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Gas and Flame Sensor Simulation Model

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Abstract: ***This work developed a system that provides smart alerts and control responses to emergencies such as fire outbreaks, gas leakage in our homes and industries. In the system's implementation, Arduino-based instrumentation, integrated with fire and gas sensor was adopted to monitor the environment. The device senses the Gas and fire occurrence accordingly modifies the level of logic at the sensor's output pin and performs additional tasks by giving a Display to make appropriate safety measures. This work was validated by using a simulation approach done using Proteus ISIS simulator software, which was used for data collection and evaluation.***

Keywords: Arduino UNO, Flame Sensor, Gas Sensor, LED, PROTEUS.

I. INTRODUCTION

It is a common tendency and human nature that many times people fail to turn off domestic utilities due to their busy schedule and/or related jobs. This can often lead to unpredicted short-circuit and fire accidents. Circuits for fire detection in industries, homes can save people's lives and prevent damage.

Therefore, fire control must be used to avoid fire incidents at home as well as in industries. Fire detection using an Arduino microcontroller can help society save human lives.

Authors simulated using fire detection software testing tools. Rapid response to smoldering flames, low fault rate was the design strategy [1].The work is confined to resolve the issues faced by employees at factories during the periods when fire breaks out. They proposed a device using Raspberry Pi 3 which can detect fire and provide information on fire areas. To catch the fire event, the Raspberry Pi controls several Arduino boards which are connected to several motors and cameras. In [2], they addressed the latest technologies which can be used to minimize extremely unfortunate fire-induced accidents.

The fire controlling tool helps in protecting assets along with the company in case of fire to minimize fire in the building and industry. The basic function of a Gas detector is to identify increasing flames gases in well-timed intervals and trigger the people present in the premises to be informed of an immediate evacuation by alarm [3].

This type of system has to be studied properly to understand the type of hazards it can avoid and also the type of Methodologies that can be replaced in future for the betterment of the purpose.

A very fine gas detection methodology is needed in various conditions to overcome the inherent problems that may arise due to functional changes in the components utilized. Smoke or gas detection program is used to estimate smoke/Gas detector reaction .Various important parameters have to be considered along with the avoiding of the situation and the parameters of the significance have to be categorized to overcome the problems[5][6][7].

II. SOFTWARE USED IMPLEMENTATION

For monitoring fire and Gas sensors Arduino IDE software is used.

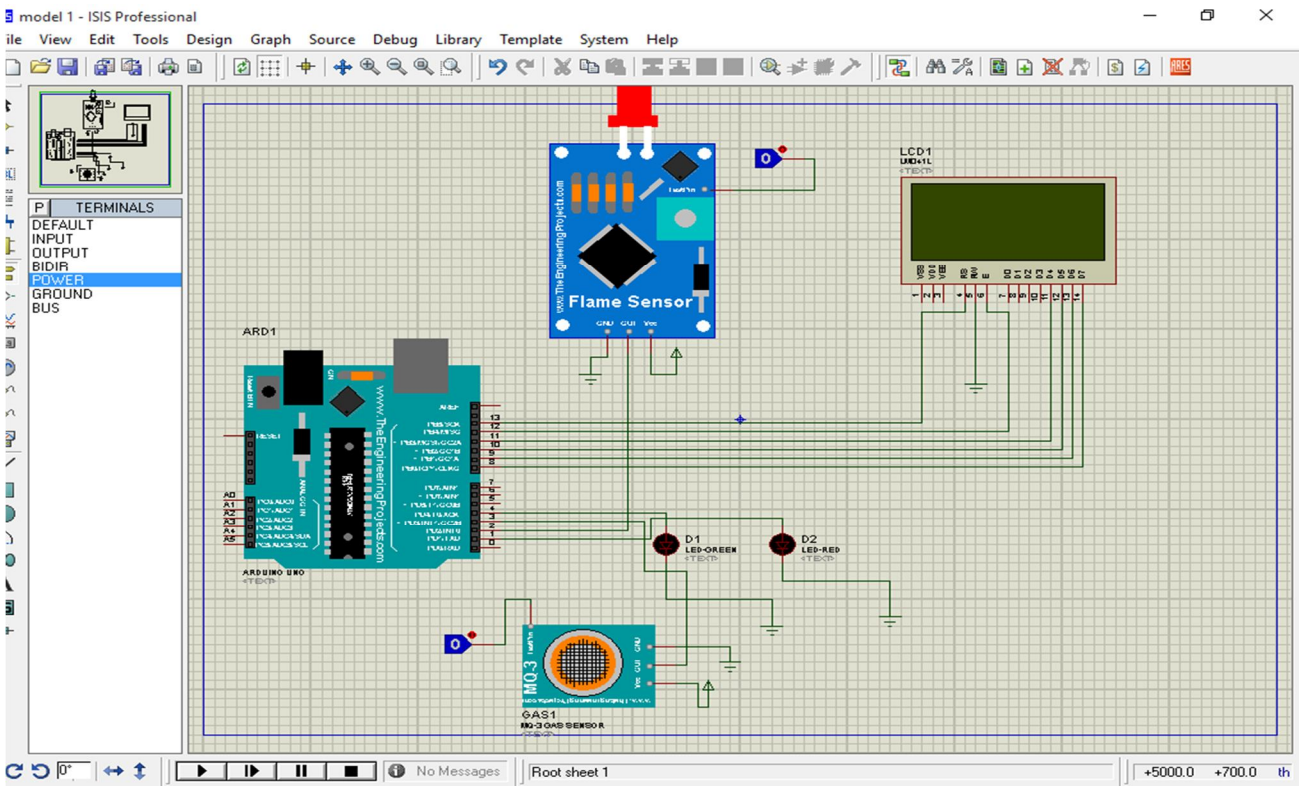
This software is used to write and upload programs to Arduino compatibles boards. Once the required commands are uploaded, they are configured to give the wanted mechanism of actions as per the need and requirement of the work. This software supports in areas operating fire and gas detection mechanisms, buzzers etc.

III. PROPOSED SIMULATION MODEL

A. Devices used

1) Ardunio UNO
2) Red Led
3) Green Led
4) Flame Sensor
5) Gas sensor
6) Logic toggle

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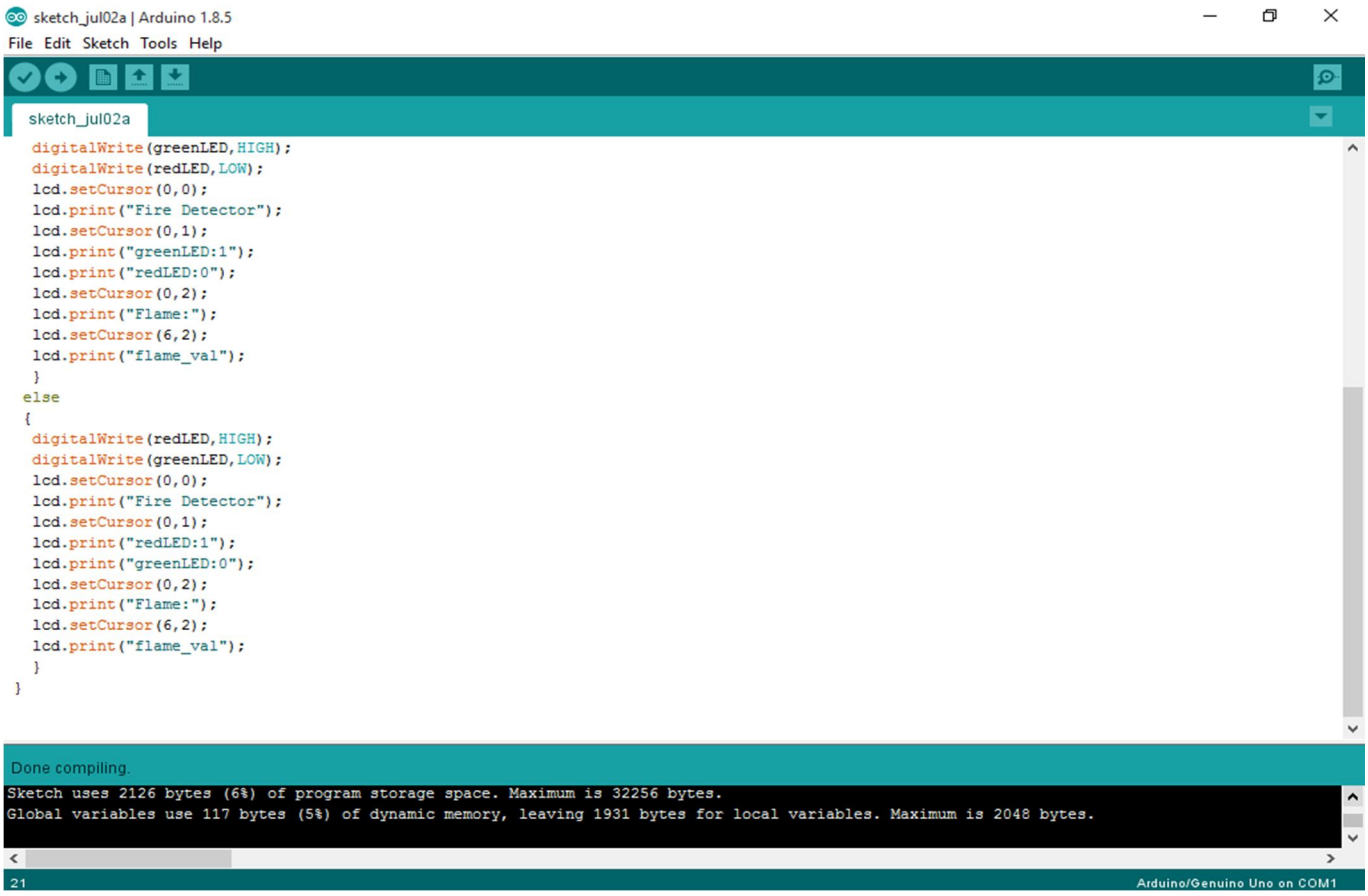
IV. PROGRAM

```
#include <LiquidCrystal.h>
LiquidCrystal lcd (13, 12, 11, 10, 9, 8);
int flame=2;
int redLED=1;
int greenLED=4;
int smoke=3;
void setup() {

{
  pinMode(flame,INPUT);
  pinMode(smoke,INPUT);
  pinMode(greenLED,OUTPUT);
  pinMode(redLED,OUTPUT);
  lcd.begin(20,4);
}
} void loop () {

  int flame_val=digitalRead(flame);
  if(flame_val==HIGH)
{
  digitalWrite(greenLED,HIGH);
  digitalWrite(redLED,LOW);
  lcd.setCursor(0,0);
  lcd.print("Fire Detector");
```

```
 lcd.setCursor(0,1);
 lcd.print("greenLED:1");
 lcd.print("redLED:0");
 lcd.setCursor(0,2);
 lcd.print("Flame:");
 lcd.setCursor(6,2);
 lcd.print("flame_val");
 }
else
{
 digitalWrite(redLED,HIGH);
 digitalWrite(greenLED,LOW);
 lcd.setCursor(0,0);
 lcd.print ("Fire Detector");
 lcd.setCursor(0,1);
 lcd.print("redLED:1");
 lcd.print("greenLED:0");
 lcd.setCursor(0,2);
 lcd.print("Flame:");
 lcd.setCursor(6,2);
 lcd.print("flame Val");
 }
}
```



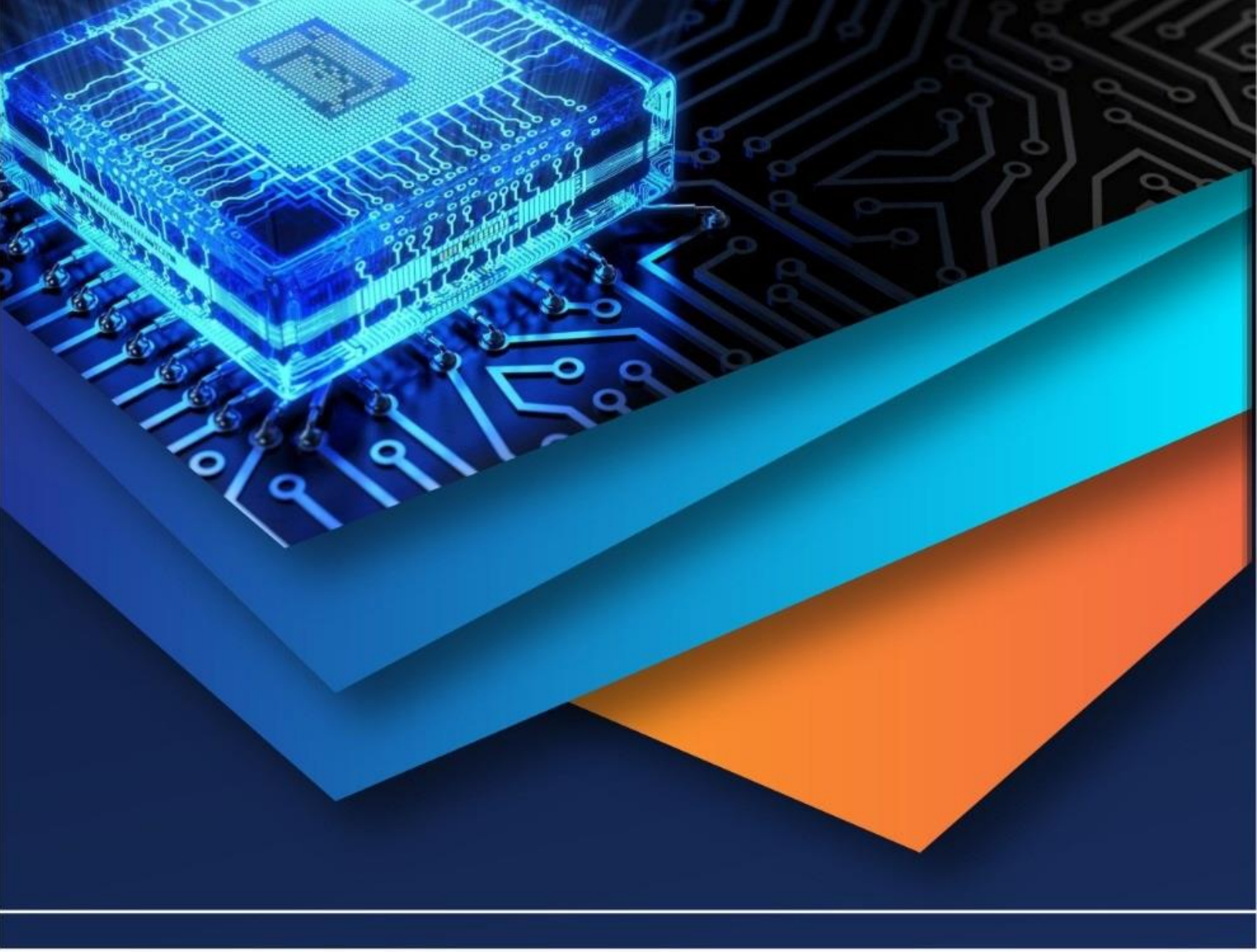
V. CONCLUSION

The simulation of flame and Gas sensor has been done using proteus demo version.Arduino IDE software is used for programming. It is less sensitive to errors as compared to other software use to program the microcontroller. This can be controlled entirely in software control, using a mix of hardware and software. The circuit's job is to make a sense and send a signal while the site catches Gas fires and releases flames. The simulation developed performs both as fire detection system and also as harmful gas detection system.

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