and Leakage Detection using Arduino UNO" IJESC.

[5] Shital Imade, Priyanka Rajmane, AishwaryaGavali, V.N. Nayak wadi"Gas leakage detection and smart alerting system using iot" International Journal of Innovative Research & Studies.

[6] L. K. S. Rohan Chandra Pandey, Manish Verma, "Internet of things (IOT) based gas leakage monitoring and alerting system with MQ-2 sensor," International Journal of Engineering Development and Research, Vol. 5, 2017.

[7] Shailendra Kumar Dewangan3 Praveen Singh Rathore4 Abid Khan1,Neju K. Prince2. Gsm based automatic lpg ordering system with leakage alert. IJRET: International Journal of Research in Engineering and Technology, 3(12), Jun-2014.

[8] P. M. Vidya, S. Abinaya, G. G. Rajeswari, and N. Guna, "Automaticlpg leakage detection and hazard prevention for home security," in Proceeding of 5th National Conference on VLSI, Embedded and Communication & Networks on April, vol. 7, 2014.Research, Vol. 5, 2017.

[9] Shailendra Kumar Dewangan3 Praveen Singh Rathore4 Abid Khan1,Neju K. Prince2. Gsm based automatic lpg ordering system with leakage alert. IJRET: International Journal of Research in Engineering and Technology, 3(12), Jun-2014.

PROJECT OUTCOMES:

Published a paper at   INSCIRD 2023 NATIONAL STUDENT'S CONFERENCE
                            ON INNVOATIO IN RULER DEVELOPMENT

Smart LPG Gas Level Monitoring and leakage Detection system using IOT
V.M. Umale, Sanket Yende, Kalyani Bhagwat, Bhavesh Shah,
Namrata Damare.
Shri Sant Gajanan Maharaj College of Engineering, Shegaon, Maharashtra,India

PROJECT IMAGES: