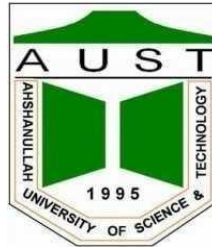


# Ahsanullah University of Science & Technology

Department of Computer Science & Engineering

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CSE 3216

Microcontroller Based System Design Lab

Project Proposal

Project Name: **Gas Leakage and Water Level  
Detection System**

Submitted To

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## **Objective**

We know that gas leakage can create serious accident and can cause huge damage to human lives and properties. The purpose of the project is monitoring water level and controlling pumps automatically. Also, the system checks for gas leakage and cut off the LPG gas supply automatically.

## **Social Values**

Every year we hear so many unexpected occurrence due to gas leakage and uncontrolled increases of water level. To prevent this kind of incidents, importance of this kind of project knows no bounds. Our projects detects gas leakage and immediately stops the gas flow immediately. This also detects the water level of any source and if the water level rises too much than it stops the water flow.

## **Required Components**

These following parts and tools are required for building this project

- Arduino UNO
- Ultrasonic Sensor
- MQ-5 Gas Sensor
- Motor
- Relay Module
- Pot
- Resistance(RES)
- 20\*4 LCD(LM044L)
- Battery
- Logicstate
- NPN Bipolar Transistor
- Diode
- Buzzer

## **Working Procedure**

The basic components that react to the input are

- Arduino UNO  
It controls and connect all the components together.
- Ultrasonic Sensor  
To detect water level.
- MQ-5 Gas Sensor  
To detect Gas Leakage.

The components that receive commands-

- Motor  
It indicates water and gas flow.
- Relay Module  
It controls water and gas valve.
- 20\*4 LCD  
It displays message.
- Buzzer  
It alerts.

#### Our system will perform following action

At first the Gas sensor will detect any leakage. If it find any it will send signal to the relay and relay will cut off the gas flow. The message will be shown to the LCD display.

The Ultrasonic Sensor will check the water flow level. If the water level is higher than 70%, a signal will be sent to the relay and that will stop the water flow. Also, the water level and the message will be shown to the display. Whether the gas leakage occurs or the water level increases upper to the safety level the buzzer will start alarming.

Both of the task will be performed simultaneously.

#### **Estimated budget**

Equipment	Quantity	Budget (Tk)
Arduino UNO R3	1	630
Ultrasonic sensor HC- SR04	1	90
MQ-5 Gas Sensor	1	140
Motor	2	200
20*4 Alphanumeric LCD Display	1	450
Pot	2	40
Relay Module	2	380
Resistance	2	10
Battery	2	900
NPN Bipolar Transistor	2	10
Diode	2	5
Buzzer	1	15
Total:		2870

## Code

```
#include<LiquidCrystal.h>
#define echo 9
#define trigger 10
#define waterValve 11
#define gasValve 12
#define gasSensor 8
long duration;
int distance;
int gasleak;
int percentageDistance;
const int buzzer = 13;

LiquidCrystal lcd(7, 6, 5, 4, 3, 2);

void setup() {
  lcd.begin(20, 4);
  lcd.clear();
  pinMode(echo, INPUT);
  pinMode(trigger, OUTPUT);
  pinMode(gasValve, OUTPUT);
  pinMode(waterValve , OUTPUT);
  pinMode(buzzer, OUTPUT);

  digitalWrite(trigger, LOW);
  digitalWrite(gasValve, LOW);
  digitalWrite(waterValve, LOW);

  lcd.setCursor(6, 0);
  lcd.print("GROUP : 5");
  lcd.setCursor(2, 1);
```

```

lcd.print("GAS LEAKAGE AND");
lcd.setCursor(5, 2);
lcd.print("WATER LEVEL ");
lcd.setCursor(2, 3);
lcd.print("DETECTION SYSTEM");
delay(2000);
lcd.clear();
}

void loop() {
  // ultrasonic reading
  digitalWrite(trigger, LOW);
  delayMicroseconds(2);
  digitalWrite(trigger, HIGH);
  delayMicroseconds(10);
  digitalWrite(trigger, LOW);
  duration = pulseIn(echo, HIGH);
  distance = duration * 0.017;
  percentageDistance = map(distance, 0, 1024, 0, 100);
  // gas leakage reading
  gasleak = digitalRead(gasSensor);

  //call functions
  cond1();
  cond2();
  cond3();
  cond4();

  water();
  gas();
  delay(500);
}

```

```

void water() {
  if (percentageDistance < 70) {
    digitalWrite(waterValve, HIGH);
  }
  else
  {
    digitalWrite(waterValve, LOW);
  }
}

```

```

void gas() {
  if (gasleak == HIGH) {
    digitalWrite(gasValve, LOW);
  }
  else
  {
    digitalWrite(gasValve, HIGH);
  }
}

```

```

void cond1() {
  if (percentageDistance > 70 && gasleak == HIGH)
    displayAlloff();
}
void cond2()
{
  if (percentageDistance < 70 && gasleak == LOW)
    displayAllon();
}
void cond3() {
  if (percentageDistance < 70 && gasleak == HIGH)

```

```

    displayWon();
}
void cond4() {
    if (percentageDistance > 70 && gasleak == LOW)
        displayGon();
}
void displayAlloff() {
    lcd.clear();
    lcd.setCursor(0, 0);
    lcd.print("Water= ");
    lcd.print( percentageDistance);
    lcd.print("%");
    lcd.setCursor(11, 0);
    lcd.print("Gas Lk= ");
    lcd.print( gasleak);
    tone(buzzer, 1000);
    delay(100);
    noTone(buzzer);
    delay(1000);
    lcd.setCursor(0, 1);
    lcd.print("NOTHING IS WORKING");
    lcd.setCursor(0, 2);
    lcd.print("W-VALVE STATUS");
    lcd.print (" OFF");
    lcd.setCursor(0, 3);
    lcd.print("G-VALVE STATUS ");
    lcd.print (" OFF");
}

void displayAllon() {
    lcd.clear();
    lcd.setCursor(0, 0);

```

```

lcd.print("Water= ");
lcd.print( percentageDistance);
lcd.print("%");
lcd.setCursor(11, 0);
lcd.print("Gas Lk= ");
lcd.print( gasleak);
noTone(buzzer);
delay(1000);
lcd.setCursor(0, 1);
lcd.print("EVERYTHING IS GOOD");
lcd.setCursor(0, 2);
lcd.print("W-VALVE STATUS");
lcd.print (" ON");
lcd.setCursor(0, 3);
lcd.print("G-VALVE STATUS ");
lcd.print (" ON");
}
void displayWon() {
  lcd.clear();
  lcd.setCursor(0, 0);
  lcd.print("Water= ");
  lcd.print( percentageDistance);
  lcd.print("%");
  lcd.setCursor(11, 0);
  lcd.print("Gas Lk= ");
  lcd.print( gasleak);

  tone(buzzer, 1000);
  delay(100);
  noTone(buzzer);
  delay(1000);
}

```



```

    lcd.setCursor(0, 1);
    lcd.print("GAS LEAKAGE DETECTED");
    lcd.setCursor(0, 2);
    lcd.print("W-VALVE STATUS");
    lcd.print (" ON");
    lcd.setCursor(0, 3);
    lcd.print("G-VALVE STATUS ");
    lcd.print (" OFF");
}

void displayGon() {
    lcd.clear();
    lcd.setCursor(0, 0);
    lcd.print("Water= ");
    lcd.print( percentageDistance);
    lcd.print("%");
    lcd.setCursor(11, 0);
    lcd.print("Gas Lk= ");
    lcd.print( gasleak);
    tone(buzzer, 1000);
    delay(100);
    noTone(buzzer);
    delay(1000);
    lcd.setCursor(0, 1);
    lcd.print("WATER LEVEL TOO HIGH");
    lcd.setCursor(0, 2);
    lcd.print("W-VALVE STATUS");
    lcd.print (" OFF");
    lcd.setCursor(0, 3);
    lcd.print("G-VALVE STATUS ");
    lcd.print (" ON");
}

```

## **Member Contribution**

All the members equally participated in this project.

## **Future Implementation**

- We will add smoke detection system.
- Will also add automated door security system.

## **Conclusion**

Gas leakage and Water level detection system is a project which can be implemented easily. This system can ensure any kind of gas leakage and water level is detected accurately. Thus, it can play a vital role in reducing the potential risk of accidents.