



# SHEET (2)

Embedded Systems

Q1:

Develop an embedded system connected to 8 bit dip-switches. The system produce a pulse of duration equal to the supplied 8 bit value (0→255) multiplied by 4.

```
{
  for (int i =0; i<9;i++)
    pinMode(2+i , INPUT);
    pinMode(13,OUTPUT);
}

void loop()
{
  int arr [8];
  int value = 0 ;

  for (int i = 0; i<9,i++)
    arr[i] = digitalRead(2+i);

  for (i = 0; i<9;i++)
  {
    int value += arr[i] * pow(2,i);
  }

  digitalWrite(13,HIGH);
  delay(4*value);
  digitalWrite(13,LOW);
}
```

Q2:

Develop an embedded system that produces continuous pulses with duration of X seconds and duty cycle of 50%. X could take values between (1 and 10 second). Use two push-button switches to increase or decrease the pulse speed.

S2-Q2 | Arduino 1.8.15

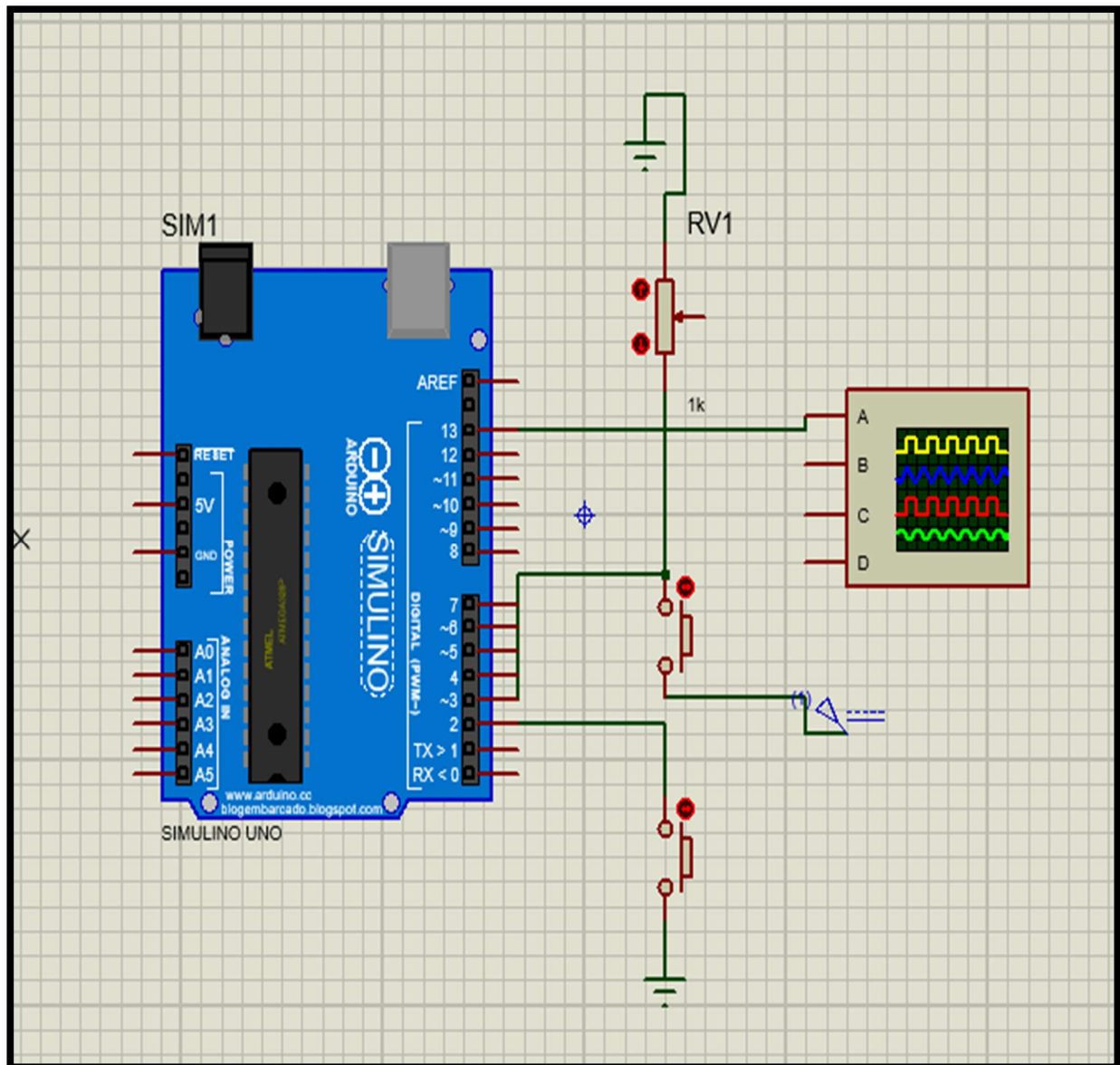
File Edit Sketch Tools Help



S2-Q2 \$

```
#define inc 3
#define dec 2
#define sig 13
int x = 1;
void decX ()
{
    if (x>1)
        x--;
}
void incX ()
{
    if (x<10)
        x++;
}
void setup()
{
    pinMode(sig, OUTPUT);
    pinMode(inc, INPUT);
    pinMode(dec, INPUT);
    digitalWrite(dec, HIGH);
    attachInterrupt(0, decX, FALLING);
    attachInterrupt(1, incX, RISING);
    interrupts();
}

void loop()
{
    digitalWrite(sig, HIGH);
    delay(x*1000/2);
    digitalWrite(sig, LOW);
    delay(x*1000/2);
}
```

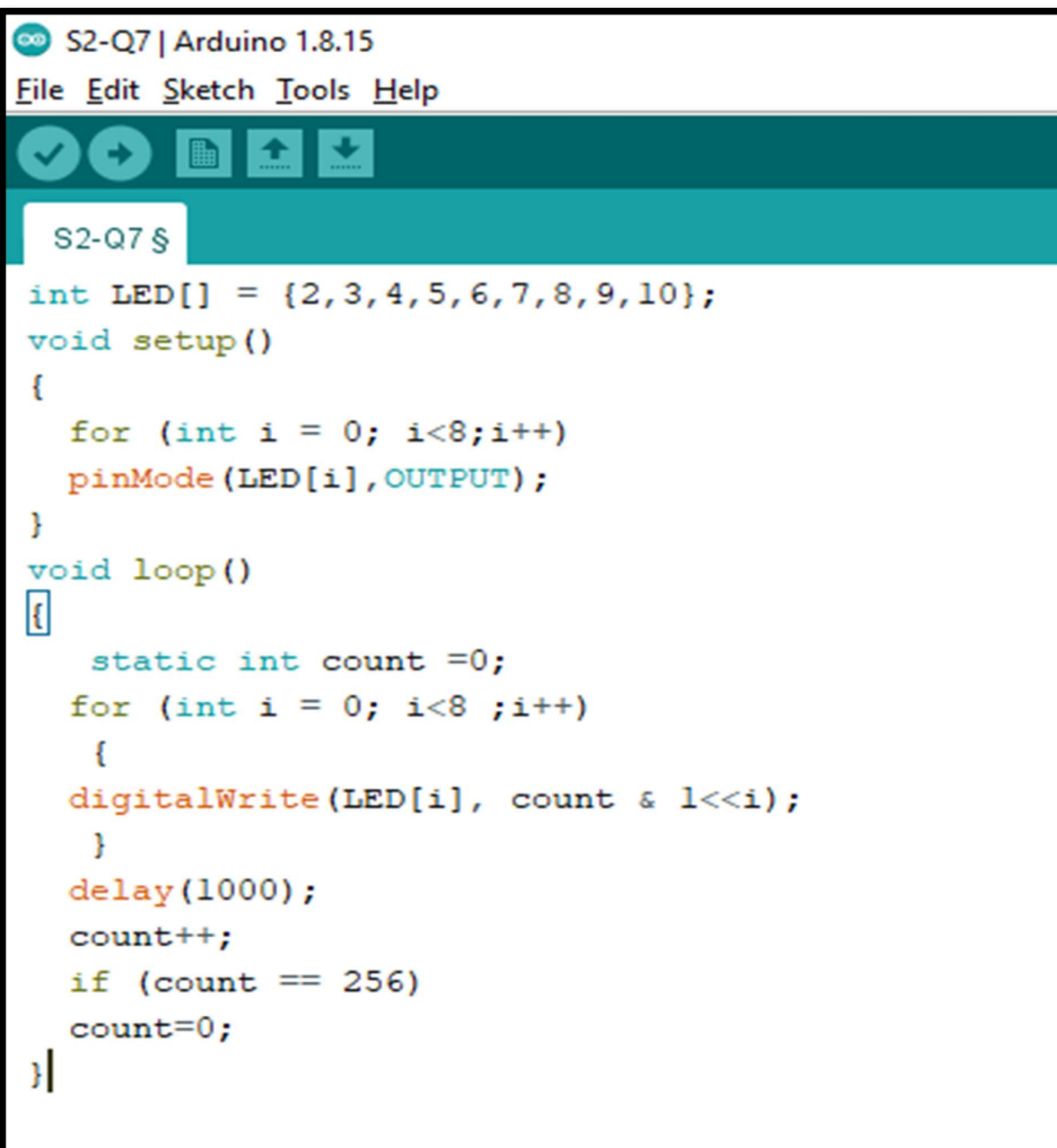


M7d4 y2ol le 7atet pot. Fel pull down resistor msh resistance 3adya 34an mafe4 sbb.

Q3:

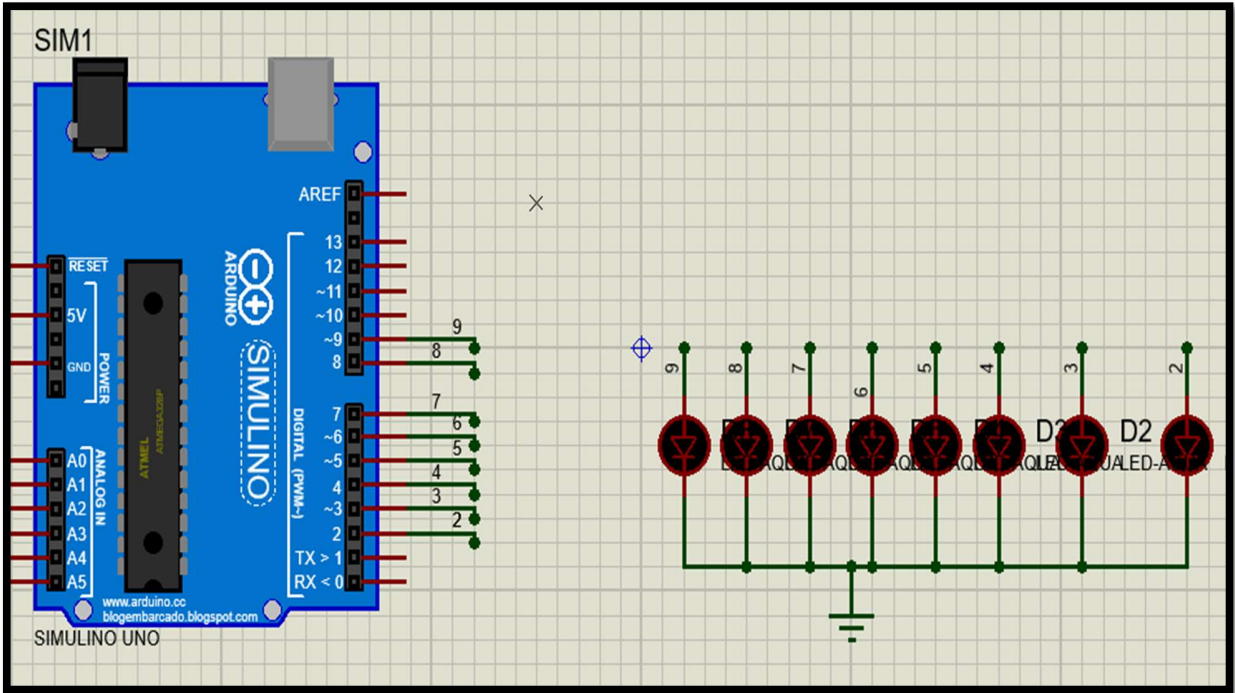
Develop an embedded system that produce an 8 bit binary value that count from 0 to 255. Each count should last 1 second.

Solve this problem without and with timers.



The screenshot shows the Arduino IDE interface with the title bar "S2-Q7 | Arduino 1.8.15". The menu bar includes "File", "Edit", "Sketch", "Tools", and "Help". Below the menu bar is a toolbar with icons for checking, running, saving, and uploading. The sketch editor shows a file named "S2-Q7.S" containing the following code:

```
int LED[] = {2,3,4,5,6,7,8,9,10};
void setup()
{
  for (int i = 0; i<8;i++)
    pinMode(LED[i],OUTPUT);
}
void loop()
{
  static int count =0;
  for (int i = 0; i<8 ;i++)
  {
    digitalWrite(LED[i], count & 1<<i);
  }
  delay(1000);
  count++;
  if (count == 256)
    count=0;
}
```



Q4:

Develop an embedded system that read 6 analog inputs and produce a pulse with duration equals to the read value. Use one push-button to switch between different inputs.

∞ S2-Q4 | Arduino 1.8.15

File Edit Sketch Tools Help

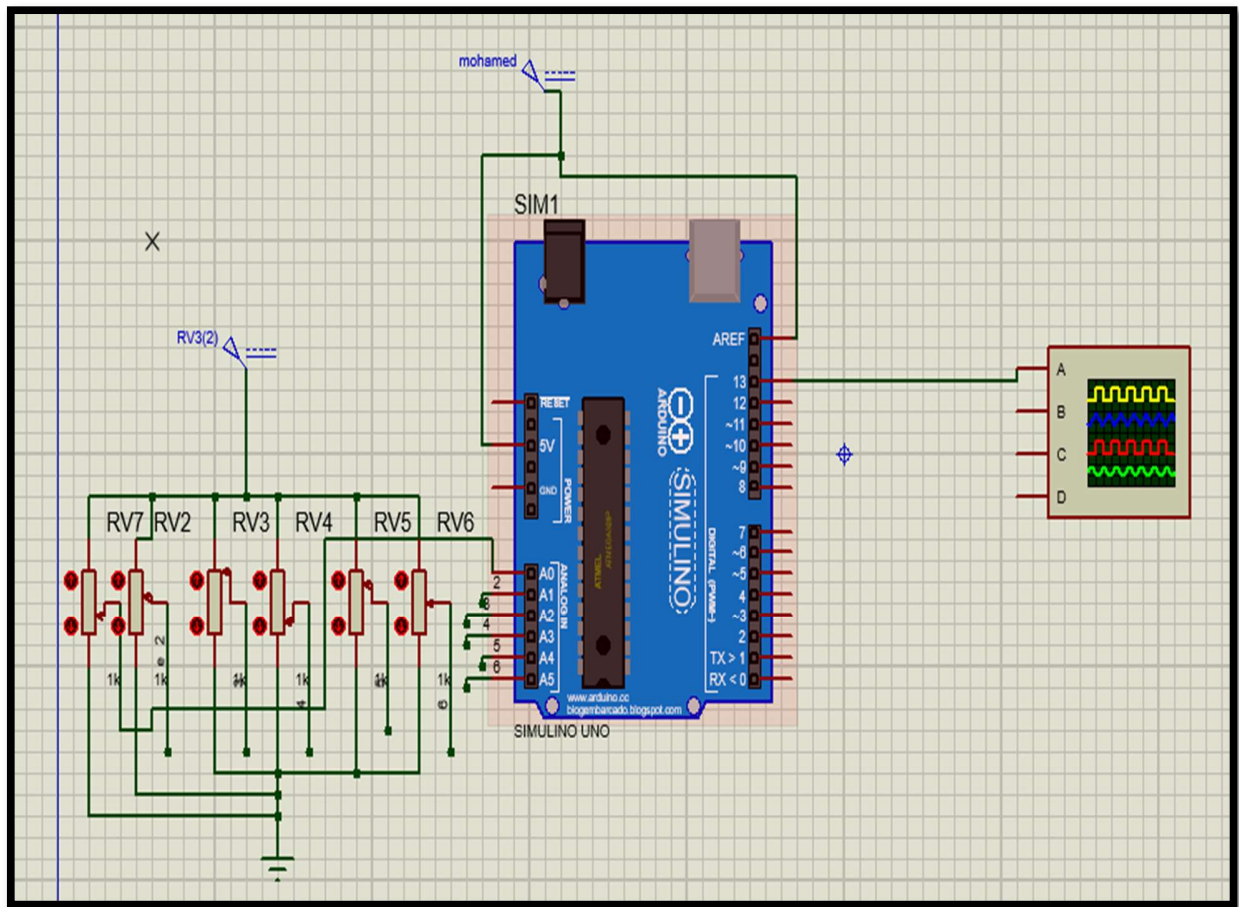


S2-Q4 §

```
#define button 2
#define sig 13
int variableRead;
void change()
{ static int i =0;
  variableRead = analogRead(i);
  i++;
  if (i>5)
    i = 0; }
void setup()
{
  analogReference(EXTERNAL);
  pinMode(sig,OUTPUT);
  pinMode(button,INPUT);
  digitalWrite(button,HIGH);
  attachInterrupt(0,change,FALLING);
  interrupts();
}
void loop()
{
  digitalWrite(sig,HIGH);  delay(variableRead/2);

  digitalWrite(sig,LOW);   delay(variableRead/2);
}
```





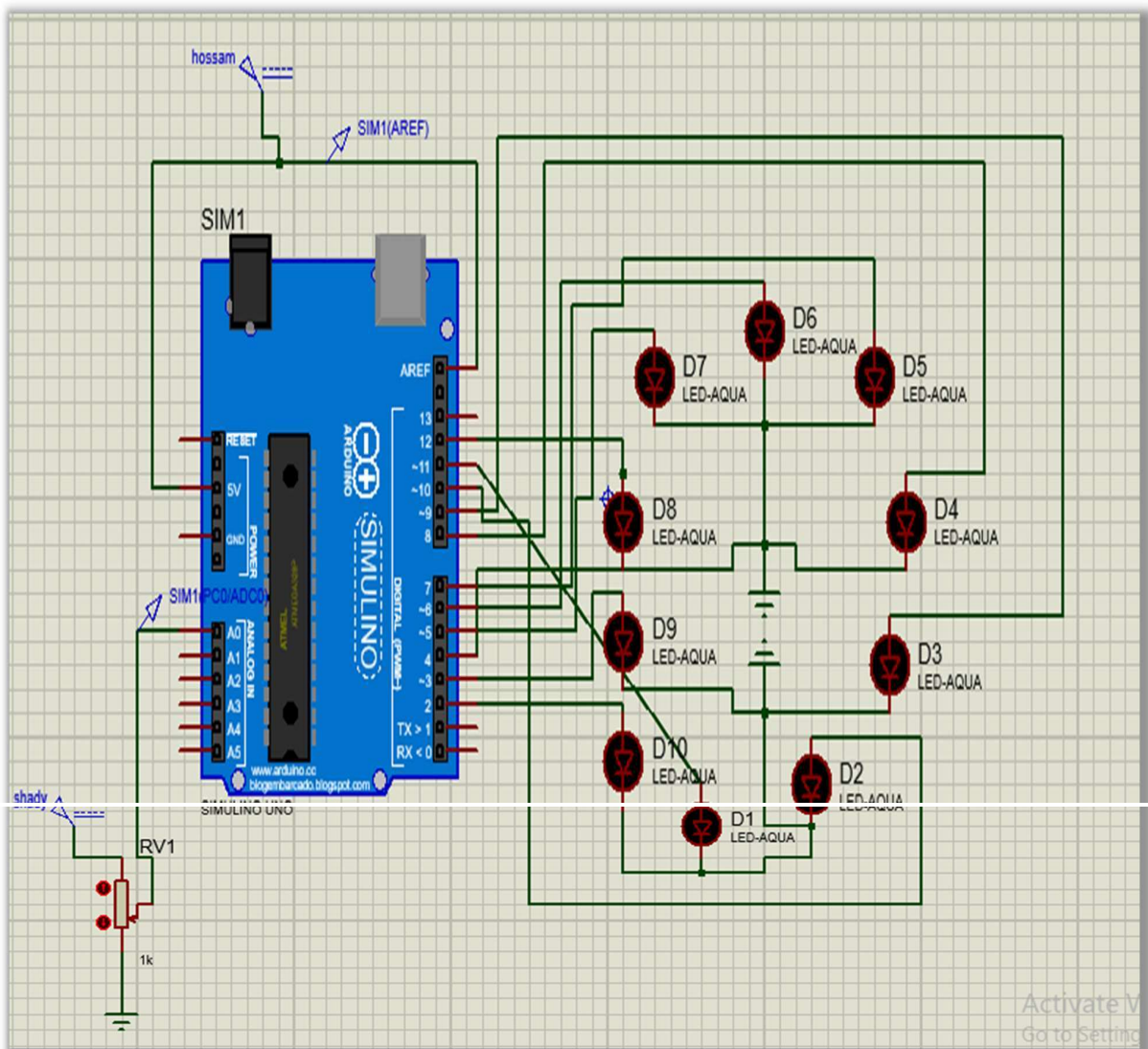


Q5:

Develop an embedded system that read analog input and produce a rotating light with speed relative to the read value. Rotating light can be made by arranging 10 LEDs in a circle.

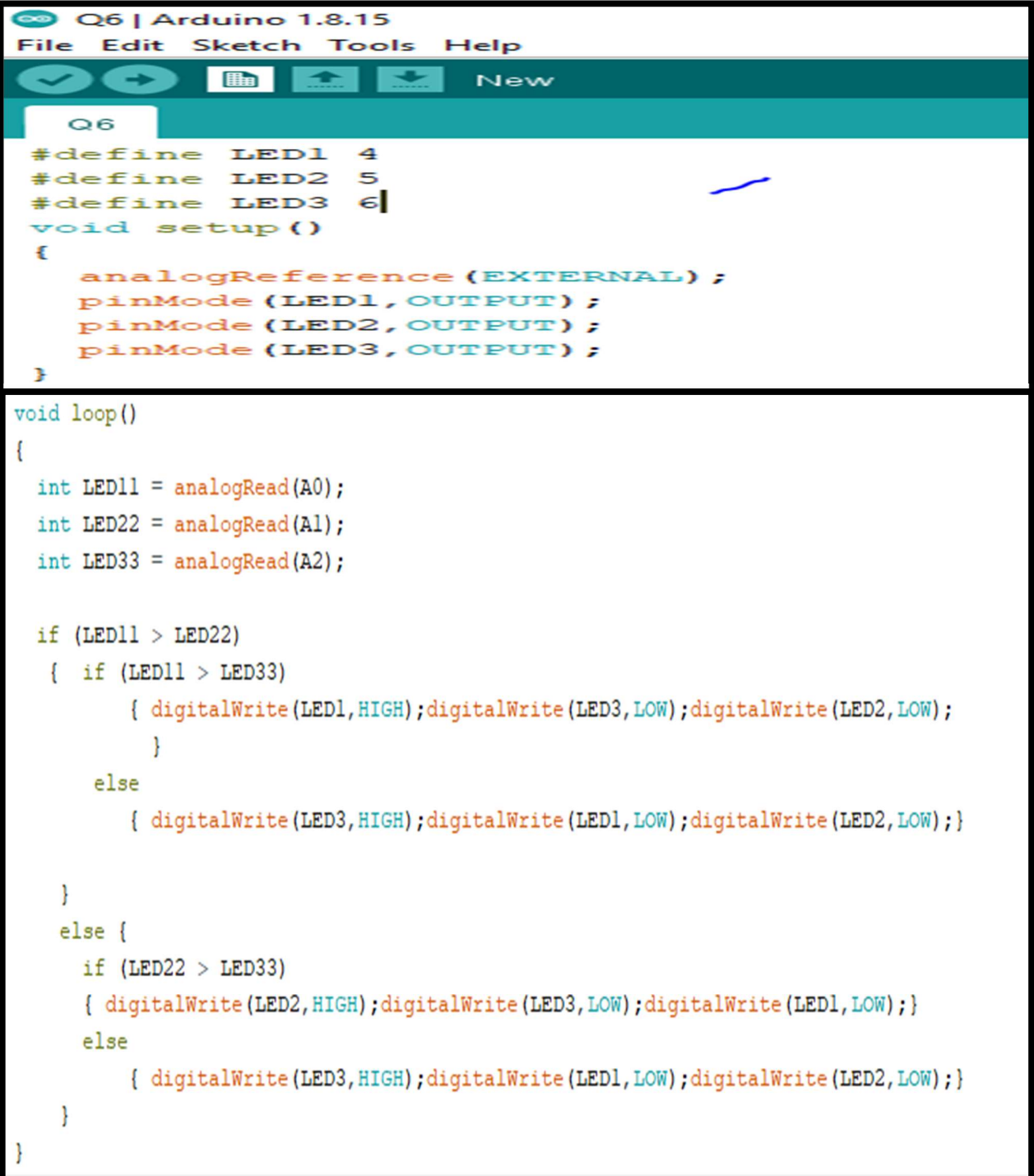
```
void setup()
{
  for (int i = 2; i<12; i++)
    pinMode(i, OUTPUT);

    analogReference(EXTERNAL);
}
void loop()
{
  for(int i=2;i<12;i++)
  {
    int x=analogRead(0);
    digitalWrite(i,HIGH);
    delay(1023-x);
    digitalWrite(i,LOW);
  }
}
```



Q6:

Develop an embedded system that read 3 analog inputs and light up one of three LEDs to show up which one is the largest input.

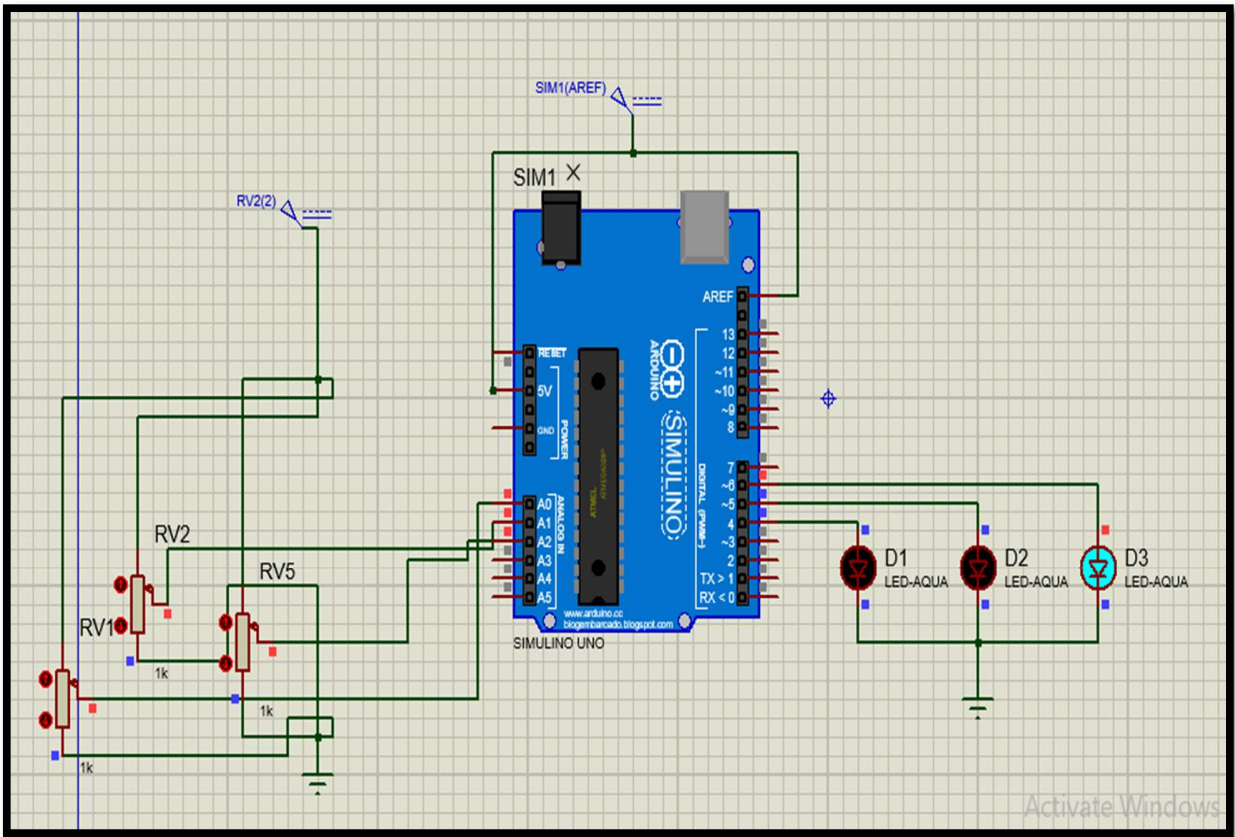


```
Q6 | Arduino 1.8.15
File Edit Sketch Tools Help

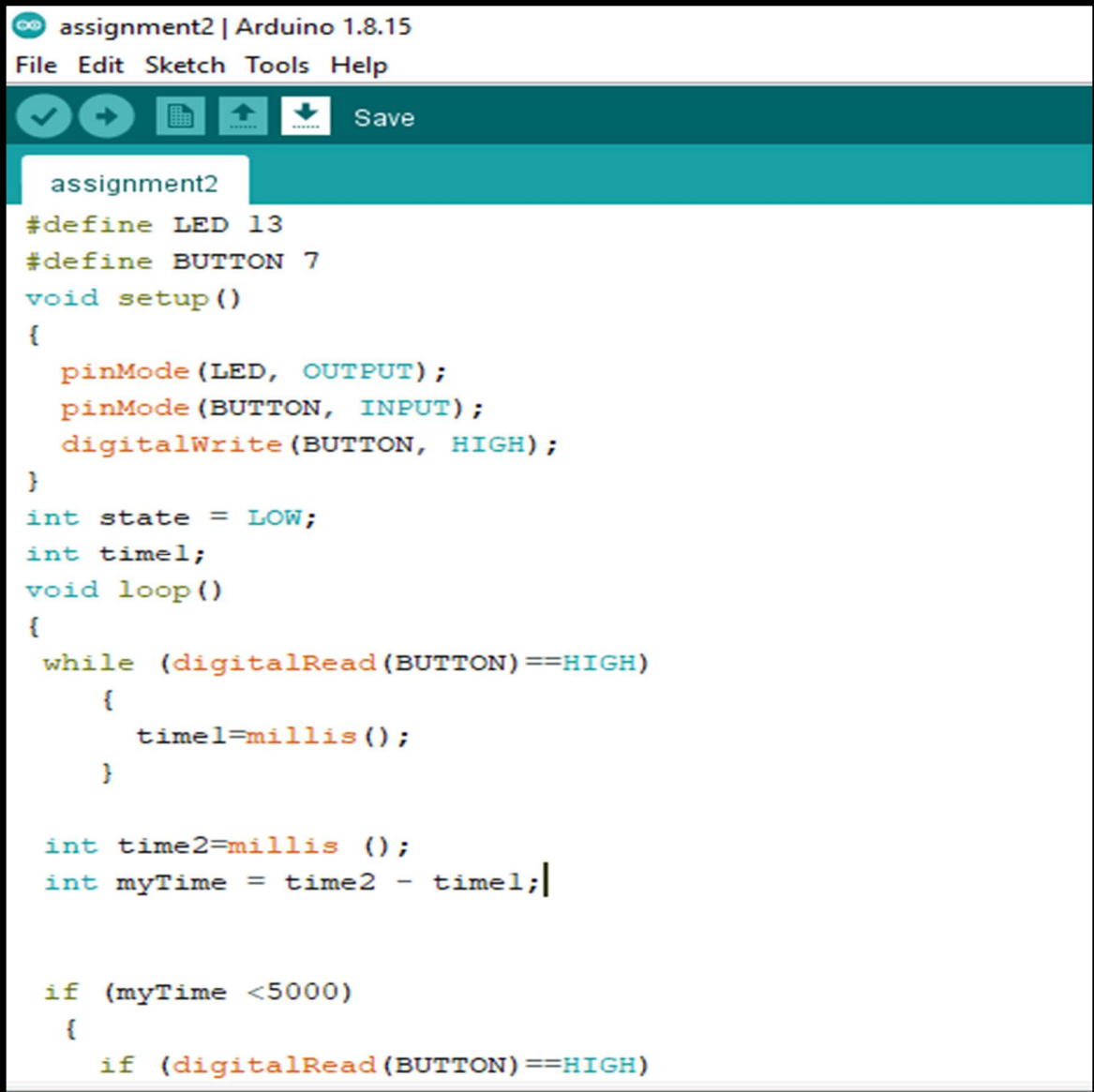
Q6
#define LED1 4
#define LED2 5
#define LED3 6
void setup()
{
    analogReference(EXTERNAL);
    pinMode(LED1, OUTPUT);
    pinMode(LED2, OUTPUT);
    pinMode(LED3, OUTPUT);
}

void loop()
{
    int LED11 = analogRead(A0);
    int LED22 = analogRead(A1);
    int LED33 = analogRead(A2);

    if (LED11 > LED22)
    {
        if (LED11 > LED33)
        {
            digitalWrite(LED1, HIGH); digitalWrite(LED3, LOW); digitalWrite(LED2, LOW);
        }
        else
        {
            digitalWrite(LED3, HIGH); digitalWrite(LED1, LOW); digitalWrite(LED2, LOW);
        }
    }
    else {
        if (LED22 > LED33)
        {
            digitalWrite(LED2, HIGH); digitalWrite(LED3, LOW); digitalWrite(LED1, LOW);
        }
        else
        {
            digitalWrite(LED3, HIGH); digitalWrite(LED1, LOW); digitalWrite(LED2, LOW);
        }
    }
}
```



Develop an embedded system that uses one push-button and a LED. If the user makes a normal press to the push-button the LED state is toggled between on and off. If the user makes a long press for 5 seconds or more, the LED starts to blink or stops based on the previous state.



```
assignment2 | Arduino 1.8.15
File Edit Sketch Tools Help

assignment2
#define LED 13
#define BUTTON 7
void setup()
{
    pinMode(LED, OUTPUT);
    pinMode(BUTTON, INPUT);
    digitalWrite(BUTTON, HIGH);
}
int state = LOW;
int timel;
void loop()
{
    while (digitalRead(BUTTON) == HIGH)
    {
        timel = millis();
    }

    int time2 = millis();
    int myTime = time2 - timel;

    if (myTime < 5000)
    {
        if (digitalRead(BUTTON) == HIGH)
```

assignment2 \$

```
if (myTime <5000)
{
    if (digitalRead(BUTTON)==HIGH)
    {
        state = (state==LOW)?HIGH:LOW;
        digitalWrite(LED, state);
    }
}
else
{ if (state ==HIGH)
  {
      digitalWrite(LED, LOW);
  }
  else
  {
      while (digitalRead(BUTTON)==LOW)
      {
          digitalWrite(LED, HIGH);
          delay(500);
          digitalWrite(LED, LOW);
          delay(500);
      }
  }
}
```

