PROJECT NAME:

DEVELOPMENT OF LPG LEAKAGE DETECTION ALERT AND AUTO EXHAUST:

ABSTRACT :

We are conveying through this final report that we have done a project related to LPG gas detection. The project aims to develop an LPG gas detection and alert system using an Arduino and Internet of Things (IoT) technology. The system will use a gas sensor to detect LPG gas leaks and send an alert to the homeowner through a buzzer and an SMS message. The Arduino will act as the main controller, processing the gas level data and triggering the alerts. In case of a gas leak, the system will also activate an exhaust fan to remove the leaked gas and reduce the risk of explosion or fire. The system will be connected to the internet, allowing the homeowner to monitor the gas levels and receive alerts remotely. This system will provide a cost-effective and efficient solution to improve the safety of households using LPG gas and reduce the risk of gas-related accidents.

further, in this report, you can get detailed information about our project LPG gas detection.

INTRODUCTION

The development of LPG (Liquefied Petroleum Gas) leakage detection alert and auto exhaust is an important safety measure in today's world. LPG is a highly flammable and explosive gas that is used in many households and industries for cooking and heating purposes. However, LPG leakage can pose a serious threat to human life and property, as it can cause fires, explosions, and even death.

To prevent such accidents, LPG leakage detection alert and auto exhaust systems have been developed. These systems use sensors to detect any leakage of LPG and automatically shut off the gas supply, preventing any further leakage. In addition, an alarm is sounded to alert the occupants of the building about the danger.

The auto exhaust system is designed to expel the leaked gas from the building to prevent it from accumulating and causing an explosion. The system includes exhaust fans that are activated automatically when the sensors detect a leakage of LPG. The fans suck the gas out of the building and expel it outside, reducing the risk of an explosion.

The development of LPG leakage detection alert and auto exhaust systems has been a significant step in ensuring the safety of people and property. These systems have been widely adopted in households and industries, reducing the risk of LPG-related accidents.

BACKGROUND:

The development of LPG leakage detection alert and auto exhaust systems can be traced back to the need for safety measures in industries and households that use LPG as a fuel. LPG is a highly flammable and explosive gas that can cause serious accidents if not handled properly.

In the past, accidents related to LPG leakage were common, leading to the loss of life and property. As a result, there was a need for safety measures to detect LPG leakage and prevent such accidents from occurring.

Initially, simple detectors such as LPG gas sensors were used to detect LPG leakage. These sensors could detect the presence of LPG in the air, but they were not effective in preventing accidents.

As technology advanced, more sophisticated detection systems were developed that could not only detect the presence of LPG but also shut off the gas supply and sound an alarm to alert the occupants of the building. These systems became popular in the industry and households, and over time, their design was further improved to make them more efficient and effective.

The development of the auto exhaust system was also a significant step in preventing LPGrelated accidents. The system was designed to expel the leaked gas from the building to prevent it from accumulating and causing an explosion. This system uses exhaust fans that are activated automatically when the sensors detect a leakage of LPG.

Overall, the development of LPG leakage detection alert and auto exhaust systems has significantly improved safety measures in industries and households that use LPG as a fuel. These systems have become an essential part of LPG safety measures, and their continued improvement will help prevent LPG-related accidents in the future

PROBLEM DEFINITION:

The problem that the development of LPG leakage detection alert and auto exhaust systems aims to solve is the safety risks posed by LPG leakage in industries and households. LPG is a highly flammable and explosive gas that can cause fires, explosions, and even death if not

handled properly.

The traditional methods of detecting LPG leakage, such as LPG gas sensors, were not effective in preventing accidents. Therefore, there was a need for a more efficient and effective method of detecting LPG leakage and preventing accidents.

The development of LPG leakage detection alert and auto exhaust systems addresses this problem by using sensors that can detect even minor leaks of LPG and automatically shut off the gas supply. In addition, the alarm sounds to alert the occupants of the building about the danger, while the auto exhaust system expels the leaked gas from the building, reducing the risk of an explosion.
This problem is particularly relevant in industries and households that use LPG as a fuel, as the risks of LPG leakage are higher in such environments. Therefore, the development of LPG leakage detection alert and auto exhaust systems is crucial in ensuring the safety of people and property in such settings.

OBJECTIVES AND SOLUTIONS:

The objectives of the development of LPG leakage detection alert and auto exhaust systems are:

To detect LPG leakage accurately: The primary objective of the system is to detect even minor leaks of LPG accurately. This is achieved by using advanced sensors that can detect the presence of LPG in the air.

To prevent LPG-related accidents: The system aims to prevent LPG-related accidents by automatically shutting off the gas supply when a leak is detected. This prevents any further leakage of LPG, reducing the risk of an explosion or fire.

To alert the occupants of the building: The system also aims to alert the occupants of the building about the danger of LPG leakage. This is achieved by sounding an alarm when a leak is detected.

To expel the leaked gas from the building: The auto exhaust system aims to expel the leaked gas from the building, reducing the risk of an explosion. This is achieved by using exhaust fans that suck the gas out of the building and expel it outside.

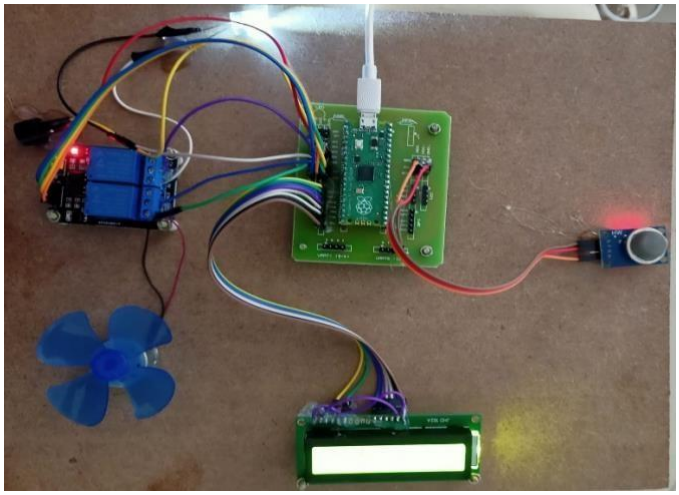
To improve overall safety measures: The development of LPG leakage detection alert and auto exhaust systems aims to improve overall safety measures in industries and households that use LPG as a fuel. By preventing accidents, these systems help ensure the safety of people and property in such settings.

To reduce the risk of environmental pollution: LPG leakage can also contribute to environmental pollution. The auto exhaust system aims to expel the leaked gas outside, reducing the risk of environmental pollution caused by LPG leakage.

Procedure:

The procedure of developing LPG leakage detection alert and auto exhaust systems can be divided into the following steps:

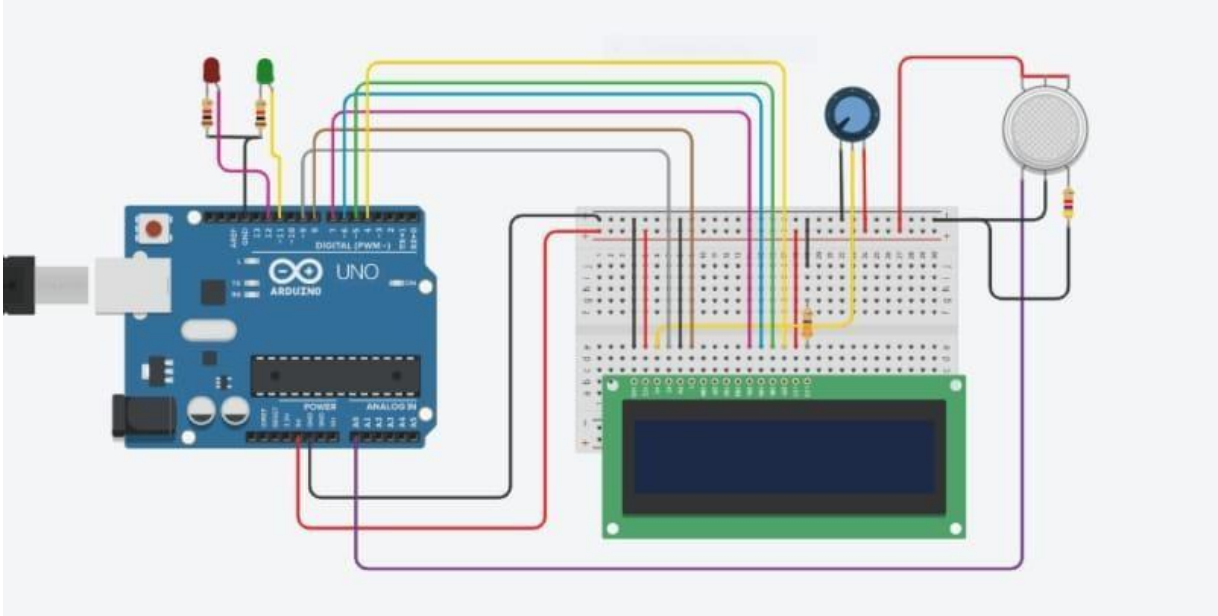
Requirement Analysis: The first step in the development process is to identify the requirements of the system. This includes identifying the types of sensors required, the detection range, and the alarm and exhaust system specifications.



ORGINAL CONNECTED CIRCUIT

Sensor Selection: Based on the requirements identified in step 1, suitable sensors are selected that can detect LPG leakage accurately.

Design and Development of the Circuit: The next step is to design and develop the circuit that will control the system. This includes designing the gas supply shut-off valve, alarm system, and exhaust fan control.



COMPLETE CIRCUIT DESIGN

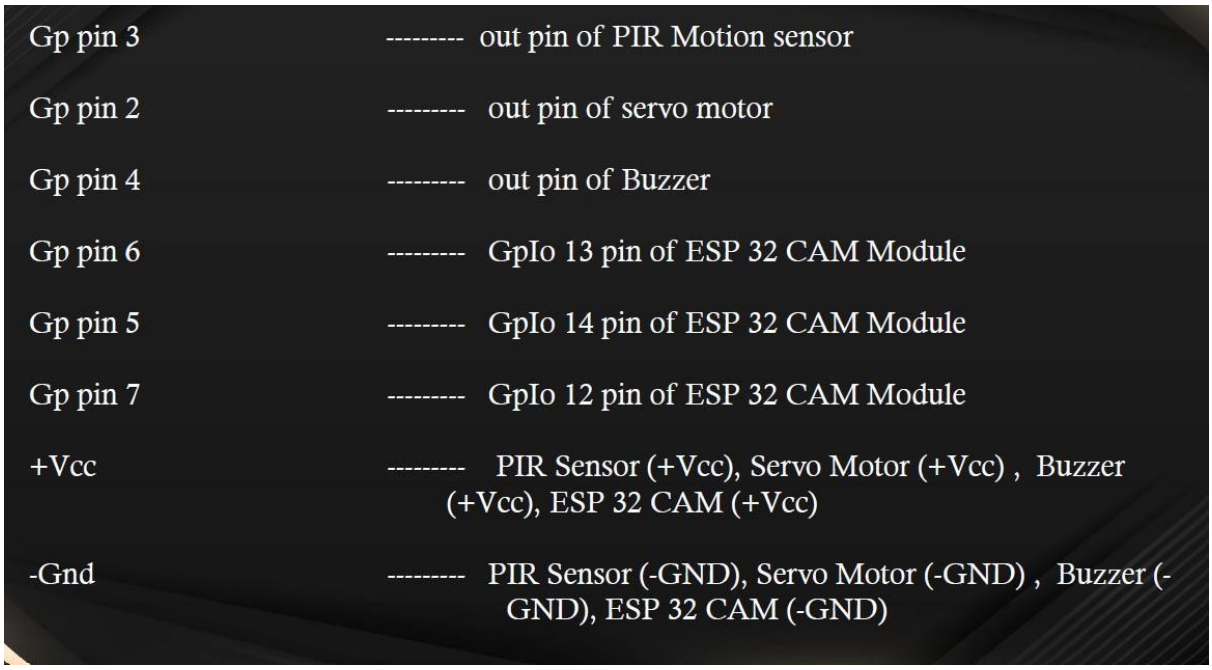
Assembly and Testing: Once the circuit is developed, the next step is to assemble the system and test its functionality. This includes testing the sensors, gas supply shut-off valve, alarm system, and exhaust fan control.

Optimization: After testing, the system is optimized to improve its performance. This may involve changing the sensor's placement, adjusting the sensitivity levels of the system, or making changes to the circuit.

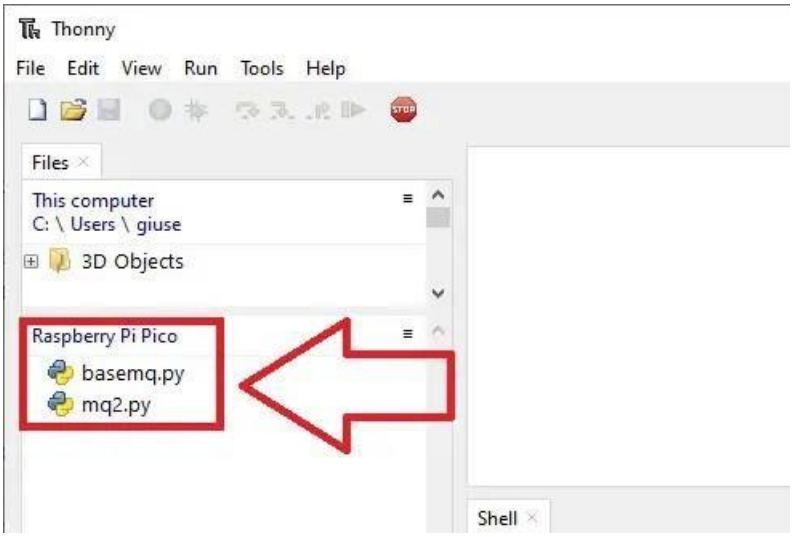
Installation and Commissioning: The final step is to install the system in the desired location and commission it. This includes setting up the alarm system, connecting the exhaust fan, and testing the system under realistic conditions.

Overall, the development of LPG leakage detection alert and auto exhaust systems requires a careful and systematic approach to ensure that the system is effective in preventing accidents and ensuring the safety of people and property. It involves a combination of technical expertise, knowledge of safety regulations, and testing and optimization to ensure that the system performs optimally.

Raspberry pi pico pins:



Thereafter we coded raspberry pi Pico using thonny software. Generally, thonny software is used to write and run the micro python code for raspberry pi pico. On thonny, we changed the interpreter to micro python and installed micro python on thonny software to write and run the code for raspberry pi pico.



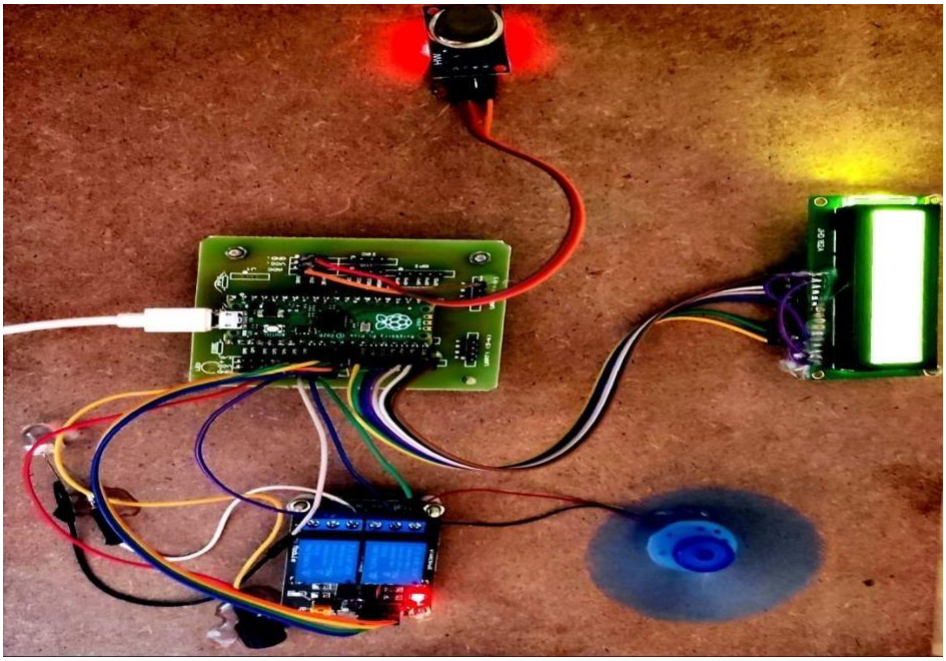
RPI Pico storage

Result:

After completing the above procedure our project "DEVELOPMENT OF LPG LEAKAGE DETECTION ALERT AND AUTO EXHAUST" got ready to use. The development of LPG leakage detection alert and auto exhaust systems has resulted in a significant improvement in safety measures in industries and households that use LPG as a fuel. The system can detect even minor leaks of LPG accurately, preventing further leakage and reducing the risk of an explosion or fire. The alarm system alerts the occupants of the building about the danger, while the auto exhaust system expels the leaked gas from the building, reducing the risk of an explosion.

Overall, the development of LPG leakage detection alert and auto exhaust systems has contributed significantly to improving the safety of people and property in settings where LPG is used as a fuel. The system has proven to be effective in preventing accidents and reducing the risks associated with LPG leakage, making it an essential safety measure in such environments.

After a discussion with our guide, our guide suggested us develop new technique. Then we installed electric shutdown and exhaust fan which has its own power battery.



Conclusion:

In conclusion, the development of LPG leakage detection alert and auto exhaust systems is an essential safety measure in industries and households that use LPG as a fuel. The system's ability to detect even minor leaks of LPG accurately and automatically shut off the gas supply, alert the occupants of the building, and expel the leaked gas from the building significantly reduces the risk of an explosion or fire.

The system's development requires a systematic approach, including requirement analysis, sensor selection, circuit design and development, testing, optimization, and installation and commissioning. The system's successful implementation has contributed significantly to improving the safety of people and property in settings where LPG is used as a fuel, making it an essential safety measure.

Overall, the development of LPG leakage detection alert and auto exhaust systems has made a significant contribution to improving safety measures, reducing the risks associated with LPG leakage, and ensuring the safety of people and property in such environments.

References:

Here are some references that discuss the development of LPG leakage detection and auto exhaust systems:

1. "Development of an LPG Leakage Detection and Auto-Cut System" by P. Pandey, A. Kumar, and S. Kumar. This paper, published in the International Journal of Emerging Technology and Advanced Engineering, describes the design and development of an LPG leakage detection and auto-cut system using a microcontroller and various sensors.

2. "Design and Implementation of an LPG Leakage Detection and Control System" by S. S. Makwana, H. M. Shah, and H. N. Soni. This paper, published in the International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, presents the design and implementation of an LPG leakage detection and control system using an Arduino microcontroller.

3. "Development of an Auto Exhaust System for Reducing Emissions in Two-Stroke Engines" by S. R. Yaragatti and S. S. Hanamapure. This paper, published in the International Journal of Engineering Research and Development, describes the design and development of an auto exhaust system for reducing emissions in two-stroke engines. The system uses a solenoid valve to control the exhaust flow and reduce emissions.

4. "Design and Development of an Auto Exhaust System for Reducing Vehicle Emissions" by M. S. Senthil Kumar, S. K. Prabhu, and S. P. Balaji. This paper, published in the International Journal of Innovative Research in Science, Engineering and Technology, presents the design and development of an auto exhaust system for reducing emissions in vehicles. The system uses a catalytic converter and an oxygen sensor to reduce emissions.

These references should provide you with a good starting point for further research on the development of LPG leakage detection and auto exhaust systems.

Codes:

Code for raspberry pi pico :

```
from machine import
Pin,ADC import time,utime
buz = Pin(5,Pin.OUT) ss =
ADC(27)
pump1=Pin(8,Pin.OUT)
pump2=Pin(9,Pin.OUT)
pump1.value(1)
pump2.value(1) buz.value(1)
rs=machine.Pin
(10,machine.PiOUT)
e=machine.Pin
(11,machine.POT) d4=
machine.Pin
(12,machine.Pin.OUT)
d5=machine.Pin
(13,machine.Pin.OUT)
d6=machine.Pin
(14,machine.Pin.OUT)
d7=machine.Pin
(15,machine.Pin.OUT) def
pulseE():     e.value(1)
utime.sleep_us(40)
e.value(0)
utime.sleep_us(40) def
send2LCD4(BinNum):
```

```
    d4.value((BinNum &
0b00000001) >>0)
    d5.value((BinNum &
0b00000010) >>1)
    d6.value((BinNum &
0b00000100) >>2)
    d7.value((BinNum &
        0b00001000) >>3)
        pulseE()        def
        send2LCD8(BinNum):
        d4.value((BinNum &
        0b00010000) >>4)
        d5.value((BinNum &
        0b00100000) >>5)
        d6.value((BinNum &
        0b01000000) >>6)
        d7.value((BinNum &
        0b10000000) >>7)
        pulseE()
        d4.value((BinNum &
        0b00000001) >>0)
        d5.value((BinNum &
        0b00000010) >>1)
```

```
  d6.value((BinNum            &
0b00000100) >>2)
   d7.value((BinNum           &
0b00001000) >>3)
   pulseE()    def
setUpLCD():
   rs.value(0)
send2LCD4(0b0011)#8 bit
send2LCD4(0b0011)#8 bit
  send2LCD4(0b0011)#8 bit
send2LCD4(0b0010)#4 bit
send2LCD8(0b00101000)#4
bit,2 lines?,5*8 bots
send2LCD8(0b00001100)#lcd on,
blink off, cursor off.
send2LCD8(0b00000110)#incr
ement cursor, no display shift
send2LCD8(0b00000001)#clea
r screen
utime.sleep_ms(2)#clear
screen needs a long delay
uart0=machine.UART
(0,baudrate=9600,tx=Pin(0),
rx=Pin(1)) print(uart0) second=0
setUpLCD() rs.value(1) for x in
```

```
'welcome':
send2LCD8(ord(x))
time.sleep(0.02)
buz.value(0)
pump2.value(0) while
True:
    #temp = sensor.temperature
    #humidity = sensor.humidity        time.sleep(1)
sval = ss.read_u16()/100        print("s:"+ str(sval))
line1="S:"+ str(sval)
 #line2="s1:"+ str(sval) +
“s2:" + str(mval) + " L:" + str(distance)

    if(sval>100):
buz.value(1)
pump1.value(0)
pump2.value(1) #
else:
#         pump1.value(1)
#         pump2.value(0)
#         buz.value(0)
```

```
    setUpLCD()
rs.value(1)     for x in
line1:
send2LCD8(ord(x))
time.sleep(0.02)
rs.value(0)
time.sleep(0.02)

send2LCD8(0b11000000)#clea
r                       screen
time.sleep(0.02)

    rs.value(1)
```

THE END