Ahsanullah University of Science & Technology
Department of Computer Science & Engineering
Semester Fall 2020

CSE 3216
Microcontroller Based System Design Lab

Project Proposal

Project Name: ZEN

<u>**Submitted To**</u>

Mr. Farzad Ahmed   **Ms. Ashna Nawar Ahmed**
Lecturer   Lecturer
Department of CSE, AUST   Department of CSE, AUST

<u>**Submitted By**</u>

Ishmam Faruki   180104026
Monjure Mowla   180104027
Nipun Paul   180104042
Mutakabbirul Islam Pranto   180104044

Objective:

Nowadays, houses are going through a swift change to make them more and more comfortable. Home automation is an example of this. Our target is to build a project where the homeowners can control some of the appliances of the house, like the fan and the light via their voice. There will also be a lamp that will automatically turn on at night. Safety and security are also emphasized in this project. As such, our project will also have a fire alarm in case of fire. Moreover, in this project, the homeowners will have the authentication system to prevent break-in. Finally, there will also be a water level sensor for the water tank of the house.

Social Values:

Unfortunately, gas explosions have become a common norm in our country. A lot of people die every year due to gas leakage in the kitchen. Our home automation will provide a fire alarm which will be triggered by a smoke detector in case of a gas leakage. This will give time to people to prevent fires or explosions by taking necessary steps. Burglary and break-in have always been a safety concern for any home. Our project will include an authentication system where people can get into the house using the information only they and their family members know. So, traditional locks and easy-to-lose spare keys have been replaced. As a result, the homeowners feel a sense of security. Next, the voice controlled appliances like the fan and the light will provide a lot more comfort and relaxation to the people of the house. In addition to these, there will be a lamp that will automatically turn itself on at night. Finally, there will be a water sensor that will alarm the house dwellers if the water level is high. As a consequence, there will be less water spillage and less damage to house goods.

Required Components:

- Arduino Mega
- LCD
- Keypad-SmallCalc
- Breadboard
- Gas Sensor
- Buzzer
- Resistor
- Cables and Connectors

- LED
- Diode
- DC Motor
- LDR
- Transistor
- Battery
- Bluetooth Module HC-05 v1
- Capacitor
- Inductor
- Temperature Sensor
- Relay Model
- Water Sensor

Design:
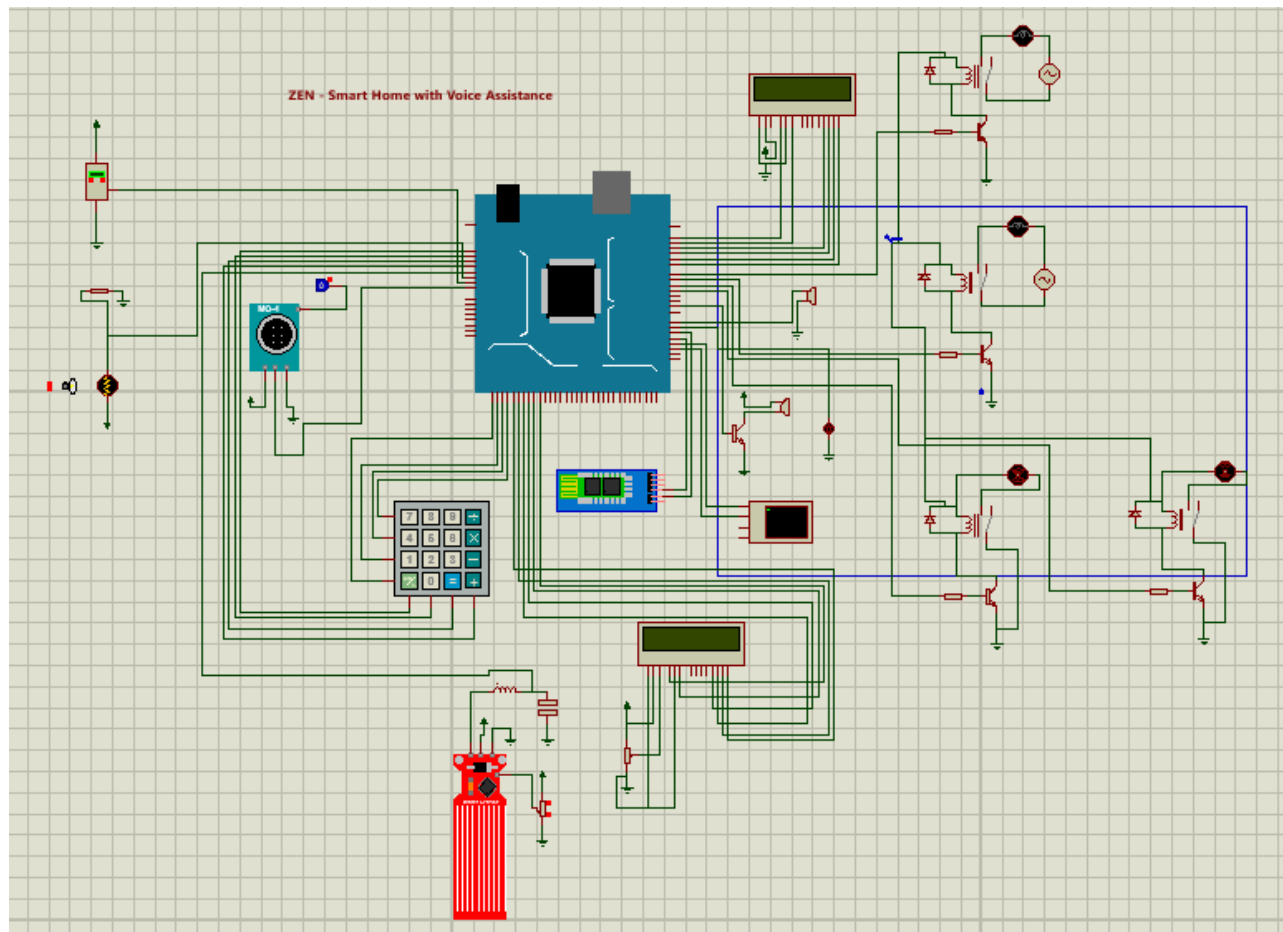
Working Procedure:

- Owner will enter his home by entering a password on the keypad. If the password matches, the LCD will show, "Welcome!". Else, after entering the wrong password 3 times, the buzzer will be on and show 'Intruder Alert!!!' on the LCD.

- There will be voice controlled lights and fans. Users can control light and fan by commanding over an android app. One fan will only work if the temperature is below 27 centigrade, else both of the fans will work. The same goes for the lights in which case one of the lights will depend on brightness level.

- A lamp will be automatically turned on at night.

- There will be an automated fire alert system, which will detect smoke and press the buzzer to alarm people.

- There will be an alarm if the water tank of the house gets filled up to a high level.

Estimated Budget:

Equipment	Quantity	Budget(TK)
Arduino MEGA	1	1000
16x2 LCD	2	320
Keypad-SmallCalc	1	90
Buzzer	2	98
MQ-4 Gas Sensor	1	68
Bluetooth Module HC-05 v1	1	350
Resistor	7	35
DC Motor	2	172
LDR	1	6
Relay Model	4	100
Diode	4	10
Breadboard	1	90
Jumper wire	As required	100
Led	3	6
Battery	1	50
Transistor	5	45
Capacitor	1	25
Inductor	1	5
Lm35 Temperature Sensor	1	82
Water Sensor	1	250
Total =		2902 Taka

Code:

```
#include <Keypad.h>
#include <LiquidCrystal.h>

LiquidCrystal lcd(13, 12, 11, 10, 9, 8);
LiquidCrystal lcd2(44, 45, 46, 47, 48, 49);

const byte ROWS = 4;
const byte COLS = 4;

char hexaKeys[ROWS][COLS] = {
  {'7','8','9','/'},
  {'4','5','6','*'},
  {'1','2','3','-'},
  {'.','0','=','+'}
};

byte rowPins[ROWS] = {50, 51, 52, 53};
byte colPins[COLS] = {A0, A1, A2, A3};

String password="*124";
String check="";
int currentposition=0;
bool flag=0;
const int buzzer1 = 14;
int f = 0;
int ldr = A6;
int value = 0;
int temp=0;
int lm35=A5;
int wrongcount=0;
int ledpin2 = 15;

Keypad customKeypad = Keypad( makeKeymap(hexaKeys), rowPins,
colPins, ROWS, COLS);
```

```cpp
String voice;

int fan = 5, fan2 = 4;
int light = 6, light2 = 7;

#define MQPin A4
#define buzzer2 1

int resval = 0;
int respin = A7;

void setup()
{
  Serial2.begin(9600);
  pinMode(light, OUTPUT);
  pinMode(light2, OUTPUT);
  pinMode(fan, OUTPUT);
  pinMode(fan2, OUTPUT);
  pinMode(MQPin, INPUT_PULLUP);
  pinMode(buzzer2, OUTPUT);
  lcd.begin(16, 2);
  lcd.clear();
  lcd.print("Loading/Initializing");
  lcd.clear();
  lcd.setCursor(0, 0);
  pinMode(buzzer1, OUTPUT);
  lcd2.begin(16, 2);
  Serial1.begin(9600);
  pinMode(ledpin2, OUTPUT);
}

void loop()
{
  char customKey = customKeypad.getKey();
  if (customKey)
```

```
{
  if(customKey!='=' && customKey!='.')
  {
    check=check+customKey;
    lcd.clear();
    lcd.begin(16, 2);
    lcd.print(check);
  }
  else if(customKey=='.')
  {
    check="";
    lcd.clear();
    lcd.setCursor(0, 0);
    lcd.print(check);
  }
  else
  {
    if(check==password)
    {
      lcd.clear();
      lcd.begin(16, 2);
      lcd.print("Welcome!");

      //The person enters the house
      f = 1;
    }
    else
    {
      wrongcount++;
      if(wrongcount<=2)
      {
        lcd.clear();
        lcd.begin(16, 2);
        lcd.print("Wrong Password!");
      }
    }
```

```cpp
      if(wrongcount>2)
      {
        lcd.clear();
        lcd.begin(16, 2);
        lcd.print("Intruder Alert!!!");
        tone(buzzer1, 1000);
        delay(1000);
        noTone(buzzer1);
        delay(1000);
      }
      check="";
    }
  }
  if(f == 1)
  {
    while(Serial2.available())
    {
      delay(3);
      char c = Serial2.read();
      voice += c;
    }
    //voice="turn on fan";
    if(voice.length() > 0)
    {
      Serial2.println(voice);
      if(voice == "turn on light")
      {
        value=analogRead(ldr);
        if(value<=500)
        {
          digitalWrite(light, HIGH);
          digitalWrite(light2, HIGH);
        }
        else
        {
          digitalWrite(light, HIGH);
```

```
      digitalWrite(light2, LOW);
    }
  }
  else if(voice == "turn off light")
  {
    digitalWrite(light, LOW);
    digitalWrite(light2, LOW);
  }
  else if(voice == "turn on fan")
  {
    temp=analogRead(lm35);
    float milivolts=(temp/1024.0)*5*1000;
    float cel=milivolts/10;
    float farh=(cel*9)/5+32;
    if(cel<27)
    {
      digitalWrite(fan, HIGH);
      digitalWrite(fan2, LOW);
    }
    else
    {
      digitalWrite(fan, HIGH);
      digitalWrite(fan2, HIGH);
    }
  }
  else if(voice == "turn off fan")
  {
    digitalWrite(fan, LOW);
    digitalWrite(fan2, LOW);
  }
  else if(voice == "turn on all")
  {
    value=analogRead(ldr);
    if(value<=500)
    {
      digitalWrite(light, HIGH);
```

```
      digitalWrite(light2, HIGH);
    }
    else
    {
      digitalWrite(light, HIGH);
      digitalWrite(light2, LOW);
    }
    temp=analogRead(lm35);
    float milivolts=(temp/1024.0)*5*1000;
    float cel=milivolts/10;
    float farh=(cel*9)/5+32;
    if(cel<27)
    {
      digitalWrite(fan, HIGH);
      digitalWrite(fan2, LOW);
    }
    else
    {
      digitalWrite(fan, HIGH);
      digitalWrite(fan2, HIGH);
    }
  }
  else if(voice == "turn off all")
  {
    digitalWrite(fan, LOW);
    digitalWrite(light, LOW);
    digitalWrite(fan2, LOW);
    digitalWrite(light2, LOW);
  }
  voice = "";
}

value=analogRead(ldr);
Serial1.println(value);
delay(100);
if(value <= 500)
```

```arduino
{
  digitalWrite(ledpin2, HIGH);
  //delay(1000);
}
else
{
  digitalWrite(ledpin2, LOW);
  //delay(1000);
}

int gas_value = digitalRead(MQPin);
if(gas_value==HIGH)
{
  digitalWrite(buzzer2, HIGH);
  delay(200);
}
else
{
  digitalWrite(buzzer2, LOW);
}

lcd2.print("  WATER LEVEL : ");
lcd2.setCursor(0, 1);
resval = analogRead(respin);
if (resval<=100)
{
  lcd2.println("    Empty   ");
}
else if (resval>100 && resval<=300)
{
  lcd2.println("     Low      ");
}
else if (resval>300 && resval<=330)
{
  lcd2.println("    Medium     ");
}
```
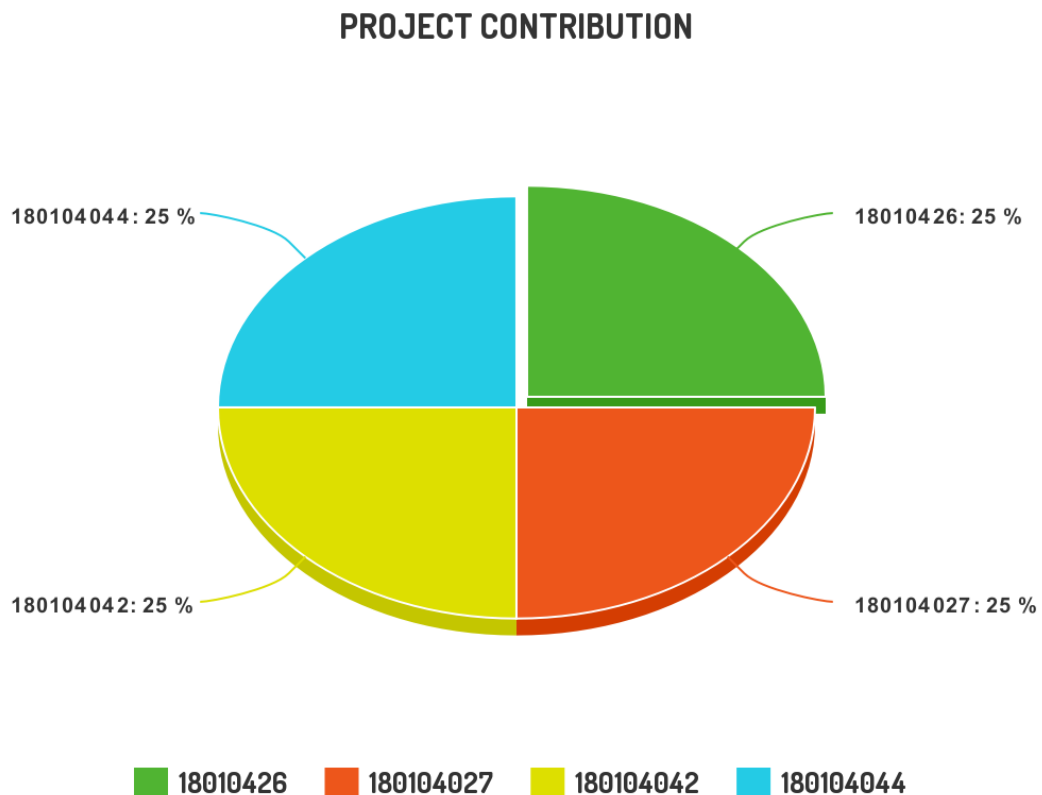
```
   else if (resval>330)
   {
     lcd2.println("      High      ");
     tone(buzzer1, 1000);
     delay(1000);
     noTone(buzzer1);
     delay(1000);
   }


  }
}
```

Members Contribution:

PROJECT CONTRIBUTION

180104044: 25 %   18010426: 25 %

180104042: 25 %   180104027: 25 %

18010426   180104027   180104042   180104044

Difficulties:

1. While building this project, we faced some technical issues like the bluetooth driver and its compatibility.

2. We wanted to change the voltages of fans and lights using the sensors. But we couldn't do it . As such, we used two fans with one of them working only if the temperature is low and used two lights with one of them working when there is less light.

3. Since we added many components in the proteus file, we faced some issues with the CPU being overloaded in some cases.

Future Plan:

1. We want to implement SMS and Call-based security using the GSM Module.

2. We also have the plan to create an AI based voice assistance.

Conclusion:

Our voice controlled automated home 'ZEN' will provide a safe, comfortable and environment friendly atmosphere to people. Though this project is currently developed on a small scale, a lot more features can be added in the future to provide more and better facilities to the people. We are hopeful that this project will live up to our expectations.