Project #1

My First task was to create an LPG gas Detector and Automatic Exhaust Fan.I built the LPG gas Detector using MQ-2 (Gas Sensor) sensor.
Gas Sensor:-

- Gas sensors reveal the amount of gas in the environment and the nature of the gas composition with electrical signals and can provide its change.
- The important things needed to be known before using a gas sensor : the type of gas that needs to be detected, its concentration, and the environment in which the gas is located.
- Based on the concentration of the gas the sensor produces a corresponding potential difference by changing the resistance of the material inside the sensor, which can be measured as output voltage.
- MQ-2 = LPG,Butane,Smoke detectors.

I got this idea while my school friend narrated about the water scarcity in his region which made me connect to water leakage and then pointed to gas leakage.But then we had to use minimum two sensors.Since LPG is mostly placed in kitchen , when I was talking to my mother I suddenly remembered she complaining about Exhaust fan not working. This gave me the motivation to build an Automatic Exhaust fan.
I made the Exhaust Fan using a Temperature sensor and a DC motor.The Exhaust Fan turns on if the surrounding temperature is more than a certain temperature.I used a TMP36 Temperature sensor.
The TMP36 are low voltage, precision centigrade temperature sensors. They provide a voltage output that is linearly proportional to the Celsius (Centigrade) temperature
Temperature Sensor:-

- Temperature sensors detect and measure the degree of hotness and coldness , and then convert it into an electrical signal.
- The fundamental working of this sensor is based on the voltage in its diode.
- The voltage detected is transformed into simple and standard values of temperature such as Fahrenheit, Kelvin, or Celsius .
- It is used in : Thermometer, refrigerator ,weather forecasting, microwave , water heaters,etc..

Code for this project :-

```
//LPG Detection system and Automatic Exhaust Fan system
int temperature = 0;
float sensor = 0;
int LED_BLUE = 4;
int LED_RED = 7;
int BUZZER = 12;
int exhaust = 10;
void setup()
{
  Serial.begin(9600);

  pinMode(7, OUTPUT);
  pinMode(12, OUTPUT);
  pinMode(4, OUTPUT);
  pinMode(A0, INPUT);
  pinMode(A3, INPUT);
}

void loop()
{
  temperature = 27;
  int tem = analogRead(A0);
  float volt =  ((tem * 5.0)/1024);
  sensor = (volt - 0.5)*100;

  Serial.print(sensor);
  Serial.println(" degree Celsius is the temperature of the room ");

  if(sensor<temperature)
  {
    digitalWrite(7, LOW);
    digitalWrite(10, LOW);
  }
  if(sensor>=temperature)
  {
    digitalWrite(7, HIGH);
```

```
   digitalWrite(10, HIGH);
  }

  int gas = analogRead(A3);
  if(gas >= 200)
  {
    tone(12,500,1000);
    digitalWrite(4, HIGH);
  }

  Serial.print("LPG Gas sensor reading = ");
  Serial.println(gas);

  delay(1000);
}
```

In the code analogRead(A0) returns the voltage value.It is then multiplied by 5 since 5V is power given to the sensor and the 1024(2^10) since the value is returned as 10 bit number.We then subtract this term by 0.5V(offset value of the sensor) and then multiply by 100 to the corresponding value in celsius.

Project #2

My second Task was completely based on Blind people. Sensors literally means to sense the surroundings. My project would help the blind people to become one step closer to the environment. The idea arose by keeping my far relative, who is partially bind, in my mind.The theme of my project was Automatic Temperature regulated fan and an glass with ultrasonic sensor.

Ultrasonic Sensor :-

- The ultrasonic sensor is a non-contact type of sensor used to measure an object's distance and velocity.
- Ultrasonic sensors have two main components: the transmitter (which emits the sound) and the receiver (which encounters the sound after it has travelled to and reflected from the object.)
- Ultrasonic sensors are used primarily as proximity sensors. They can be found in automobile self-parking technology and anti-collision safety systems.

I used an ultrasonic sensor to measure the distance between the person wearing them and the wall.When the person comes close to the wall the buzzer turns on and it indicates to them that an opaque object is close to them in the forward direction. It helps them to avoid a lot of obstacles.

.When I helped my relative , I understood their problems more clearly. One of the problems was that she was not able to find the switch to on the fans. So, I designed an automatic temperature regulated fan which is based on IR sensor and temperature sensor.

IR sensor:-

- IR sensor is an electronic device that emits light in order to sense some object of the surroundings.
- An **IR sensor** can measure the heat of an object as well as detect the motion. Usually, in the **infrared spectrum**, all the objects radiate some form of thermal radiation. These types of radiation are invisible to our eyes, but infrared sensors can detect these radiations.
- The emitter is simply an IR LED and the detector is simply an IR photodiode . Photodiodes are sensitive to IR light of the same wavelength which is

emitted by the IR LED. When IR light falls on the photodiode, the resistances and the output voltages will change in proportion to the magnitude of the IR light received.

When the person enters the room, the IR sensor detects them (all objects emit a certain type of thermal radiation) and if the detected IR is within the range the fan turns on. Depending on the temperature of the room , the speed of the fan changes.

Code for this project:-

```
const int ultra = 3;
const int buzzer = 13;
const int sonic = 5;
int LED_RED = 2;
//int IR = 6;
int LED_GREEN = 7;

const int analogInPin = A0;
int sensorValue = 0;

const int temp = A4;

void setup()
{
  Serial.begin(9600);
  pinMode(A4, INPUT);

  pinMode(sonic, OUTPUT);
  pinMode(buzzer, OUTPUT);
   pinMode(LED_RED, OUTPUT);
  pinMode(9, OUTPUT);

}

void loop()
{
  digitalWrite(sonic, LOW);
  delay(5);
  digitalWrite(sonic, HIGH);
```

```
delay(10);
digitalWrite(sonic, LOW);
 const int distance = 50;
int time = pulseIn(ultra, HIGH);
float length = (time*0.034)/2;  //time is in microsec and distance is in cm
if(length >= distance)
{
  tone(13,250,1000);
  digitalWrite(LED_RED, HIGH);
}
Serial.print(length);
Serial.println("cm");
delay(1000);

sensorValue = analogRead(analogInPin);
Serial.print("\nsensor = ");
Serial.println(sensorValue);
if(sensorValue < 20){
  digitalWrite(7,LOW);
  digitalWrite(9, LOW);

  }
if(sensorValue>=25&&sensorValue<=35)
{
  digitalWrite(7, HIGH);
  int fanspeed = 0.5*sensorValue;
 analogWrite(9, fanspeed);
  }
if(sensorValue>35)
{
  digitalWrite(7, HIGH);
  int fanspeed = 5*sensorValue;
 analogWrite(9, fanspeed);
  }
delay(100);

 int bottle = analogRead(A0);
```

```
  float volt =  (bottle /1024.00)*5000;
  float celsius = (volt-0.5)/10;
  Serial.print(celsius);
  Serial.println("celsius");

}
```

Project #3

My third task was related to finding the height and weight of a person. I used Ultrasonic sensor to find the height of the person.The force sensor was used to find the weight of the person. The person would be asked to stand on a stand ,where the base force sensor would be placed , and the Ultrasonic sensor was placed at the height of 3m from the base.

Force Sensor:-

- It converts an input mechanical force such as load, weight, tension, compression or pressure into another physical variable, in this case, into an electrical output signal that can be measured, converted and standardized. As the force applied to the force sensor increases, the electrical signal changes proportionally.
- The force sensor is primarily composed of three parts: the force sensitive component,the component that converts the measured into electric energy,the circuit part(like pcb).

Using the height and weight , we can find the BMI of a person. Very less members are aware of this.Using BMI we can determine if the person is suffering from malnutrition or from obesity .

I actually got this idea from one of the institute emails regarding participation in BGMI game. On seeing the word “BGMI” I suddenly remembered “BMI” .Before that I already had an idea of finding the weight. Maybe that idea made me to see “BgMI”.

The code this task:-

```
#include <Adafruit_LiquidCrystal.h>


Adafruit_LiquidCrystal lcd(0);

int echo = 3;
int trigger = 6;

void setup()
{
  lcd.begin(16, 2);
  lcd.setBacklight(1);

  pinMode(trigger, OUTPUT);
  pinMode(echo, INPUT);

}

void loop()
{
   digitalWrite(trigger, LOW);
  delay(5);
  digitalWrite(trigger, HIGH);
  delay(1000);
  digitalWrite(trigger, LOW);
  int time = pulseIn(echo, HIGH);
  float distance = (time*0.034)/2;
  distance = (300-distance)/100;

  float sensor = analogRead(A0);
  sensor=sensor/10;

  int BMI = sensor/(distance * distance);

  lcd.setCursor(0,0);
```

```
  lcd.print("BMI: ");
  lcd.print(BMI);
  lcd.setCursor(0, 1);
  if(BMI>25)
  lcd.print("Overweight");
  if(BMI<17.5)
  lcd.print("Underweight");
  if(BMI>17.5&&BMI<25)
  lcd.print("Healthy");
  delay(500);
}
```