VISVESVARAYA TECHNOLOGICAL UNIVERSITY

"Jnana Sangama", Belgaum -590014, Karnataka.

LAB REPORT
On

INTERNET OF THINGS

Submitted by

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in partial fulfillment for the award of the degree of
BACHELOR OF ENGINEERING
in
COMPUTER SCIENCE AND ENGINEERING

B.M.S. COLLEGE OF ENGINEERING
(Autonomous Institution under VTU)
BENGALURU-560019
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B. M. S. College of Engineering,

Bull Temple Road, Bangalore 560019

(Affiliated To Visvesvaraya Technological University, Belgaum)

Department of Computer Science and Engineering

CERTIFICATE

This is to certify that the Lab work entitled **“Internet Of Things”** carried out by **RAKESH JADHAV(1BM20CS122)**, who is Bonafede student of **B. M. S. College of Engineering**. It is in partial fulfillment for the award of **Bachelor of Engineering in Computer Science and Engineering** of the Visvesvaraya Technological University, Belgaum during the year 2022-23. The Lab report has been approved as it satisfies the academic requirements in respect of a **Internet Of Things- (20CS5PEIOT)** work prescribed for the said degree.

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Program no: **01** Program Title: **LED BLINK**

Aim: To control the LED using arduino (to turn ON/OFF LED)

Components Required :

Arduino Uno board - 1

USB Cable - 1

LED - 1

Jumper wires

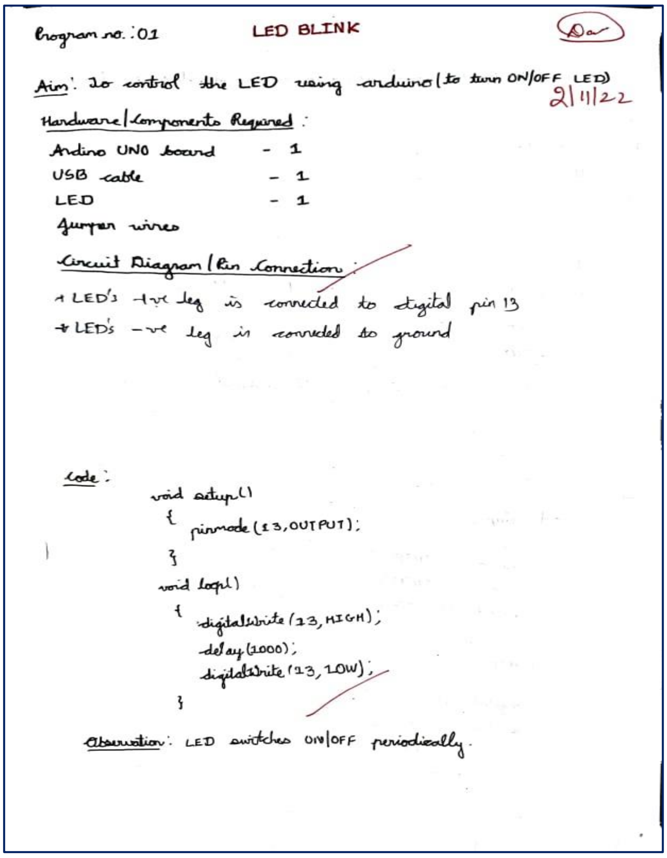
Pin connection :

- LED's positive leg is connected to digital pin 13
- LED's negative leg is connected to ground

Code :

```
void setup()
{
        pinMode(13, OUTPUT);
}
void loop()
{
        digitalWrite(13, HIGH);
        delay(1000);
        digitalWrite(13, LOW);
}
```

Handwritten code:



Program no. : 01 LED BLINK

Aim: To control the LED using arduino (to turn ON/OFF LED)

2|11|22

Hardware/Components Required :

Ardino UNO board	- 1
USB cable	- 1
LED	- 1
Jumper wires	

Circuit Diagram / Pin Connection :

- LED's +ve leg is connected to digital pin 13
- LED's -ve leg is connected to ground

code :

```
void setup()
  {
    pinmode(13,OUTPUT);
  }
void loop()
  {
    digitalwrite(13,HIGH);
    delay(1000);
    digitalwrite(13,LOW);
  }
```

Observation: LED switches ON/OFF periodically.

Observation: LED switches ON/OFF periodically. Digital output visualization using Arduino Uno.

Program no: **02** Program Title: **TRAFFIC SIGNAL**

Aim : To simulate traffic signal scenario using an arduino UNO board

Components Required :

Arduino Uno board - 1

USB Cable - 1

LED - 3

Jumper wires

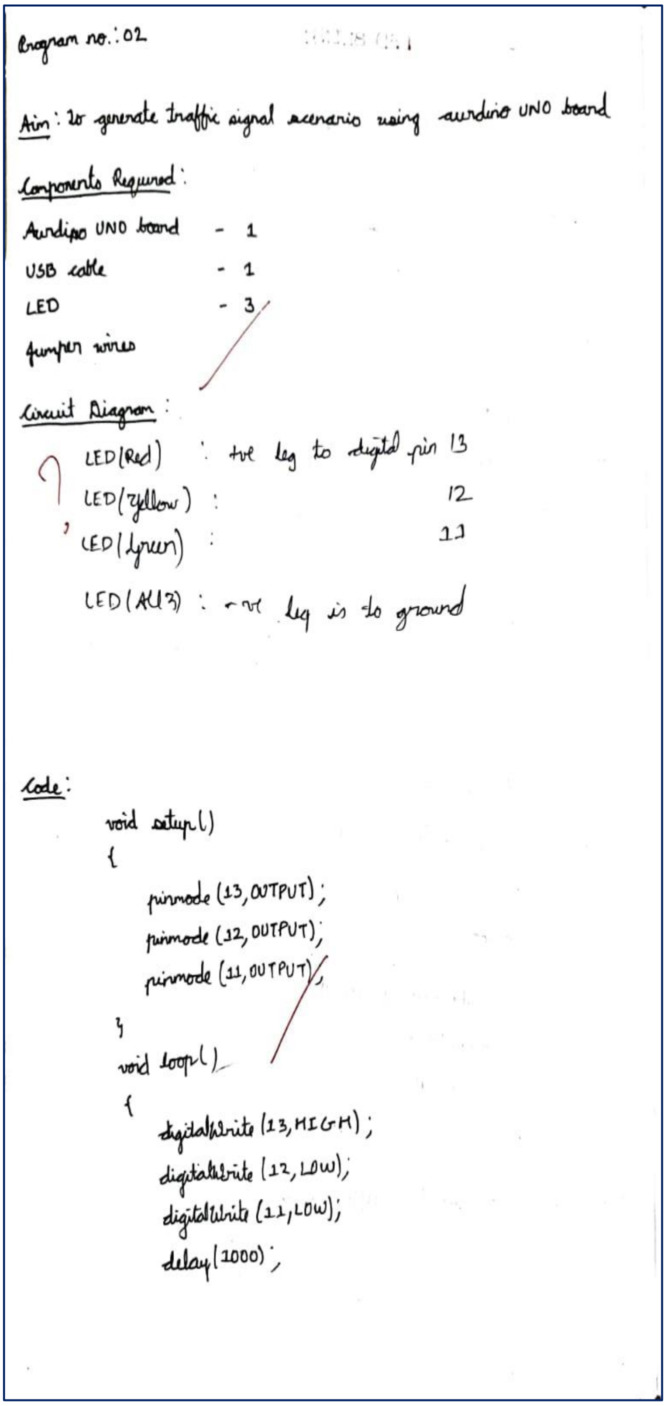
Pin Connections :

- LED(RED) positive pin to digital pin 13
- LED(Yellow) positive pin to digital pin 14
- LED(Green) positive pin to digital pin 15
- LED(ALL) negative pin to Ground

Code :

```
void setup()
{
        pinMode(13, OUTPUT);
        pinMode(12,OUTPUT);
        pinMode(11,OUTPUT);
}
void loop()
{
        digitalWrite(13, HIGH);
        digitalWrite(12, LOW);
        digitalWrite(11, LOW);
        delay(1000);

        digitalWrite(13, LOW);
        digitalWrite(12, HIGH);
        digitalWrite(11, LOW);
        delay(1000);

        digitalWrite(13, LOW);
        digitalWrite(12, LOW);
        digitalWrite(11, HIGH);
        delay(1000);
}
```

Handwritten code :



Program no.: 02

Aim: To generate traffic signal scenario using aurdino UNO board

Components Required:

Aurdino UNO board	-	1
USB cable	-	1
LED	-	3
Jumper wires		

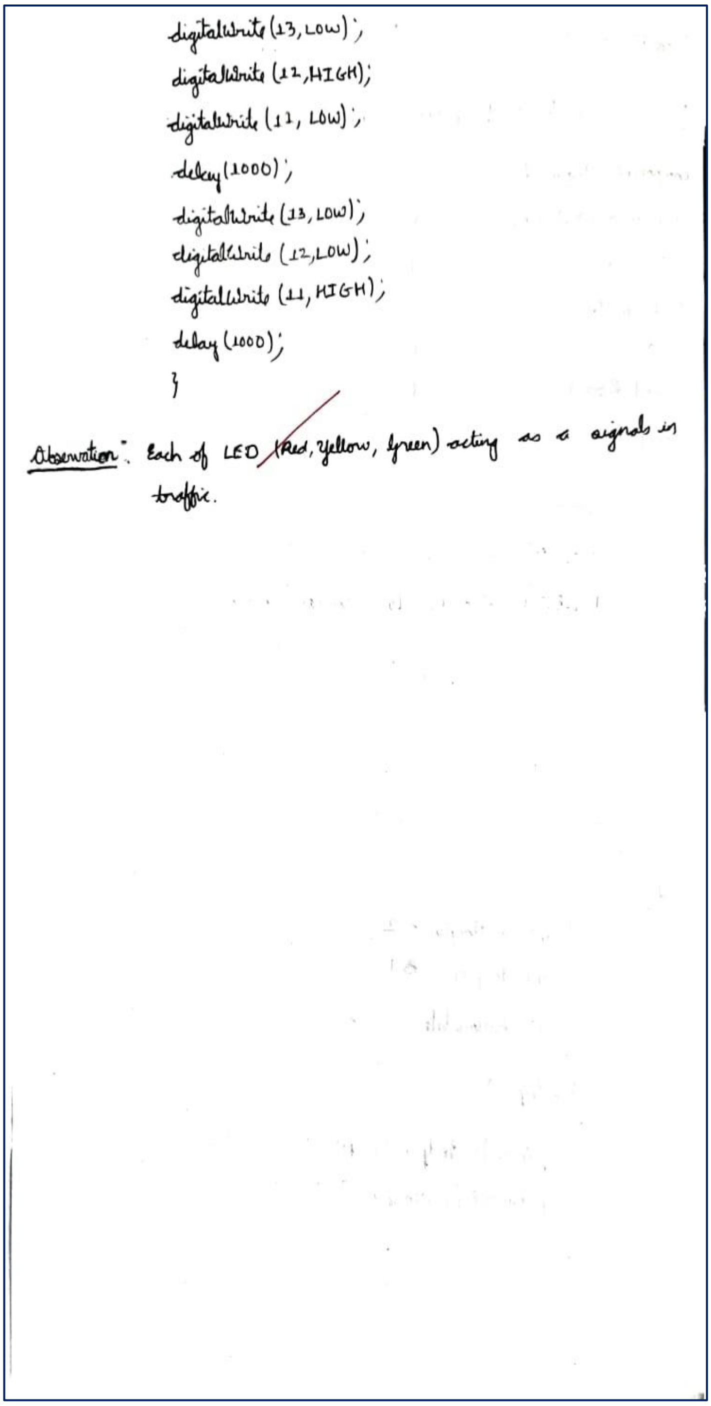
Circuit Diagram:

LED(Red) : +ve leg to digital pin 13
LED(Yellow) : 12
LED(Green) : 11

LED(All3) : -ve leg is to ground

Code:

```
void setup()
{
    pinmode(13,OUTPUT);
    pinmode(12,OUTPUT);
    pinmode(11,OUTPUT);
}
void loop()
{
    digitalWrite(13,HIGH);
    digitalWrite(12,LOW);
    digitalWrite(11,LOW);
    delay(1000);
```



```
    digitalWrite(13,LOW);
    digitalWrite(12,HIGH);
    digitalWrite(11, LOW);
    delay(1000);
    digitalWrite(13,LOW);
    digitalWrite(12,LOW);
    digitalWrite(11,HIGH);
    delay(1000);
}
```

Observation: Each of LED (Red, Yellow, Green) acting as a signals in traffic.

Observation: Each of the LEDs switch ON/OFF periodically.

Program no: **03** Program Title: **PUSH BUTTON**

Aim : To simulate LED blink using digital input.

Components Required :

Arduino Uno board - 1

USB Cable - 1

Breadboard - 1

Push Button - 1

LED - 1

Jumper wires

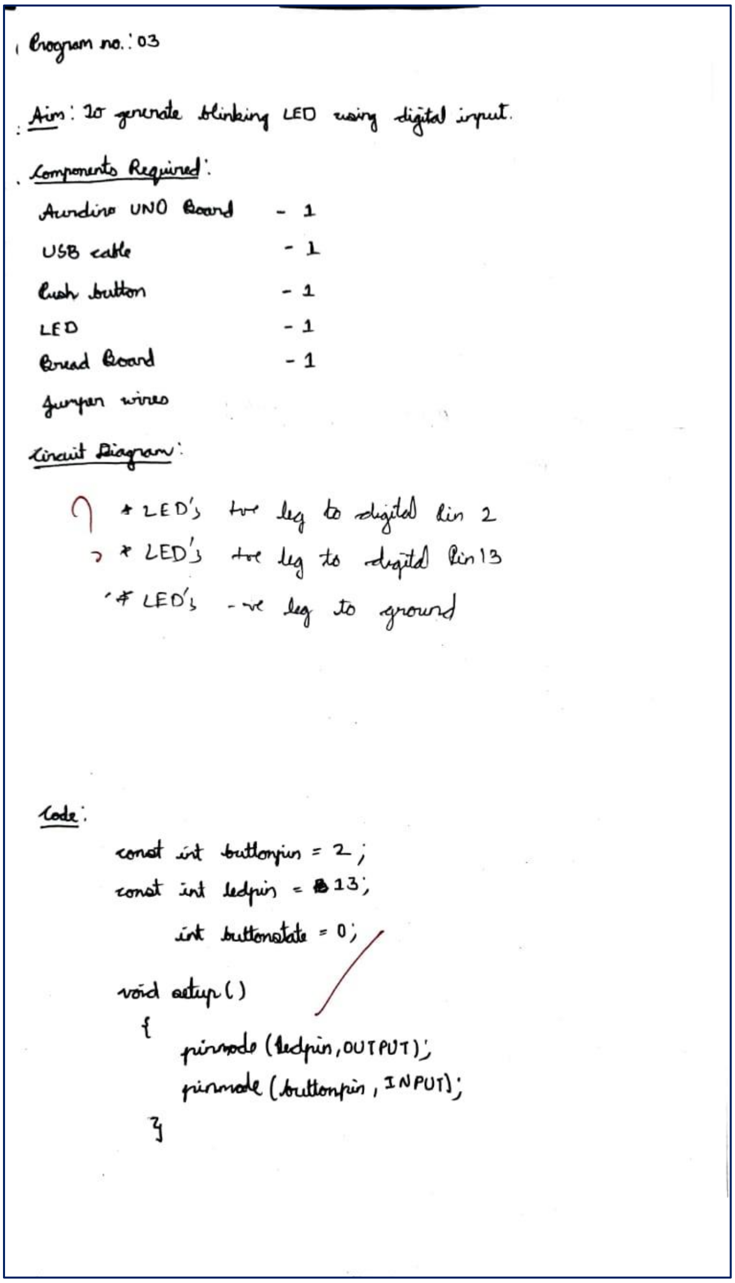
Pin Connections :

- LED positive pin to digital pin 2
- LED positive pin to digital pin 13
- LED negative pin to Ground

Code :

```
int pushButtonPin = 2;
int ledPin = 13;
void setup()
{
        pinMode(pushButtonPin,INPUT);
         pinMode(ledPin,OUTPUT);
}
void loop()
{
        int pushButtonState = digitalRead(pushButtonPin);
        if (pushButtonState == 1)
        {
                digitalWrite(ledPin, HIGH);
        }
        else
        {
                digitalWrite(ledPin, LOW);
        }
}
```

Handwritten code :



Program no.: 03

Aim: To generate blinking LED using digital input.

Components Required:

Aurdino UNO Board	- 1
USB cable	- 1
Push button	- 1
LED	- 1
Bread Board	- 1
Jumper wires	

Circuit Diagram:

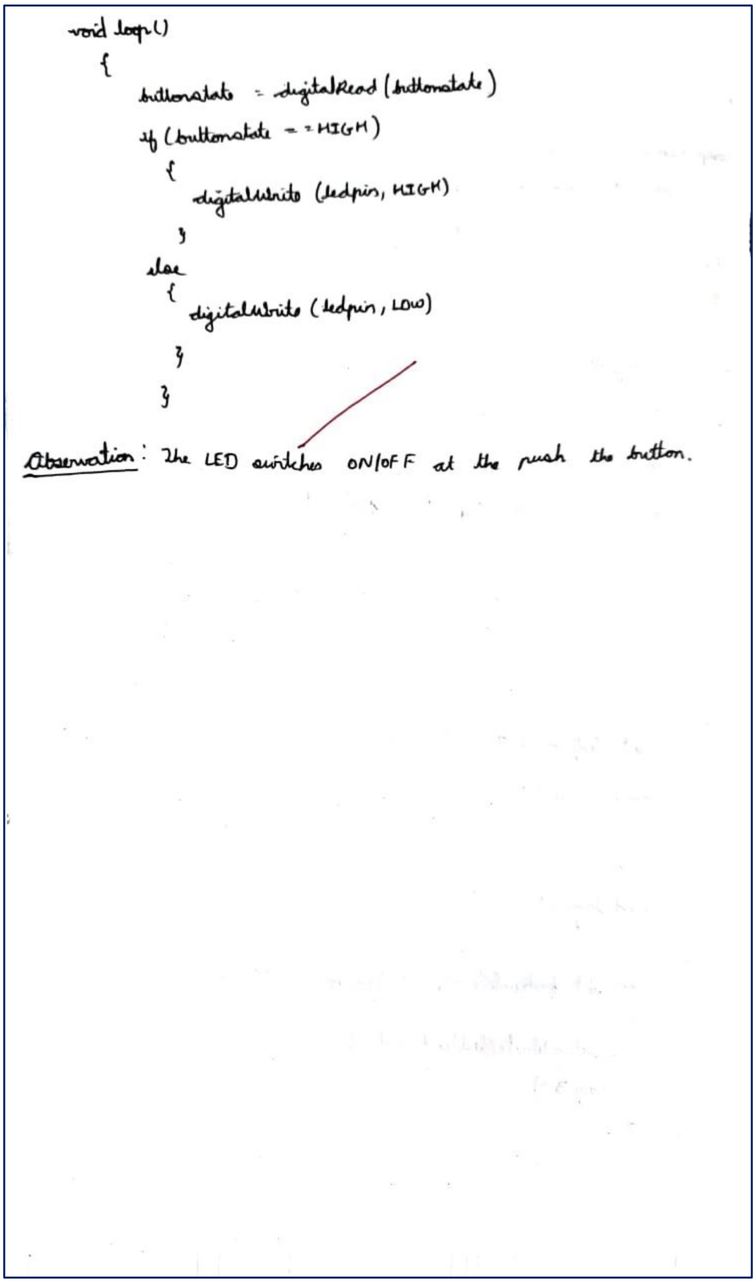
* LED's +ve leg to digital Pin 2

* LED's +ve leg to digital Pin13

* LED's -ve leg to ground

Code:

```
const int buttonpin = 2 ;
const int ledpin = 13;
      int buttonstate = 0;

void setup()
  {
      pinmode(ledpin,OUTPUT);
      pinmode(buttonpin, INPUT);
  }
```



```
void loop()
  {
      buttonstate = digitalRead(buttonstate)
      if (buttonstate = = HIGH)
        {
          digitalWrite (ledpin, HIGH)
        }
      else
        {
          digitalWrite (ledpin, LOW)
        }
      }
```

Observation: The LED switches ON/OFF at the push the button.

Observation: The LED switches ON/OFF periodically when input is given through the push button.

Program no: **04** Program Title: **LED FADE**

Aim : To demonstrate analog output with fading LED

Components Required :

Arduino Uno board - 1

USB Cable - 1

LED - 1

Jumper wires

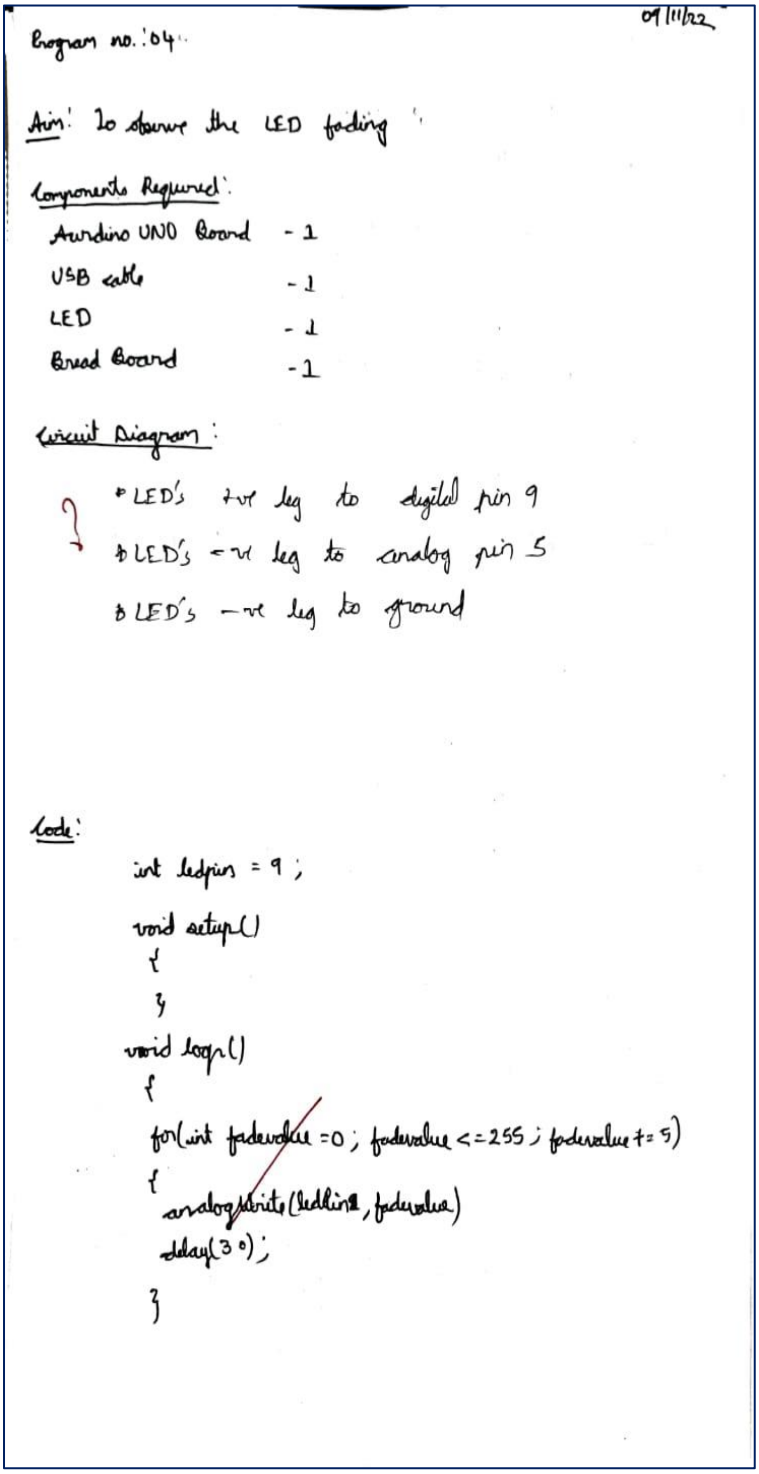
Pin Connections :

- LED positive pin to digital pin 9
- LED negative pin to analog pin 5
- LED negative pin to Ground

Code :

```
const int LedPin = 9;
void setup()
{
        pinMode(LedPin, OUTPUT);
}
void loop()
{
        for(int fade value = 0; fade value <= 255; fade value += 255)
        {
                analogWrite(LedPin, fade value);
                delay(330);
        }
        for(int fade value = 255; fade value <= 0; fade value -= 255)
        {
                analogWrite(LedPin, fade value);
                delay(330);
        }
}
```

Handwritten code :



09/11/22

Program no.:04

Aim: To observe the LED fading

Components Required:

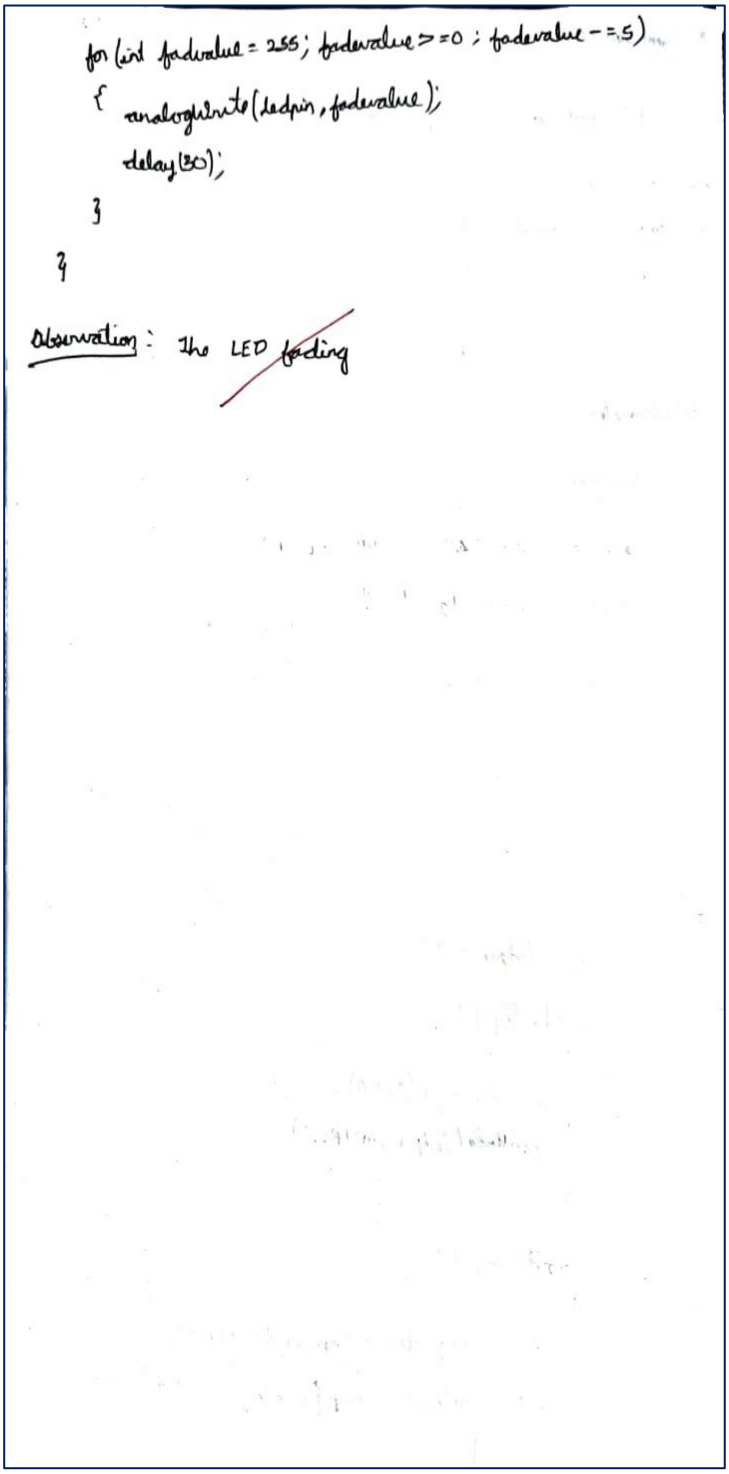
Aurdino UNO Board	- 1
USB cable	- 1
LED	- 1
Bread Board	- 1

Circuit Diagram:

- LED's +ve leg to digital pin 9
- LED's -ve leg to analog pin 5
- LED's -ve leg to ground

Code:

```
int ledpin = 9;
void setup()
 {
 }
void loop()
 {
  for(int fadevalue =0; fadevalue <=255; fadevalue += 5)
  {
   analogWrite(ledPin, fadevalue)
   delay(30);
  }
```



```
  for (int fadevalue = 255; fadevalue >=0 ; fadevalue -= 5)
  { analogWrite(ledpin, fadevalue);
    delay(30);
  }
 }
```

Observation: The LED fading

Observation: The LED gradually fades away.

Program no: **05** Program Title: **LED FADE WITH POTENTIOMETER**

Aim : To demonstrate analog output with fading LED using potentiometer

Components Required :

Arduino Uno board - 1

USB Cable - 1

LED - 1

Potentiometer - 1

Jumper wires

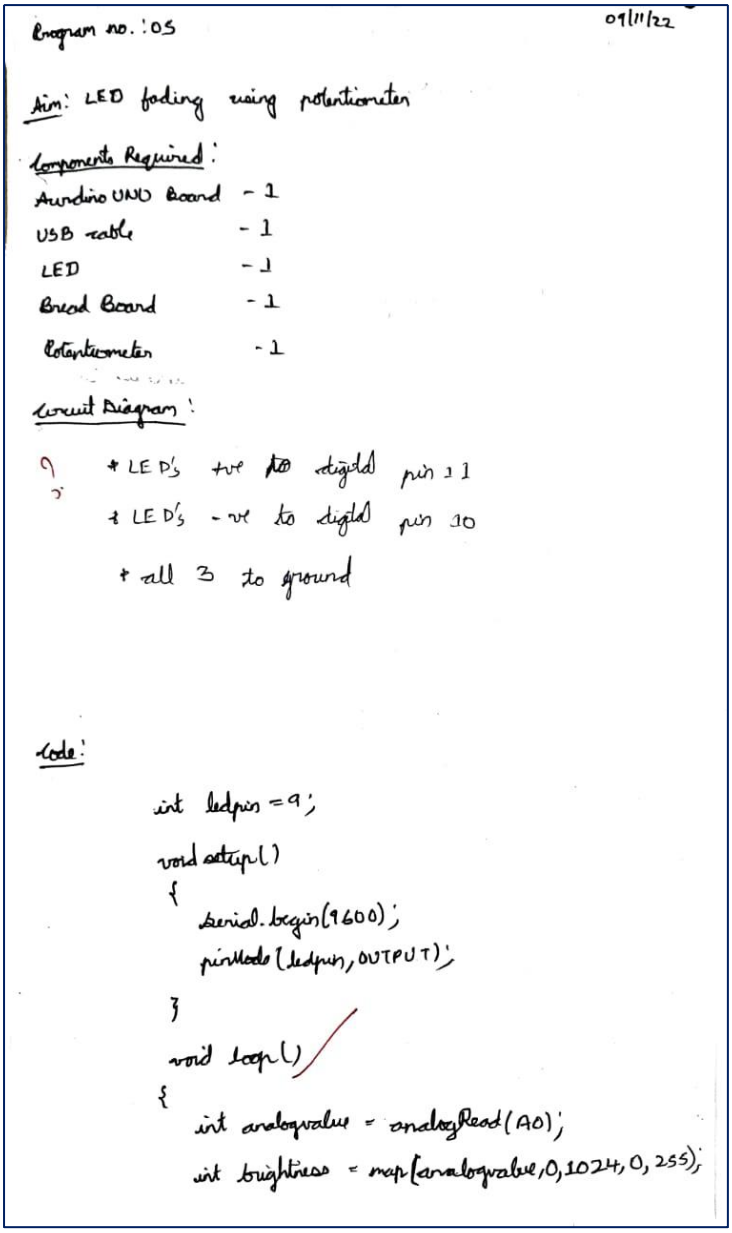
Pin Connections :

- LED positive pin to digital pin 11
- LED negative pin to analog pin 10
- Potentiometer and LED negative pin to ground

Code :

```
const int LedPin = 11;
void setup()
{
        pinMode(LedPin, OUTPUT);
        Serial.begin(9600);
}
void loop()
{
        int fade value = analogRead(A0);
        int brightness = map(fade value 0,1023,0,255);
        analogWrite(LedPin, brightness);
        Serial.print(“analog”);
        Serial.println(fade value);
        Serial.print(“brightness”);
        Serial.println(brightness);
        delay(2);
}
```

Handwritten code :



Program no. : 05 09/11/22

Aim: LED fading using potentiometer

Components Required:

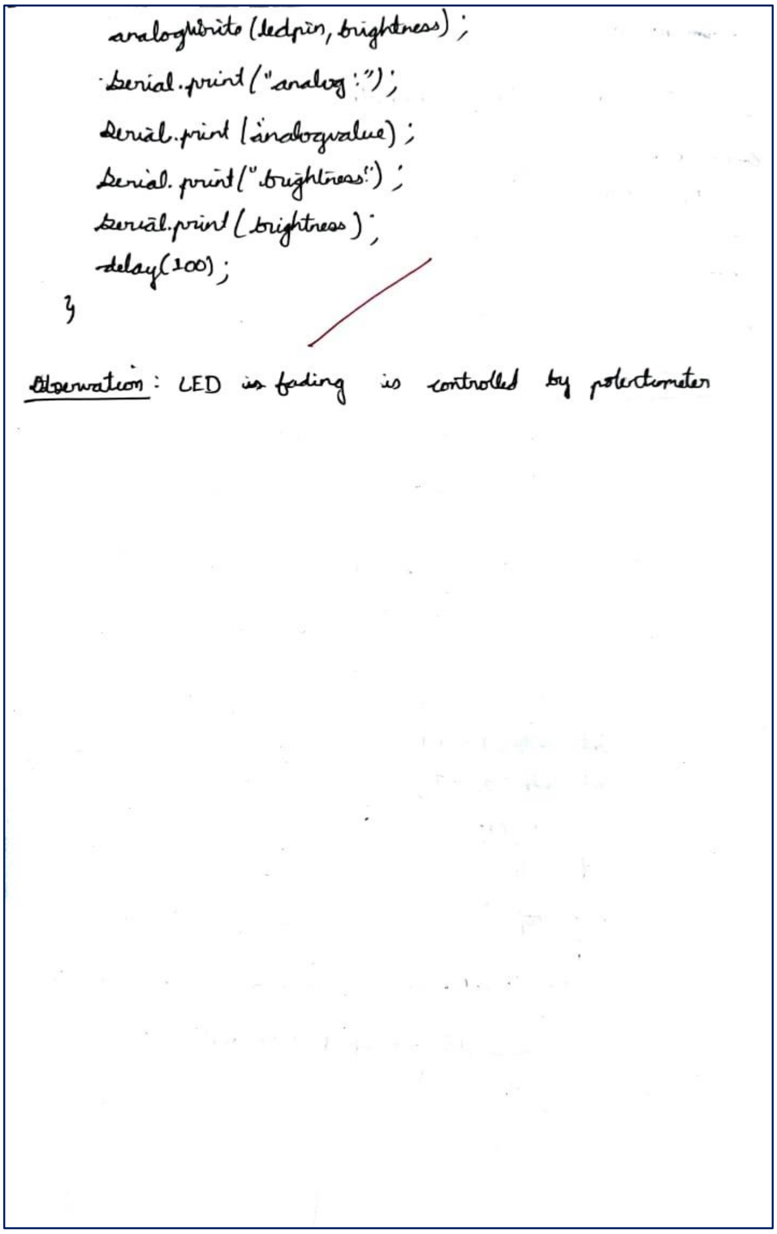
Aurdino UNO Board	- 1
USB cable	- 1
LED	- 1
Bread Board	- 1
Potentiometer	- 1

Circuit Diagram:

- LED's +ve to digital pin 11
- LED's -ve to digital pin 10
- all 3 to ground

Code:

```
int ledpin =9;
void setup()
 {
   Serial.begin(9600);
   pinMode(ledpin, OUTPUT);
 }
 void loop()
{
  int analogvalue = analogRead(A0);
  int brightness = map(analogvalue,0,1024,0,255);
```



```
  analogWrite(ledpin, brightness);
  Serial.print("analog:");
  Serial.print(analogvalue);
  Serial.print("brightness:");
  Serial.print(brightness);
  delay(100);
}
```

Observation: LED is fading is controlled by potentiometer

Observation: The LED gradually flows and fades according to potentiometer input.

Program no: **06** Program Title: **FADING OF TWO LEDs**

Aim : To demonstrate analog output with fading two LED

Components Required :

Arduino Uno board - 1

USB Cable - 1

LED - 2

Jumper wires

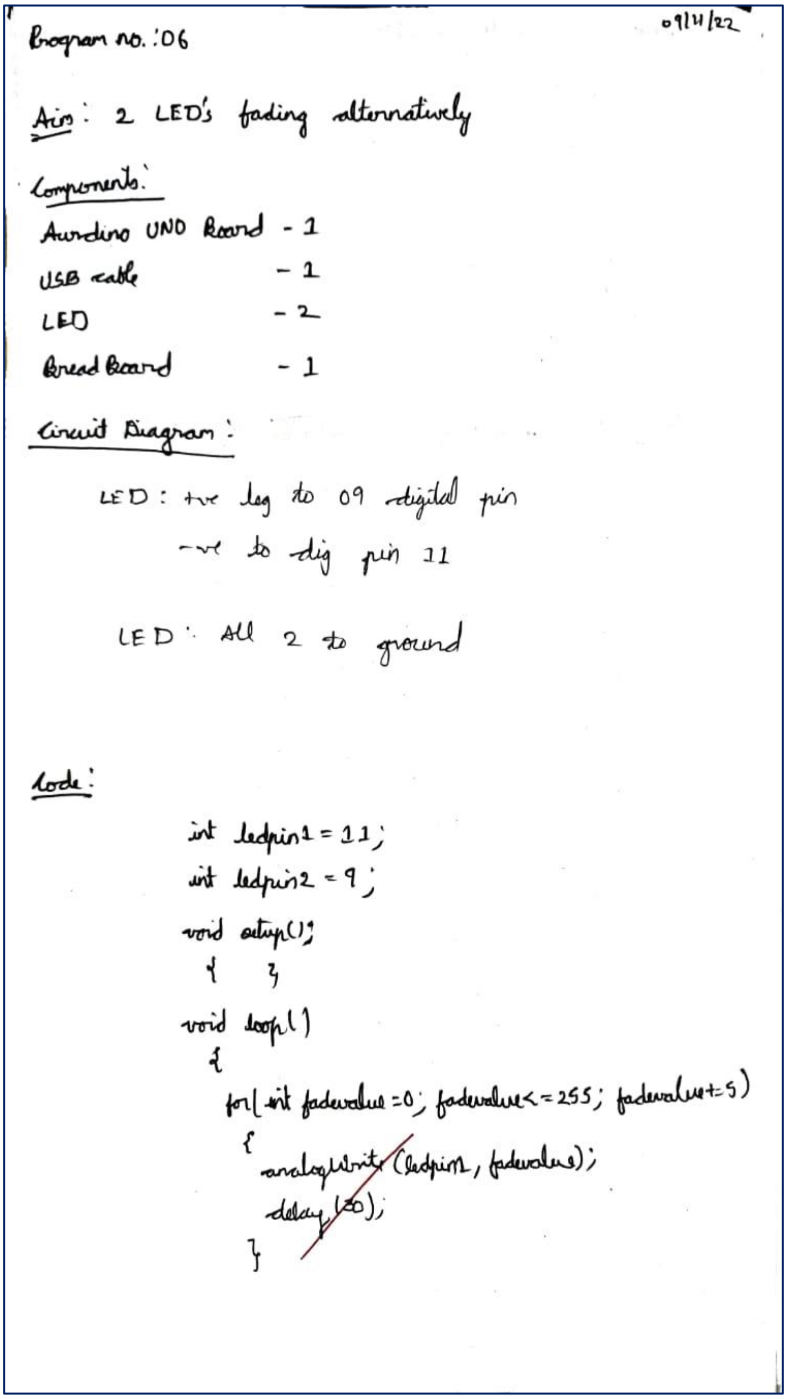
Pin Connections :

- LED positive pin to digital pin 9
- LED negative pin to digital pin 11
- LED negative pin to Ground

Code :

```
const int LedPin = 9;
const int LedPin = 11;
void setup()
{
        pinMode(LedPin 1,LedPin 2 );
        pinMode(LedPin 1,OUTPUT );
        pinMode(LedPin 1,OUTPUT );
}
void loop()
{
        for(int fade value = 0; fade value <= 255; fade value += 255)
        {
                analogWrite(LedPin 1, fade value); delay(100);
        }
        for(int fade value = 255; fade value >= 0; fade value -= 15)
        {
                analogWrite(LedPin 2, fade value); delay(100);
        }
        for(int fade value = 255; fade value >= 0; fade value -= 15)
        {
                analogWrite(LedPin 1, fade value); delay(1000);
        }
        for(int fade value = 255; fade value >= 0; fade value += 15)
        {
                analogWrite(LedPin 2, fade value);

                delay(1000);
        }
}
```

Handwritten code :



Program no. :06 09/11/22

Aim: 2 LED's fading alternativly

Components:

Aurdino UNO Board	- 1
USB cable	- 1
LED	- 2
Bread Board	- 1

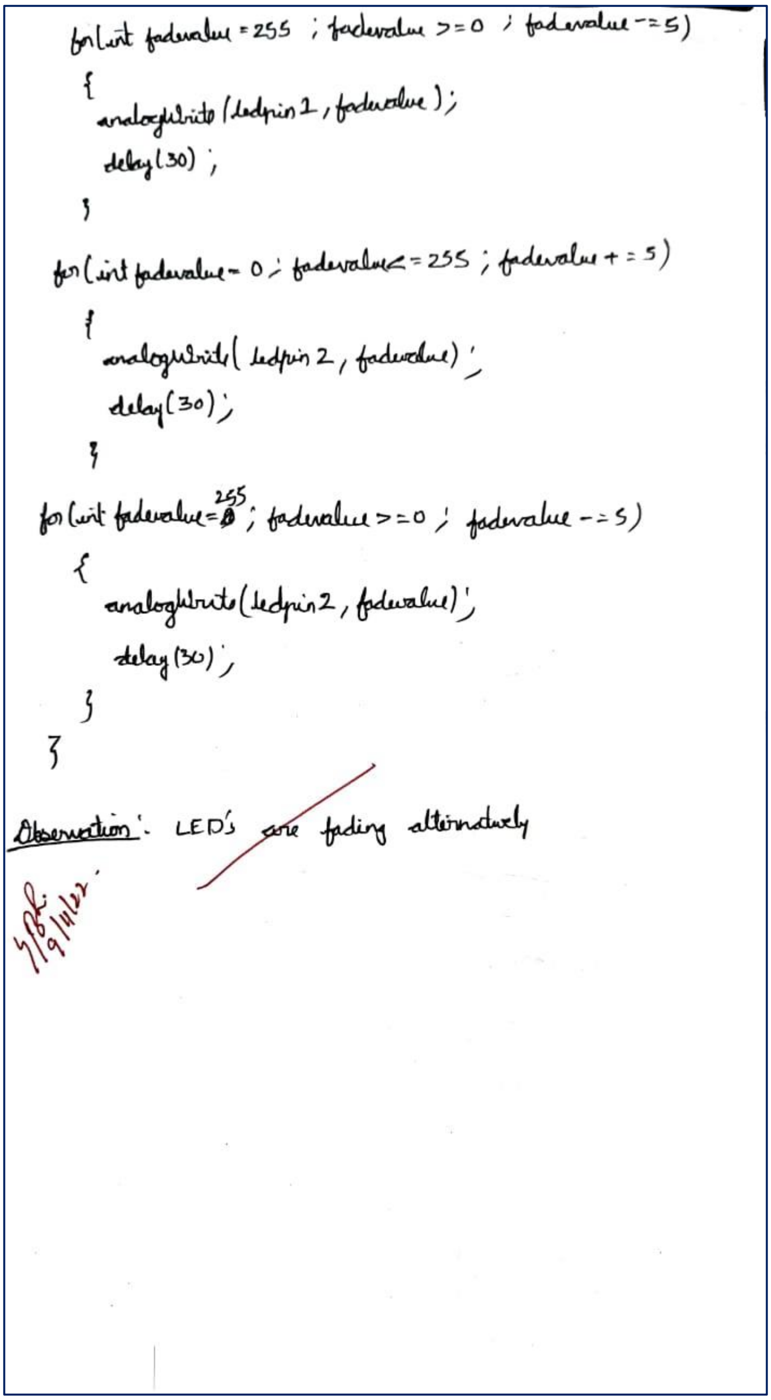
Circuit Diagram:

LED: +ve leg to 09 digital pin
-ve to dig pin 11

LED: All 2 to ground

Code:

```
int ledpin1 = 11;
int ledpin2 = 9;
void setup();
 {   }
void loop()
 {
   for(int fadevalue =0; fadevalue<=255; fadevalue+=5)
    {
     analogWrite(ledpin1, fadevalue);
     delay(30);
    }
```



```
  for(int fadevalue =255 ; fadevalue >=0 ; fadevalue -=5)
   {
    analogWrite(ledpin1, fadevalue);
    delay(30);
   }
 for(int fadevalue= 0 ; fadevalue<=255 ; fadevalue +=5)
   {
    analogWrite( ledpin2, fadevalue);
    delay(30);
   }
for(int fadevalue=255; fadevalue >=0 ; fadevalue -=5)
  {
   analogWrite(ledpin2, fadevalue);
   delay(30);
  }
}
```

Observation: LED's are fading alterndively

9/11/22

Observation: One LED flows and glows, while the other fades away simultaneously.

Program no: **07** Program Title: **LED WITH LDR CONTROL**

Aim : To demonstrate LED with LDR control

Components Required :

Arduino Uno board - 1

Resistor - 1

USB Cable - 1 LED - 1

Breadboard -1

LDR - 1

Jumper wires

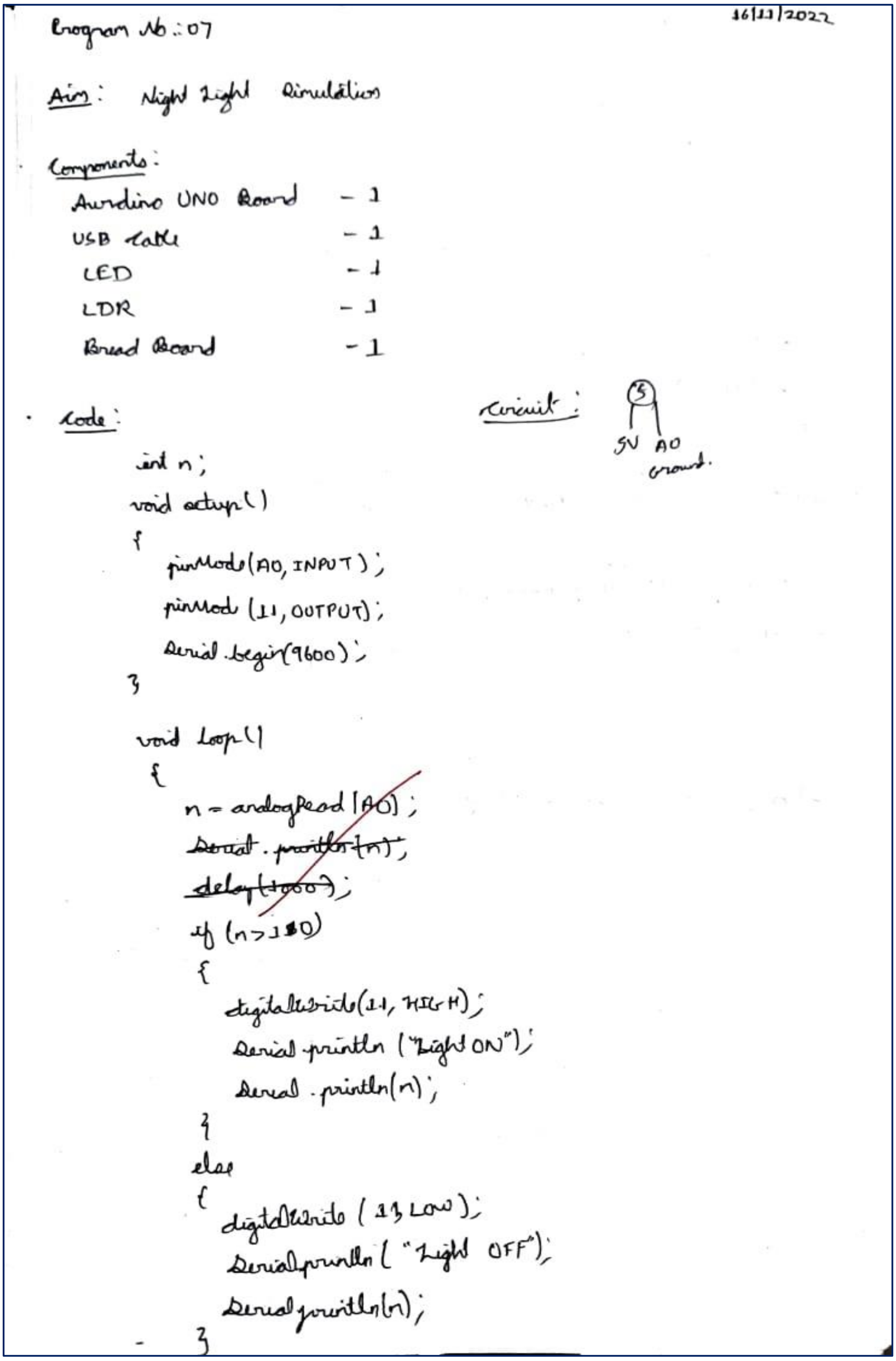
Pin Connections :

- LED positive pin to digital pin 13
- LED negative pin to ground
- Positive leg of LDR to A0
- Negative leg of LDR to 5V
- Resistor negative leg to ground
- Resistor positive leg to 5V

Code :

```
int value = 0;
void setup()
{
        pinMode(11, OUTPUT);
        pinMode(A0, INPUT);
        Serial.begin(9600);
}
void loop()
{
        value = analogRead(A0);
        if(value < 50 );
        {
                digitalWrite(11,HIGH);
                Serial.println(“Light in ON”);
                Serial.print(value);
        }
        else
        {
                digitalWrite(11,LOW);
                Serial.println(“Light in OFF”);
                Serial.print(value);
        }
}
```

Handwritten code :



Program No.:07 16/11/2022

Aim: Night Light Simulation

Components:

Aurdino UNO Board	- 1
USB Cable	- 1
LED	- 1
LDR	- 1
Bread Board	- 1

Code:

Circuit: 5V A0 Ground.

```
int n;
void setup()
{
  pinMode(A0, INPUT);
  pinMod (11, OUTPUT);
  Serial.begin(9600);
}

void Loop()
 {
   n = analogRead(A0);
   ~~Serial.println(n);~~
   ~~delay(1000);~~
   if (n>150)
   {
     digitalWrite(11, HIGH);
     Serial println ("Light ON");
     Serial .println(n);
   }
   else
   {
     digitalWrite ( 11 LOW);
     Serialprintln ( "Light OFF");
     Serialprintln(n);
   }
```

Observation: The LED glows when LDR is kept in the dark.

Program no: **08** Program Title: **TEMPERATURE SENSOR**

Aim : To sense the temperature of the environment

Components Required :

Arduino Uno board - 1

USB Cable - 1

LED - 1

Temperature Sensor - 1

Jumper wires

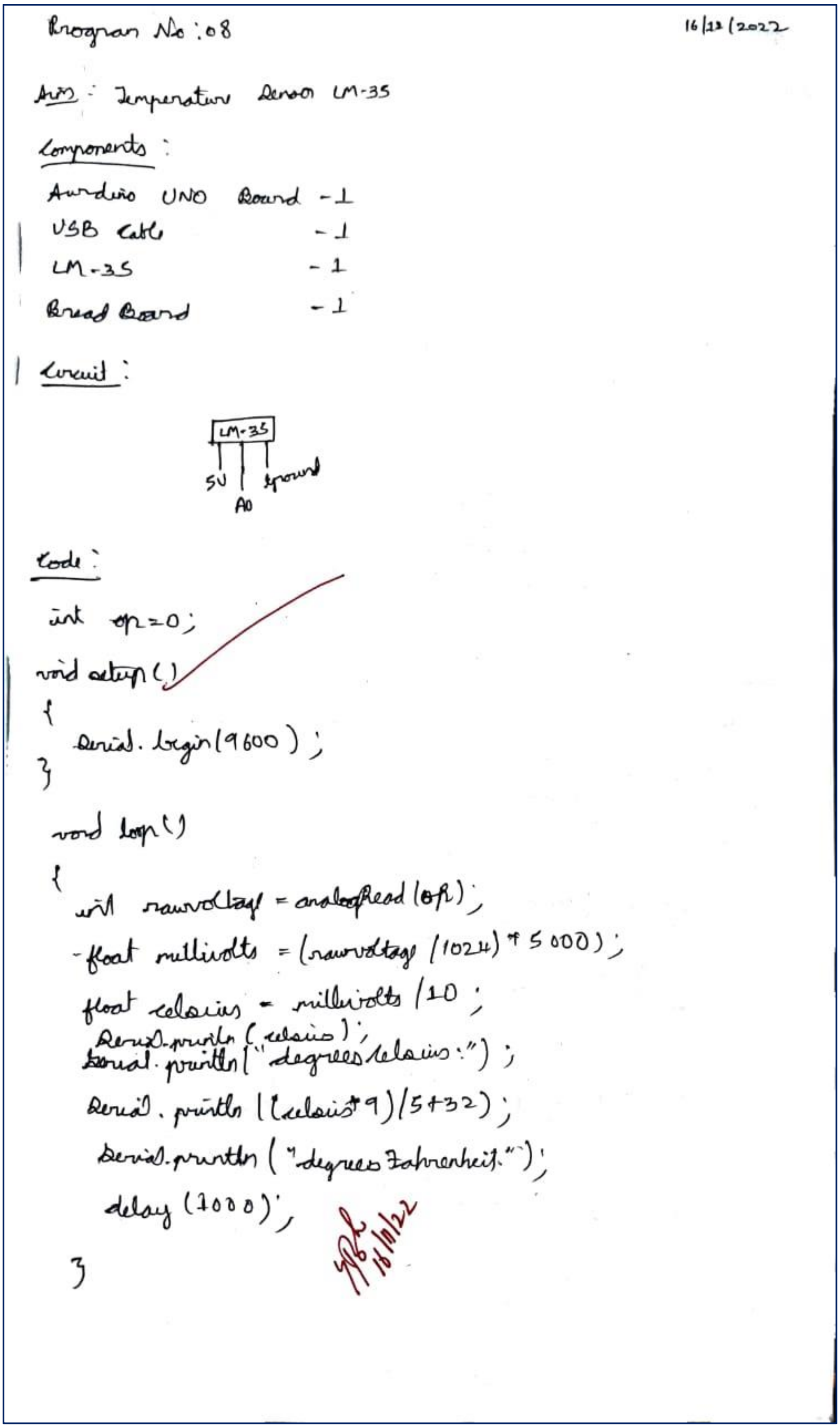
Pin Connections :

- Center leg of Temperature sensor to A0.
- Right leg of Temperature sensor to 5V.
- Left leg of Temperature sensor to ground.
- Led positive leg to ground

Code :

```
int OutPin = 0;
void setup()
{
        Serial.begin(9600);
}
void loop()
{
        int rowvoltage = analogRead(OutPin);
        float millivolts = (rowvoltage/1024.0)*5000;
        float celsius = millivolts/10;
        Serial.print(celcius);
        Serial.println(" degree celsius");
        Serial.println((celcius*9)/5+32);
        Serial.println(" degree Fahrenheit");
        delay(100);
}
```

Handwritten code :



Program No : 08 16/11/2022

Aim : Temperature Sensor LM-35

Components :

Aurdino UNO Board	- 1
USB Cable	- 1
LM-35	- 1
Bread Board	- 1

Circuit :

LM-35
5V
A0
ground

Code :

```
int op=0;
void setup()
{
  Serial.begin(9600);
}
 void loop()
 {
  int rawvoltage = analogRead(op);
  -float millivolts =(rawvoltage /1024)*5000);
  float celsius = millivolts /10;
   Serial.println(celsius);
  Serial.println("degrees celsius:");
  Serial.println((celsius*9)/5+32);
   Serial.println("degrees Fahrenheit.");
   delay(1000);
 }
```

16/11/22

Observation: The current temperature in the environment is observed.

Program no: **09** Program Title: **ULTRASOUND SENSOR**

Aim : To measure the distance between an object using ultrasound sensor.

Components Required :

Arduino Uno board - 1

USB Cable - 1

LED - 1

HC - SR04 - 1

Jumper wires

Pin Connections :

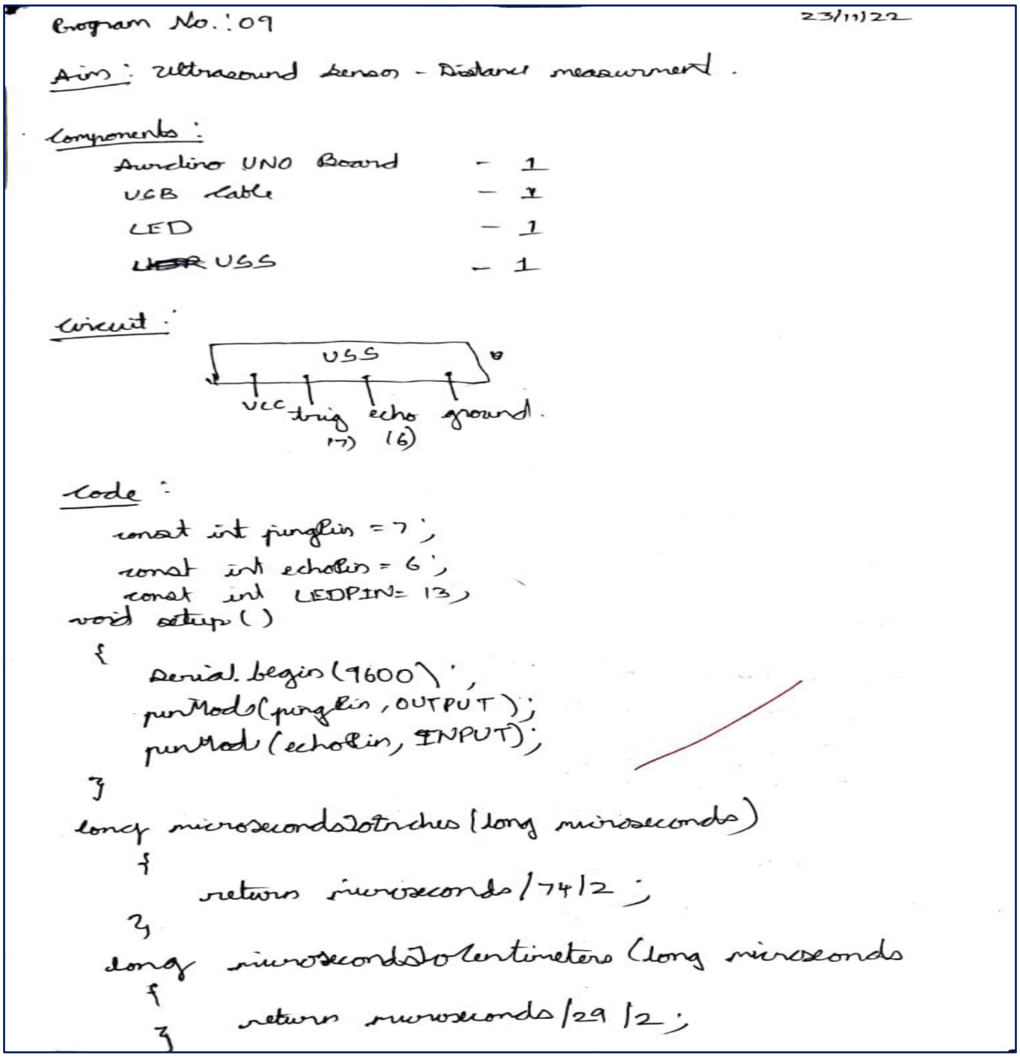
- Pin connected to digital Pin 7
- Pin connected to analog pin 6, VCC
- Pin connected to ground

Code :

```
const int pingPin = 7;
const int echoPin = 6;
void setup()
{
        Serial.begin(9600);
         pinMode(pingPin, OUTPUT);
         pinMode(echoPin, INPUT);
         pinMode(13,OUTPUT);
}
void loop()
{
        long duration, inches, cm;
        digitalWrite(pingPin, LOW);
         delayMicroseconds(2);
        digitalWrite(pingPin, HIGH);
        delayMicroseconds(10);
        digitalWrite(pingPin, LOW);
        duration = pulseIn(echoPin, HIGH);
        inches = microsecondsToInches(duration);
        cm = microsecondsToCentimeters(duration);
        if(cm < 300)
        {
                digitalWrite(13,HIGH);
        }
        else
```

```
          {
                    digitalWrite(13,LOW);
          }
          Serial.print(inches);
          Serial.print("in, ");
          Serial.print(cm);
          Serial.print("cm");
          Serial println();
          Delay(100);
}
long microseconds ToInches(long microseconds)
{
          Return microseconds/74/2;
}
long microsecondsToCentimeters(long microseconds)
{
          Return microseconds/29/2;
}
```

Handwritten code :



Program No.: 09 23/11/22

Aim: ultrasound sensor - Distance measurment.

Components:

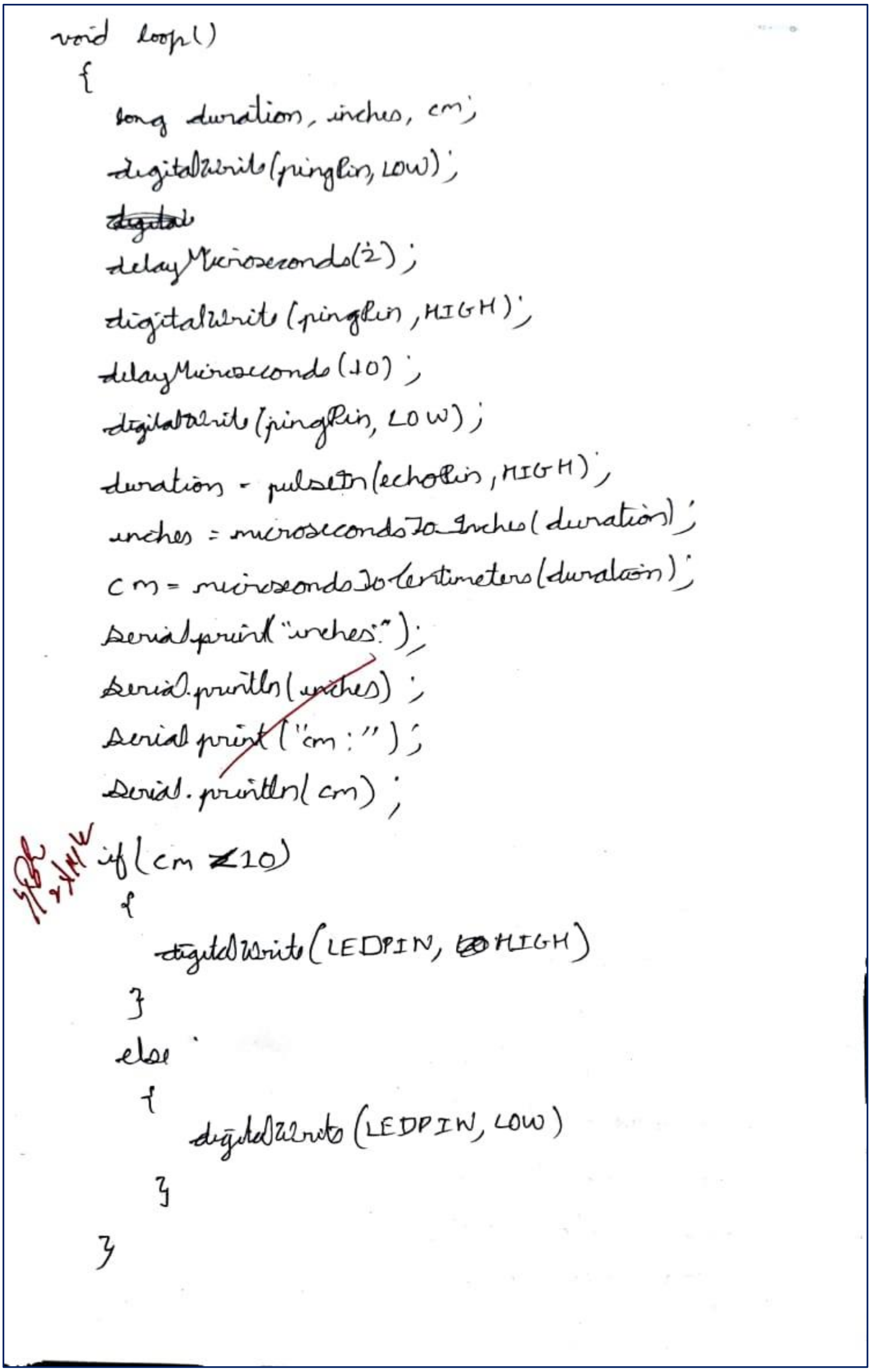
Aurdino UNO Board	- 1
USB cable	- 1
LED	- 1
~~USR~~ USS	- 1

Circuit:

USS
vcc
trig (7)
echo (6)
ground.

Code:

```
   const int pingPin =7;
   const int echoPin = 6;
   const int LEDPIN= 13;
void setup()
 {
     Serial.begin(9600);
     pinMode(pingPin,OUTPUT);
     pinMode(echoPin, INPUT);
 }
long microsecondsToInches(long microseconds)
   {
        return microseconds/74/2;
   }
  long microsecondsToCentimeters(long microseconds
   {
        return microseconds/29/2;
   }
```



```
void loop()
 {
   long duration, inches, cm;
   digitalWrite(pingPin, LOW);
   ~~digital~~
   delayMicroseconds(2);
   digitalWrite(pingPin, HIGH);
   delayMicroseconds(10);
   digitalWrite(pingPin, LOW);
   duration = pulseIn(echoPin, HIGH);
   inches = microsecondsToInches(duration);
   cm = microsecondsToCentimeters(duration);
   Serial.print("inches:");
   Serial.println(inches);
   Serial.print("cm:");
   Serial.println(cm);
 if(cm <10)
  {
    digitalWrite(LEDPIN, ~~LO~~HIGH)
  }
  else
   {
     digitalWrite(LEDPIN, LOW)
   }
 }
```

Observation: The distance between various objects were observed.

Program no: **10** Program Title: **NIGHT LIGHT SIMULATION WITH HUMAN PRESENCE DETECTION**

Aim: Nightlight Simulation with Human Presence Detection.

Components Required :

Arduino Uno board - 1

USB Cable - 1

Resistor(110K) - 1

LED - 1

LDR- 1

Jumper wires

Pin Connections:

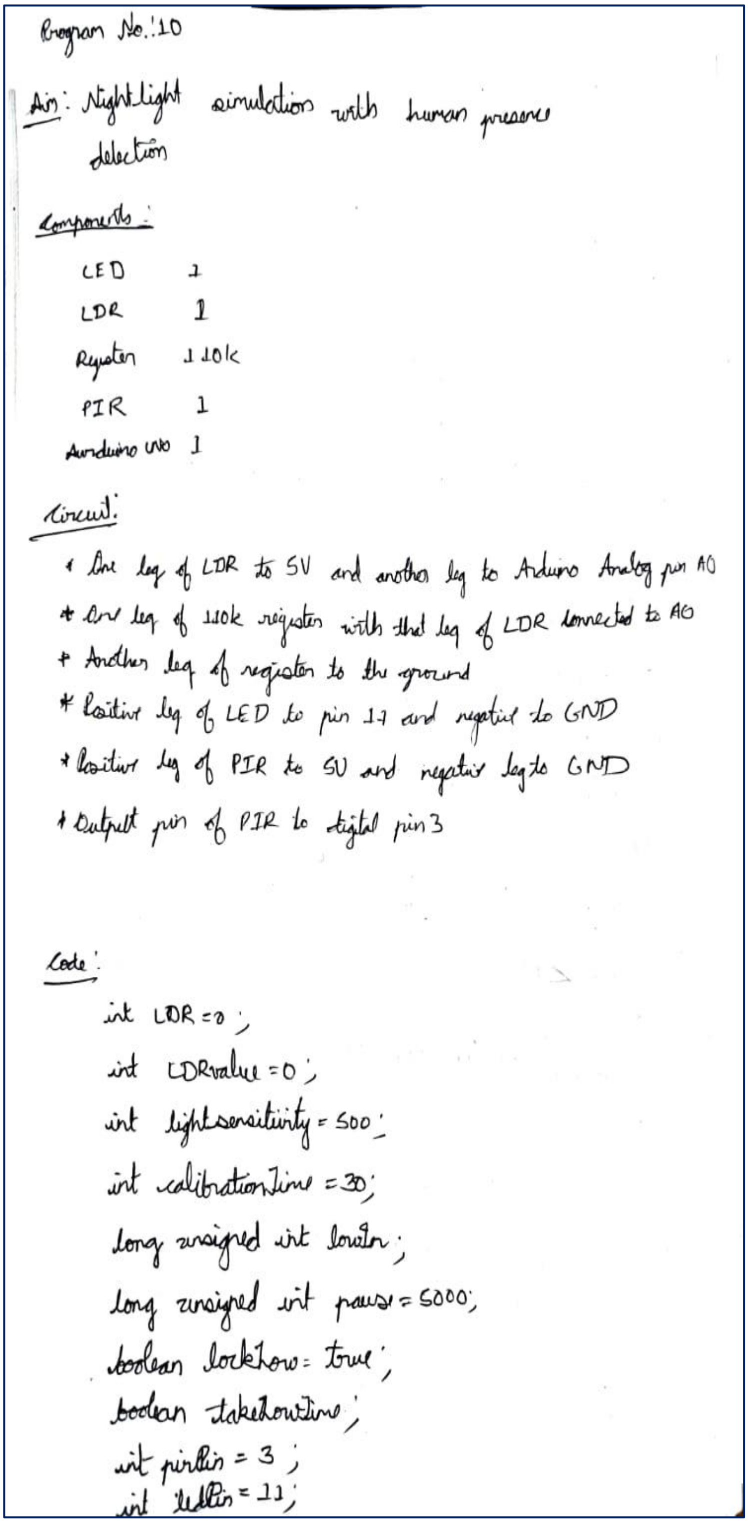
- One leg of LDR to 5V and another leg to Arduino Analog pin A0
- One leg of 110K register with that leg of LDR connected to A0
- Another leg of register to the ground
- Positive leg of LED to pin 11 and negative to GND
- Positive leg of PIR to 5V and negative leg to GND
- Output pin of PIR to digital pin 3

Code:

```
int LDR = 0; LDRValue = 0;
int calibrationTime = 30
long unsigned
int pause = 5000;
boolean lockLow = true;
boolean takeLowTime;
int pirPin = 3;
int ledPin = 11;
void setup()
{

        Serial.begin(9600);
        buad pinMode(11, OUTPUT);
        pinMode(pirPin, INPUT);
        pinMode(ledPin, OUTPUT);
        digitalWrite(pirPin, LOW);
        Serial.print("calibrating sensor ");
        for(int i = 0; i< light_sensitivity)
       {

                digitalWrite(ledPin, HIGH);

               if(lockLow)

               {

                       lockLow = false;
```

```
            Serial.println("---");
            Serial.print("motion detected at ");
            Serial.print(millis()/1000);
            Serial.println(" sec");
             delay(50);
        }
        takeLowTime = true;
    }
    if(digitalRead(pirPin) == LOW || LDRValue >= light_sensitivity)
    {
        digitalWrite(ledPin, LOW);
        if(takeLowTime)
        {
             lowIn = millis();
             takeLowTime = false;
        }
        if(!lockLow&&millis() - lowIn> pause)
        {
            lockLow = true;
            Serial.print("motion ended at ");
            Serial.print((millis() - pause)/1000);
            Serial.println(" sec");
           delay(50);
       }
        delay(100);
    }
}
```

Handwritten code :



Program No.:10

Aim: Night light simulation with human presence detection

Components:

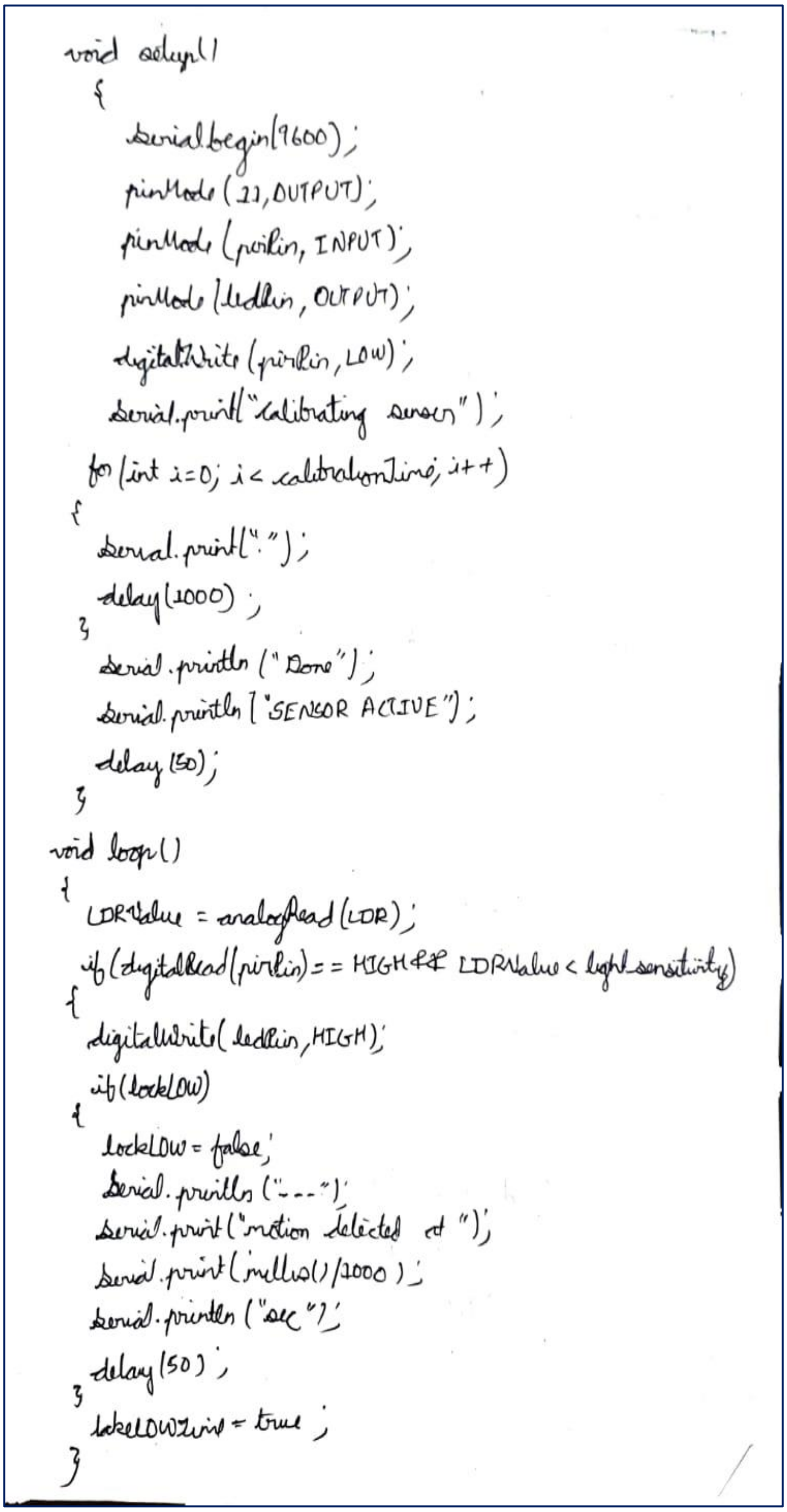
LED	1
LDR	1
Register	1 10k
PIR	1
Arduino uno	1

Circuit:

- One leg of LDR to 5V and another leg to Arduino Analog pin A0
- One leg of 110k register with that leg of LDR connected to A0
- Another leg of register to the ground
- Positive leg of LED to pin 11 and negative to GND
- Positive leg of PIR to 5V and negative leg to GND
- Output pin of PIR to digital pin 3

Code:

```
int LDR=0;
int LDRvalue=0;
int lightsensitivity=500;
int calibrationTime=30;
long unsigned int lowIn;
long unsigned int pause=5000;
boolean lockLow=true;
boolean takeLowTime;
int pirPin = 3;
int ledPin = 11;
```



```
void setup()
  {
     Serial.begin(9600);
     pinMode(11,OUTPUT);
     pinMode(pirPin, INPUT);
     pinMode(ledPin, OUTPUT);
     digitalWrite(pirPin,LOW);
     Serial.print("calibrating sensor");
  for(int i=0; i< calibrationTime; i++)
  {
    Serial.print(".");
    delay(1000);
  }
    Serial.println("Done");
    Serial.println("SENSOR ACTIVE");
    delay(50);
  }
void loop()
{
  LDRValue = analogRead(LDR);
  if(digitalRead(pirPin)==HIGH && LDRValue < light_sensitivity)
 {
  digitalWrite(ledPin,HIGH);
  if(lockLOW)
 {
   lockLOW=false;
   Serial.println("---");
   Serial.print("motion detected at ");
   Serial.print(millis()/1000);
   Serial.println("sec");
   delay(50);
 }
  takeLOWTime=true;
 }
```

Observation: The LED glows while there is darkness when there is a human presence detected.

Program no: **11** Program Title: **FIRE ALERT**

Aim: Fire alarm simulation

Components Required :

Arduino Uno board - 1

USB Cable - 1

Flame Sensor - 1

LED - 1

Buzzer - 1

Jumper wires

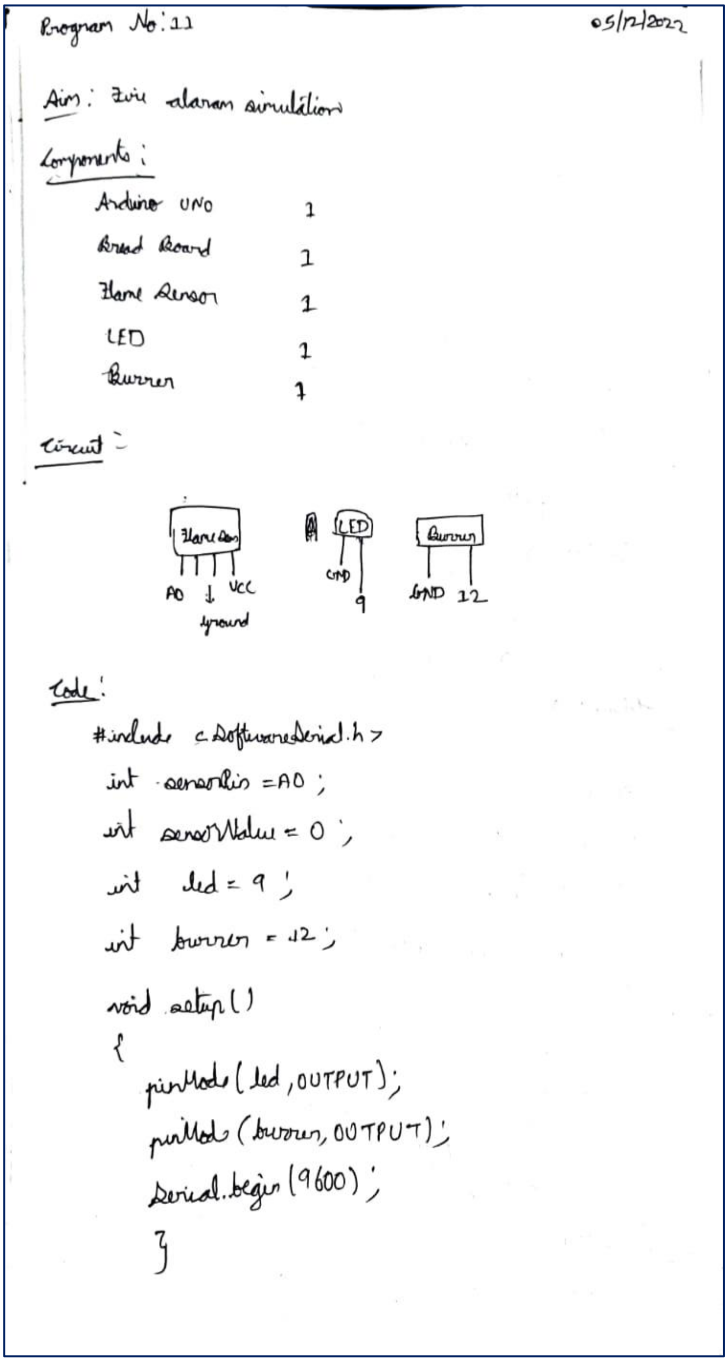
Pin Connections:

- Flame sensor interfacing to Arduino
- Flame sensor to Arduino 5V -> 5V
- ground -> ground
- A0 -> A0
- Led interfacing to Arduino
- LED +ve is connected to 9th pin of Arduino
- LED -ve is connected to ground pin of arduino
- Buzzer interfacing to Arduino
- Buzzer +ve is connected to 12th pin of Arduino
- Buzzer -ve is connected to GND pin of Arduino

Code:

```
int sensorPin = A0;
int sensorValue = 0;
int led = 9;
void setup()
{
        pinMode(led, OUTPUT);
        pinMode(buzzer,OUTPUT);
        Serial.begin(9600);
}
void loop()
{
        Serial.println("Welcome to TechPonder Flame Sensor Tutorial");

        sensorValue = analogRead(sensorPin);

        Serial.println(sensorValue);

        if (sensorValue < 100)
        {
                Serial.println("Fire Detected");
                Serial.println("LED on");
                digitalWrite(led,HIGH);
                digitalWrite(buzzer,HIGH);
                delay(1000);
        }
        digitalWrite(led,LOW);
        digitalWrite(buzzer,LOW);
        delay(sensorValue);
}
```

Handwritten code:



Program No: 11 05/12/2022

Aim: Fire alaram simulation

Components:

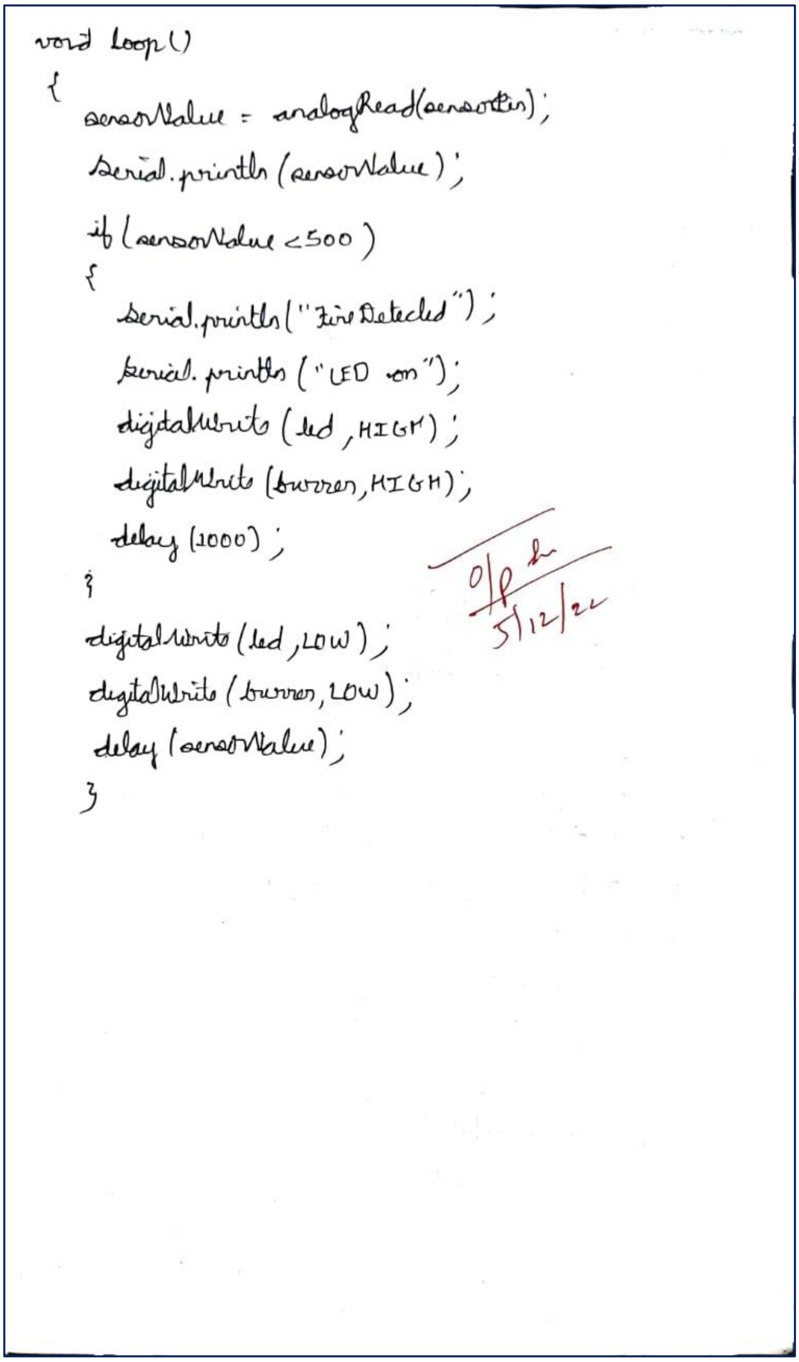
Arduino UNO	1
Bread Board	1
Flame Sensor	1
LED	1
Buzzer	1

Circuit:

Flame Sensor
A0
ground
VCC
LED
GND
9
Buzzer
GND
12

Code:

```
#include <SoftwareSerial.h>
int sensorPin =A0;
int sensorValue = 0;
int led = 9;
int buzzer = 12;
void setup()
{
  pinMode(led,OUTPUT);
  pinMode(buzzer,OUTPUT);
  Serial.begin(9600);
}
```



```
void loop()
{
  sensorValue = analogRead(sensorPin);
  Serial.println(sensorValue);
  if(sensorValue<500)
  {
    Serial.println("Fire Detected");
    Serial.println("LED on");
    digitalWrite(led,HIGH);
    digitalWrite(buzzer,HIGH);
    delay(1000);
  }
  digitalWrite(led,LOW);
  digitalWrite(buzzer,LOW);
  delay(sensorValue);
}
```

O/p
5/12/22

Observation: The fire alarm goes off when fire or hotness is detected.

Program no: **12** Program Title: **AUTOMATIC IRRIGATION CONTROLLER SIMULATION**

Aim: Sensing the soil moisture and sprinkling the Water simulation

Components Required :

Arduino Uno board - 1

USB Cable - 1

Min Servo Motor – 1

Moisture Sensor - 1

LED - 1

Buzzer - 1

Jumper wires

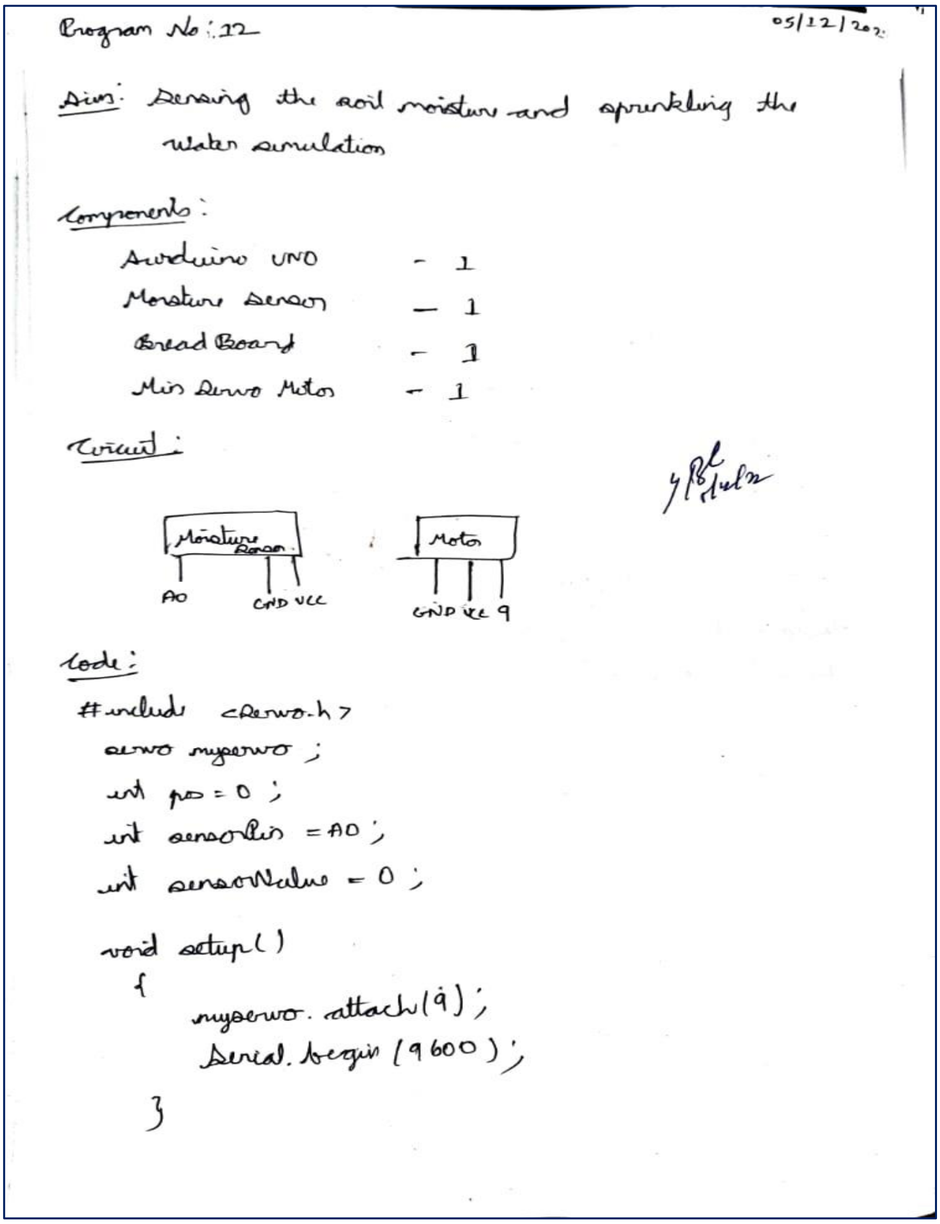
Pin Connections:

- Moisture sensor VCC to Arduino 5V
- Moisture sensor GND to Arduino GND
- Moisture sensor A0 to Arduino A0
- Servo motor VCC to Arduino 5V
- Servo motor GND to Arduino GND
- Servo Motor Signal to Arduino digital pin 9

Code:

```
#include Servo myservo;
int pos = 0;
int sensorPin = A0;
int sensorValue = 0;
void setup()
{
        myservo.attach(9);
        Serial.begin(9600);
}
void loop()
{
        sensorValue = analogRead(sensorPin);

        Serial.println (sensorValue);

        if(sensorValue>500)

        {

                for (pos = 0; pos <= 180; pos += 1)
                {
                        myservo.write(pos);
                        delay(15);
                }
                for (pos = 180; pos >= 0; pos -= 1)
                {
                        myservo.write(pos);
                        delay(15);
                }
        }
        delay (1000);
}
```

Handwritten code :



Program No: 12 05/12/202

Aim: Sensing the soil moisture and sprinkling the water simulation

Components:

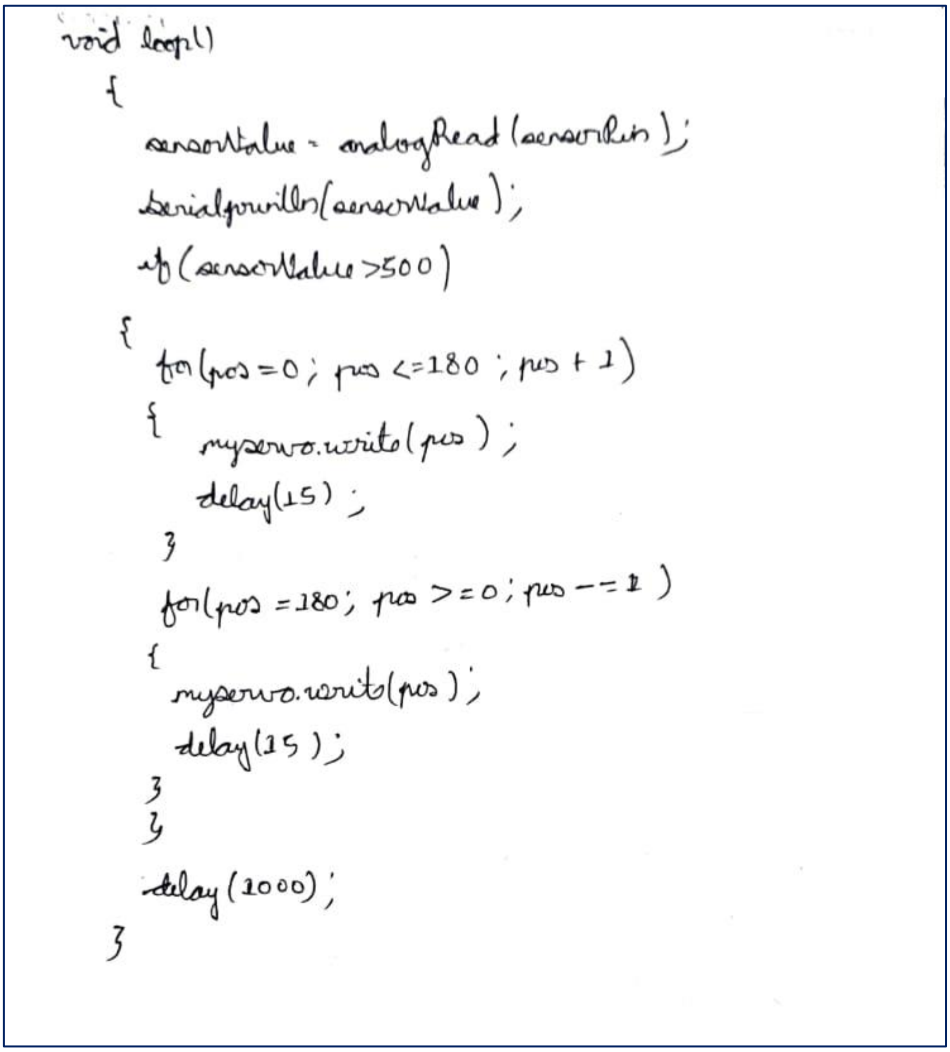
Arduino UNO	- 1
Moisture Sensor	- 1
Bread Board	- 1
Mini Servo Motor	- 1

Circuit:

Moisture Sensor
A0
GND VCC
Motor
GND VCC 9

Code:

```
#include <Servo.h>
 servo myservo;
 int pos = 0;
 int sensorPin = A0;
 int sensorValue = 0;

 void setup()
  {
     myservo.attach(9);
     Serial.begin(9600);
  }
```



```
void loop()
  {
    sensorValue = analogRead(sensorPin);
    Serialprintln(sensorValue);
    if(sensorValue>500)
  {
    for(pos=0; pos <=180 ; pos + 1)
    {
      myservo.write(pos);
      delay(15);
    }
    for(pos =180; pos >=0; pos -= 1 )
    {
     myservo.write(pos);
     delay(15);
    }
    }
    delay(1000);
  }
```

Observation: The water sensor goes off when the lack of moisture content is sensed.

Program no:**13** Project Titile: **RFID READER AND ACCESS CONTROL**

Aim: To count the number of RFID tags read by the RFID reader

Components Required :

Arduino Uno board - 1

USB Cable - 1

RFID reader module - 1

RFID tags - 1 Jumper wires

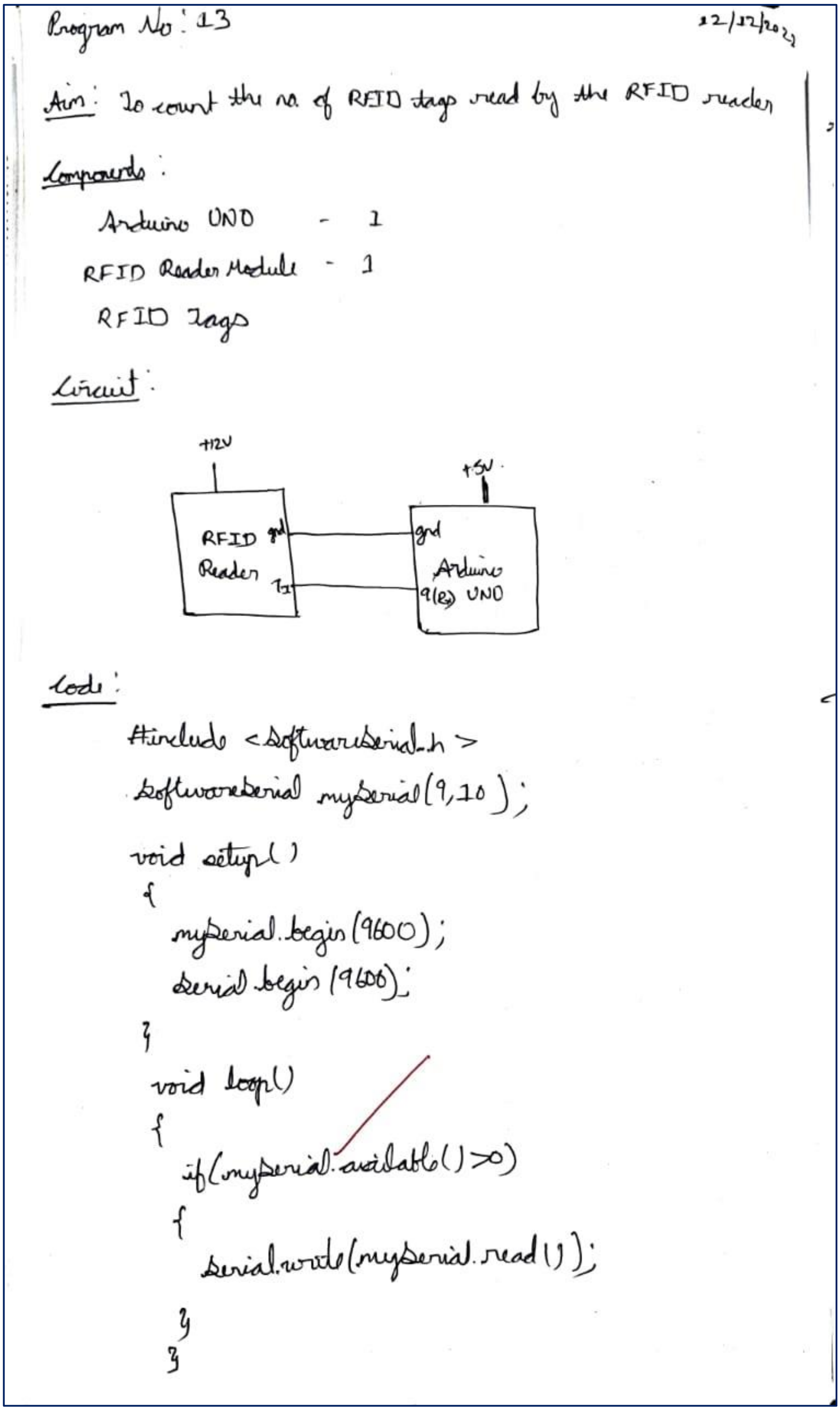
Pin Connections:

- Arduino ground to RFID ground
- TX(RFID) to 9(RX) arduino
- VCC USB Port to 12 RFID reader **Code:**

Code:

```
#include <SoftwareSerial.h>
SoftwareSerial mySerial(9, 10);
void setup()
{
        mySerial.begin(9600);
        Serial.begin(9600);
}

void loop()
{
              if(mySerial.available()>0)
              {
                        Serial.write(mySerial.read());
              }
}
```

Handwritten code :



Program No: 13 12/12/2023

Aim: To count the no of RFID tags read by the RFID reader

Components:

Arduino UNO - 1

RFID Reader Module - 1

RFID Tags

Circuit:

+12V
RFID Reader
gnd
Tx
+5V
gnd
Arduino UNO
9(Rx)

Code:

```
#include <SoftwareSerial.h>
SoftwareSerial mySerial(9,10);
void setup()
{
  mySerial.begin(9600);
  Serial.begin(9600);
}
 void loop()
 {
   if(mySerial.available()>0)
   {
     Serial.write(mySerial.read());
   }
 }
```

Observation: The RFID card is detected when brought closer to the RFID reader.

Program no:**14** Program Title: **ACCESS BASED ON RFID TAG**

Aim: To demonstrate the use of the RFID tag for access control

Components Required :

Arduino Uno board - 1
USB Cable - 1
RFID reader EM -18 - 1
RFID tags - 1
RFID Tag Reader - 1
Jumper wires

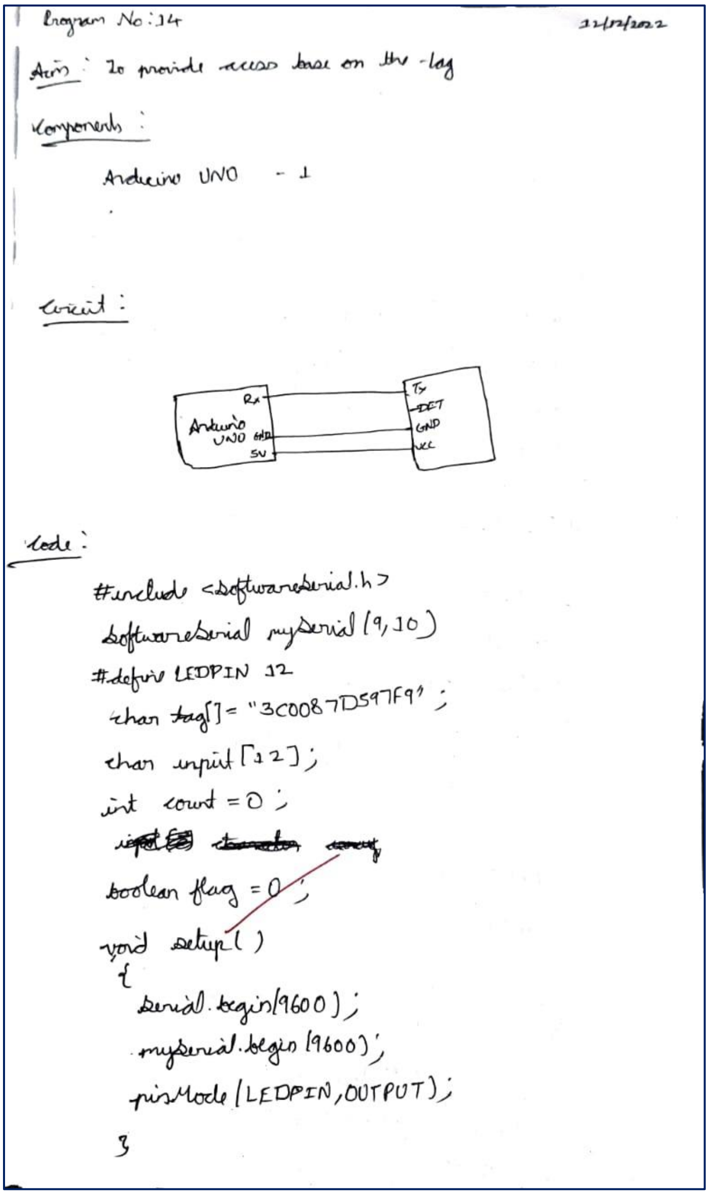
Pin Connections :

- 5V to VCC of base Tag
- Ground of Arduino to ground of the base of the tag
- RX to TX

Code :

```
#include <softwareSerial.h>

SoftwareSerial MySerial (9,10);

#define LEDPIN 12

char tag[]= “3C0087D597F9”
char input[12];

int count = 0;

char input[12];

int count = 0;
char input[12];

int count = 0;

boolean flag = 0;

void setup()

{

        Serial.begin(9600);

       pinMode(LEDPIN, OUTPUT);

}

void loop()

{

          if(MySerial.available());

          {

                count=0;

                while(MySerial.available()&& count<12)

                {

                         input[count]=Myserial.read();
                Serial.Write(input[count]);

                count ++;

                delay(5);

            }

          if(count==12)

          {

                flag=1;

                while(count=12; && flag!=0)

                {

                        if(input[count]==flag[count])

                                flag=1;

                        else

                                flag=0;

                count++;

                }

          }

          if(flag==1)

          {

                Serial.println("Access Allowed");

                digitalWrite(LEDPIN,HIGH);

                delay(2000)
                digitalWrite(LEDPIN,LOW);
          }

            else

            {

                Serial.println("Access denied");

                digitalWrite(LEDPIN,LOW);

                delay(2000); }

            for(count=0;count<12;count++)

          {

                input[count]= 'F' }

                count=0;

          }

     }
```

Handwritten code :



Program No : 14 12/12/2022

Aim : To provide access base on the tag

Components :

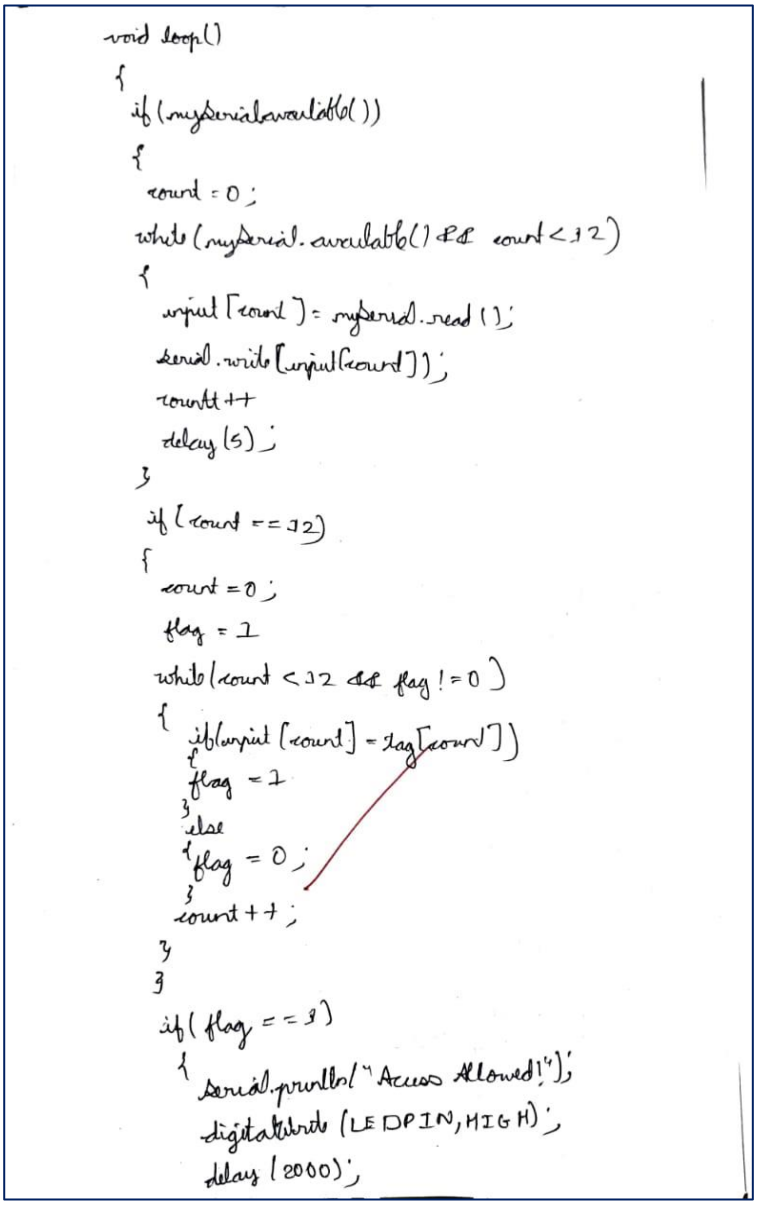
Arduino UNO - 1

Circuit :

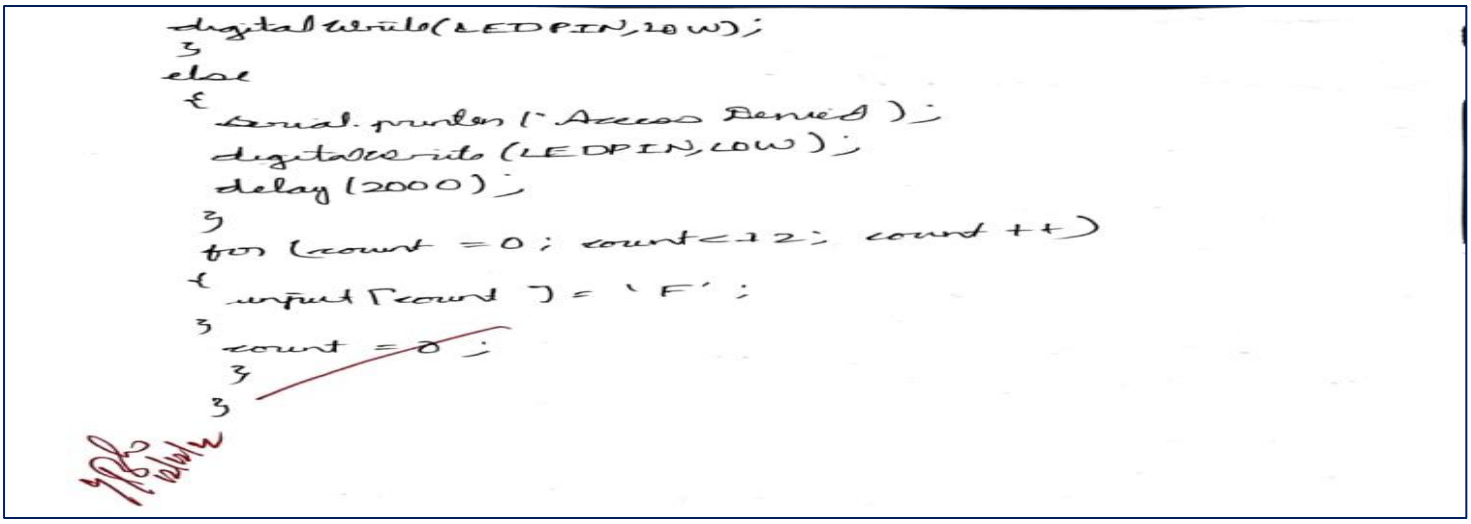
Arduino UNO
Rx
GND
5V
Tx
DET
GND
VCC

Code :

```
#include <SoftwareSerial.h>
SoftwareSerial mySerial (9,10)
#define LEDPIN 12
char tag[] = "3C0087D597F9";
char input[12];
int count = 0;
~~input [illegible] character array~~
boolean flag = 0;
void setup( )
 {
  Serial.begin(9600);
  mySerial.begin(9600);
  pinMode(LEDPIN,OUTPUT);
 }
```



```
void loop()
{
 if (mySerialavailable())
 {
  count = 0;
  while (mySerial.available() && count<12)
  {
   input[count] = mySerial.read();
   Serial.write(input[count]);
   count++
   delay(5);
  }
  if (count == 12)
  {
   count = 0;
   flag = 1
   while(count <12 && flag != 0)
   {
    if(input[count] = tag[count])
    {
    flag = 1
    }
    else
    {flag = 0;
    }
    count ++;
   }
  }
  if( flag == 1)
  {
   Serial.println("Access Allowed!");
   digitalWrite (LEDPIN,HIGH);
   delay(2000);
```



```
   digitalWrite(LEDPIN,LOW);
  }
  else
  {
   Serial.println("Access Denied );
   digitalWrite (LEDPIN,LOW);
   delay(2000);
  }
  for (count = 0; count<12; count ++)
  {
   input[count ] = 'F';
  }
  count = 0;
 }
}
```

Observation: Access is allowed when the card designated is recognized by the RFID tag reader.

Program no: **15** Program Title: **HOME AUTOMATION(COMMAND PROMPT)**

Aim: To establish the working of home automation.

Components Required :

Arduino Uno board - 1

USB Cable - 1

Bluetooth model - 1

Breadboard - 1

Jumper wires

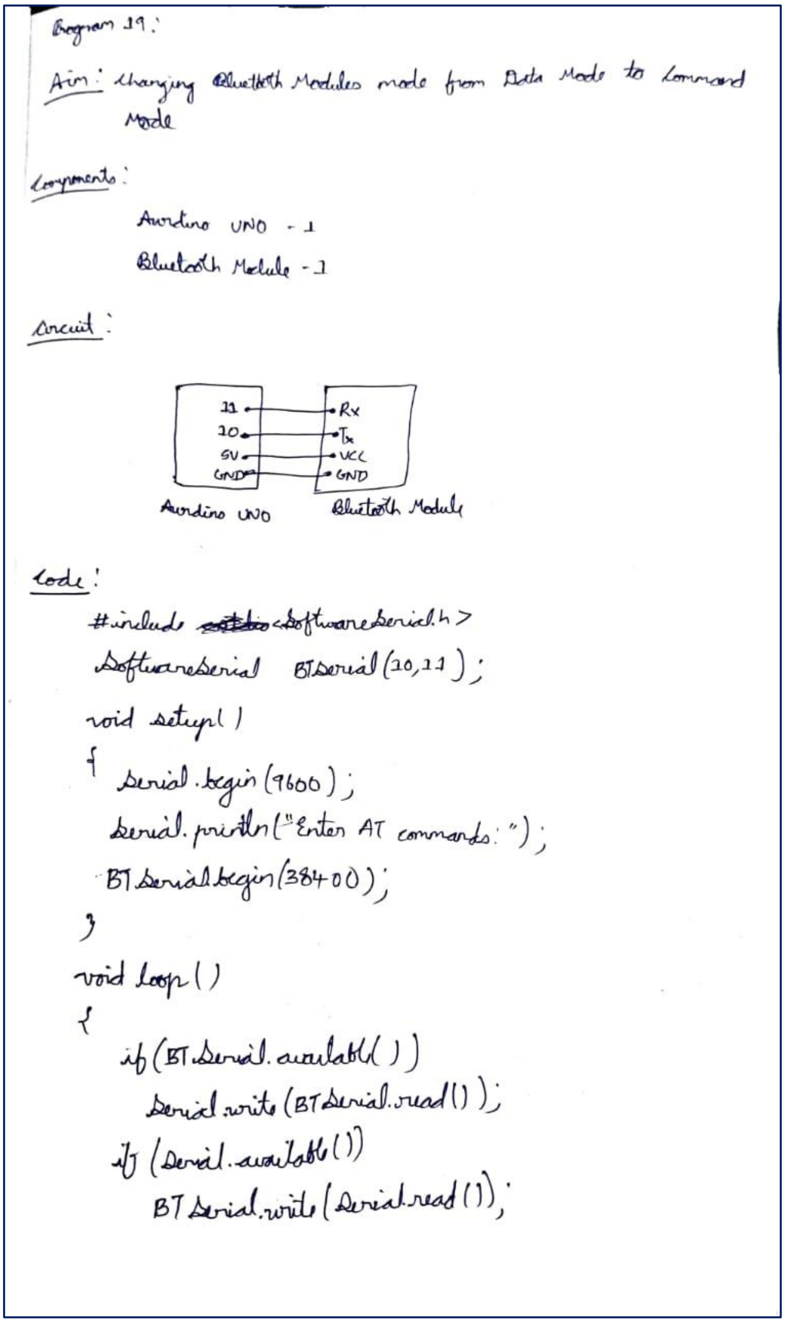
Pin Connections :

- LED positive pin to digital 13
- LED negative pin to ground
- Bluetooth TX to arduino RX
- Bluetooth RX to arduino TX
- Bluetooth pin one pin to ground
- Bluetooth pin one pin to VCC(5V)

Code :

```
#include SoftwareSerial BTSerial(10, 11);
void setup()
{
        Serial.begin(9600);
        Serial.println("Enter AT commands:");
        BTSerial.begin(38400);
}
void loop()
{
        Serial.write(BTSerial.read());
        BTSerial.write(Serial.read());
}
```

Handwritten code :



Program 19 :

Aim : Changing Bluetooth Modules mode from Data Mode to Command Mode

Components :

Aurdino UNO - 1

Bluetooth Module - 1

Circuit :

11
10
5V
GND
Rx
Tx
VCC
GND
Aurdino UNO
Bluetooth Module

Code :

```
#include <SoftwareSerial.h>
SoftwareSerial BTSerial(10,11);
void setup()
{ Serial.begin(9600);
  Serial.println("Enter AT commands:");
  BT.Serial.begin(38400);
}
void loop()
{
    if(BT.Serial.available())
      Serial.write(BTSerial.read());
    if(Serial.available())
      BTSerial.write(Serial.read());
```

Observation: The Username and password for an automated home unit is set up successfully.

Program no: **16** Program Title: **HOME AUTOMATION(LED CONTROL)**

Aim: To see the working of LED control with the help of an android mobile application.

Components Required :

Arduino Uno board - 1

USB Cable - 1

Bluetooth model - 1

Android Phone - 1

Breadboard - 1

Jumper wires

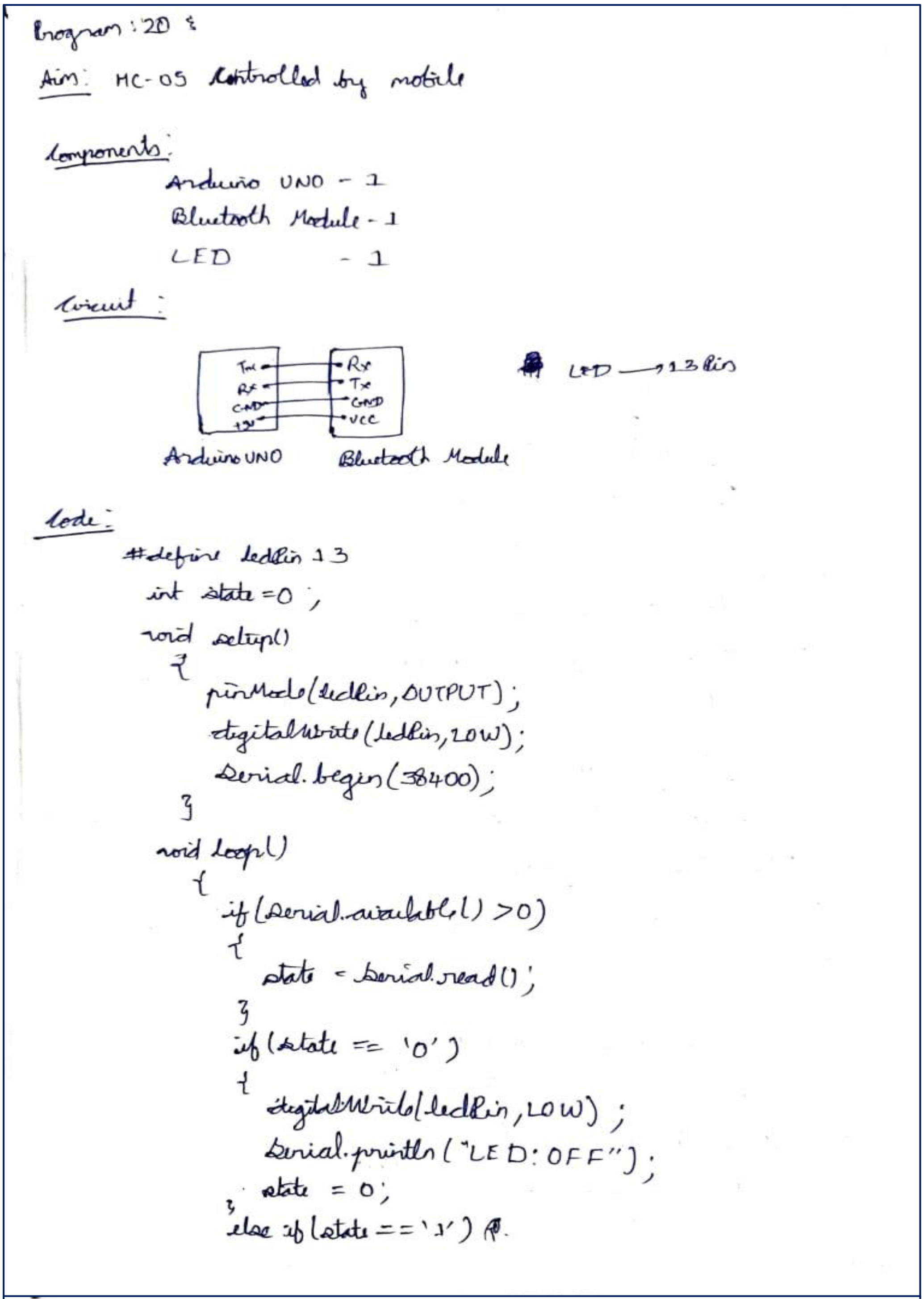
Pin Connections :

- LED positive pin to digital 13
- LED negative pin to ground
- Bluetooth TX to arduino RX
- Bluetooth RX to arduino TX
- Bluetooth pin one pin to ground
- Bluetooth pin one pin to VCC(5V)

Code :

```
#define ledPin 13
int state = 0;
void setup()
{
        pinMode(ledPin, OUTPUT);
        digitalWrite(ledPin, LOW);
        Serial.begin(38400);
}
void loop()
{
        if(Serial.available() > 0)
        if (state == '0')
        {
                digitalWrite(ledPin, LOW);
                Serial.println("LED: OFF");
                state = 0;
        }
        else if (state == '1')
        {
                digitalWrite(ledPin, HIGH);

                Serial.println("LED: ON");

                state = 0;

        }
```

Handwritten code :



Program : 20 :

Aim: HC-05 Controlled by mobile

Components:

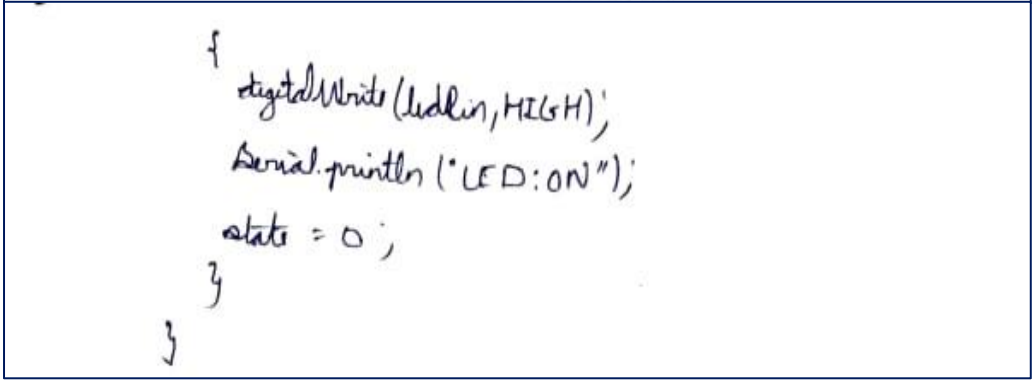
Arduino UNO - 1
Bluetooth Module - 1
LED - 1

Circuit :

Tx
Rx
GND
+5V
Rx
Tx
GND
VCC
LED → 13 Pin
Arduino UNO
Bluetooth Module

Code:

```
#define ledPin 13
 int state =0 ;
 void setup()
  {
   pinMode(ledPin,OUTPUT);
   digitalWrite(ledPin,LOW);
   Serial.begin(38400);
  }
  void loop()
   {
    if(Serial.available() >0)
    {
      state = Serial.read();
    }
    if (state == '0')
    {
      digitalWrite(ledPin,LOW) ;
      Serial.println ("LED:OFF");
      state = 0;
    }
    else if (state == '1')
```



```
    {
      digitalWrite(ledPin,HIGH);
      Serial.println ("LED:ON");
      state = 0 ;
    }
  }
```

Observation: Using the username and password that was established in the previous experiment, the LED was switched ON/OFF using the android mobile application.

Program no**: 17** Program Title: **HOME AUTOMATION(RELAY)**

Aim: To see the working of LED control with the help of an android mobile application.

Components Required :

Arduino Uno board - 1

USB Cable - 1

Bluetooth model - 1

Android Phone - 1

4 - Channel Relay - 1

Breadboard - 1

Jumper wires

Pin Connections :

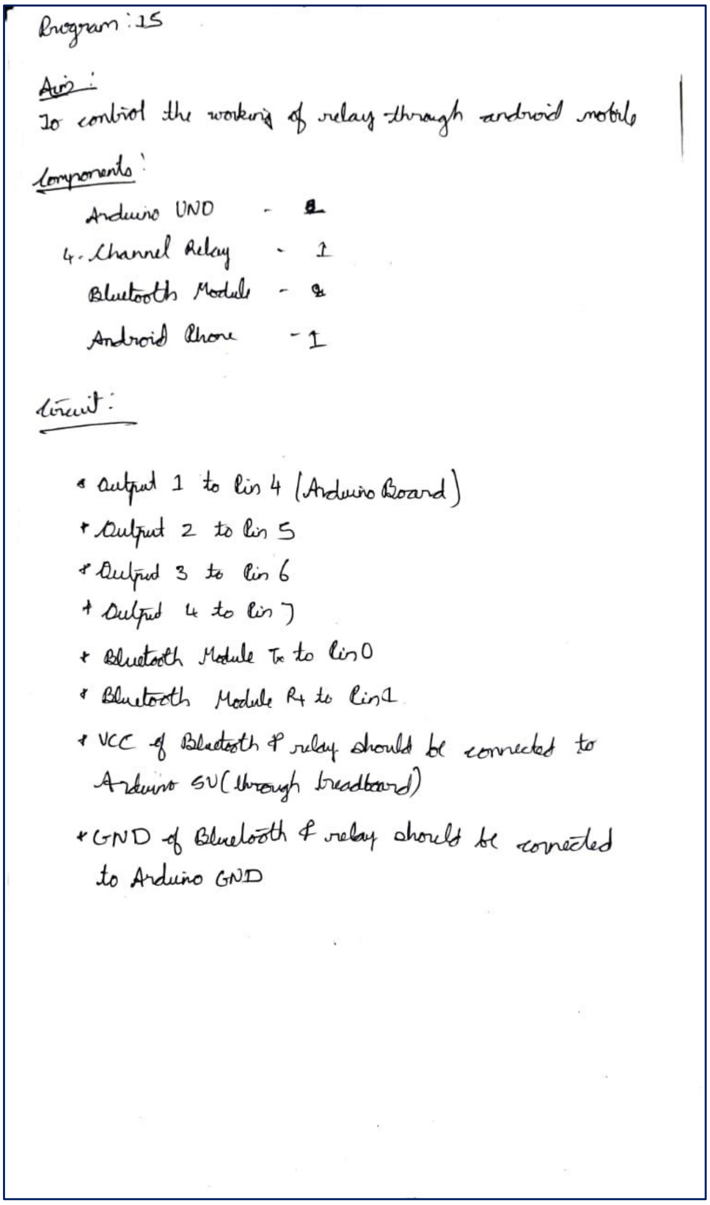
- Output 1 to Pin 4 (Arduino Board)
- Output 2 to Pin 5
- Output 3 to Pin 6
- Output 4 to Pin 7
- Bluetooth Module Tx to Pin 0
- Bluetooth Module Rx to Pin 1
- VCC of Bluetooth & relay should be connected to Arduino 5V(through breadboard)
- GND of Bluetooth & relay should be connected to Arduino GND

Code :

```
char val;
int ledpin = 2;
void setup()
{
        pinMode(ledpin = 2, OUTPUT);
        pinMode(ledpin = 3, OUTPUT);
        pinMode(ledpin = 4, OUTPUT);
        pinMode(ledpin = 5, OUTPUT);
        Serial.begin(9600);
}
void loop()
{
        if( Serial.available();
        {
```

```
        val = Serial.read();
    if( val == 'a' )
    {
        digitalWrite(ledpin = 2, HIGH);
    }
    if( val == 'A' )
    {
        digitalWrite(ledpin = 2, LOW);
    }
    if( val == 'b' )
    {
        digitalWrite(ledpin = 3, HIGH);
    }
    if( val == 'B' )
    {
        digitalWrite(ledpin = 3, LOW);
    }
    if( val == 'C' )
    {
        digitalWrite(ledpin=4, LOW);
    }
    if( val == 'D' )
    {
        digitalWrite(ledpin=5, LOW);
    }
    if( val == 'c' )
    {
        digitalWrite(ledpin = 4, HIGH);
    }
    if( val == 'd' )
    {
        digitalWrite(ledpin = 5, HIGH);
    }
}
```

Handwritten code :



Program : 15

Aim :

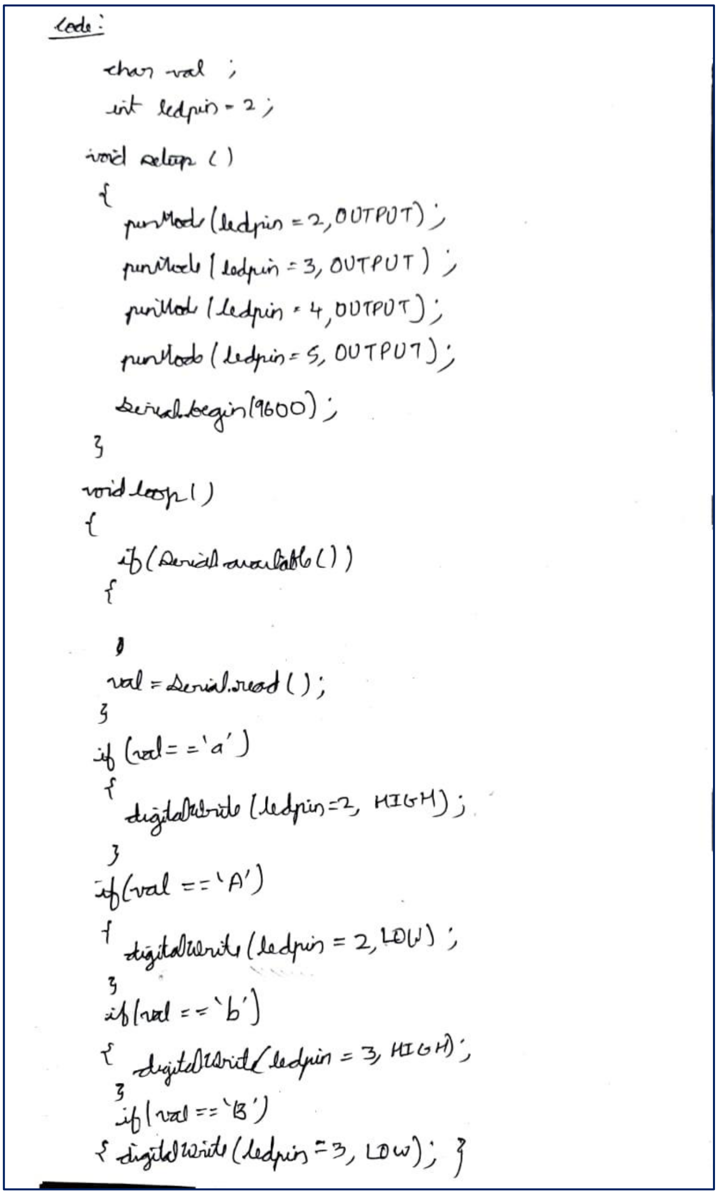
To control the working of relay through android mobile

Components :

Arduino UNO	- 1
4. Channel Relay	- 1
Bluetooth Module	- 1
Android Phone	- 1

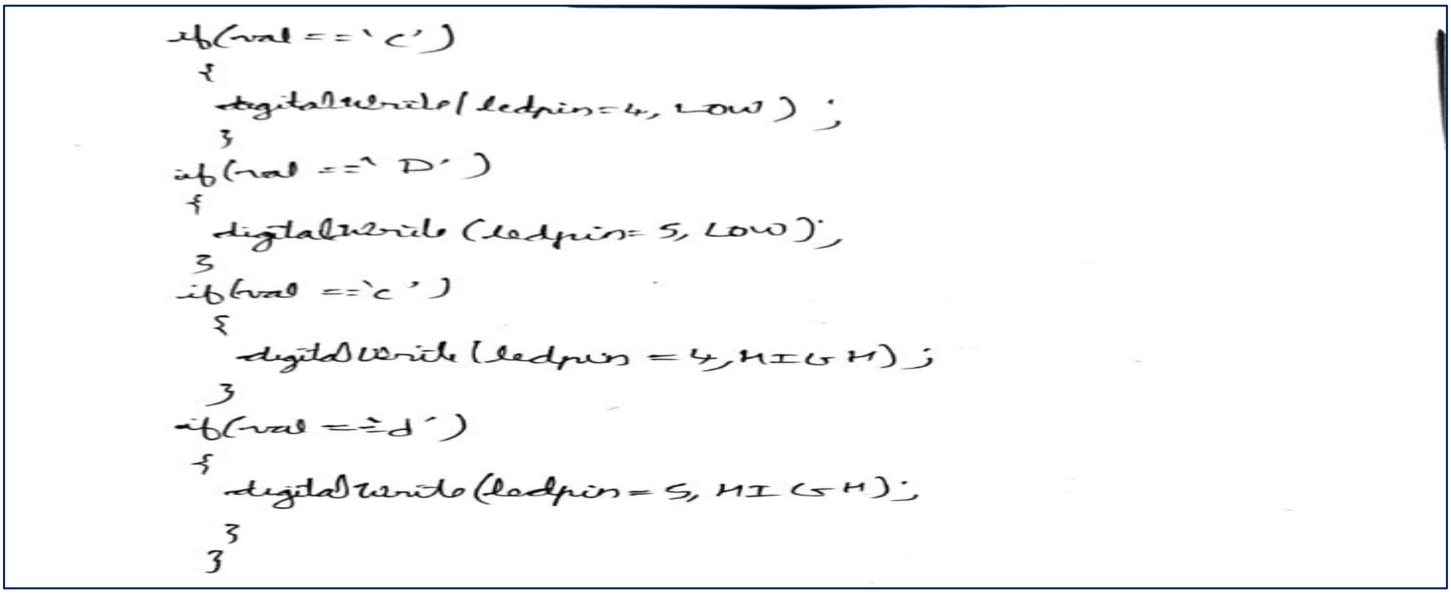
Circuit :

- Output 1 to Pin 4 (Arduino Board)
- Output 2 to Pin 5
- Output 3 to Pin 6
- Output 4 to Pin 7
- Bluetooth Module Tx to Pin0
- Bluetooth Module Rx to Pin1
- VCC of Bluetooth & relay should be connected to Arduino 5V(through breadboard)
- GND of Bluetooth & relay should be connected to Arduino GND



Code :

```
   char val ;
   int ledpin = 2 ;
  void setup ( )
  {
    pinMode (ledpin = 2,OUTPUT);
    pinMode (ledpin = 3, OUTPUT ) ;
    pinMode (ledpin = 4,OUTPUT);
    pinMode (ledpin = 5, OUTPUT);
    Serial.begin(9600);
  }
 void loop ( )
 {
   if (Serial.available( ))
  {

   val = Serial.read ( );
  }
 if (val = ='a')
  {
   digitalWrite (ledpin=2, HIGH);
  }
 if(val == 'A')
  {
   digitalWrite (ledpin = 2, LOW) ;
  }
 if (val == 'b')
 {  digitalWrite(ledpin = 3, HIGH);
  }
  if (val == 'B')
 { digitalWrite (ledpin =3, LOW); }
```



```
        if(val == 'C')
         {
          digitalWrite(ledpin=4, LOW ) ;
         }
        if(val == 'D' )
        {
         digitalWrite (ledpin= 5, LOW);
        }
        if(val == 'c' )
         {
          digitalWrite (ledpin = 4,HIGH) ;
         }
        if(val == 'd' )
        {
         digitalWrite(ledpin= 5, HIGH);
         }
        }
```

Observation: Home automation commands when connected through relay.

Program no: **18** Program Title: **PROGRAMMING ARDUINO WITH GSM MODULE**

Aim: To Program Arduino with GSM Module

Components Required :

Arduino Uno board – 1

USB Cable - 1

GSM module - 1

Android Phone - 1

Airtel SIM card - 1

Breadboard - 1

Flame Sensor(For flame sensor program) - 1

Jumper wires

Pin Connections:

- GSM Tx –>Arduino Rx (Here pin 2)
- GSM Rx –>ArduinoTx. (Here pin 3)
- Make the ground common between Arduino and GSM modem

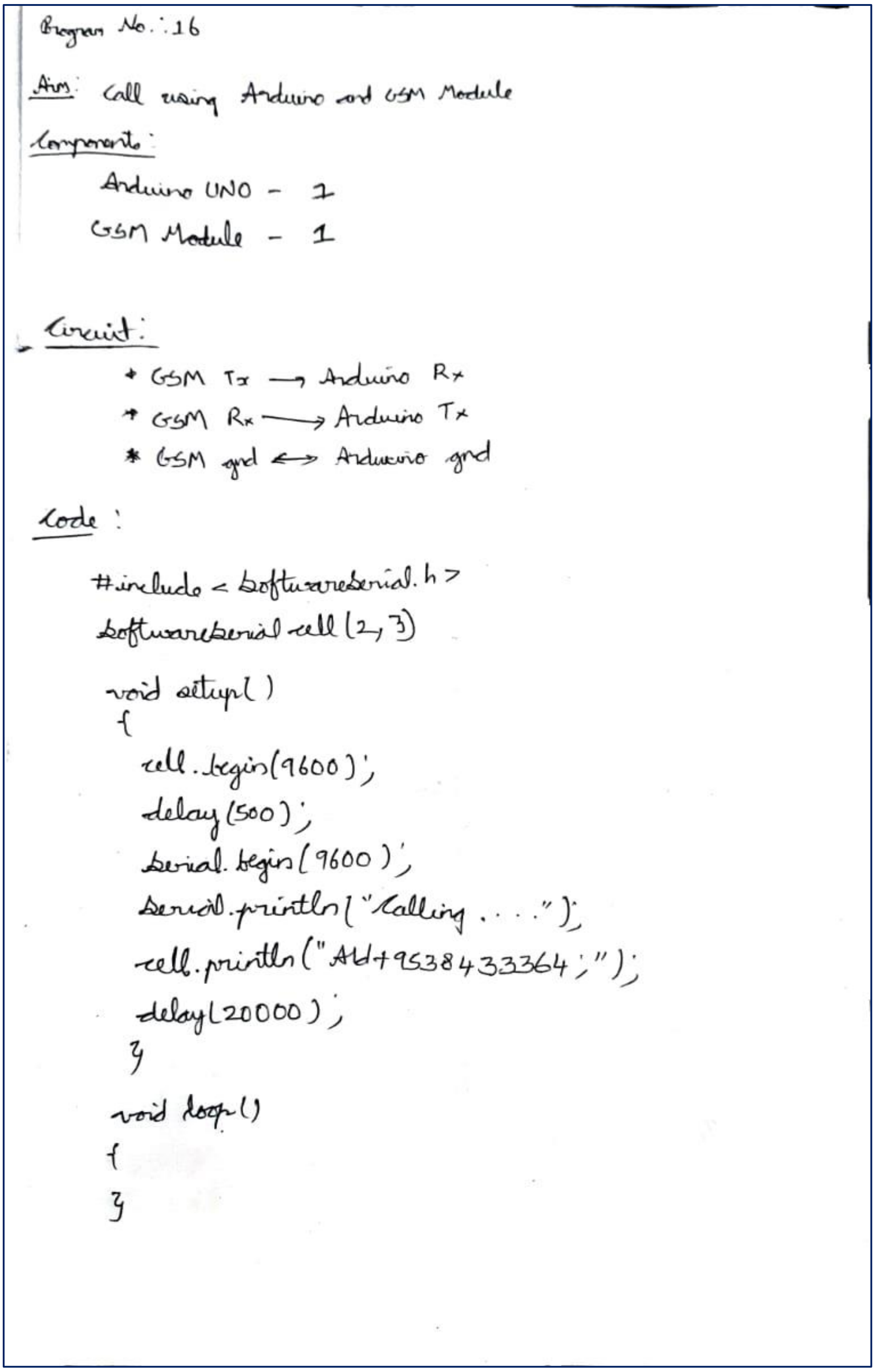
1. GSM Module: Call to a particular number

Aim : Call using Arduino and GSM Module – to a specific mobile number inside the program.

Code :

```
#include SoftwareSerial cell(2,3);
void setup()
{
        cell.begin(9600);
        delay(500);
        Serial.begin(9600);
        Serial.println("CALLING. ........ ");
        cell.println("ATD+9538433364;");
}
void loop()
{
}
```

Handwritten code :



Program No.: 16

Aim: Call using Arduino and GSM Module

Components:

Arduino UNO - 1

GSM Module - 1

Circuit:

- GSM Tx → Arduino Rx
- GSM Rx → Arduino Tx
- GSM gnd ↔ Arduino gnd

Code:

```
#include <SoftwareSerial.h>
SoftwareSerial cell(2,3)
 void setup()
 {
   cell.begin(9600);
   delay(500);
   Serial.begin(9600);
   Serial.println("Calling....");
   cell.println("ATD+9538433364;");
   delay(20000);
  }
 void loop()
 {
 }
```

Observation: Using a specific number calls were made and received by the GSM module.

2. Call to a particular number on an alert

Aim : Call a specified mobile number mentioned in the program using Arduino and GSM Module when a flame sensor detects “fire”.

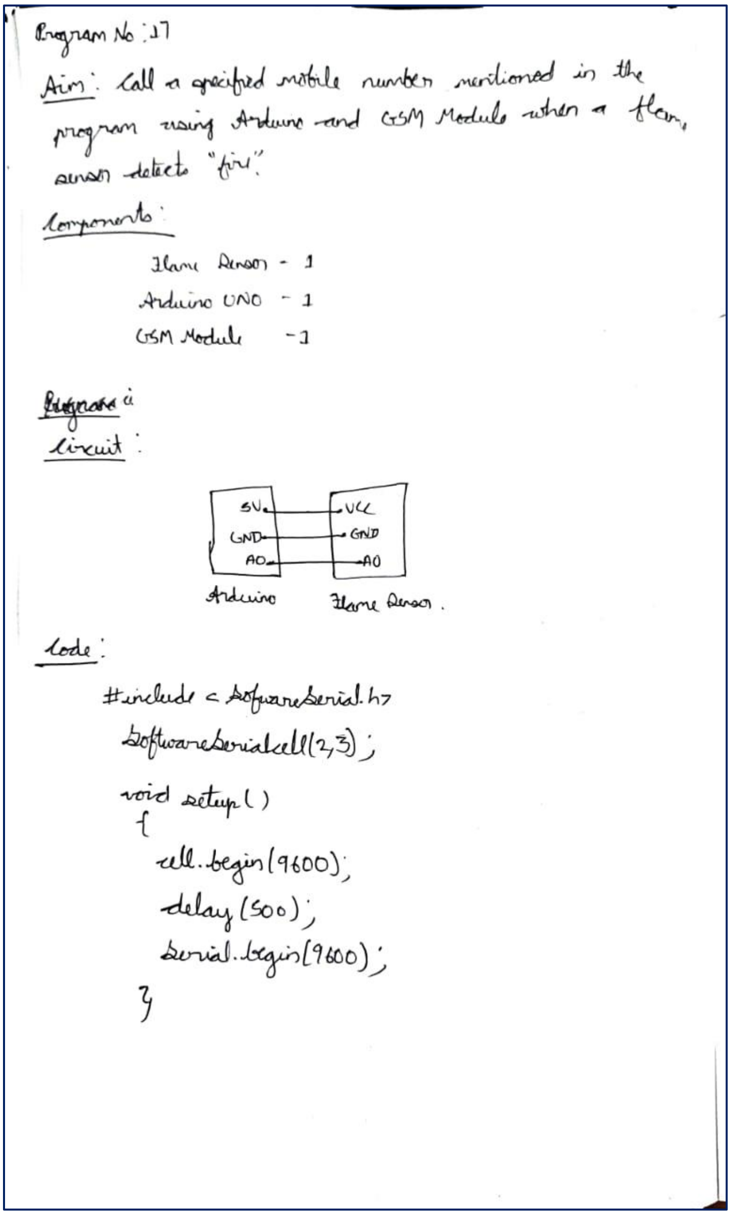
Connections for flame sensor:

Arduino to Flame Sensor 5V to VCC
GND to GND

Code :

```
#include SoftwareSerialcell(2,3);
void setup()
{
    cell.begin(9600);
    delay(500);
    Serial.begin(9600);
}
void loop()
{
    int val=analogRead(A0);
    Serial.println(val);
    delay(1000);
    if (val<50)
    {
        Serial.println(“Calling… ......... ”);
        cell.println(“ATD+;”);
        delay(10000);
        cell.println(“ATH”);
    }
}
```

Handwritten code :



Program No :17

Aim: Call a specified mobile number mentioned in the program using Arduino and GSM Module when a flame sensor detects "fire".

Components:

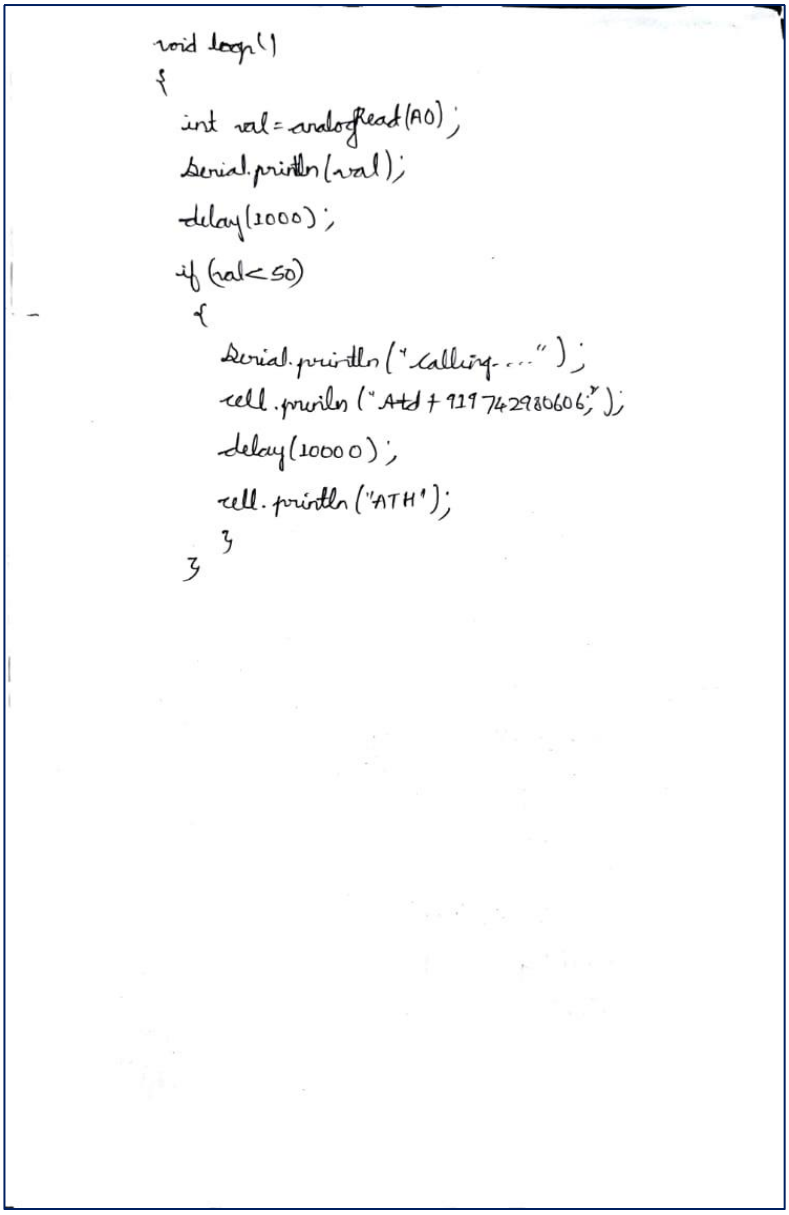
Flame Sensor - 1
Arduino UNO - 1
GSM Module - 1

~~Program~~:
Circuit :

5V
GND
A0
VCC
GND
A0
Arduino
Flame Sensor.

Code:

```
#include <SoftwareSerial.h>
 SoftwareSerialcell(2,3);
 void setup()
  {
   cell.begin(9600);
   delay(500);
   Serial.begin(9600);
  }
```



```
void loop()
{
 int val=analogRead(A0);
 Serial.println(val);
 delay(1000);
 if (val<50)
  {
    Serial.println("Calling....");
    cell.println("Atd+919742980606;");
    delay(10000);
    cell.println("ATH");
    }
 }
```

Observation: Calls were made by the GSM module to a specific number when fire/flame was detected.

3. Sending and Receiving Message Aim:

1) Send SMS using Arduino and GSM Module – to a specific mobile number inside the program

2) 2) Receive SMS using Arduino and GSM Module – to the SIM card loaded in the GSM Module. Program: Note: According to the code, messages will be sent and received when ‘s’ and ‘r’ are pressed through the serial monitor respectively.

Code :

```
#include SoftwareSerial mySerial(2, 3);
void setup()
{
        mySerial.begin(9600);
        Serial.begin(9600);
        delay(100);
}
void loop()
{
        if (Serial.available()>0)
        switch(Serial.read())
        {
                case 's': SendMessage();
                break;
                case 'r': ReceiveMessage();
                break;
        }
        if (mySerial.available()>0)
        {
                Serial.write(mySerial.read());
        }
}
voidSendMessage()
{
        mySerial.println("AT+CMGF=1");

        delay(1000);

        mySerial.println("AT+CMGS=\"+919742980606\"\r");
        delay(1000);
        mySerial.println("I am SMS from GSM Module");
        delay(100);
        mySerial.println((char)26);
        delay(1000);
}
void ReceiveMessage()
{
        mySerial.println("AT+CNMI=2,2,0,0,0");
        delay(1000);
}
```

Observation: Messages were sent and received to and from the GSM module.

4. Controlling LED through received messages:

Aim: Use received messages through Arduino and GSM Module to control Switching ON/OFF the LED.

Pin Connections:

- Attach LED to pin 13 and GND.

Code :

```
#include SoftwareSerial cell(2,3);
voidreadfn()
{
        if (cell.available())
        {
                while (cell.available())
                {
                        Serial.write(cell.read());
                }
        }
}
void setup()
{
        pinMode(13,OUTPUT);
        Serial.begin(9600);
        cell.begin(9600);
        cell.println("AT");
        delay(1000);
        readfn();
}
void loop()
{
        if(cell.available())
        {
        String message =cell.readString();
        Serial.println(message);
         if(message.indexOf("SWITCH ON")>0)
        {
                digitalWrite(13,HIGH);
        }
        else
        if(message.indexOf("SWITCH OFF")>0)
```

```
                {
                        digitalWrite(13,LOW);
                }
                else
                {
                        Serial.println ("Nothing to do...");
                }
                }
        }
```

Observation: Received messages through Arduino and GSM Module to control Switching ON/OFF the LED