FINAL PROJECT

TEAM-2

HOME AUTOMATION SYSTEM
(DOMOTIC HOUSE)

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ABSTRACT

The objective of this notebook was to put to application the basics of the design of digital systems on Arduino (open-hardware) that we learnt in the various notebooks.

We learned to connect the Arduino with external input and output peripherals, obtained a higher-level system, learned about sensors, buzzers, LEDs, transistors and the like.

We learned to assemble the basic constituents into a real time application which in this case was a DOMOTECH SYSTEM (HOME AUTOMATION SYSTEM).

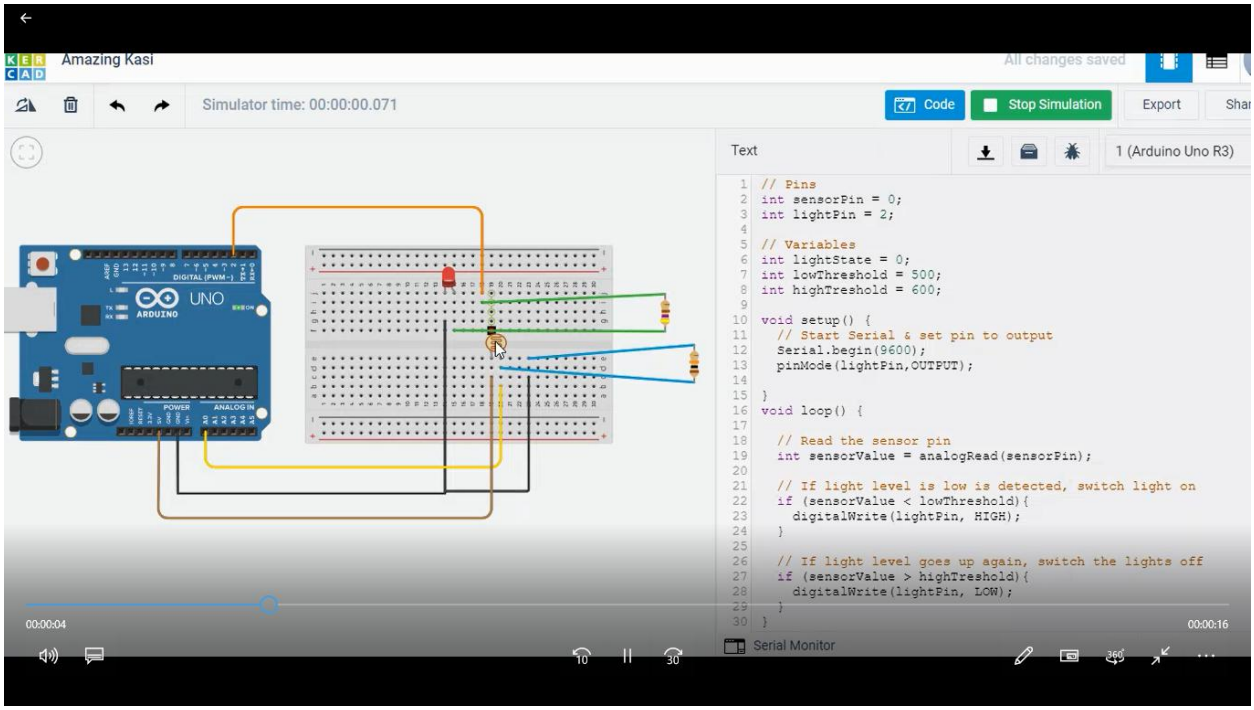
TOOLS WE USED

The programs were supposed to be understood and tested by us. The best way to understand a piece of code is to rewrite it and test it on our own. TINKERCAD simulator was used by our team to test and run the programs. TINKERCAD is an online simulator powered by AUTODESK. Tinkercad is an easy, browser-based 3D design and modelling tool for all. Tinkercad allows users to imagine anything and then design it in minutes.

1. SMART LIGHTNING USING ARDUINO AND PHOTOCELL

In this project, we will show you how to switch a light on or off depending on exterior light levels, with an Arduino board and some components. This will be achieved by using a photocell sensor, which is a basically a light-dependent resistor. In this project, the "light" will be modelled with a LED, and the photocell will be placed next to the Arduino board. But it is easy to imagine that the photocell will for example be placed outside of your home to detect if we are currently during the night or during daytime, and the Arduino will then switch the lights accordingly.

Our Design:



This circuit uses the following components on Tinkercad:

-Arduino

-Breadboard

-LEDs

-Photocells

-Resistances

The code that simulates this is:

```
// Pins
int sensorPin = 0;
int lightPin = 2;

// Variables
int lightState = 0;
int lowThreshold = 500;
int highTreshold = 600;

void setup() {

  // Start Serial & set pin to output
  Serial.begin(9600);
  pinMode(lightPin,OUTPUT);

}

void loop() {

  // Read the sensor pin
  int sensorValue = analogRead(sensorPin);

  // If light level is low is detected, switch light on
  if (sensorValue < lowThreshold){
    digitalWrite(lightPin, HIGH);
  }

  // If light level goes up again, switch the lights off
  if (sensorValue > highTreshold){
    digitalWrite(lightPin, LOW);
  }
}
```

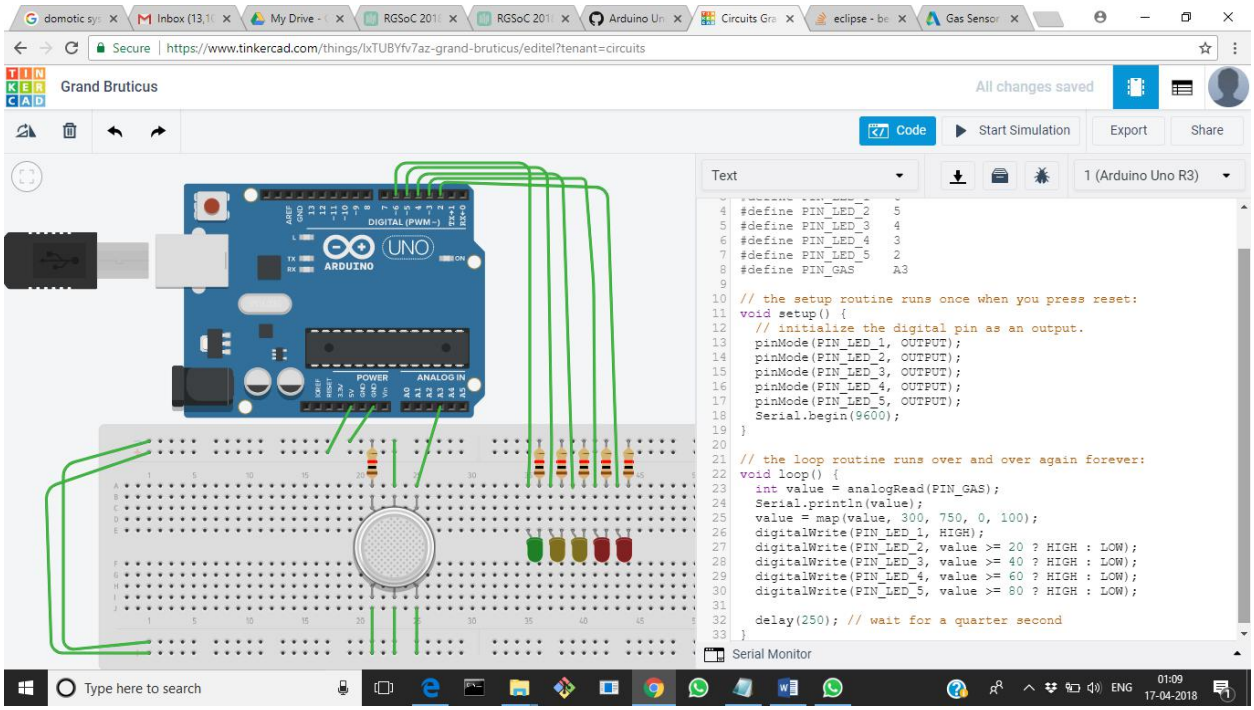
SEE IT WORK

https://drive.google.com/file/d/1_Z7JFgVcTXjR03XKGQZYr5phorF7gVYQ/view?usp=sharing

2. GAS SENSOR ARDUINO SHIELD

In this project, we show how to light different LEDs according to level of gas. In case of high level of gas, all the LEDs light up indicating a possible fire/gas leak in the house.

Our Design:



This circuit uses the following components on Tinkercad:

-Arduino

-Breadboard

-LEDs

-Photocells

-Resistances

The code that simulates this is:

```
// Pin 13 has an LED connected on most Arduino boards.

#define PIN_LED_1     6
#define PIN_LED_2     5
#define PIN_LED_3     4
#define PIN_LED_4     3
#define PIN_LED_5     2
#define PIN_GAS   A3

// the setup routine runs once when you press reset:
void setup() {
   // initialize the digital pin as an output.
   pinMode(PIN_LED_1, OUTPUT);
   pinMode(PIN_LED_2, OUTPUT);
   pinMode(PIN_LED_3, OUTPUT);
   pinMode(PIN_LED_4, OUTPUT);
   pinMode(PIN_LED_5, OUTPUT);
   Serial.begin(9600);
}

// the loop routine runs over and over again forever:
void loop() {
   int value = analogRead(PIN_GAS);
   Serial.println(value);
   value = map(value, 300, 750, 0, 100);
   digitalWrite(PIN_LED_1, HIGH);
   digitalWrite(PIN_LED_2, value >= 20 ? HIGH : LOW);
   digitalWrite(PIN_LED_3, value >= 40 ? HIGH : LOW);
   digitalWrite(PIN_LED_4, value >= 60 ? HIGH : LOW);
   digitalWrite(PIN_LED_5, value >= 80 ? HIGH : LOW);

   delay(250); // wait for a quarter second
}
```

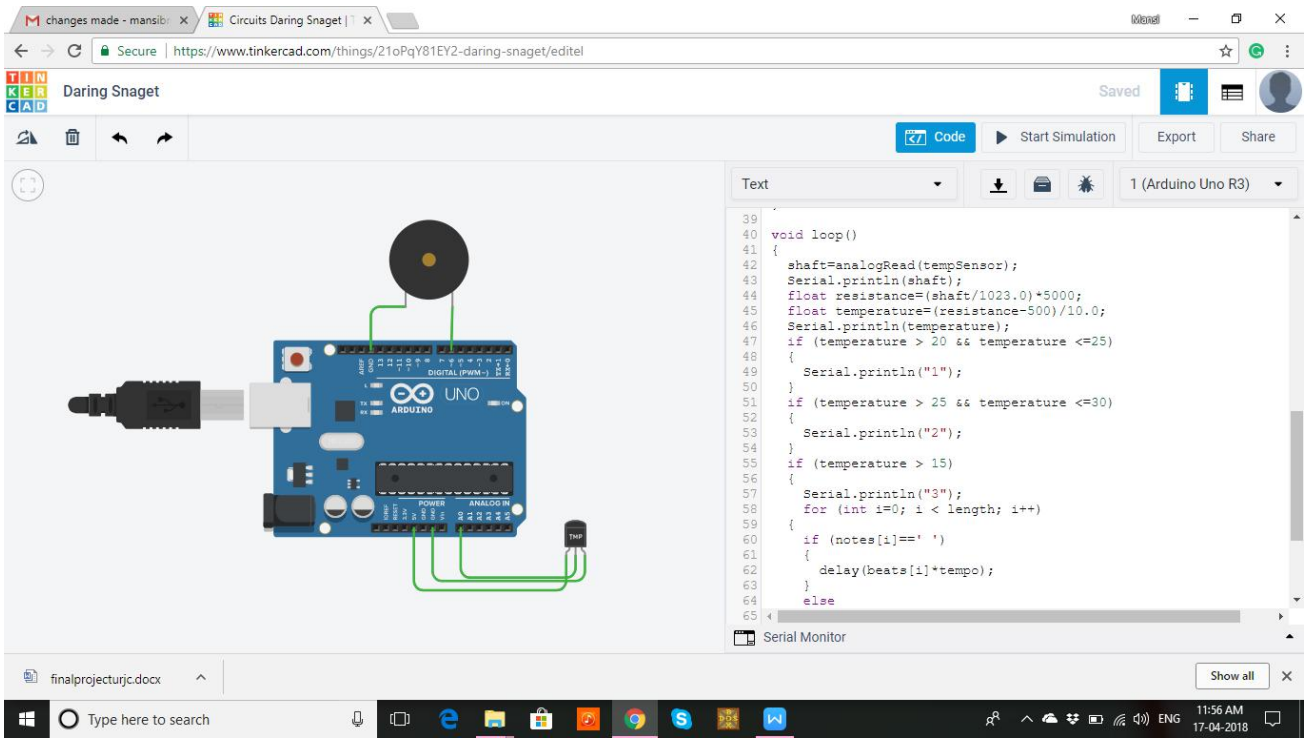
SEE IT WORK

https://drive.google.com/file/d/1T-3menowPzD4Wz8ELypr14Puy9MZKDwX/view?usp=sharing

3. TEMPERATURE SENSOR

In this project, a temperature rise above 45 degree celcius is detected by means of a temperature sensor and indicated by a buzzer.

Our Design:



This circuit uses the following components on Tinkercad:

-Arduino

-Buzzer

- Temp sensor[TMP 36]

-Resistances

The code that simulates this is:

```
int tempSensor=A0;
int buzzpin=6;
```

```
int shaft;
int velocity;
int val=0;
int length=15;
char notes[]= "ccggaagffeeddc";
int beats[]={1,1,1,1,1,1,2,1,1,1,1,1,1,2,4};
int tempo=300;

void playTone(int tones, int duration)
{
   for (long i=0; i < duration*1000; i+=tones*2);
            {
               tone(buzzpin,tones, duration);
            }
}

void playNote(char note, int duration)
            {
               char names[]= {'c', 'd', 'e', 'f', 'g', 'a', 'b', 'C'};
               int tones[]={1915, 1700, 1519, 1432, 1275, 1136, 1014, 956};
               for (int i=0; i < 8; i++)
               {
                  if (names[i]==note)
                  {
                     playTone(tones[i], duration);
                  }
               }
            }

void setup()
{
   Serial.begin(9600);
   pinMode(tempSensor, INPUT);
   pinMode(buzzpin, OUTPUT);
}

void loop()
{
   shaft=analogRead(tempSensor);
   Serial.println(shaft);
   float resistance=(shaft/1023.0)*5000;
```

```
  float temperature=(resistance-500)/10.0;
  Serial.println(temperature);
  if (temperature > 20 && temperature <=25)
  {
    Serial.println("1");
  }
  if (temperature > 25 && temperature <=30)
  {
    Serial.println("2");
  }
  if (temperature > 45)
  {
    Serial.println("3");
      for (int i=0; i < length; i++)
  {
    if (notes[i]==' ')
    {
      delay(beats[i]*tempo);
    }
    else
    {

      playNote(notes[i], beats[i]*tempo);
    }
    delay(tempo/2);
  }
    delay(1000);
  }
  delay(3000);
}
```

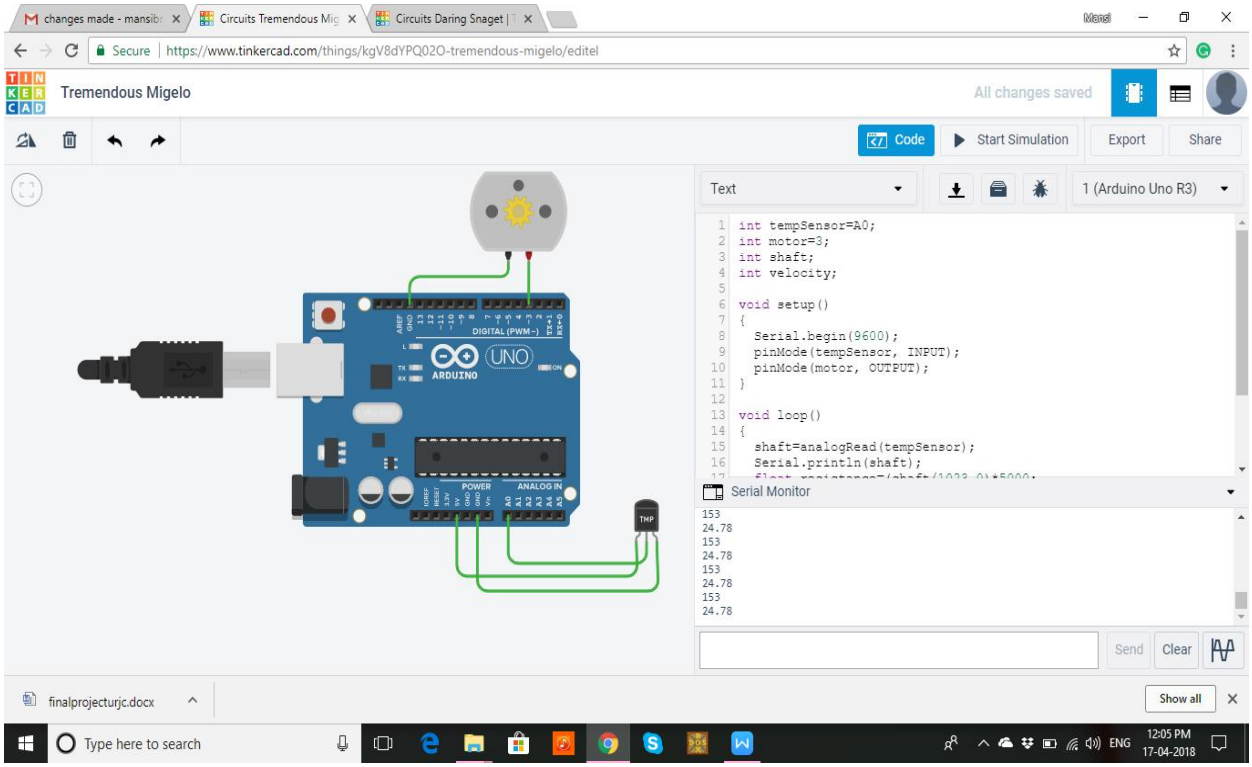
SEE IT WORK

https://www.tinkercad.com/things/21oPqY81EY2-daring-snaget/editel

4. Fan Speed Automation Control

In this project, a temperature sensor is used to detect the current temperature and the speed of the fan is controlled accordingly.

Our Design:



This circuit uses the following components on Tinkercad:

-Arduino

-Buzzer

- Temp sensor[TMP 36]

-Resistances

The code that simulates this is:

```
int tempSensor=A0;
int motor=3;
int shaft;
int velocity;

void setup()
{
   Serial.begin(9600);
   pinMode(tempSensor, INPUT);
   pinMode(motor, OUTPUT);
}

void loop()
{
   shaft=analogRead(tempSensor);
   Serial.println(shaft);
   float resistance=(shaft/1023.0)*5000;
   float temperature=(resistance-500)/10.0;
   Serial.println(temperature);
   velocity=map(shaft, 0, 5, 0, 255);
   analogWrite(motor, velocity);
   delay(1000);
}
```

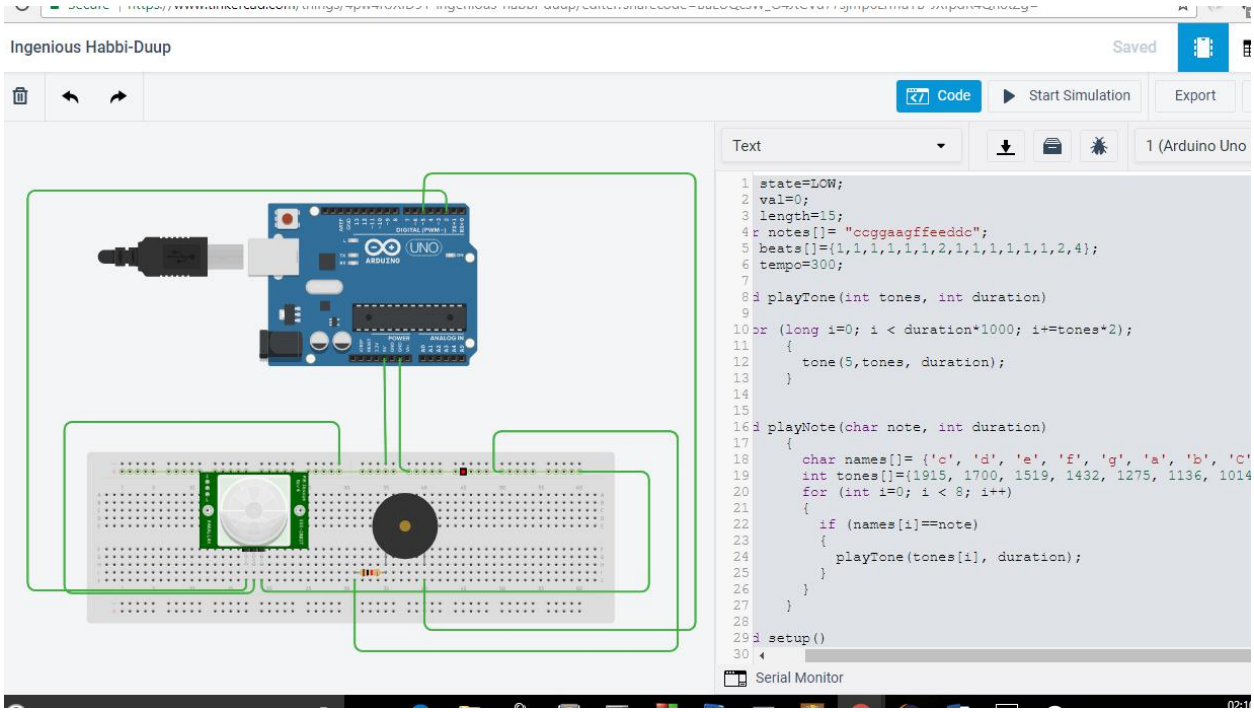
SEE IT WORK

https://www.tinkercad.com/things/kgV8dYPQ02O-tremendous-migelo/editel

5. ANTI THEFT ALARM

This is a circuit that use the PIR or Passive Infrared Sensor to detect motion. Whenever motion is detected an alarm (a series of musical notes) is played by the circuit.

Our Design:



This circuit uses the following components on Tinkercad:

- Arduino
- PIR Sensor
- Piezo
- Resistances

The code that simulates this is:

```
int state=LOW;
int val=0;
int length=15;
char notes[]= "ccggaagffeeddc";
int beats[]={1,1,1,1,1,1,2,1,1,1,1,1,1,2,4};
```

```
int tempo=300;

void playTone(int tones, int duration)
{
   for (long i=0; i < duration*1000; i+=tones*2);
           {
              tone(5,tones, duration);
           }
}

void playNote(char note, int duration)
           {
              char names[]= {'c', 'd', 'e', 'f', 'g', 'a', 'b', 'C'};
              int tones[]={1915, 1700, 1519, 1432, 1275, 1136, 1014, 956};
              for (int i=0; i < 8; i++)
              {
                 if (names[i]==note)
                 {
                    playTone(tones[i], duration);
                 }
              }
           }

void setup()
{
   pinMode(13, OUTPUT);
   pinMode(2, INPUT);
   pinMode(5, OUTPUT);
   Serial.begin(9600);
}

void loop()
{
   val=digitalRead(2);
   Serial.println(val);
   if (val==HIGH)
   {
     digitalWrite(13, HIGH);
       delay(150);
       if (state==LOW)
       {
```

```
        for (int i=0; i < length; i++)
   {
      if (notes[i]==' ')
      {
         delay(beats[i]*tempo);
      }
      else
      {

         playNote(notes[i], beats[i]*tempo);
      }
      delay(tempo/2);
   }
         Serial.println("Motion detected");
         state=HIGH;
     delay(1000);
      }
   }
   else
   {
      digitalWrite(13, LOW);
      delay(150);
      if (state==HIGH)
      {
         Serial.println("Motion Ended");
         state=LOW;
      }
   }
}
```

SEE IT WORK

https://drive.google.com/file/d/1RZNjYHxkAXHS9cUjrnCNDt9wUz0zxgzp/view?usp=sharing

TIME DEVOTED BY EACH GROUP MEMBER

Mansi Breja: 5 hours

Sarthak Tandon: 5 hours

CONCLUSION

The assigned task of designing a DomoTech System gave us an opportunity to go beyond our way and increase our familiarisation with the in depth functionality of Arduino circuitry using simulators like Tinkercad. The team developed a deeper understanding of making circuits using Arduino components and controlling them.

The document provided to us was very informative, and it guided us wonderfully throughout the project completion. Our professor, Dr. Pinaki Chakraborty helped us in all possible ways and guided us throughout.

Our basic knowledge of the programming languages of C/C++ also helped us in accomplishing this task and in due course, we only learned both electronics and programming better!