

Jalpaiguri Government Engineering College



A report project on

“Automatic Gas Cylinder Booking System With Leakage Alarm”



Submitted By

- Samrat Mitra
Roll-17101106004, Information Technology
- Sourav Sarkar
Roll-17101106017, Information Technology
- Rohan Das
Roll-18101106083, Information Technology
- Samanwita Das
Roll-17101106019, Information Technology
- Saronick Bose
Roll-17101106030, Information Technology

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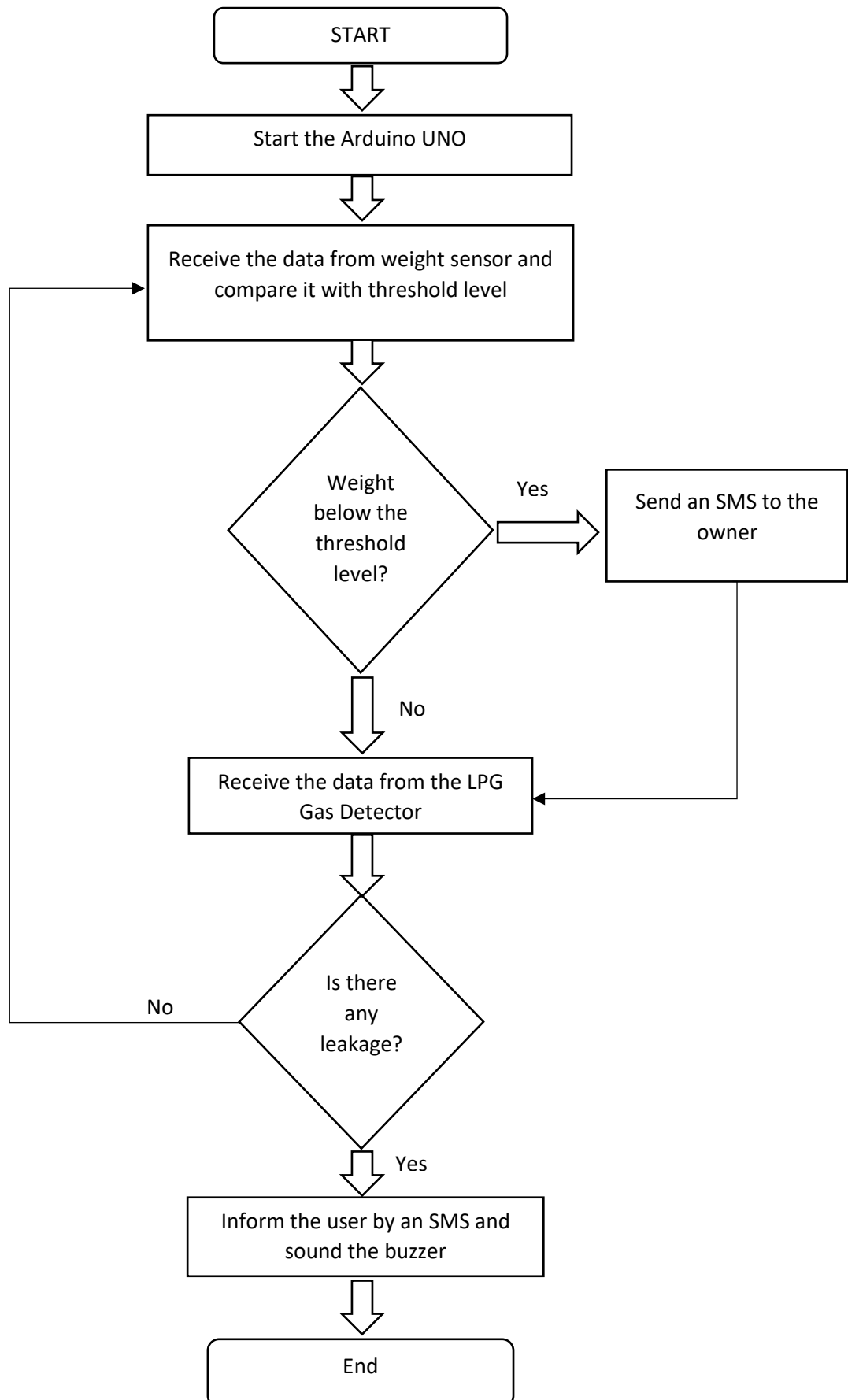
Introduction

In today's world almost every house uses LPG gas for cooking but it is very difficult to keep track of the remaining gas in the cylinder. So most of the time we find out the cylinder is empty. It will be difficult situation for the one who uses LPG gas for cooking regularly. So we have proposed a new system which automatically keep track of the remaining gas in a cylinder and when the gas is about to empty it inform the owner by sending a SMS by using GSM. In addition to that Gas sensor is used to detect gas leakage in the home. If any gas leakage detected automatically it will send SMS to the owner, alerts the house using a buzzer. In our project we have used an Arduino UNO and weight sensor to check the weight of the cylinder regularly. The values are next feed to the Arduino UNO. If the gas level is cross below the threshold level, then a SMS will be sent to owner automatically that he/she should book a new cylinder.

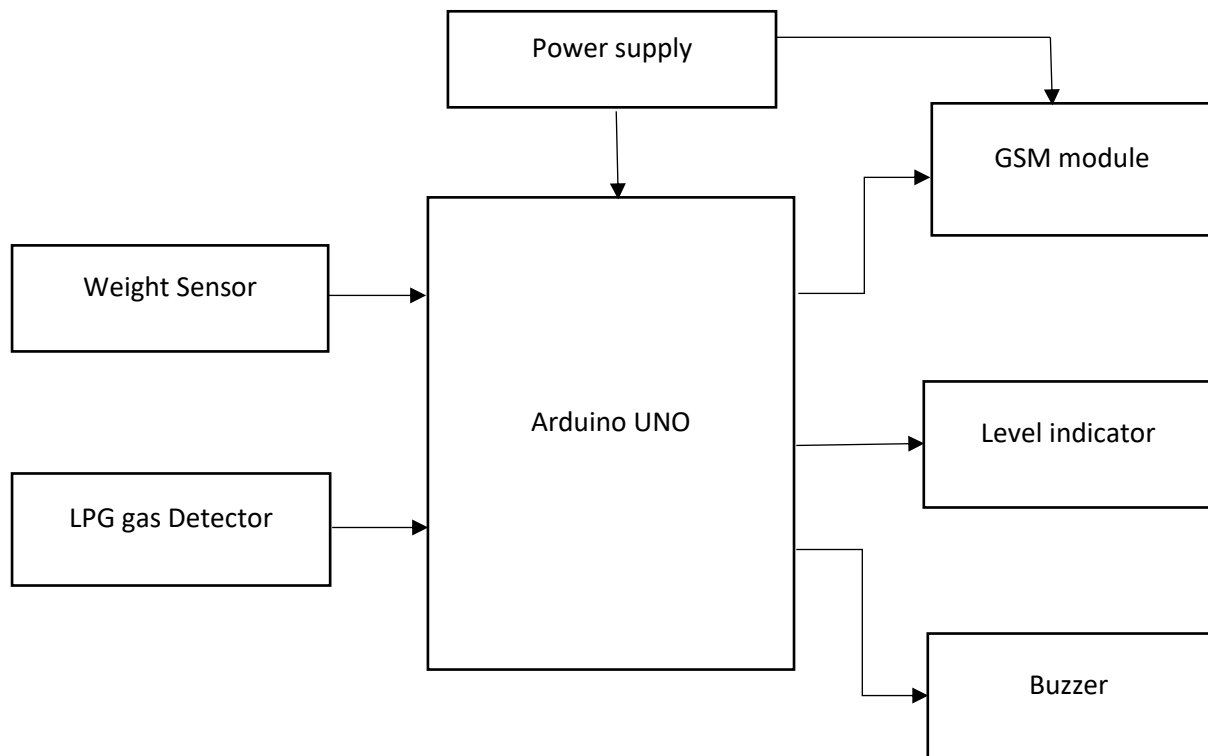
Proposed System

Proposed System overcomes the shortcomings of existing system. Idea focuses on providing functionalities like detecting gas leakage and informing user if there is possibility of leakage. Also user gets the status of gas level of cylinder.

Flow of Working



Block Diagram



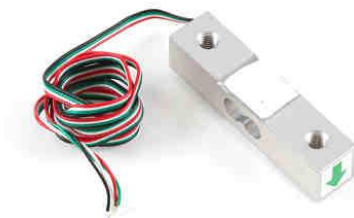
Working

The working of any advanced system is mainly dependent on the microcontroller which controls the entire functioning of the device. In this case the Arduino Uno microcontroller acts like a conditional switch. It performs two set of action depending upon the condition present. First it receives the data from the weight sensor and check if it is less then the threshold, if yes then it turns on the GSM module and then send a message to the owner, if no then it receives the data from gas sensor. It triggers the buzzer and send an SMS to the owner when the leakage of the gas is detected by the sensor. If there is no leak then it waits for sometime then perform the same action.

Components Used

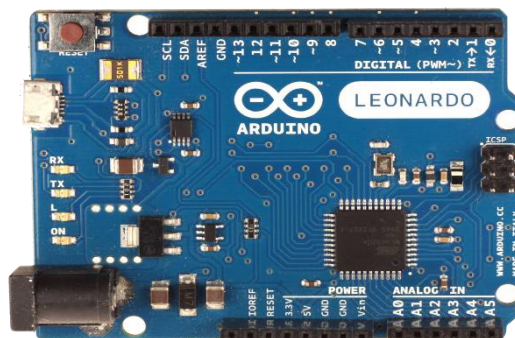
- **Weight Sensor:**

A weight sensor is another term for a load cell. They are sometimes referred to as weight sensors as one of their main uses is weighing. Weight sensors are available in different sizes and capacities which enables them to suit different kinds of weighing applications.



- **Arduino UNO:**

ATMEGA328P Board is a powerful development platform based on ATMEGA328 microcontroller which is one of the most feature rich AVR microcontroller from Atmel, featuring 128K Flash, 4K RAM, 53 I/O lines arranged in seven 8 bit ports, 8 ADCs, 2 UARTs, 4 timers, 8 interrupts and much more. This board is mainly used for developing embedded application involving high speed wireless communication, real time data monitoring and control, interactive control panels. ATMEGA328P Development Board has all microcontroller pins in proper PORT wise configuration. Analog Input pins are from A0-A7 and Digital pins are from D2-D12. It has one GND, RESET (RST), RXD, TXD and One microcontroller. USB jack is connected with PC It requires input voltage of 7-12 volt. We can also give power supply using external sources other than USB port.



- **GSM Module:**

A GSM modem or GSM module is a hardware device that uses GSM mobile telephone technology to provide a data link to a remote network. From the view of the mobile phone network, they are essentially identical to an ordinary mobile phone, including the need for a SIM to identify themselves to the network.

In this project we used **SIM900A GSM Modem with SMA Antenna**.

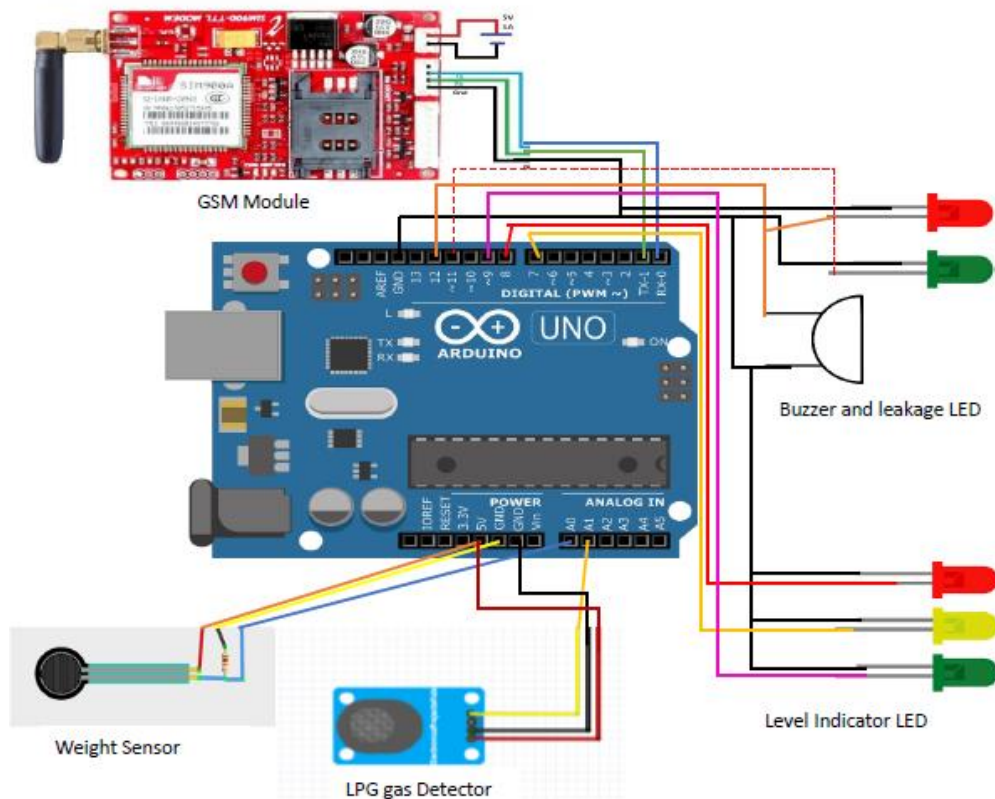


- **LPG Gas Detector:**

MQ-2 Sensor is the back bone of this device and it senses the presence or absence of the LPG gas. This detector has a fast reaction and induces a stable and long lifetime. It provides high sensitivity not only to LPG but also to iso-butane, H₂, LPG, CH₄, CO, Alcohol, Smoke and propane. It has very low sensitivity to alcohol and smoke. The basic height of the sensor is $23 \pm 5\%$ mm and it has a width of $20 \pm 5\%$ mm. The detector can detect the gas concentrations anywhere from 200 p.p.m. to 10000 p.p.m. It detects concentration of gas in air. We set threshold value 270 ppm. If Sensor reading is greater than threshold then leakage detected otherwise leakage not detected.



Circuit Diagram



Arduino Code

Interface with Weight Sensor:

```
int Pin1 = 9; //for green level indicator LED
int Pin2 = 2; //for 80% used gas
int Pin3 = 3; //for 90% used gas
int Pin4 = 8; //for red LED
int Pin5 = 7; //for yellow LED
int weightA0 = A0; //Analog input read for weight sensor
int sensorThreshold1 = 400; //Threshold for indicating that 80% gas is used
int sensorThreshold2 = 600; //Threshold for indicating that 90% gas is used
void setup()
{
  pinMode(Pin1, OUTPUT);
  pinMode(Pin4, OUTPUT);
  pinMode(Pin2, OUTPUT);
  pinMode(Pin3, OUTPUT);
  pinMode(Pin5, OUTPUT);
  pinMode(weightA0, INPUT);
  Serial.begin(9600);
}
void loop()
{
  int analogSensor = analogRead(weightA0);
```

```

Serial.print("Pin A0: ");
Serial.println(analogSensor); // Checks if it has reached the threshold value
if (sensorThreshold2 > analogSensor > sensorThreshold1)
{
    digitalWrite(Pin2, HIGH);
    digitalWrite(Pin5, HIGH);
}
if (analogSensor > sensorThreshold2)
{
    digitalWrite(Pin3, HIGH);
    digitalWrite(Pin4, HIGH);
}
else
{
    digitalWrite(Pin2, LOW);
    digitalWrite(Pin3, LOW);
    digitalWrite(Pin1,HIGH);
}
delay(100);
}

```

Interface with GSM module:

```

int state = 0;
const int pin2 = 2;
const int pin3 = 3;
void setup()
{
    Serial.begin(9600);
}
void loop()
{
    if (digitalRead(pin2) == HIGH && state == 0)
    {
        Serial.print("\r");
        delay(1000); Serial.print("AT+CMGF=1\r");
        delay(1000);
        Serial.print("AT+CMGS=\"+918250914178\"\r");
        delay(1000);
        Serial.print("Warning your cylinder has less than 20% gas left");
        delay(1000);
        Serial.write(0x1A);
        delay(1000);
        state = 1;
    }

    if (digitalRead(pin3) == HIGH && state == 1)
    {
        Serial.print("\r"); delay(1000);
        Serial.print("AT+CMGF=1\r");
        delay(1000);
        Serial.print("AT+CMGS=\"+918250914178\"\r");
        delay(1000);
        Serial.print("Warning your cylinder has 10% gas left");
        delay(1000);
        Serial.write(0x1A);
        delay(1000);
    }
}

```

```

        state = 2;
    } \
    if (digitalRead(pin2) == LOW && state == 1)
    {
        state = 1;
    }
    if (digitalRead(pin3) == LOW && state == 2)
    {
        state = 1;
    }
}

```

Interface with LPG Gas detector:

```

int LED1 = 12; //Red led for indicating Gas leakage
int LED2 = 11; //Green led for indicating no leakage
int buzzer = 12; //Buzzer
int smokeA1 = A1; //Analog input read from the LPG gas detector
int sensorThreshold = 400; //present of LPG gas in air *safe value
void setup()
{
    pinMode(LED1, OUTPUT);
    pinMode(greenLed, OUTPUT);
    pinMode(buzzer, OUTPUT);
    pinMode(smokeA1, INPUT);
    Serial.begin(9600);
}
void loop()
{
    int analogSensor = analogRead(smokeA1);
    Serial.print("Pin A1: ");
    Serial.println(analogSensor); // Checks if it has reached the threshold va
lue
    if (analogSensor > sensorThreshold)
    {
        digitalWrite(LED1, HIGH);
        digitalWrite(LED2, LOW);
        tone(buzzer, 1000, 200);
    }
    else
    {
        digitalWrite(LED1, LOW);
        digitalWrite(LED2, HIGH);
        noTone(buzzer);
    }
    delay(100);
}

```

Future Scope

Our project just a prototype and it can be improved and the cost can be reduced. Also we add a servo motor to turn off the cylinder nob whenever leakage is detected.

Conclusion

By implementing this project we help the people to save their time by providing update about the gas cylinder. It can provides the security to people by sensing the leakage of gas. It is very useful for domestic purpose as well as for the industrial purpose. The programming used for this project is very simple and can be easily understood as we have used Arduino language. Ease of use of this system makes the project user friendly.

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