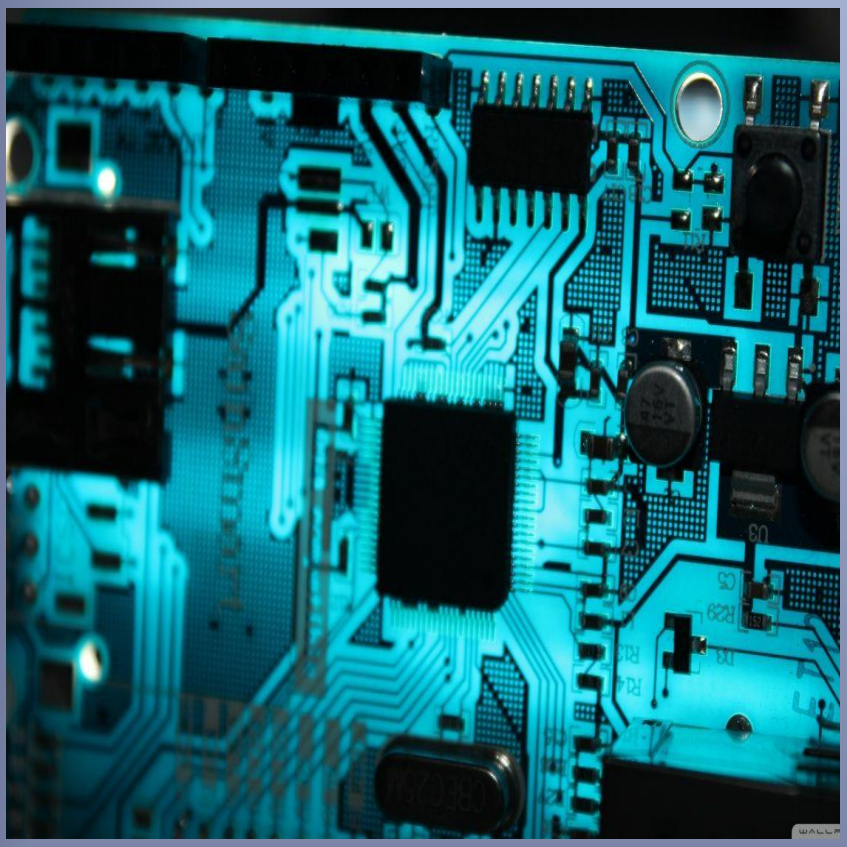


Project Report

Fire and Smoke Detector

This an Arduino Based project which give you safety from Fire ,Smoke and Gas .

NORTH SOUTH UNIVERSITY

CSE-323

Operating System Concepts

Group Members

	Name	Id
1	Md.Nur-E-Azam	1512268042
2	ShahidulMorsalinJahin	1620564042
3	ZannatulFerdousProme	1621109042

Fire and Smoke Detectors are very useful in detecting smoke or fire in buildings, and so are the important safety parameters. In this session, we are going to build a Fire and Smoke Detector Circuit which sense the smoke in the air, reads and displays the level of Smoke in the Air in PPM (parts per million) and Sense the fire and measure the length of fire and the smoke .

Components Required:

Gas sensor NQ2
Infrared Flame sensor module
12C 16*2 Arduino LCD Display Module
HC-SR04 Ultrasonic Sensor
Arduino uno
BreadBoard
Wires
LED light
Registers

GAS sensor NQ2:

MQ-2 semiconductor Sensor for Combustible Gas

Sensitive material of MQ-2 gas sensor is SnO2, which with lower conductivity in clean air. When the target combustible gas

exist, the sensors conductivity is more higher along with the gas concentration rising.

MQ-2 gas sensor has high sensitivity to LPG, Propane and Hydrogen, also could be used to Methane and other combustible steam, it is with low cost and suitable for different applications.

Character

High sensitivity to Combustible gas in wide range

High sensitivity to LPG, Propane and Hydrogen

Fast response

Wide detection range

Stable performance, long life, low cost

Simple drive circuit

Infrared Flame sensor module:

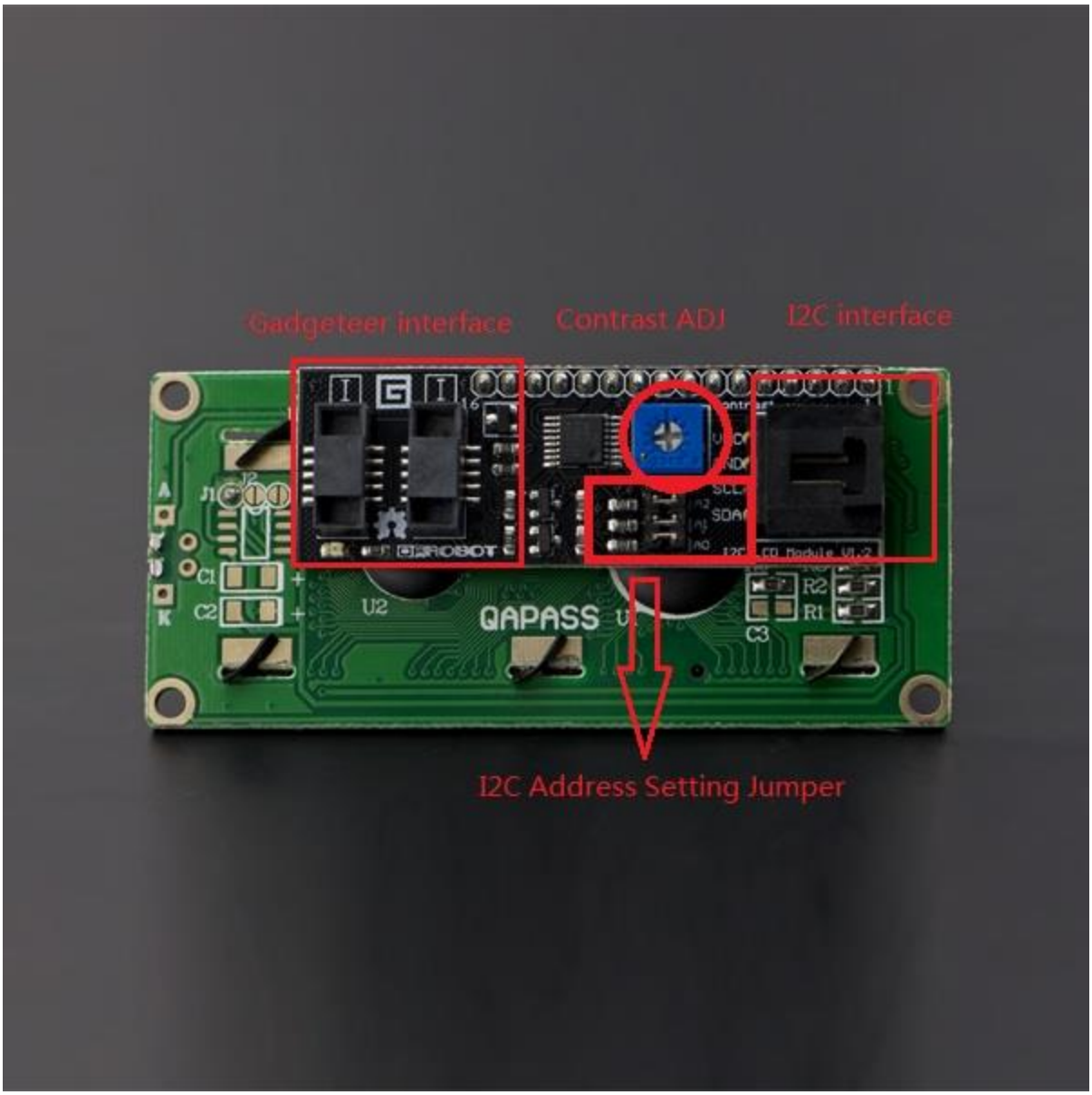
A flame sensor module that consists of a flame sensor (IR receiver), resistor, capacitor, potentiometer, and comparator LM393 in an integrated circuit. It can detect infrared light with a wavelength ranging from 700nm to 1000nm.The far-infrared flame probe converts the light detected in the form of infrared light into current changes. Sensitivity is adjusted through the onboard variable resistor with a detection angle of 60 degrees.

I2C 16x2 Arduino LCD Display Module:

This is a 16x2 LCD display screen with I2C interface. It is able to display 16x2 characters on 2 lines, white characters on blue background.

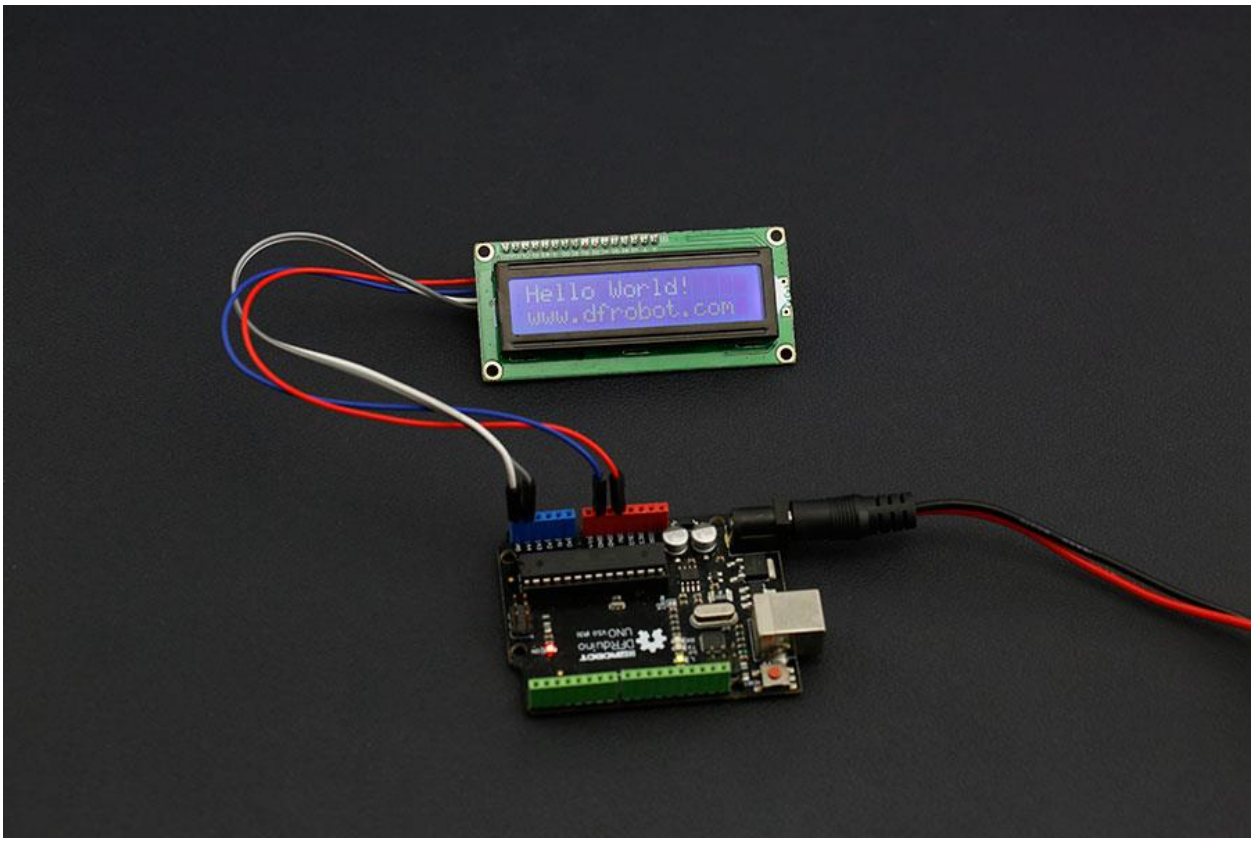
Usually, Arduino LCD display projects will run out of pin resources easily, especially with Arduino Uno. And it is also very complicated with the wire soldering and connection.

This I2C 16x2 Arduino LCD Screen is using an I2C communication interface. It means it only needs 4 pins for the LCD display: VCC, GND, SDA, SCL. It will saves at least 4 digital / analog pins on Arduino. All connector are standard XH2.54 (Breadboard type). You can connect with jumper wire directly.



To avoid the confliction of I2C address with other I2C devices, such ultrasonic sensor, IMU, accelerometers and gyroscope, the I2C address of the module is configurable from 0x20-0x27. And its contrast can be adjusted manually.

Another alternative option is I2C 20x4 Arduino LCD Display Module if more characters is required.



HC-SR04 Ultrasonic Sensor:

The HC-SR04 ultrasonic sensor uses sonar to determine distance to an object like bats do. It offers excellent non-contact range detection with high accuracy and stable readings in an easy-to-use package. It comes complete with ultrasonic transmitter and receiver modules. The ultrasonic sensor uses sonar to determine the distance to an object.

Arduinouno:

The UNO is the best board to get started with electronics and coding. The UNO is the most robust board.. The UNO is the most used and documented board of the whole Arduino family.

Arduino Uno is a microcontroller board based on the ATmega328P .It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, 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.. You can tinker with your UNO without worring too much about doing something wrong, worst case scenario you can replace the chip for a few dollars and start over again.

Code:

Distence:

```
long duration;
intdistanceCm, distanceInch;

void setup() {

lcd.begin(16,2);
pinMode(trigPin, OUTPUT);
pinMode(echoPin, INPUT);

}

void loop() {

digitalWrite(trigPin, LOW);
delayMicroseconds(2);
digitalWrite(trigPin, HIGH);
delayMicroseconds(10);
digitalWrite(trigPin, LOW);
```

```
duration = pulseIn(echoPin, HIGH);
distanceCm= duration*0.034/2;
distanceInch = duration*0.0133/2;

lcd.setCursor(0,0);
lcd.print("Distance: ");
lcd.print(distanceCm);
lcd.print("   cm");
delay(10);
lcd.setCursor(0,1);
lcd.print("Distance: ");
lcd.print(distanceInch);
lcd.print(" inch");
delay(10);

}
```

GAS SENSOR:

```
#include "LiquidCrystal.h"

LiquidCrystallcd(8, 9, 4, 5, 6, 7);

constinttrigPin = 2;
constintechoPin = 3;
int Led = 13;
int Buzzer = 9;
intGassensor = A5;
intSensorThres = 400;//THRESHOLD VALUE
void setup() {
pinMode(Led, OUTPUT);
pinMode(Buzzer, OUTPUT);
pinMode(Gassensor, INPUT);
}
```

```
void loop() {
intanalogSensor = analogRead(Gassensor);
if (analogSensor<SensorThres)
digitalWrite(Led, LOW);
digitalWrite(Buzzer, HIGH);
}
else
{
digitalWrite(Led, HIGH);
digitalWrite(Buzzer, LOW);
}
delay(100);
}
```

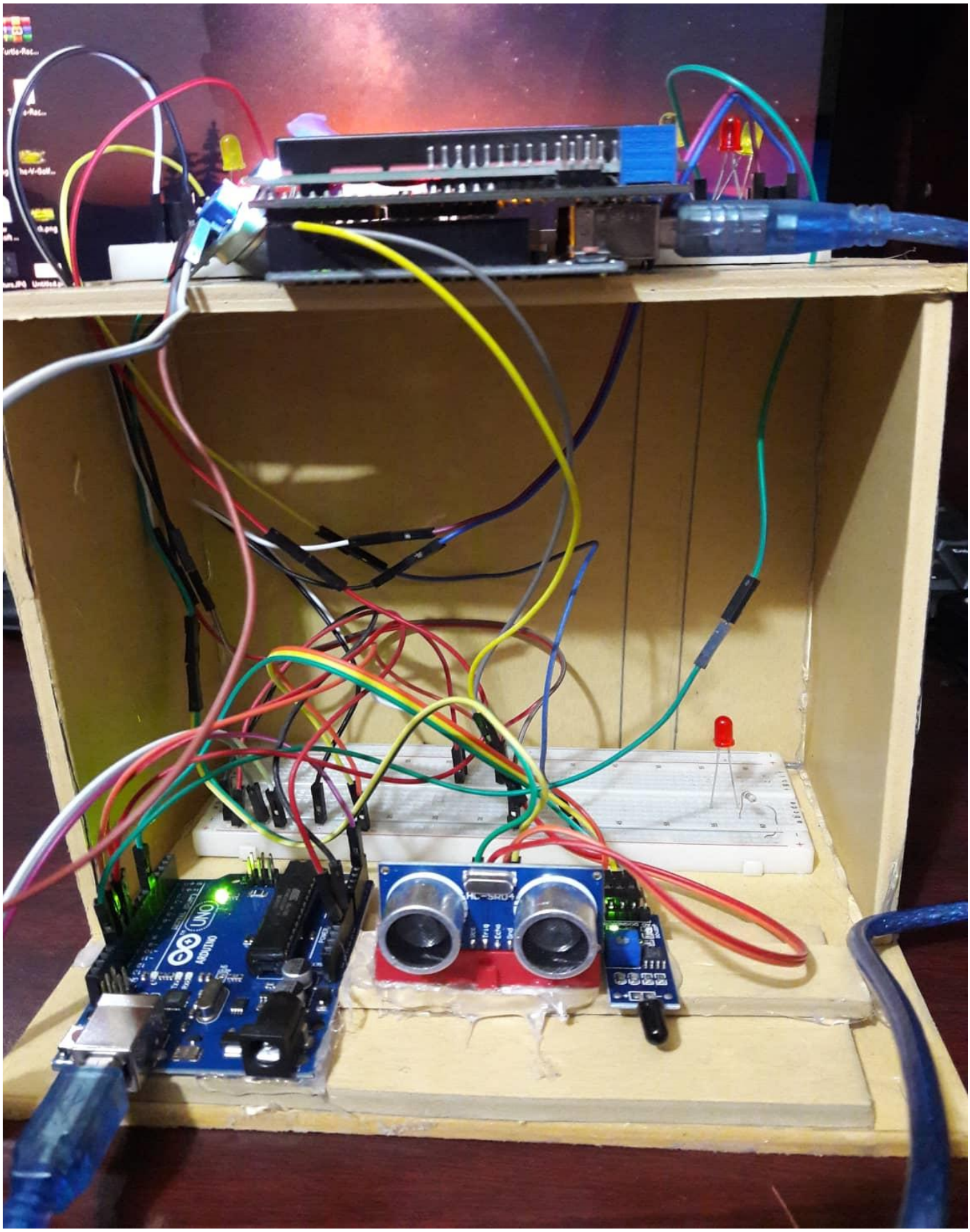
Flame detector:

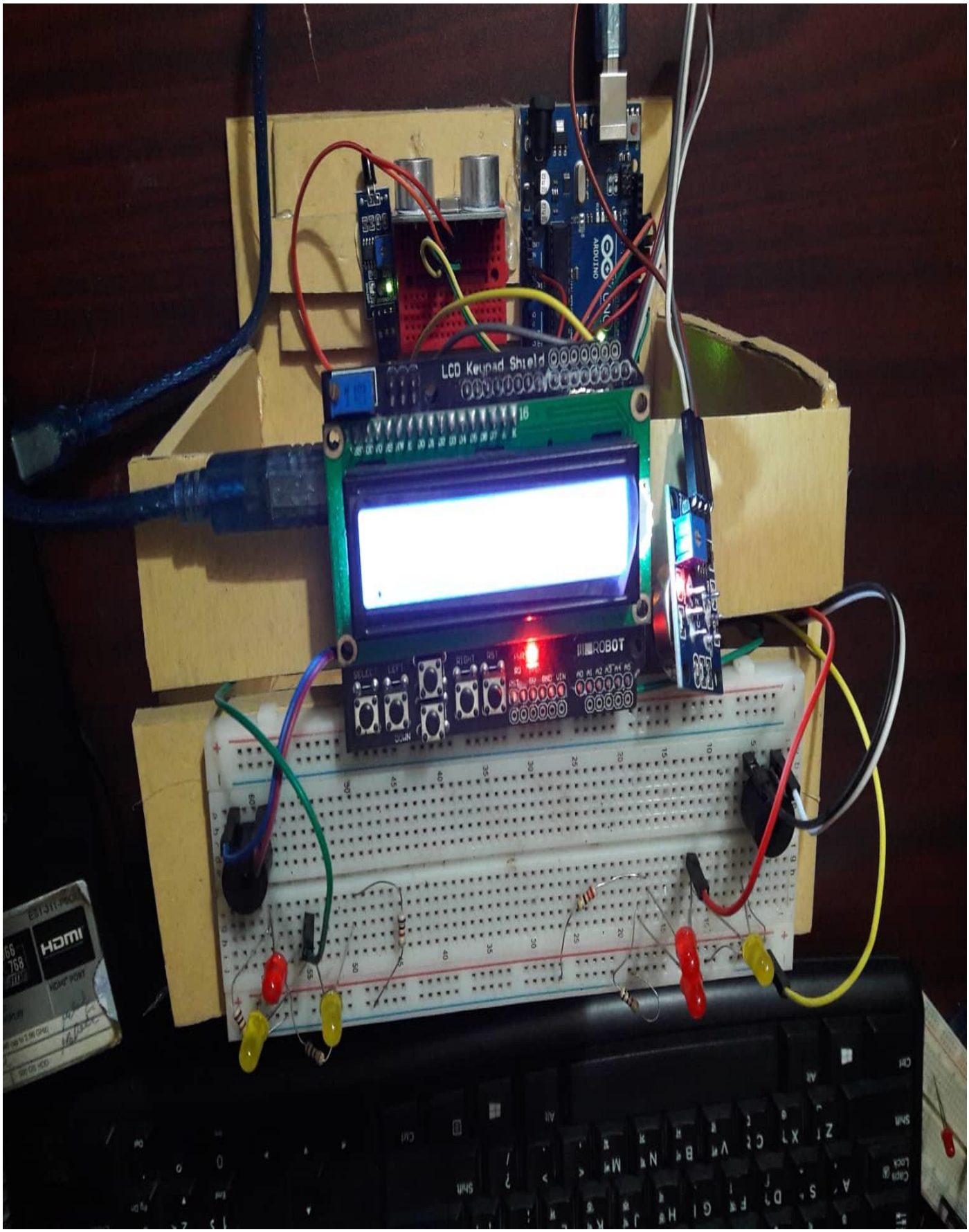
```
int Led = 13;
int Buzzer = 9;
intFlamePin = 5;
int Flame = HIGH;
void setup() {
pinMode(Led, OUTPUT);
pinMode(Buzzer, OUTPUT);
pinMode(FlamePin, INPUT);
Serial.begin(9600);
}
void loop() {
Flame = digitalRead(FlamePin);
if (Flame== LOW)
{
Serial.println("FLAME DETECTED");
digitalWrite(Buzzer, HIGH);
digitalWrite(Led, HIGH);
}
```

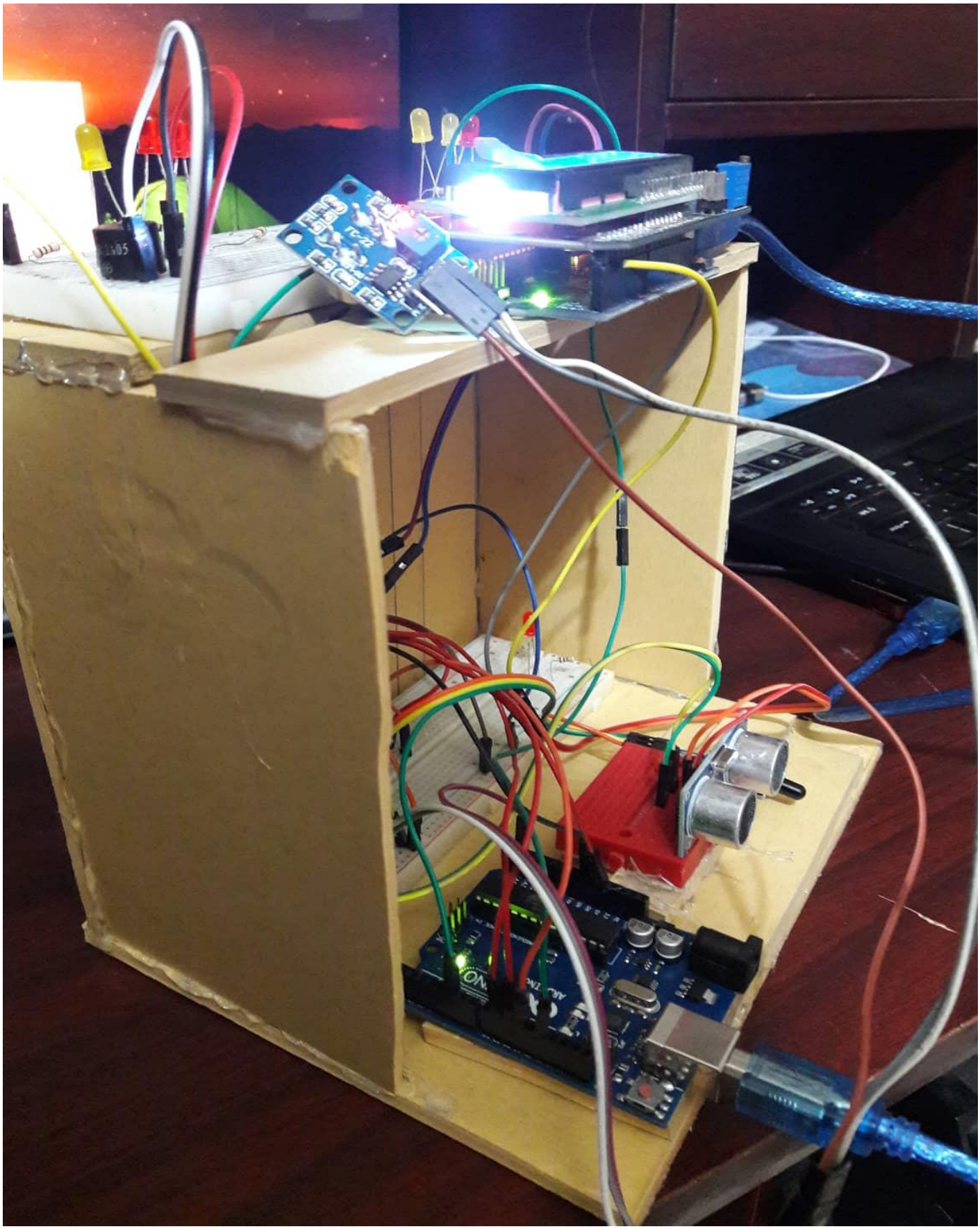
```
else{
Serial.println("FLAME DETECTED");
digitalWrite(Buzzer, LOW);
digitalWrite(Led, LOW);
}
}
```

IMPLEMENTATION:

In this system we have used Gas sensor NQ2, HC-SR04 Ultrasonic Sensor and Infrared Flame sensor module for sence the fire,gas and smoke. We have used LCD display for displaying the length of fire and the smoke. The system operates by the two Arduino uno receiving value from the sensor.


UNO
ARDUINO
HC-SR04


LCD Keypad Shield
ROBOT
HDMI



Reference:

1. https://www.google.com

2. International Journal of Intellectual Advancements and Research in Engineering Computations.

3. https://www.youtube.com

4. Microsoft Office Word Document