VISVESVARAYA TECHNOLOGICAL UNIVERSITY

"JnanaSangama", Belgaum -590014, Karnataka.

LAB REPORT on

INTERNET OF THINGS LAB

Submitted by

Saurav Chhetri (1BM21CS194)

in partial fulfillment for the award of the degree of

BACHELOR OF ENGINEERING

in

COMPUTER SCIENCE AND ENGINEERING

B.M.S. COLLEGE OF ENGINEERING BENGALURU-560019 Oct-2023 to Feb-2024

(Autonomous Institution under VTU)

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 lab” carried out by **Saurav Chhetri (1BM21CS194),** who is a bonafide 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 2023. The Lab report has been approved as it satisfies the academic requirements in respect of a **Internet of things lab (21CS5PCIOT)**work prescribed for the said degree.

Sowmya T
Assistant Professor
Department of CSE
BMSCE, Bengaluru

Dr. Jyothi S Nayak
Professor and Head
Department of CSE
BMSCE, Bengaluru

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

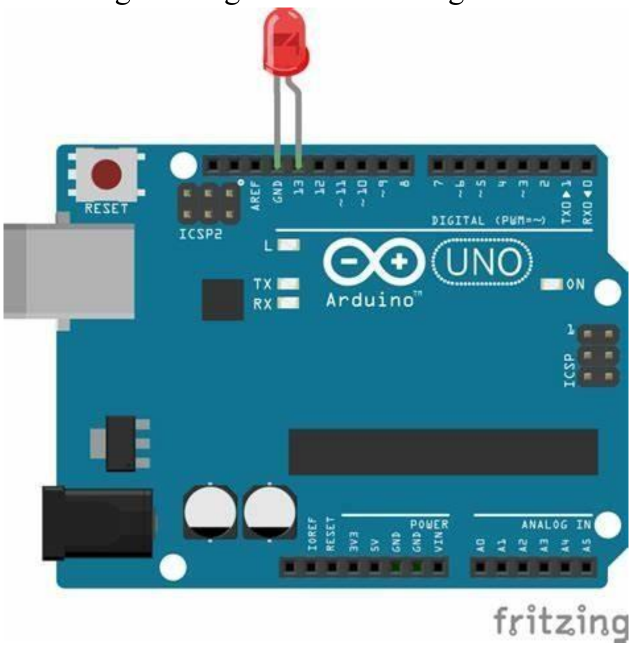
Aim: To control the LED using Arduino (to turn ON/OFF LED)

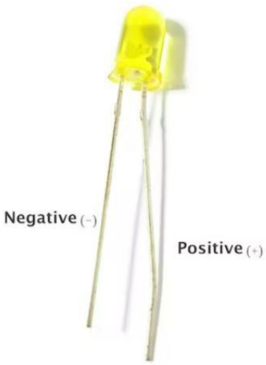
Hardware/components Required.

Arduino Uno board - 1
USB Cable - 1
LED - 1
Jumper wires

Circuit Diagram / Pin connection

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





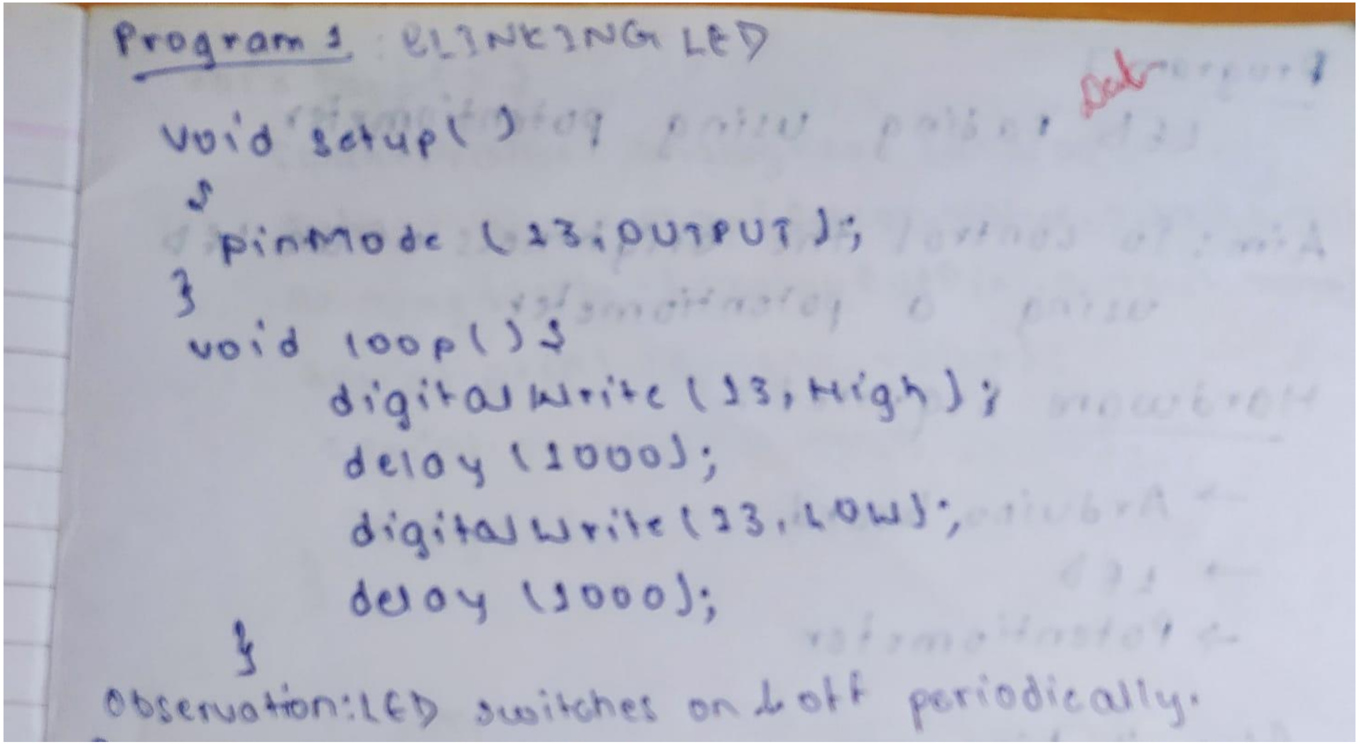
Code:

```
void setup()
{
  // initialize digital pin 9 as an output.
pinMode(13, OUTPUT);
}

void loop()
```

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

Handwritten code pic:



Program 1 : BLINKING LED

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

Observation: LED switches on & off periodically.

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

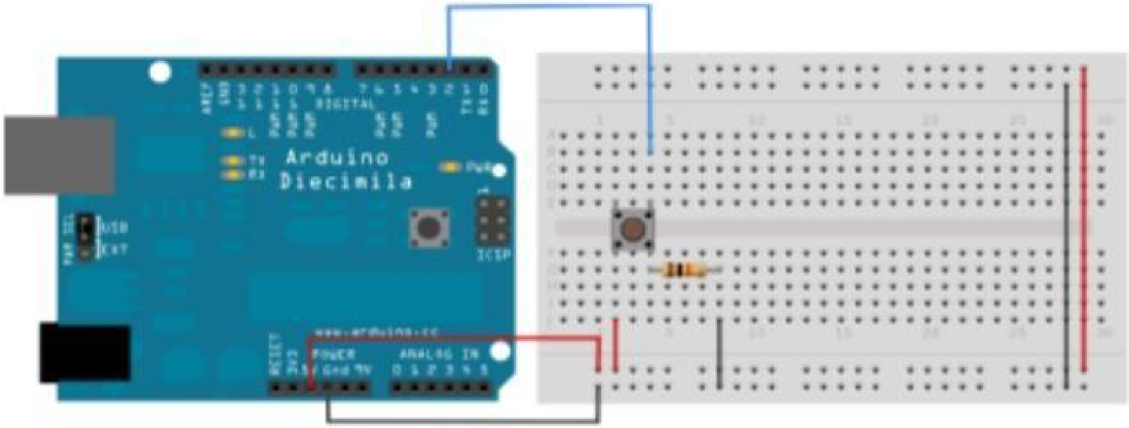
Program no: **02**   Program Title: **LED ON/OFF**

Aim: To turn an LED ON /OFF using a Pushbutton.

Hardware/components Required

Arduino Uno board - 1
USB Cable - 1
LED - 1
Pushbutton
Jumper wires

Circuit Diagram / Pin connection

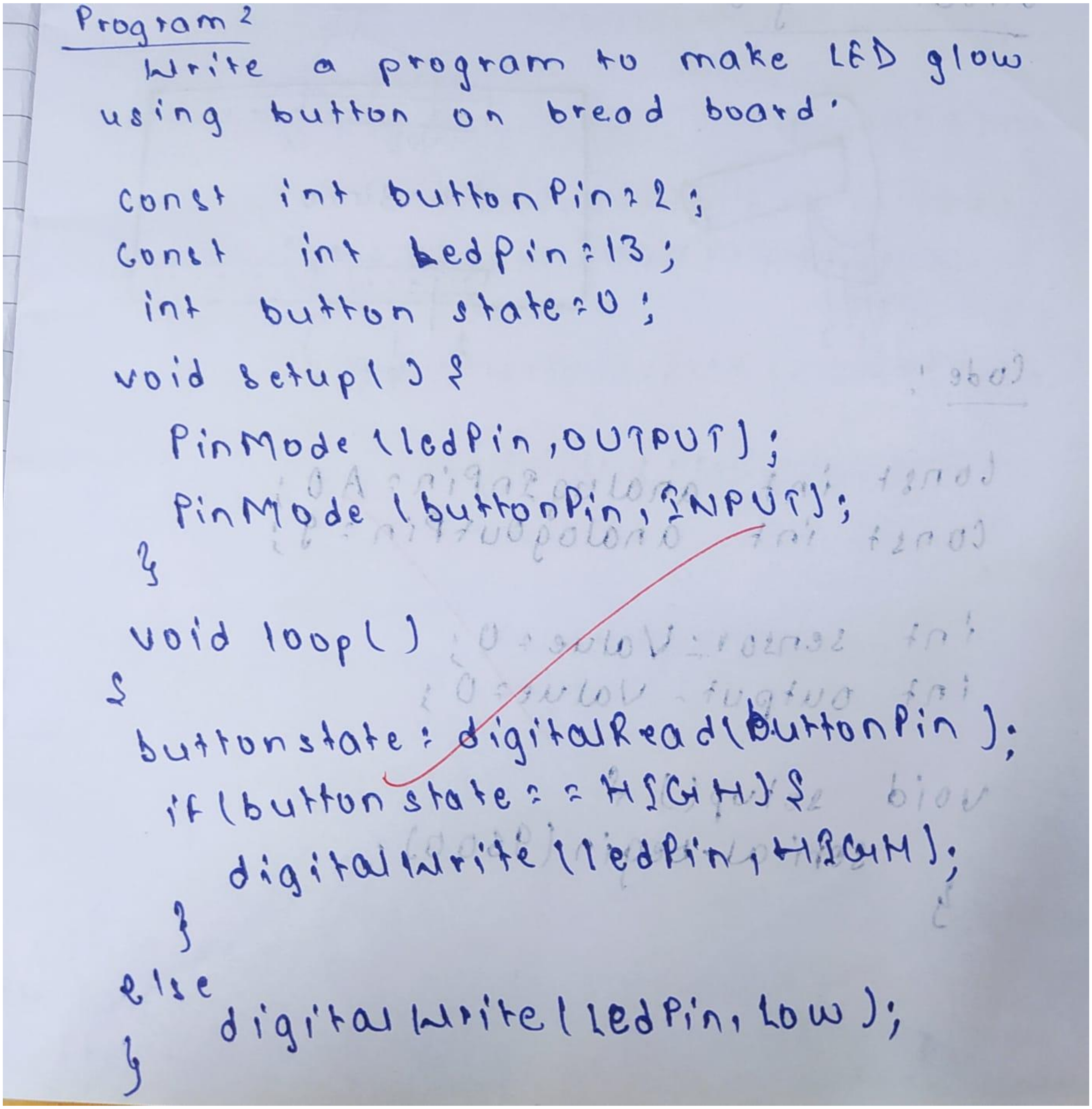


Code:

```
const int buttonPin=2;
const int ledPin=13;
int buttonState=0;
void setup()  {.
  pinMode(ledPin, OUTPUT);
  pinMode(buttonPin,OUTPUT);
}


void loop()
{
  buttonState=digitalRead(buttonPin);
if(buttonState==HIGH){     digitalWrite(ledPin,HIGH)
;
}else{
 digitalWrite(ledPin,LOW);
 }       }
```

Handwritten code pic:



Program 2

Write a program to make LED glow using button on bread board.

```
const int buttonPin=2;
Const int ledPin=13;
 int button state=0;
void setup( ) {
   PinMode (ledPin,OUTPUT);
   PinMode (buttonPin, INPUT);
 }
 void loop( )
{
 buttonstate= digitalRead(ButtonPin );
  if (button state= =HIGH) {
    digitalWrite (ledPin, HIGH);
  }
else
   digitalWrite(LedPin, Low );
}
```

Observation: LED turns ON when push button is pressed and turns OFF when it is released. Digital output visualization using Arduino Uno.

Program no: **03** Program Title: **LED FADING**

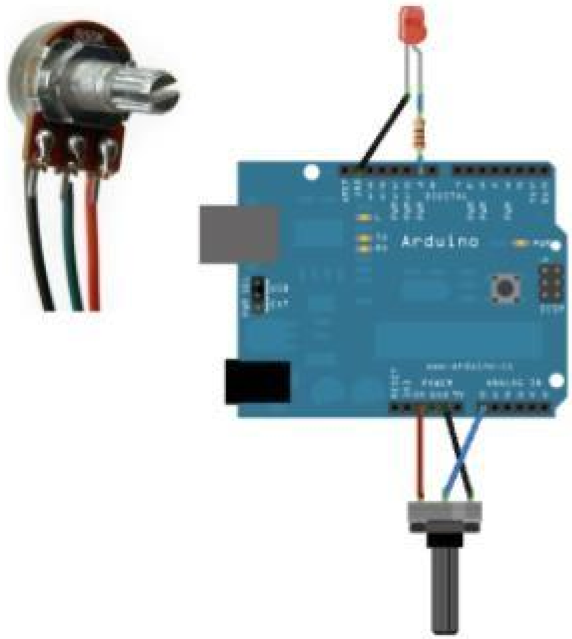
Aim: To control the brightness of an LED using Potentiometer.

Hardware/components Required

Arduino Uno board - 1
USB Cable - 1
LED - 1
Potentiometer
Jumper wires

Circuit Diagram / Pin connection

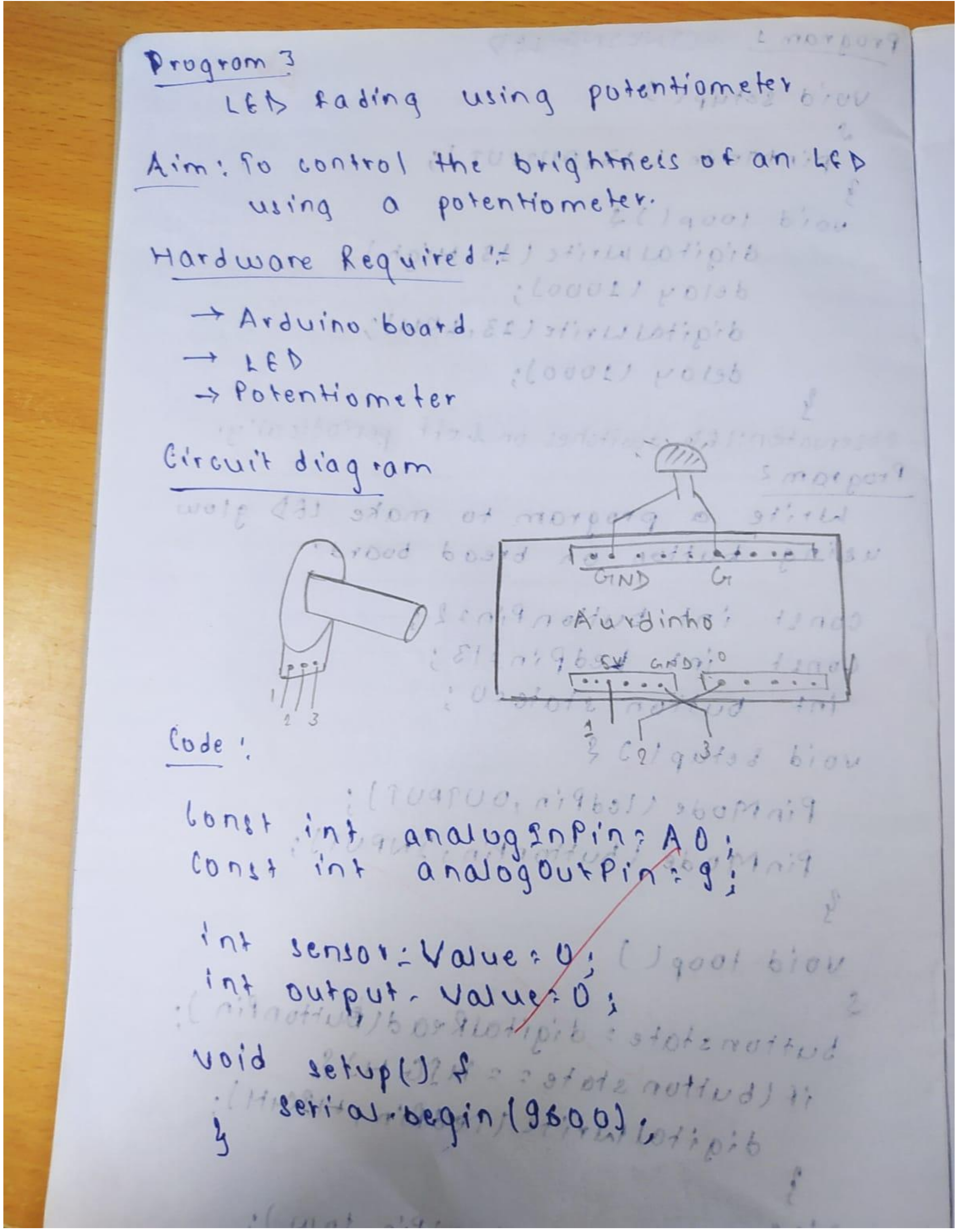
LED positive to pin 9,LED negative to ground
Potentiometer: VCC - 5V , A0 -A0 , GND-GND



Code:

```
const int analogPin=A0;
const int analogOutPin=9;
int sensorValue=0; int
outputValue=0; void
setup(){  Serial.begin(960
0);
} void
loop(){
 sensorValue=analogRead(analogPin); outputValue=map(sensorValue,0,1023,0,255);
analogWrite(analogOutPin,outputValue);
Serial.print(sensorValue);
Serial.print(outputValue);
delay(2); }
```

Handwritten code pic:



Program 3

LED fading using potentiometer

Aim: To control the brightness of an LED using a potentiometer.

Hardware Required:-

→ Arduino board
→ LED
→ Potentiometer

Circuit diagram

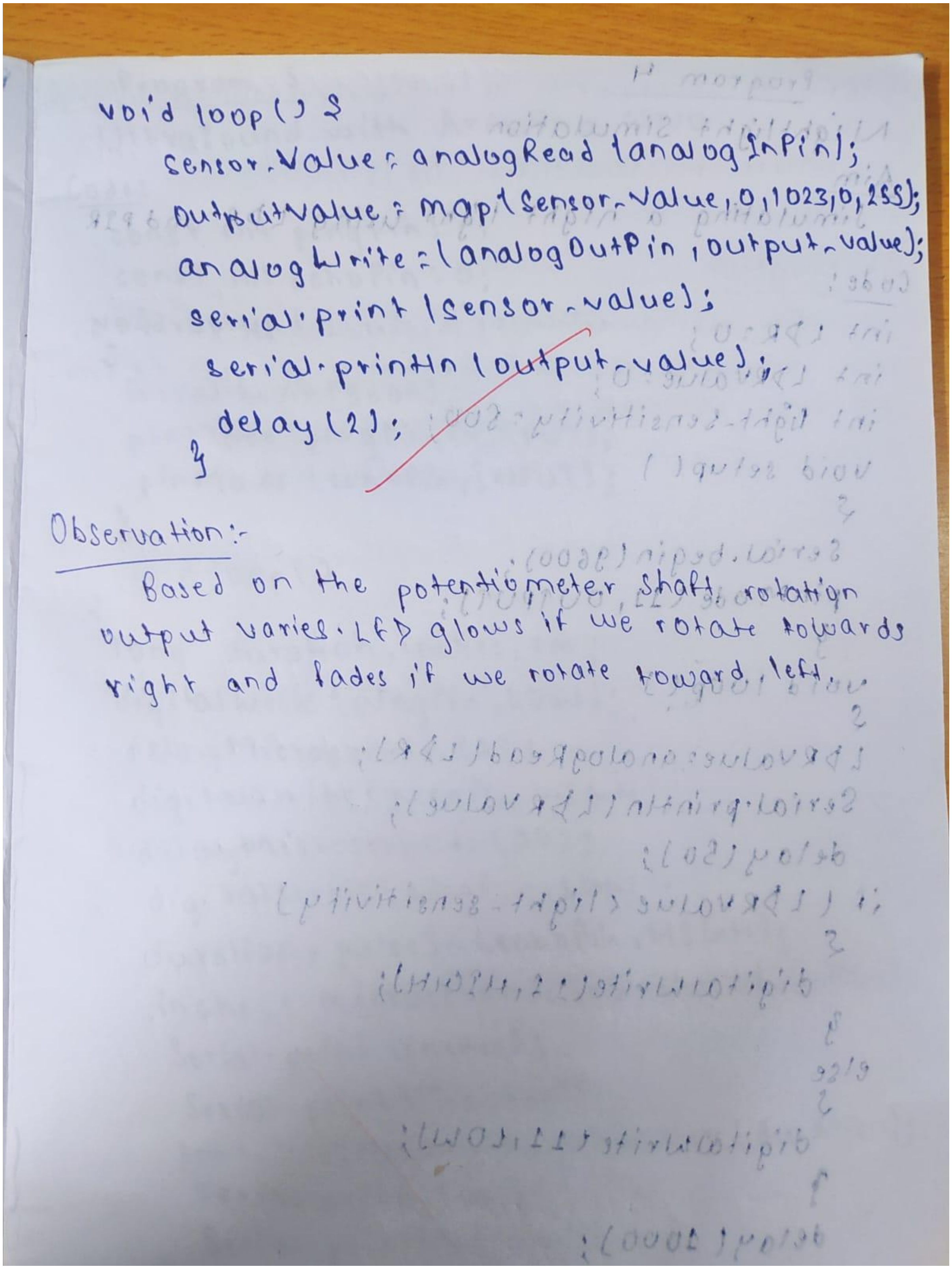
GND
G
Aurdino
5V
GND
1
2
3
1
2
3

Code:

```
Const int analogInPin = A0;
Const int analogOutPin = 9;

int sensor-Value = 0;
int output-Value = 0;

void setup() {
  serial.begin(9600);
}
```



```
void loop() {
    Sensor.Value = analogRead (analogInPin);
    OutputValue = map(Sensor_Value,0,1023,0,255);
    analogWrite =(analogOutPin , output_value);
    serial.print (sensor_value);
     serial.println (output_value);
     delay (2);
  }
```

Observation:-

Based on the potentiometer shaft rotation output varies. LED glows if we rotate towards right and fades if we rotate toward, left.

Observation: Based on the potentiometer shaft rotation output varies.LED glows if we rotate towards right and fades if we rotate towards left..

Program no:**04** Program Title: **LED FADING**

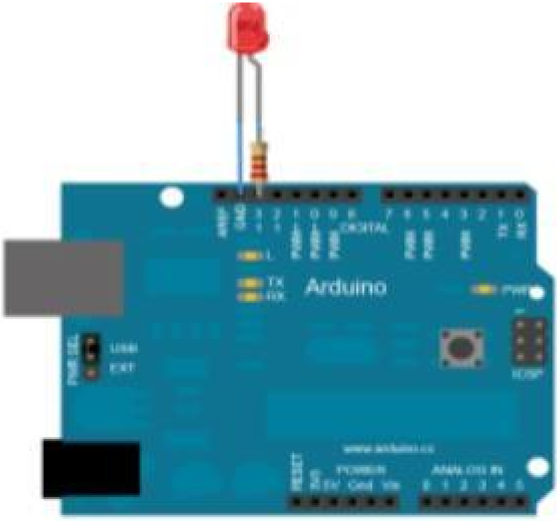
Aim: To control the brightness of an LED without using a Potentiometer.

Hardware/components Required

Arduino Uno board - 1
USB Cable - 1
LED - 1
Jumper wires

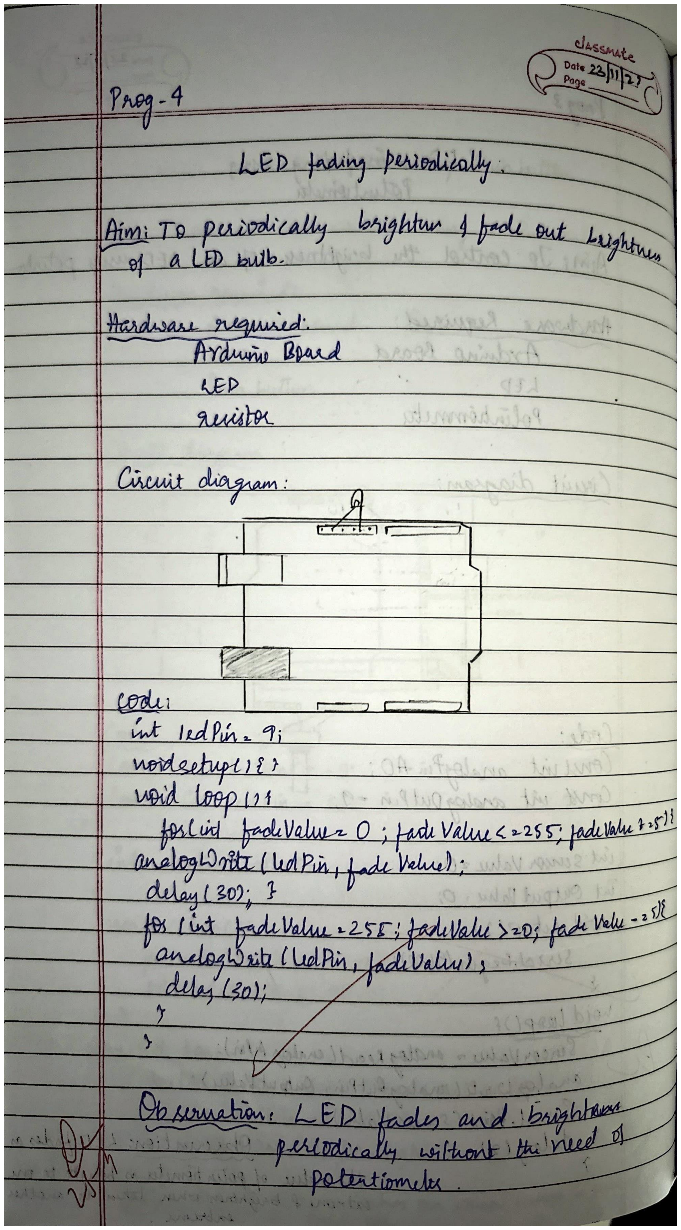
Circuit Diagram / Pin connection

LED positive to pin 9, negative to ground



Code:

```
int ledPin = 9;    // LED connected to
digital pin 9 void setup() {
  } void
loop()
{
  // fade in from min to max in increments of 5 points:
  for (int fadeValue = 0 ; fadeValue <= 255; fadeValue += 5)
{     // sets the value (range from 0 to 255):
    analogWrite(ledPin, fadeValue);     delay(30); // wait for 30
milliseconds to see the dimming effect
  }
  // fade out from max to min in increments of 5 points:
  for (int fadeValue = 255 ; fadeValue >= 0; fadeValue -= 5)
 {    // sets the value (range from 0 to 255):
    analogWrite(ledPin, fadeValue);
 delay(30);   }   }
```



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Date 23/11/23
Page

Prog-4

LED fading periodically.

Aim: To periodically brighten & fade out brightness of a LED bulb.

Hardware required:
Arduino Board
LED
resistor

Circuit diagram:

code:

```
int ledPin = 9;
voidsetup(){}
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: LED fades and brightens periodically without the need of potentiometer.

Handwritten code pic:

Observation:LED fades and glows periodically , output is visualized using arduino uno.

Program no:**05**   Program Title: **Nightlight Simulation**

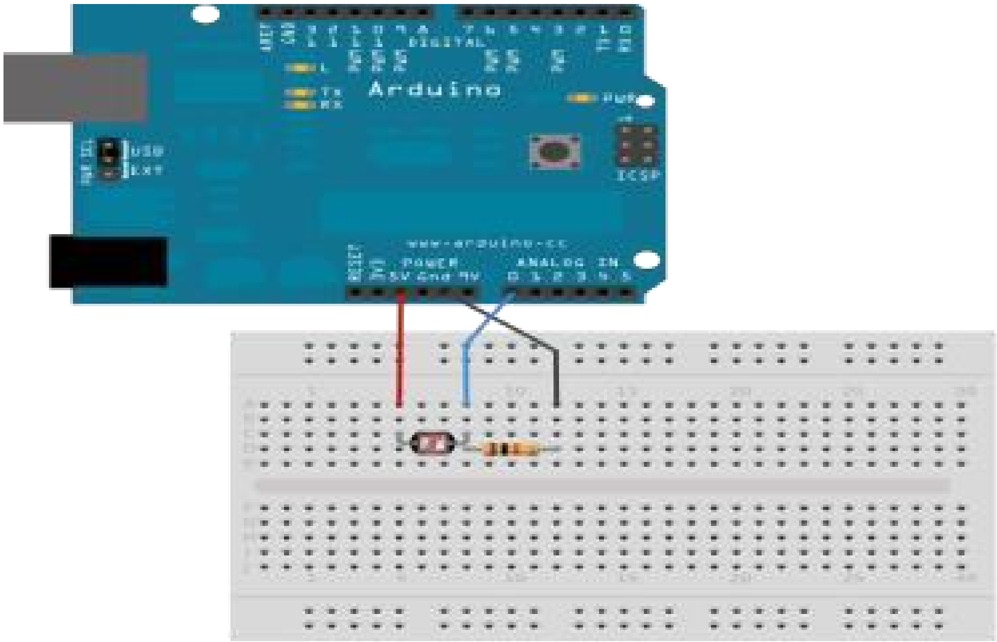
Aim: Simulating a night light using LDR

Hardware/components Required

Arduino Uno board - 1
USB Cable - 1
LED - 1
LDR-1
10K resistor-1
Jumper wires

Circuit Diagram / Pin connection

1. Attach one leg of LDR to 5V and another leg to Arduino Analog pin A0
2. Attach one leg of 110K register with that leg of LDR connected to A0
3. Attach another leg of register to the ground
4. Connect the positive leg of LED to pin 11 and negative to GND



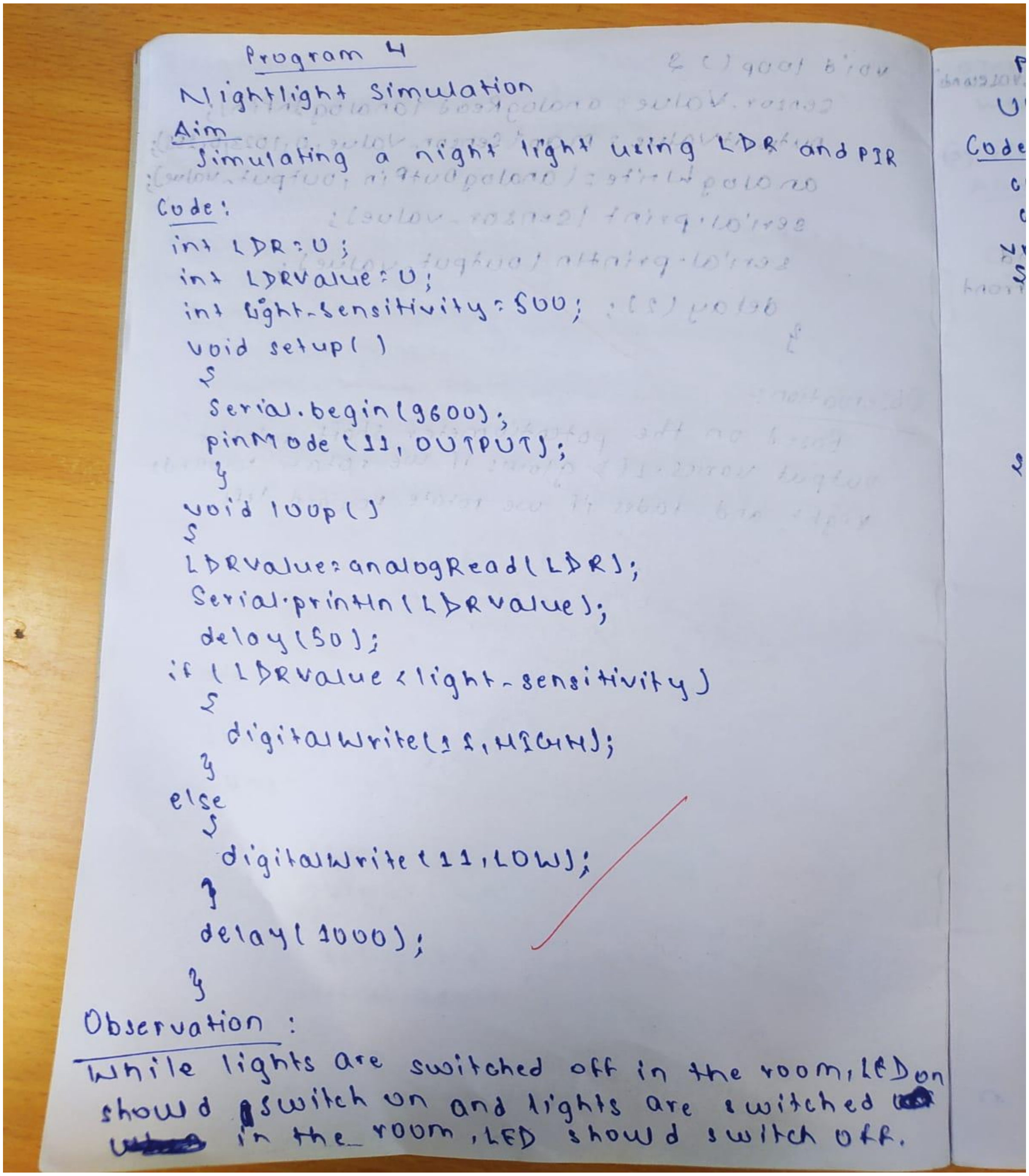
Code:

```
int LDR = 0; //analog pin to which LDR is connected, here we set it to 0 so it
means A0 int LDRValue = 0; //that’s a variable to store LDR values
int light_sensitivity = 500; //This is the approx value of light surrounding your LDR
void setup()
 {
 Serial.begin(9600); //start the serial monitor with 9600 buad
 pinMode(11, OUTPUT); //attach positive leg of LED to pin 11
 }

void loop()
 {
 LDRValue = analogRead(LDR); //reads the ldr’s value through LDR
Serial.println(LDRValue); //prints the LDR values to serial monitor  delay(50);
//This is the speed by which LDR sends value to arduino

 if (LDRValue < light_sensitivity)
 {
 digitalWrite(11, HIGH);
 }
else
 {
 digitalWrite(11, LOW);
 }
 delay(1000);
 }
```

Handwritten code pic:



Program 4

Nightlight Simulation

Aim

Simulating a night light using LDR and PIR

Code:

```
int LDR=0;
 int LDRValue=0;
 int light_sensitivity=500;
 void setup( )
  {
   Serial.begin(9600);
   pinMode(11, OUTPUT);
   }
 void loop( )
 {
 LDRValue=analogRead(LDR);
  Serial.println(LDRValue);
  delay(50);
if (LDRValue<light_sensitivity)
  {
    digitalWrite(11,HIGH);
  }
else
  {
   digitalWrite(11,LOW);
  }
  delay(1000);
 }
```

Observation :

While lights are switched off in the room, LED on should switch on and lights are switched in the room, LED should switch off.

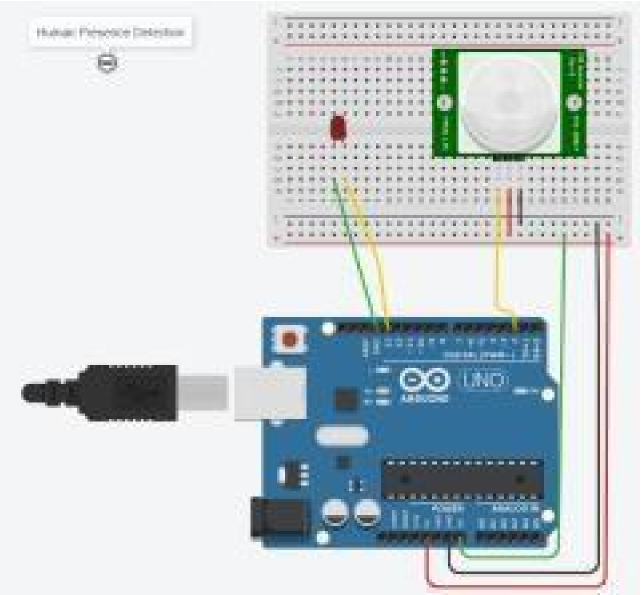
Observation: While lights are switched off in the room, LED should switch ON, when lights are switched on in the room, LED should switch off immediately.

Program no: **06** Program Title: **Nightlight Simulation**

Aim: Simulating a night light using PIR

Hardware/components Required
Arduino Uno board - 1
USB Cable - 1
LED - 1
PIR sensor-1
Jumper wires

Circuit Diagram / Pin connection



Code: int

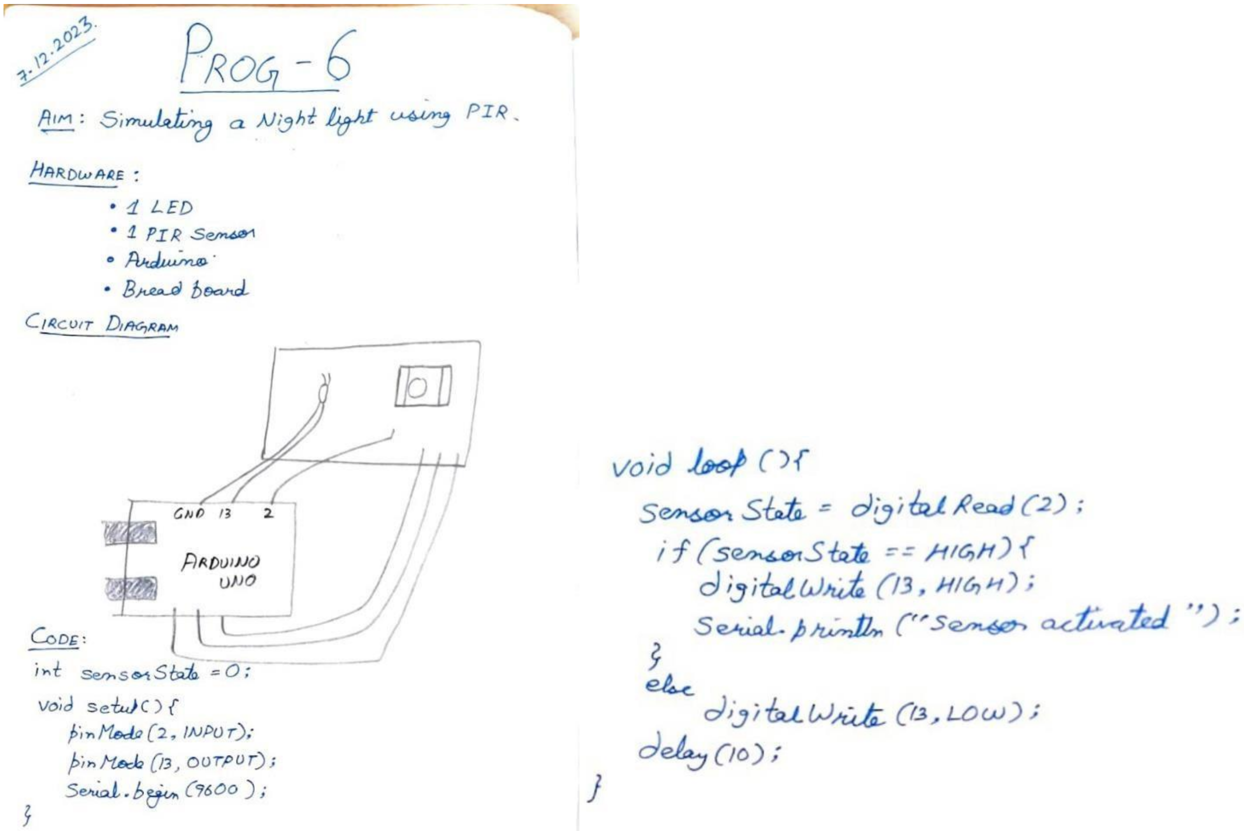
```
sensorState = 0;

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

}
```

```
void loop()
{
 // read the state of the sensor/digital input sensorState
 = digitalRead(2);
 // check if sensor pin is HIGH. if it is, set the //
 LED on.
 if (sensorState == HIGH) {
   digitalWrite(13, HIGH);
   Serial.println("Sensor activated!");
  } else {  digitalWrite(13,
   LOW);
  }  delay(10);
 }
```

Handwritten code pic:



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PROG - 6

AIM: Simulating a Night light using PIR.

HARDWARE:

- 1 LED
- 1 PIR Sensor
- Arduino
- Bread board

CIRCUIT DIAGRAM

GND
13
2
ARDUINO
UNO

CODE:

```
int  sensorState = 0;
void setup() {
   pinMode(2, INPUT);
   pinMode(13, OUTPUT);
   Serial.begin(9600);
}
```

```
void loop(){
  sensorState = digitalRead(2);
   if(sensorState == HIGH){
     digitalWrite(13, HIGH);
     Serial.println("Sensor activated");
  }
  else
     digitalWrite(13, LOW);
  delay(10);
}
```

Observation: While lights are switched off in the room, LED should switch ON, when lights are switched on in the room, LED switches off.

Program no: **07** Program Title: **Ultrasound sensing**

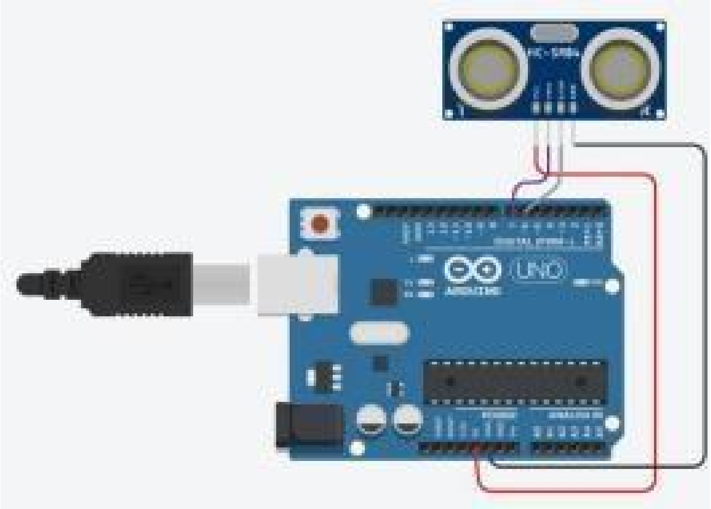
Aim: Simulating ultrasound with Arduino UNO and Ultrasonic sensor

Hardware/components Required

Arduino Uno board - 1
USB Cable - 1
Ultrasonic sensor-1
Jumper wires

Circuit Diagram / Pin connection

VCC-5V , GND-GND , pingpin-7 , echopin - 6

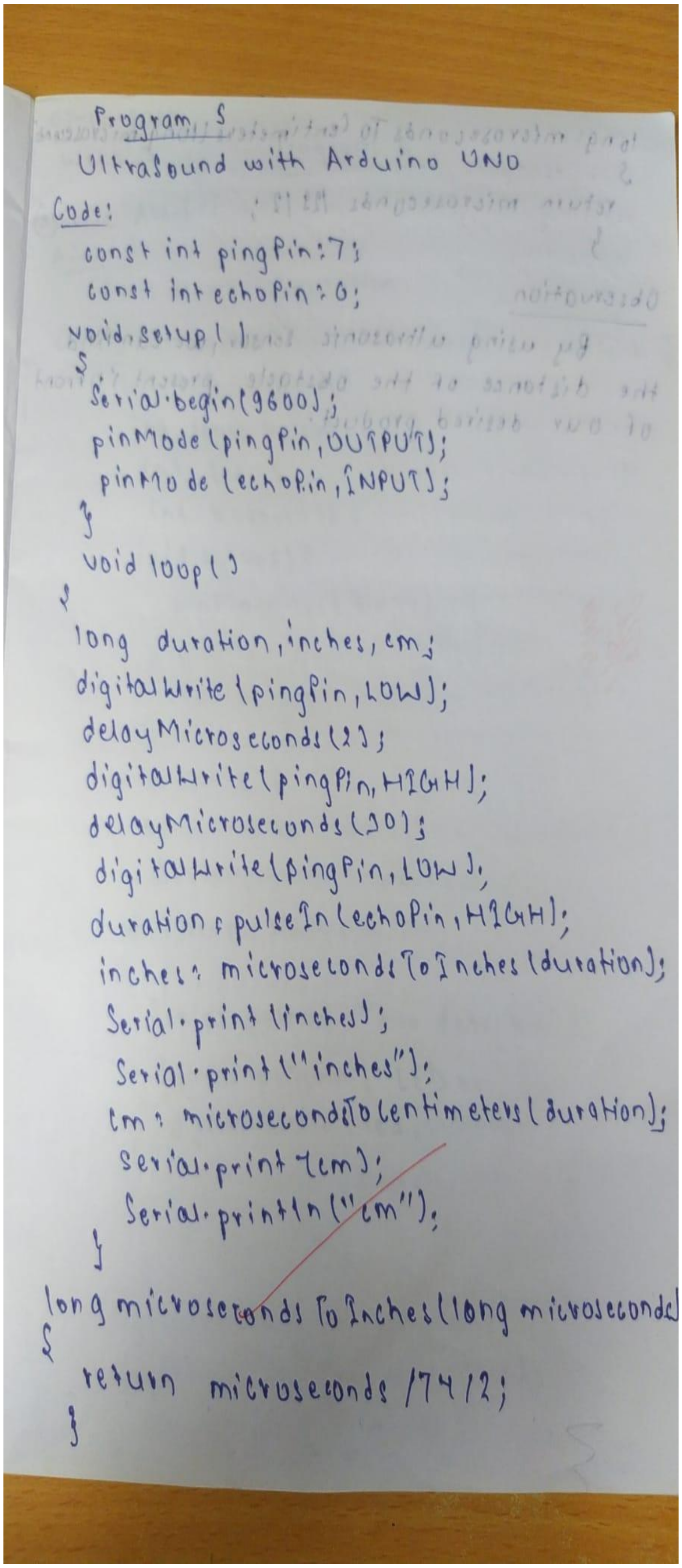


Code:

```
const int pingPin = 7;

const int echoPin=6;// Trigger Pin of Ultrasonic Sensor const int echoPin = 6; // Echo Pin of
Ultrasonic Sensor

void setup()

{

Serial.begin(9600);  pinMode(pingPin,

OUTPUT);   pinMode(echoPin,

INPUT);
```

```
 }   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);
 Serial.print(inches);   Serial.print("inches");
cm = microsecondsToCentimeters(duration);
 Serial.print(cm);
 Serial.println("cm");
}
long microsecondsToInches(long microseconds)  {   return
microseconds / 74 / 2;
 }
long microsecondsToCentimeters(long microseconds) {
return microseconds / 29 / 2;
}
```

Handwritten code pic:

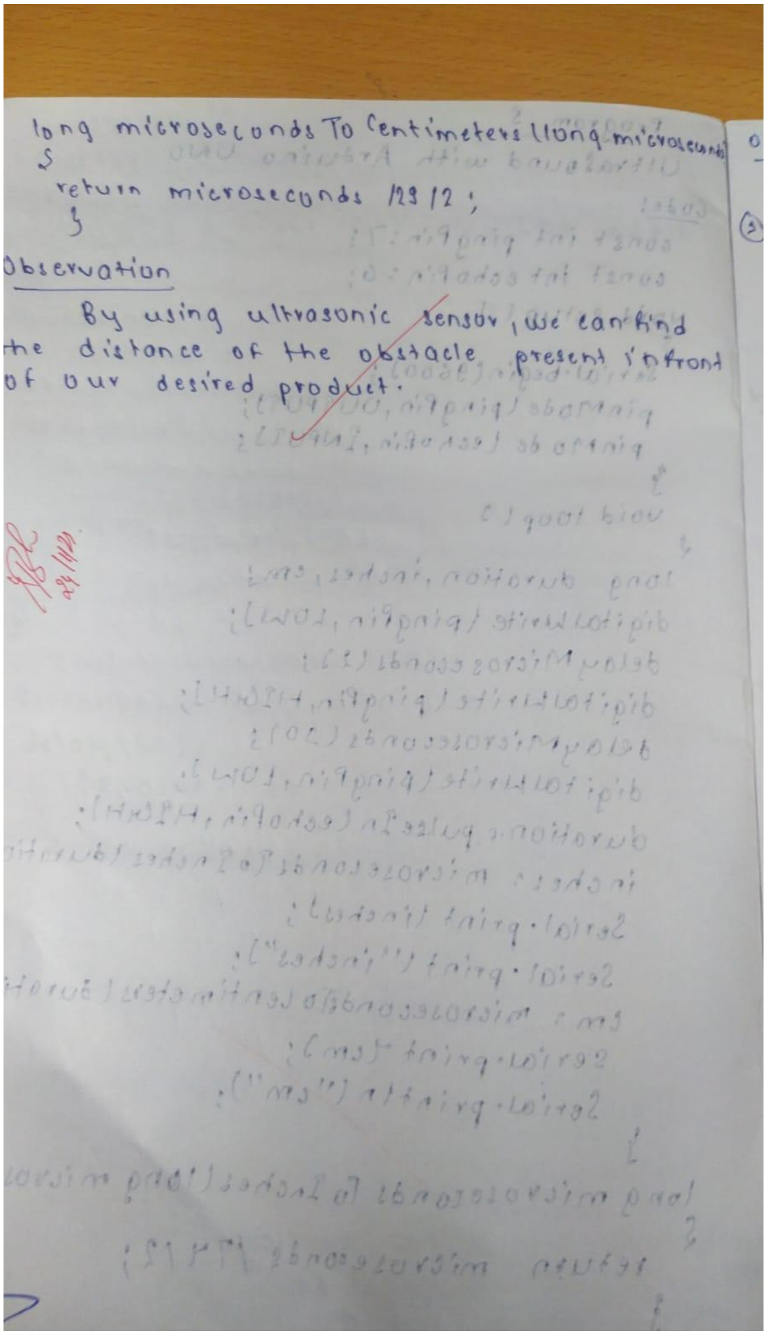


Program 5

Ultrasound with Arduino UNO

Code:

```
const int pingPin:7;
const int echoPin:6;
void setup()
{
  Serial.begin(9600);
  pinMode(pingPin,OUTPUT);
  pinMode(echoPin,INPUT);
}
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);
  Serial.print(inches);
  Serial.print("inches");
  cm: microsecondsToCentimeters(duration);
  serial.print(cm);
  Serial.println("cm");
}
long microsecondsToInches(long microseconds
{
  return microseconds/74/2;
}
```



```
long microsecondsToCentimeters(long microseconds)
{
  return microseconds /29 /2 ;
  }
```

Observation

By using ultrasonic sensor, we can find the distance of the obstacle present infront of our desired product.

Observation: Based on vibrations of sound,distance will be measured.

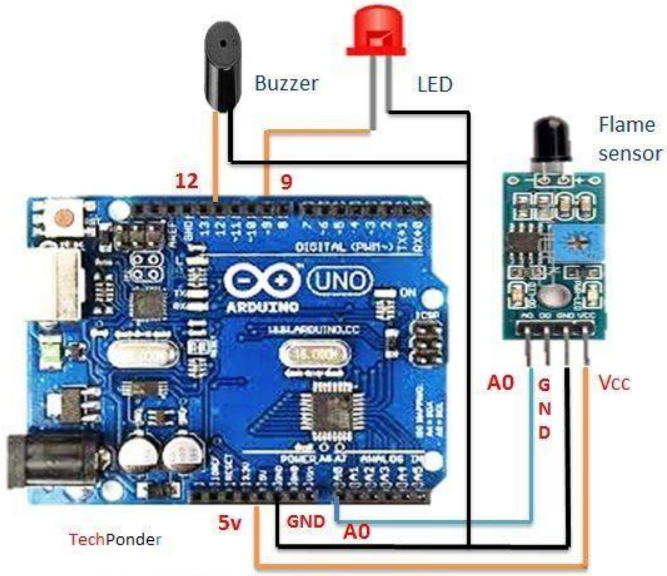
Program no: **08** Program Title: **Fire Alert**

Aim: Fire alarm simulation

Hardware/components Required

Flame sensor (Analogue Output)
Arduino
Bread board
LED
Buzzer
Connecting wires

Circuit Diagram / Pin connection



Flame Detection using Arduino

Flame sensor interfacing to Arduino

Flame sensor to Arduino vcc -> vcc

gnd -> gnd

A0 -> A0

Led interfacing to Arduino

LED +ve is connected to **9th pin** of Arduino

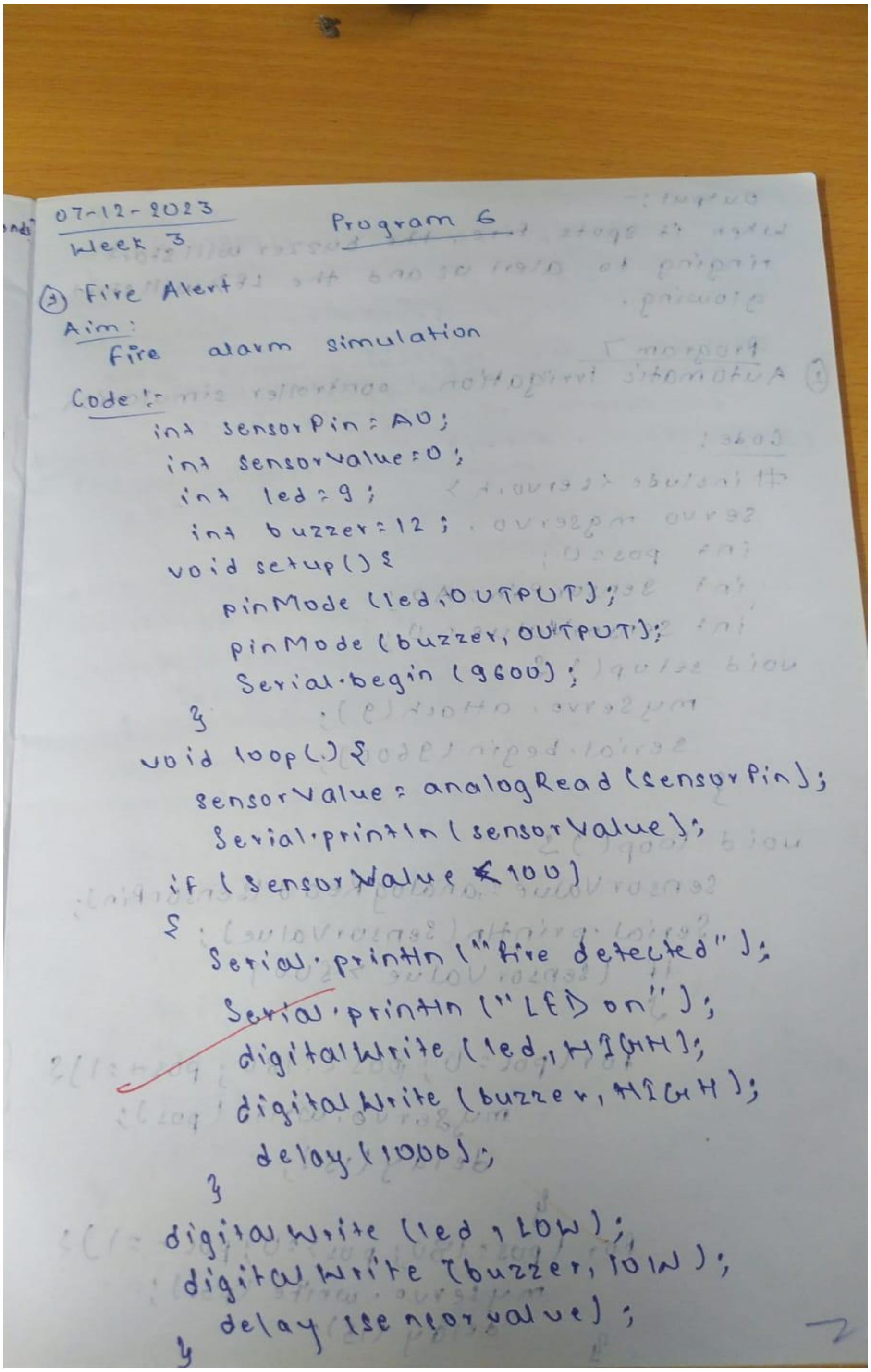
LED -ve is connected to **gnd pin** of arduino

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; // select the input pin for the LDR
int sensorValue = 0; // variable to store the value coming from the sensor
int led = 9; // Output pin for LED int buzzer = 12; // Output pin for
Buzzer void setup() {
// declare the ledPin and buzzer as an OUTPUT:
pinMode(led, OUTPUT); pinMode(buzzer,OUTPUT);
Serial.begin(9600);
} void
loop() {
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 pic:



07-12-2023
Week 3

Program 6

(1) Fire Alert

Aim:
fire alarm simulation

Code:-

```
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 < 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);
 }
```

Observation: When flame is detected,LED and buzzer turns ON.

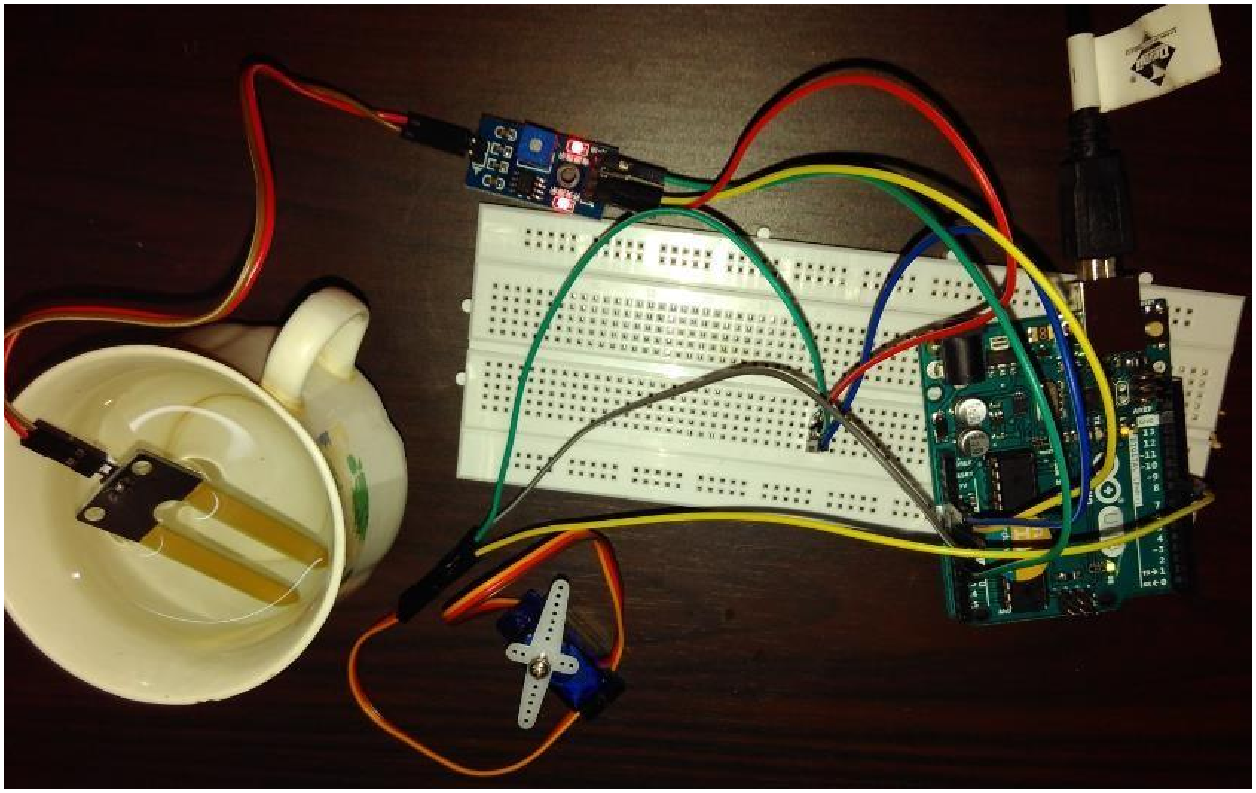
Program no: **09**   Program Title: **Automatic Irrigation**

Aim: Sensing the soil moisture and sprinkling the Water simulation

Hardware Required

Arduino
Moisture Sensor
Breadboard
Min servo motor

Circuit diagram



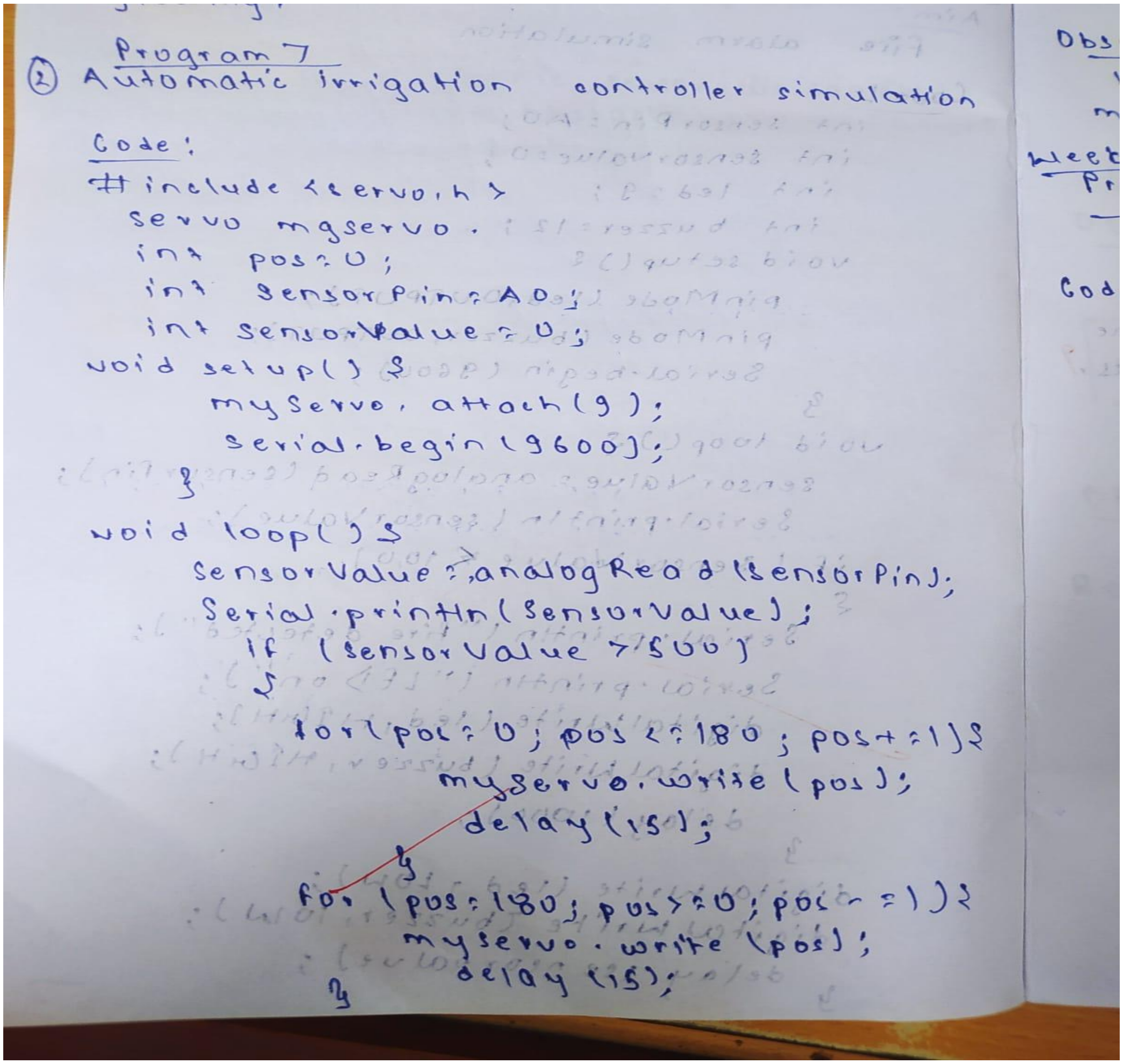
Moisture sensor VCC to Arduino 5V
Moisture sensor GND to Arduino GND
Moisture sensor A0 to Arduino A0

Servo motor VCC to Arduino 5V
Servo motor GND to Arduino GND
Servo Motor Signal to Arduino digital pin 9

Code:

```
#include <Servo.h>
Servo myservo;  // create servo object to control a servo
// twelve servo objects can be created on most boards
int pos = 0;    // variable to store the servo position

int sensorPin = A0;    // select the input pin for the potentiometer int
sensorValue = 0;  // variable to store the value coming from the sensor
void setup() {
 myservo.attach(9);  // attaches the servo on pin 9 to the servo object
Serial.begin(9600);
} void loop()
{
  // read the value from the sensor: sensorValue
= analogRead(sensorPin); Serial.println
(sensorValue); if(sensorValue>500)
{
  for (pos = 0; pos <= 180; pos += 1) { // goes from 0 degrees to 180 degrees
    // in steps of 1 degree     myservo.write(pos);              // tell servo to go to
position in variable 'pos'     delay(15);                       // waits 15ms for the
servo to reach the position
  }
  for (pos = 180; pos >= 0; pos -= 1) { // goes from 180 degrees to 0
degrees     myservo.write(pos);              // tell servo to go to position in
variable 'pos'     delay(15);                       // waits 15ms for the servo to
reach the position   } } delay (1000);
}
```

Handwritten code pic:

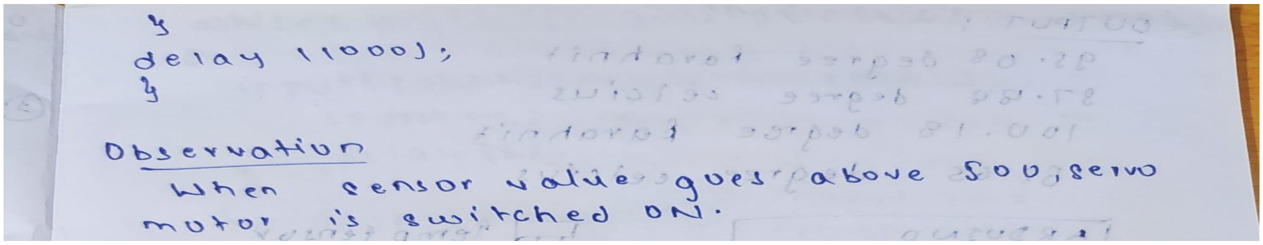


Program 7

② Automatic irrigation controller simulation

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);
   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);
}
```

Observation

When sensor value goes above 500, servo motor is switched ON.

Observation: Soil moisture sensor continuously detects the soil moisture and servo motor would turn ON when there is a low moisture level.

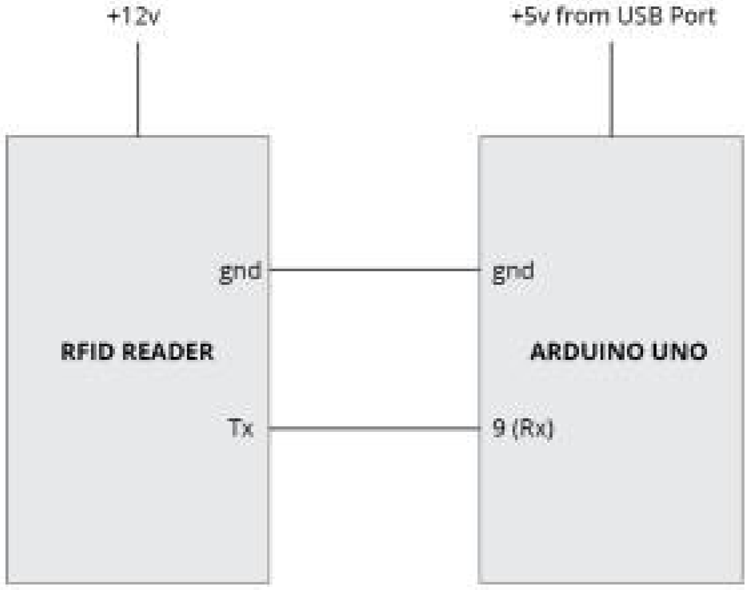
Program no: **10** Program Title: **READING RFID TAG**

Aim: To read the code present on RFID tag and print it in serial monitor.

Hardware/components Required

Arduino Uno board - 1
USB Cable - 1
RFID tag
Jumper wires

Circuit Diagram / Pin connection
5V-Arduino 5V GND-Arduino GND Tx-pin 9

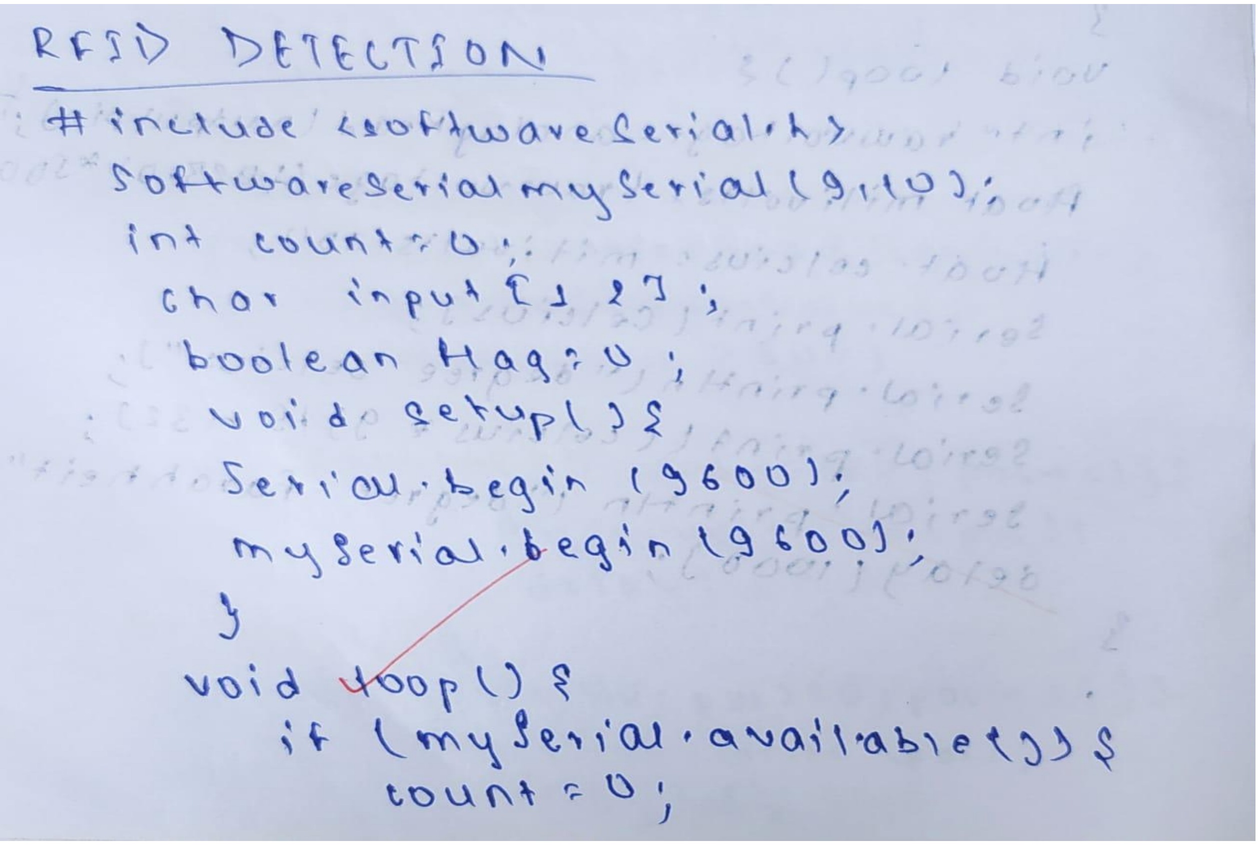


Interfacing RFID Reader to Arduino

Code:

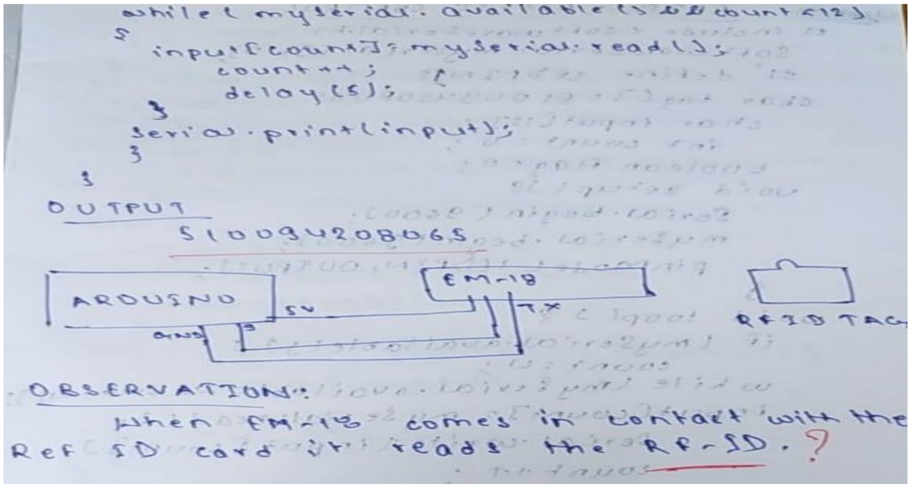
```
#include<SoftwareSerial.h>

SoftwareSerial mySerial(9, 10);

int count = 0; // count = 0
char input[12]; // character array of size 12
boolean flag = 0; // flag
=0  void setup()  {
   Serial.begin(9600); // begin serial port with baud rate 9600bps mySerial.begin(9600);
}  void
loop()
{  if(mySerial.available())
   {  count =
     0;
     while(mySerial.available() && count < 12) // Read 12 characters and store them in input
array
      {  input[count]
        =mySerial.read();  count++;
        delay(5);
      }
      Serial.print(input); // Print RFID tag number

        }
}
```

Handwritten code pic:



RFID DETECTION

```
#include <softwareSerial.h>
 SoftwareSerial mySerial(9,10);
 int count=0;
  char input[12];
  boolean flag=0;
   void setup(){
   Serial.begin(9600);
    mySerial.begin(9600);
   }
  void loop(){
     if (mySerial.available()){
       count=0;
```



```
   while( mySerial.available() && count<12)
  {
    input[count]=mySerial.read();
       count++;
       delay(5);
    }
   serial.print(input);
   }
 }
```

OUTPUT

```
     S1009420806S
```

ARDUINO
5V
GND
EM-18
TX
RFID TAG

OBSERVATION:

When EM-18 comes in contact with the Ref ID card it reads the RF-ID. ?

Observation: The output consists of 12 character ASCII data, where first 10 bits will be the tag number and last 2 bits will be the XOR result of the tag number which can be used for error correction.

Program no: **11** Program Title: **ACCESS CONTROL via RFID TAG**

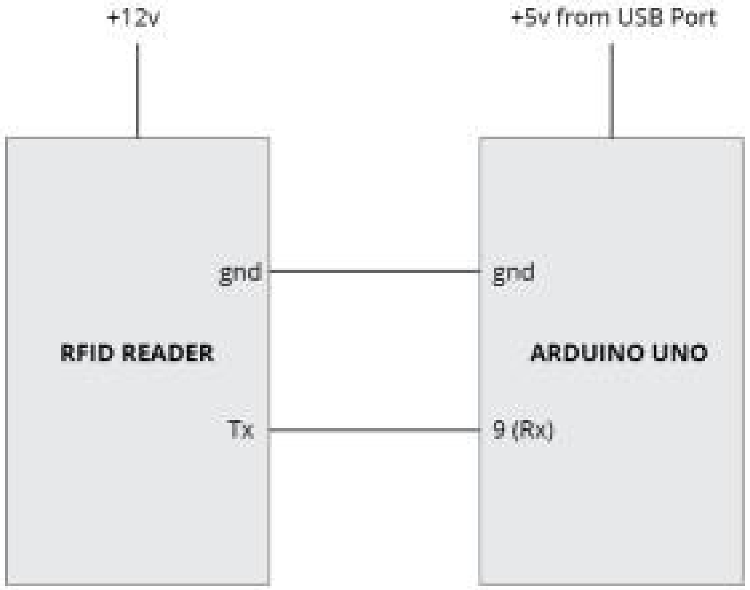
Aim: To read the code present on RFID tag tapped. If the code matches with the previously known tag(configured in the code), it will grant access(here LED will glow), otherwise access will be denied.

Hardware/components Required

Arduino Uno board - 1
USB Cable - 1
RFID tag
Jumper wires

Circuit Diagram / Pin connection

5V-Arduino 5V GND-Arduino GND Tx-pin 9



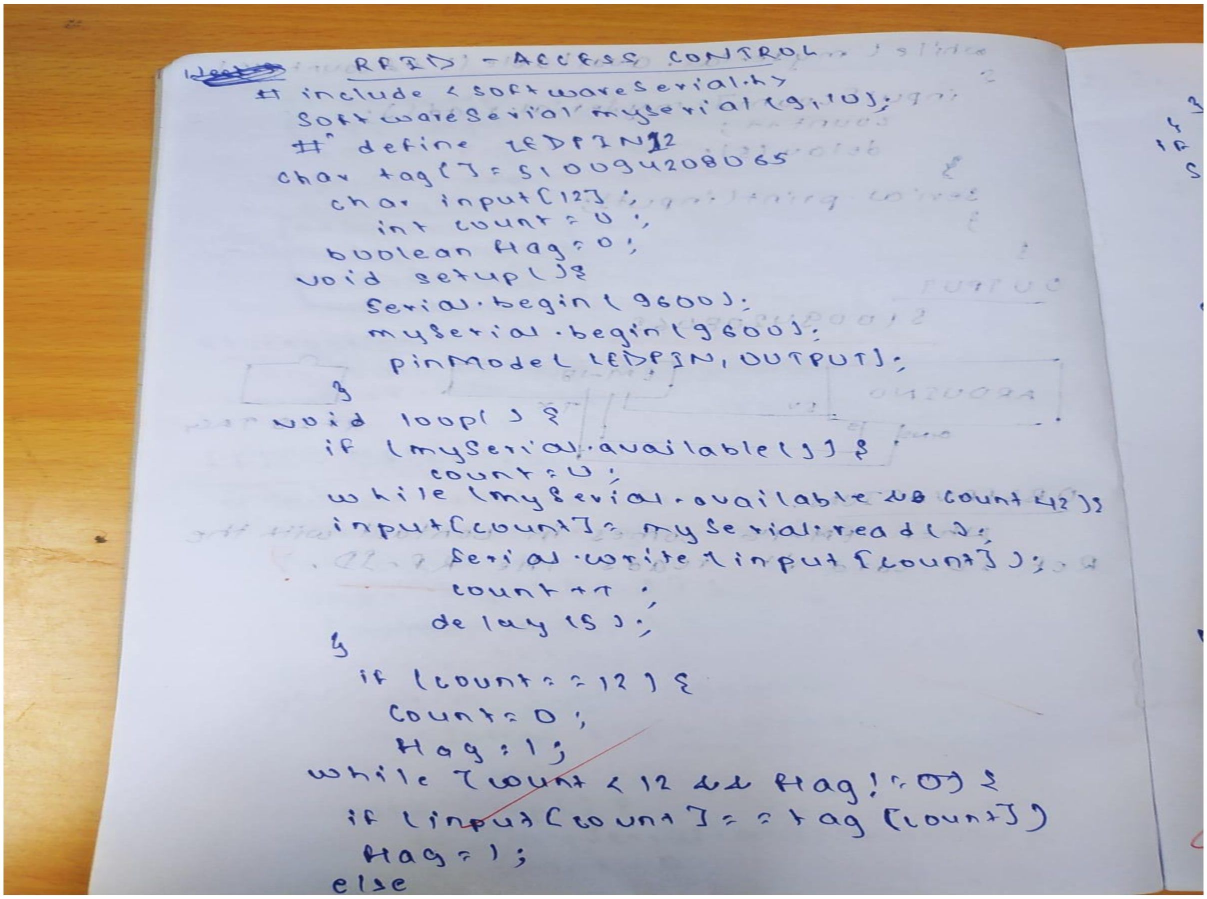
Interfacing RFID Reader to Arduino

Code:

```
#include<SoftwareSerial.h>

SoftwareSerial mySerial(9, 10);
#define LEDPIN 12
char tag[] ="5300292DD087"; // Replace with your own Tag ID
char input[12]; // A variable to store the Tag ID being presented int count = 0; // A counter
variable to navigate through the input[] character array
boolean flag = 0; // A variable to store the Tag match status void setup()
{
        Serial.begin(9600); // Initialise Serial Communication with the Serial Monitor
          mySerial.begin(9600);
        pinMode(LEDPIN,OUTPUT); //WRONG TAG INDICATOR
}  void
loop()
{  if(mySerial.available())// Check if there is incoming data in the RFID Reader Serial
Buffer.
        {  count = 0; // Reset the counter to zero
                /* Keep reading Byte by Byte from the Buffer till the RFID Reader Buffer is
        empty  or till 12 Bytes (the ID size of our Tag) is read */
                while(mySerial.available() && count < 12)
                 {  input[count] = mySerial.read();
                                // Read 1 Byte of data and store it in the input[] variable
                              Serial.write(input[count]);  count++;
                        // increment counter
                        delay(5);  }
                /* When the counter reaches 12 (the size of the ID) we stop and compare each
value  of the input[] to the corresponding stored value */
                if(count == 12) //
                 {  count =0; // reset counter varibale to 0
                        flag = 1;
                            /* Iterate through each value and compare till either the 12 values are
                              all matching or till the first mistmatch occurs */
                        while(count<12 && flag !=0)
                         {  if(input[count]==tag[count])  flag = 1; // everytime the values match,
                                we set the flag variable
to 1  else  flag= 0;
                         /* if the ID values don't match, set flag variable to 0 and  stop
                       comparing by exiting the while loop */
                                count++; // increment i
                        }
                 }  if(flag == 1) // If flag variable is 1, then it means the tags
                  match
                 {
                        Serial.println("Access Allowed!");
                        digitalWrite(LEDPIN,HIGH);  delay
                        (2000);
                        digitalWrite (LEDPIN,LOW);
```

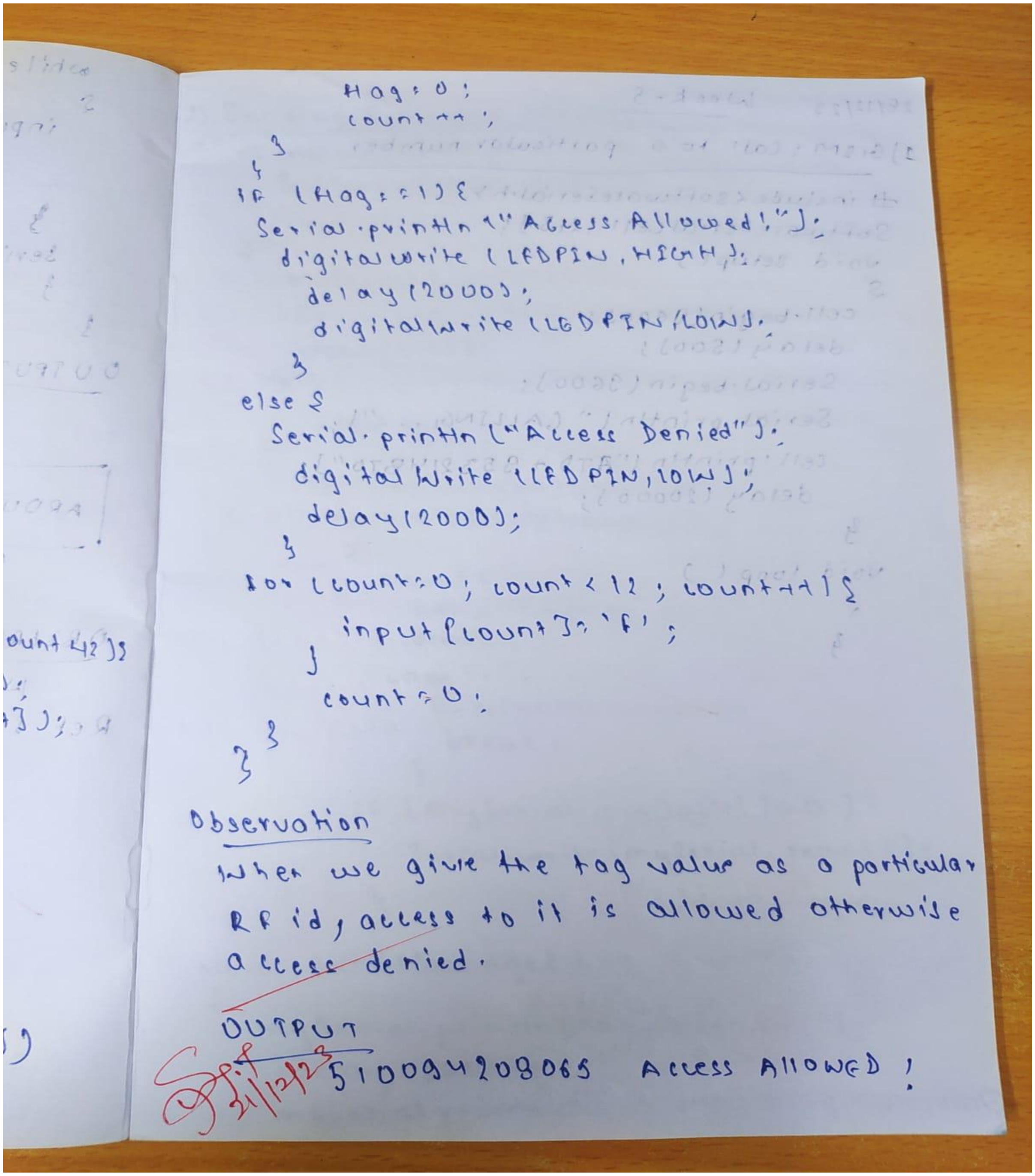
```
                    }
                    else
                    {
                                   Serial.println("Access Denied"); // Incorrect Tag Message
                              digitalWrite(LEDPIN,LOW);
                              delay(2000);
                                        }
                      /* Fill the input variable array with a fixed value 'F' to overwrite  all
                    values getting it empty for the next read cycle */
                    for(count=0; count<12; count++)
                    {  input[count]= 'F';
                    }  count = 0; // Reset counter
          variable  }
}
```

Handwritten code pic:



RFID - ACCESS CONTROL

```
# include <softwareSerial.h>
SoftwareSerial myserial(9,10);
#define LEDPIN 12
char tag[]= "5100942080 65
  char input[12];
    int count = 0;
  boolean flag=0;
void setup(){
    Serial.begin(9600);
    myserial.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) {
      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

When we give the tag value as a particular RF id, access to it is allowed otherwise access denied.

OUTPUT

```
510094208065   Access Allowed!
```

21/12/23

Observation: If the code matches with the previously known tag(configured in the code), it will grant access(here LED will glow), otherwise access will be denied.

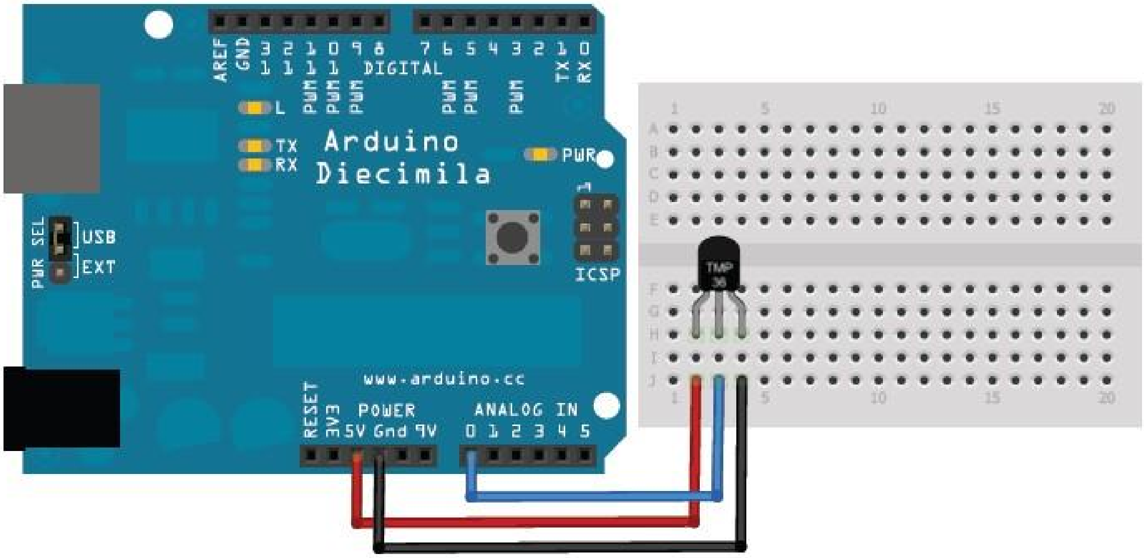
Program no: **12**   Program Title: **TEMPERATURE SENSING**

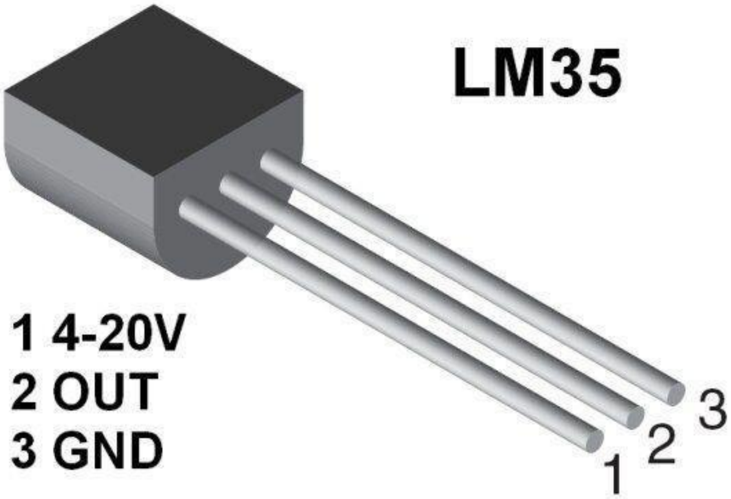
Aim: To monitor the temperature using LM35.

Hardware/components Required

Arduino Uno board - 1
USB Cable - 1
Temperature sensor LM35
Jumper wires

Circuit Diagram / Pin connection



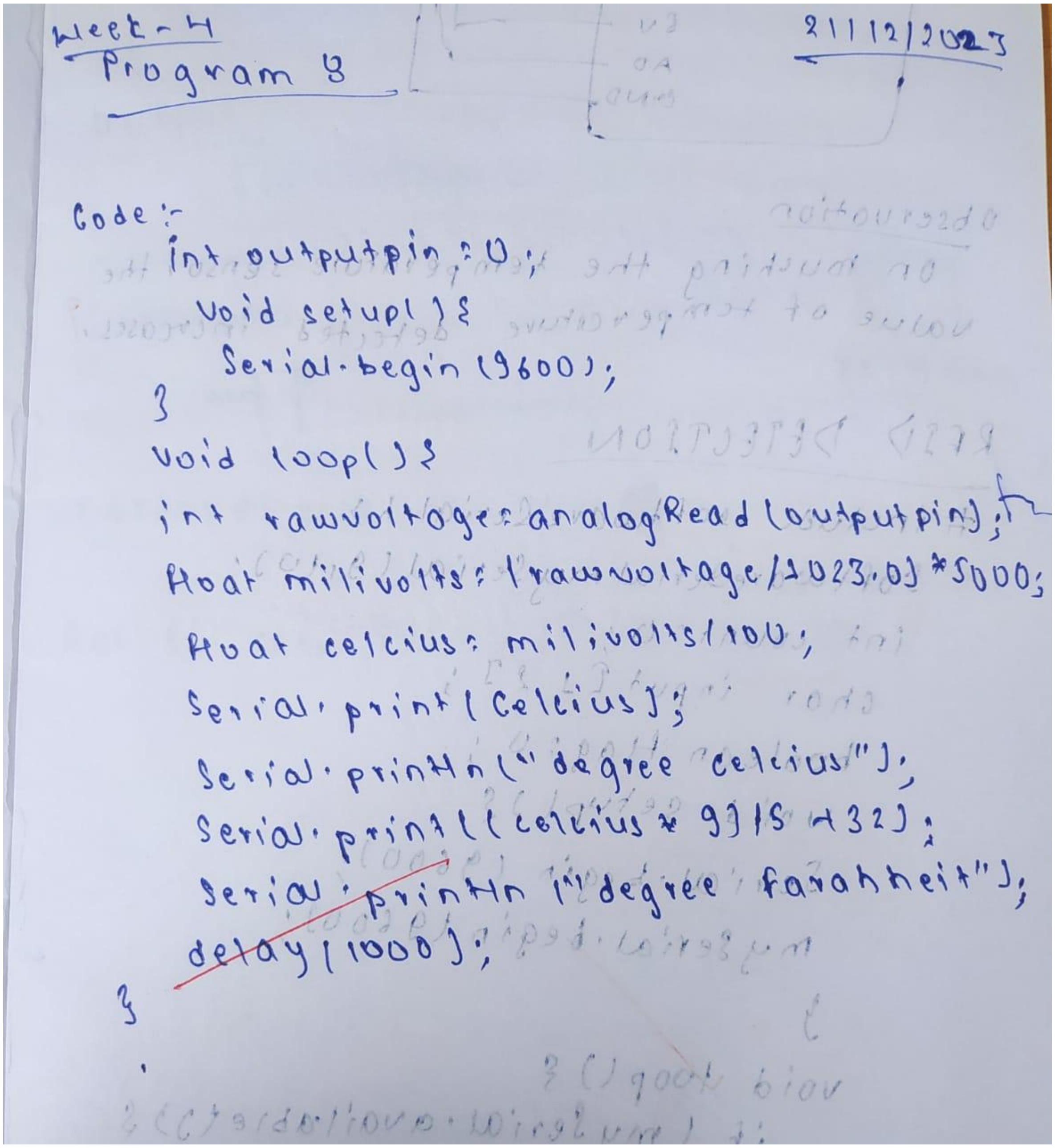


Code:

```
int sensorPin = 0; //the analog pin the TMP36's Vout (sense) pin is connected to
                   //the resolution is 10 mV / degree centigrade with a
                   //500 mV offset to allow for negative temperatures


/*
* setup() - this function runs once when you turn your Arduino on
* We initialize the serial connection with the computer
 */ void
setup()
{
  Serial.begin(9600);  //Start the serial connection with the computer
                      //to view the result open the serial monitor
}


void loop()                  // run over and over again
{
 //getting the voltage reading from the temperature sensor
int reading = analogRead(sensorPin);


 // converting that reading to voltage, for 3.3v arduino use 3.3
float voltage = reading * 5.0 / 1024;


 // print out the voltage
 Serial.print(voltage); Serial.println(" volts");


 // now print out the temperature
 float temperatureC = (voltage - 0.5) * 100 ;  //converting from 10 mv per degree wit 500 mV
offset
```

```
                                        //to degrees ((volatge - 500mV) times 100)
Serial.print(temperatureC); Serial.println(" degress C");


 // now convert to Fahrenheight  float temperatureF =
(temperatureC * 9 / 5) + 32;  Serial.print(temperatureF);
Serial.println(" degress F");


 delay(1000);                                    //waiting a second
}
```

Handwritten code pic:



Week-4
Program 8

21/12/2023

Code :-

```
  int outputpin = 0;
    void setup(){
      Serial.begin(9600);
   }
   void loop(){
   int rawvoltage= analogRead(outputpin);
   float milivolts= (rawvoltage/1023.0)*5000;
    float celcius= milivolts/100;
    Serial.print(Celcius);
    Serial.println("degree celcius");
    Serial.print((celcius * 9)/5 +32);
    serial.println("degree farahheit");
   delay(1000);
 }
```

Observation: Sensor senses the temperature of the surroundings as 21C

Program no: **13** Program Title: **GSM CALLING**

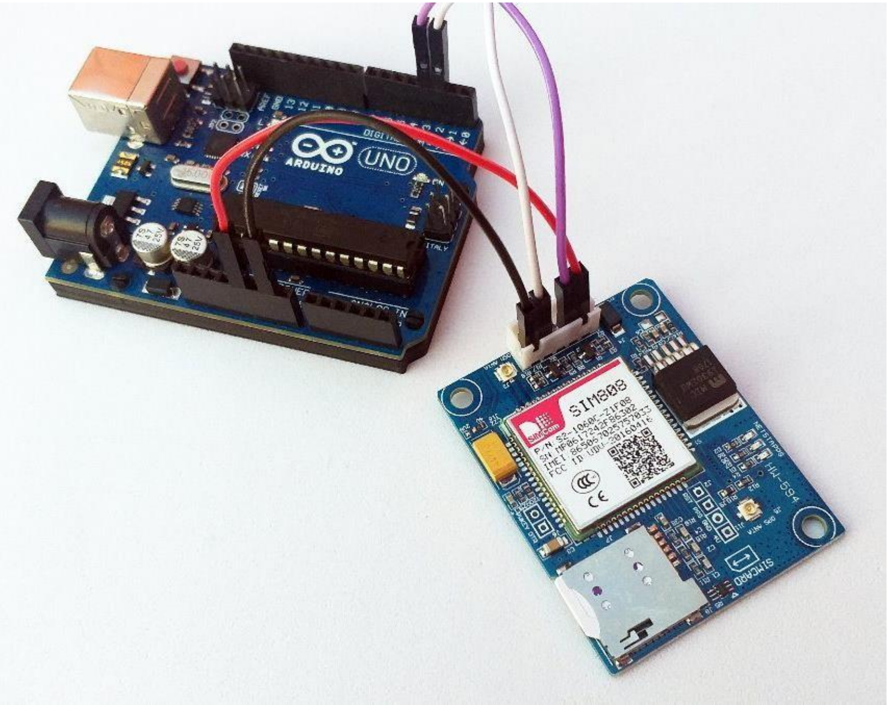
Aim: Call using Arduino and GSM Module – to a specified mobile number inside the program.

Hardware/components Required

Arduino Uno board - 1
USB Cable - 1
GSM module
SIM slot
Jumper wires

Circuit Diagram / Pin connection:

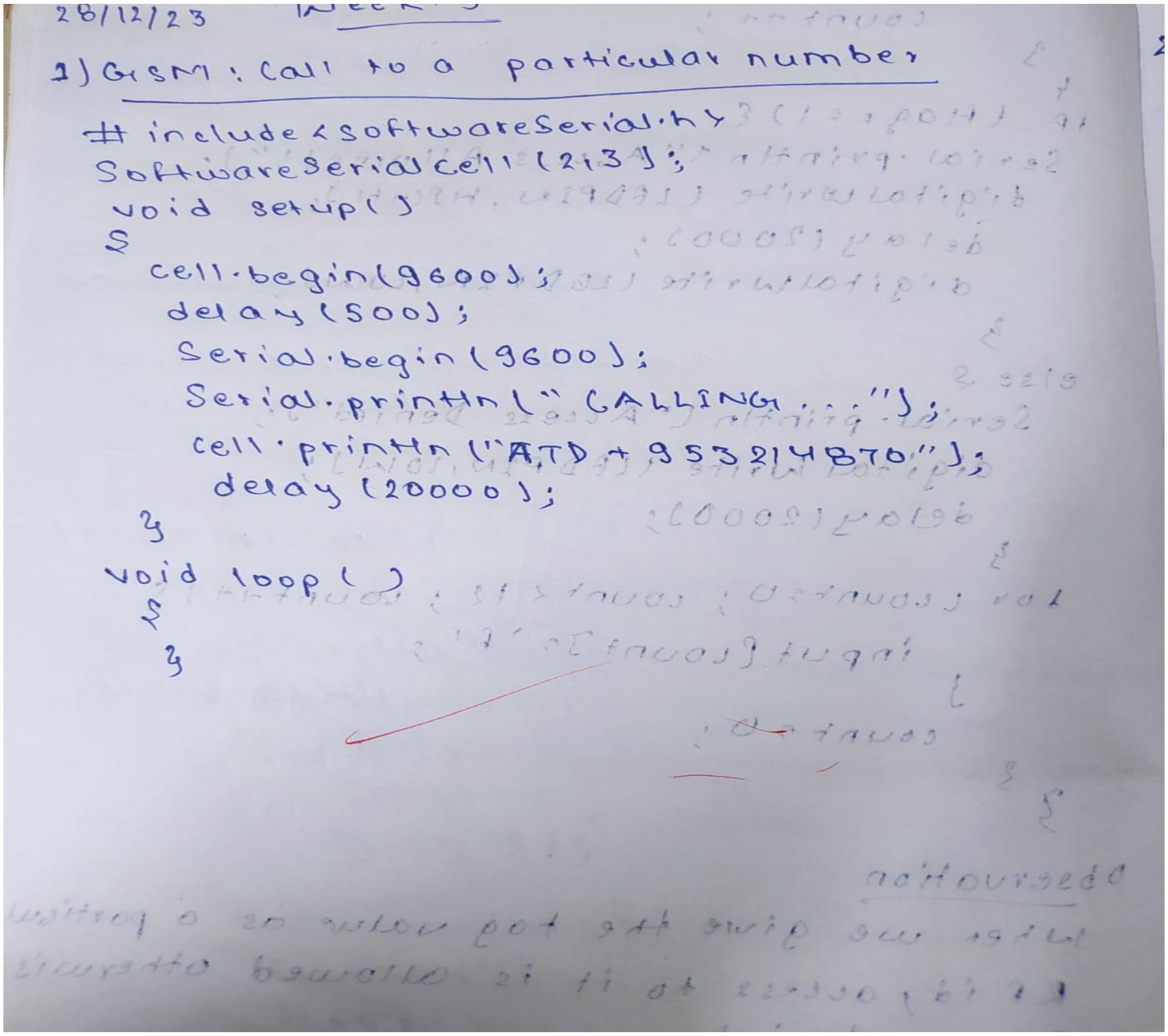
GSM Tx –>Arduino Rx (Here pin 2)
GSM Rx –>ArduinoTx. (Here pin 3)
Make the ground common between Arduino and GSM modem.



Code:

```
#include <SoftwareSerial.h>
SoftwareSerial cell(2,3); // (Rx, Tx)

void setup() { cell.begin(9600);
delay(500);  Serial.begin(9600);
Serial.println("CALLING.........");  cell.println("ATD+9538433364;");
// ATD – Attention Dial  delay(20000);
}

void loop()
{

}
```

Handwritten code pic:



28/12/23

1) GSM : Call to a particular number

```
#include<softwareSerial.h>
SoftwareSerial cell(2,3);
void setup()
{
  cell.begin(9600);
   delay(500);
   Serial.begin(9600);
   Serial.println(" CALLING...");
   cell.println("ATD + 953214870");
    delay(20000);
 }
void loop()
 {
 }
```

Observation: Calling to GSM module , you’ll get beep sound.

Program no: **14** Program Title: **GSM CALLING FIRE ALERT**

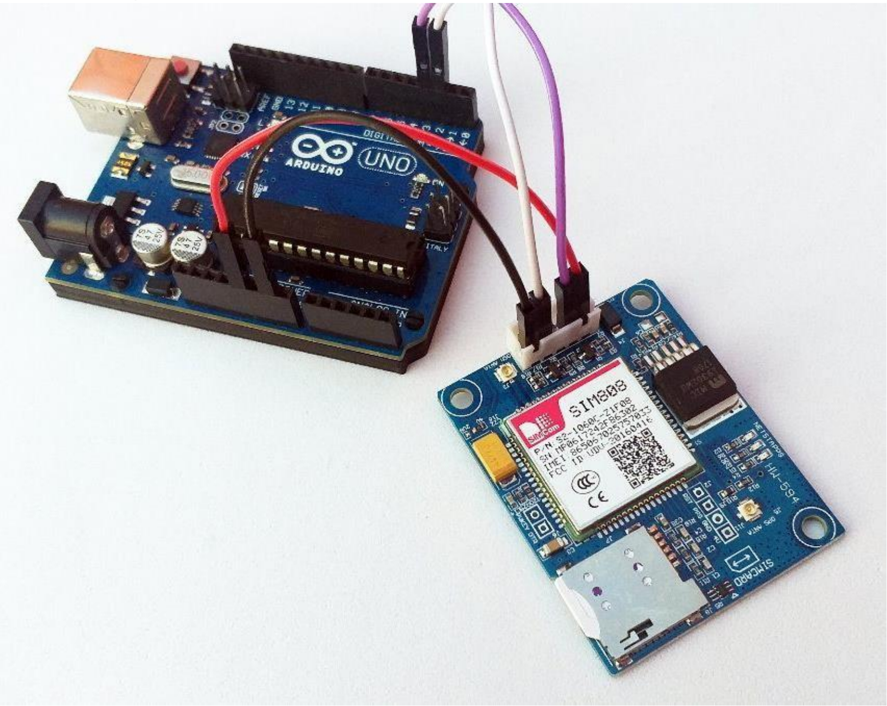
Aim: Call a specified mobile number mentioned in the program using Arduino and GSM Module when a flame sensor detects “fire”.

Hardware/components Required

Arduino Uno board - 1
USB Cable - 1
GSM module
SIM slot
Flame sensor
Jumper wires

Circuit Diagram / Pin connection:

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

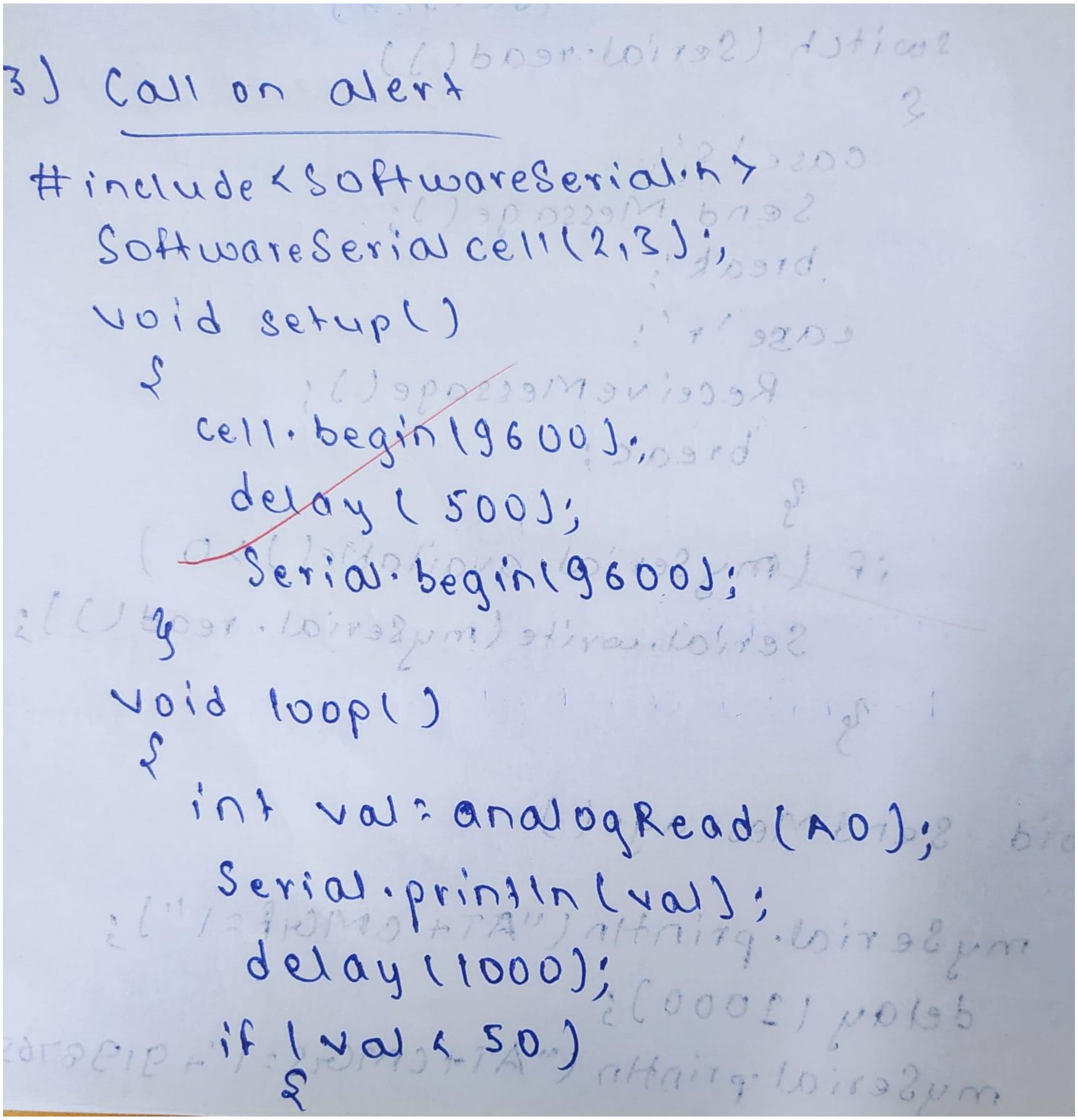


Code:

```
#include <SoftwareSerial.h>
SoftwareSerialcell(2,3);
```

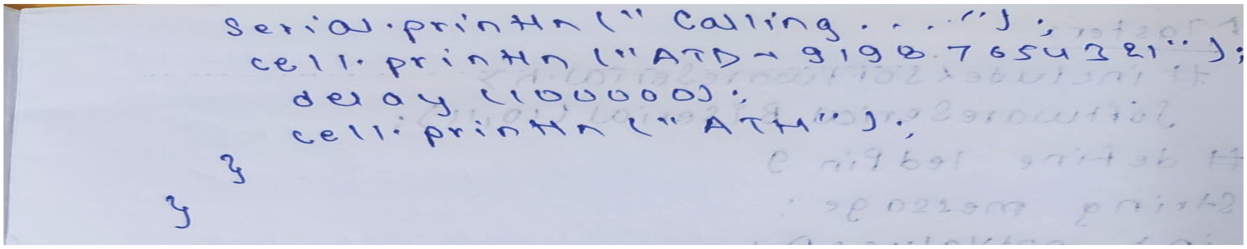
```
void setup()
{  cell.begin(9600);
delay(500);
Serial.begin(9600);
}  void loop()
{
intval=analogRead(A0);
Serial.println(val);
delay(1000);  if (val<50)
   {
Serial.println("CALLING..........");
cell.println("ATD+919742980606;");
delay(10000);  cell.println("ATH"); //
Attention Hook Control
   }
}
```

Handwritten code pic:



3) Call on alert

```
#include<SoftwareSerial.h>
 SoftwareSerial cell(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~ 9198.7654321");
          delay(100000);
          cell.println("ATH");
     }
  }
```

Observation: When there is a flame,a particular specified number will get a call as an alert.

Program no: **15** Program Title: **SMS SERVICE USING GSM**

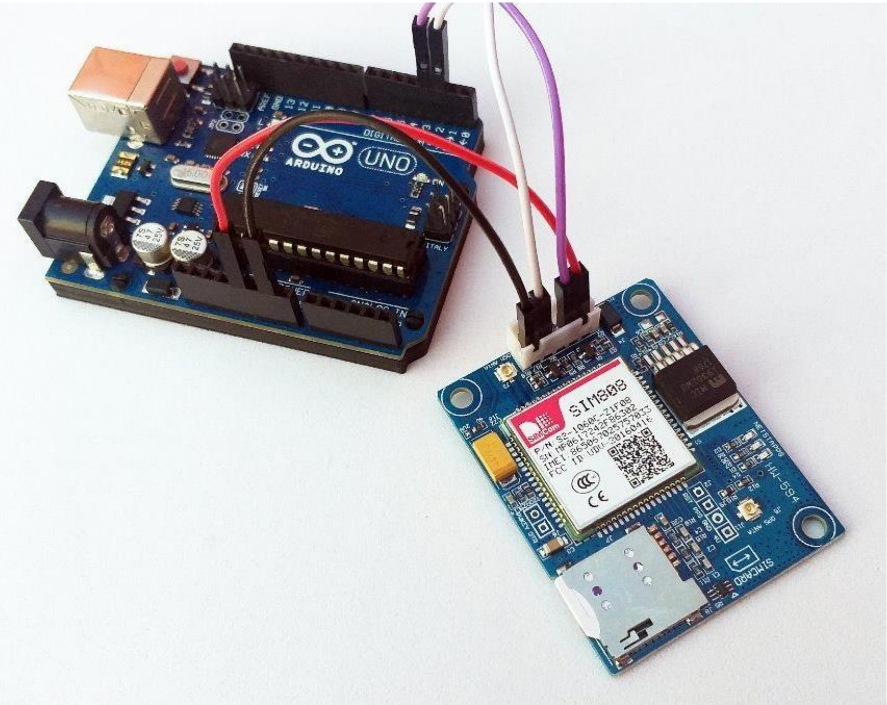
1) Send SMS using Arduino and GSM Module – to a specified mobile number inside the program
2) Receive SMS using Arduino and GSM Module – to the SIM card loaded in the GSM Module.

Hardware/components Required

Arduino Uno board - 1
USB Cable - 1
GSM module
SIM slot
Jumper wires

Circuit Diagram / Pin connection:

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



Code:

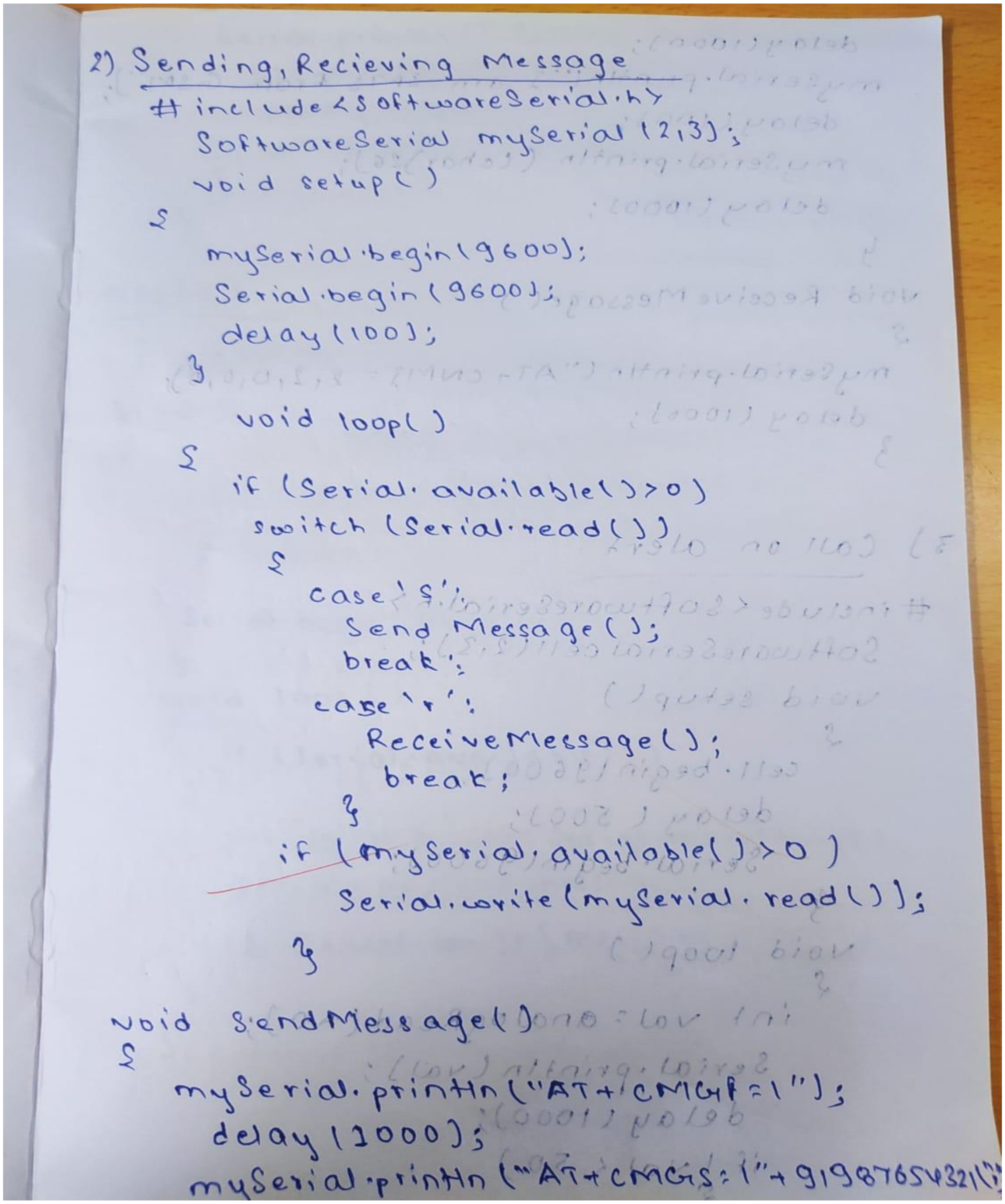
```
#include <SoftwareSerial.h>
SoftwareSerial mySerial(2, 3);
```

```
void setup()
{
mySerial.begin(9600); // Setting the baud rate of GSM Module  Serial.begin(9600);
// Setting the baud rate of Serial Monitor (Arduino)  delay(100);
}



void loop()
{  if
(Serial.available()>0)
switch(Serial.read())
  {  cas
e 's':
SendMessage();
break; case 'r':
RecieveMessage();
break;  }

if (mySerial.available()>0)
Serial.write(mySerial.read());
}

voidSendMessage()
{
mySerial.println("AT+CMGF=1"); //Sets the GSM Module in Text Mode //AT+CMGF,
SMS Format
delay(1000); // Delay of 1000 milli seconds or 1 second
mySerial.println("AT+CMGS=\"+919742980606\"\r"); // AT+CMGS, Send
Message // Replace withyour mobile number
delay(1000);  mySerial.println("I am SMS from
GSM Module");
// The SMS text you want to send  delay(100);
mySerial.println((char)26);// ASCII code of CTRL+Z , to terminate the message
delay(1000);
```

}

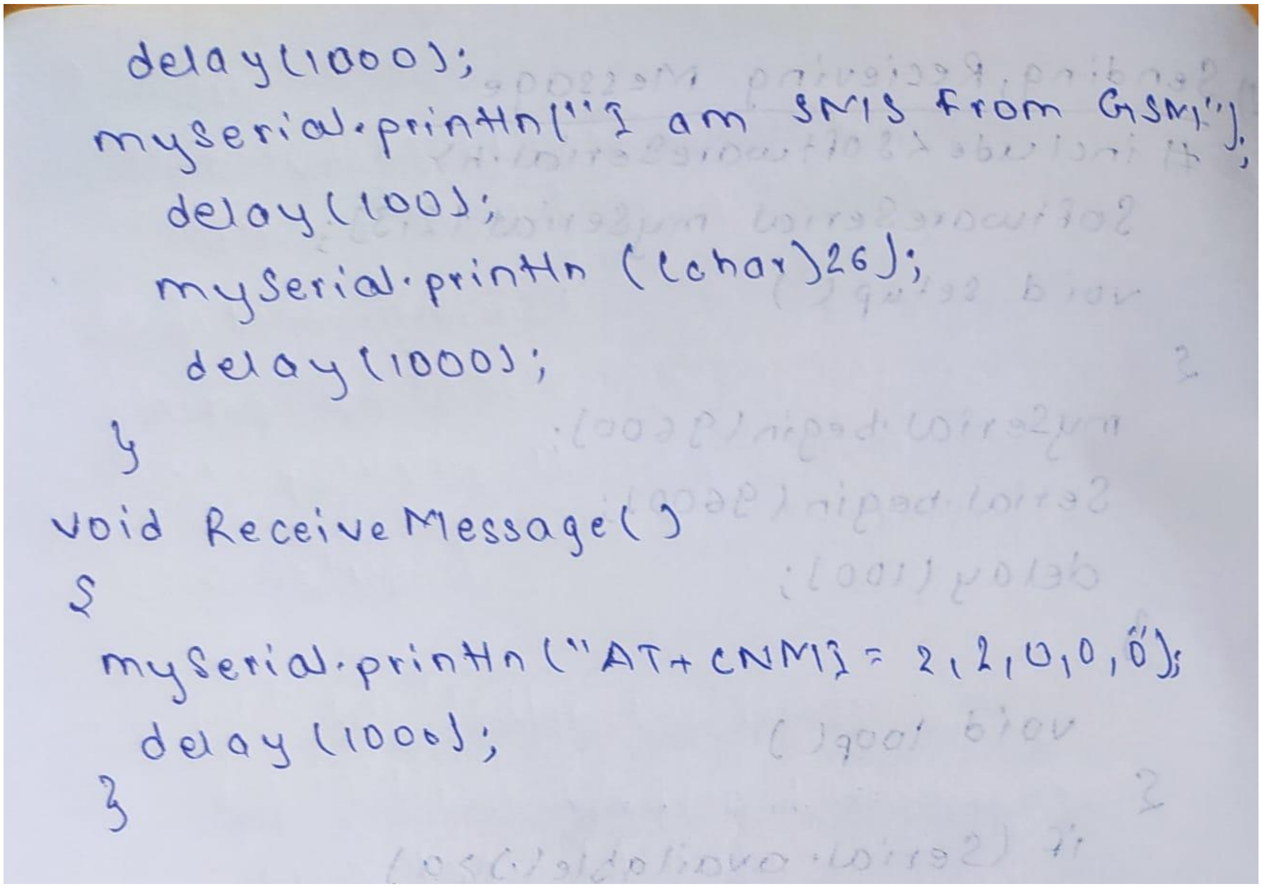
voidRecieveMessage()
{
mySerial.println("AT+CNMI=2,2,0,0,0"); // AT+CNMI, New Message Indications // AT Command to recieve a live SMS delay(1000);
 }

Handwritten code:



2) Sending, Recieving Message

```
#include<SoftwareSerial.h>
   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());
      }

void SendMessage()
{
    mySerial.println("AT+CMGF=1");
     delay(1000);
    mySerial.println("AT+CMGS=1"+91987654321
```



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

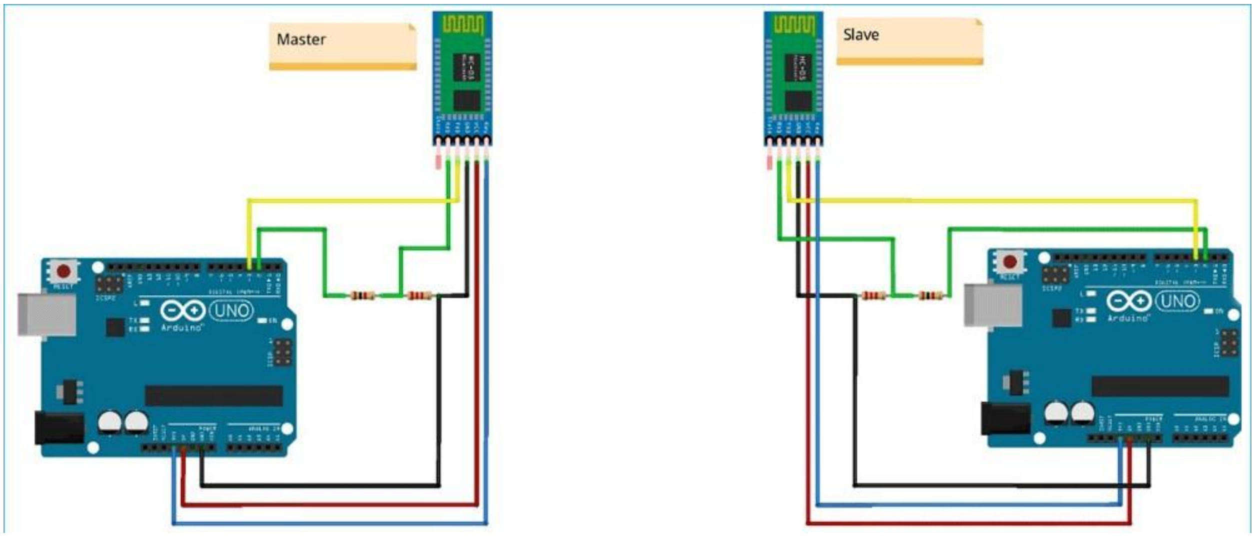
Observation: According to the code, messages will be sent and received when ‘s’ and ‘r’ are pressed through serial monitor respectively.

Program no: **16** Program Title: **BLUETOOTH MASTER SLAVE**

Aim: To control the LED in the master device by client device.

Hardware/components Required
Arduino Uno board - 2
USB Cable - 1
Jumper wires
LED-1
HC-05 bluetooth module-2

Circuit Diagram / Pin connection:



Slave Mode:

The HC-05 bluetooth module can also act as a slave. There are fewer commands to set this up:

AT+ORGL Reset to defaults
AT+RMAAD Clear any paired devices
AT+ROLE=0 Set mode to SLAVE
AT+ADDR Display SLAVE address //+ADDR:98d3:33:807822 Master Mode:

To configure the module as Bluetooth Master and to pair with another bluetooth module follow these steps. First we need to put the module into command mode Enter these commands in order:
AT+RMAAD Clear any paired devices
AT+ADCN

AT+ROLE=1 Set mode to Master
AT+CMODE=0 Allow master to ONLY connect to bound address (slave). This allows the master to automatically connect to the slave when switched on AT+PSWD=1234 Set PIN. Should be same as slave device

AT+BIND=<address> Set bind address to the slave address AT+LINK=<address> Connect to slave.
AT+INIT

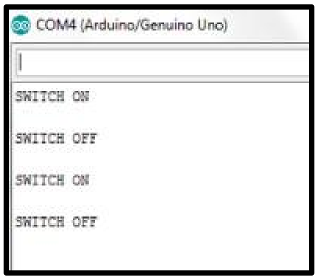
Note: If it shows any Error, then check if both the bluetooth modules are blinking in sync. If so then both the bluetooth modules are synchronized.

BT-Slave Program:

```
#include <SoftwareSerial.h>

SoftwareSerial BTSerial(10, 11); // RX | TX

void setup() {
  Serial.begin(9600);
  BTSerial.begin(38400); // HC-05 default speed in AT command more }  void
loop() {
 // Reading the button if(Serial.available())
   {
   String message = Serial.readString();
   Serial.println (message);
    BTSerial.write(message.c_str());

    }
}
```

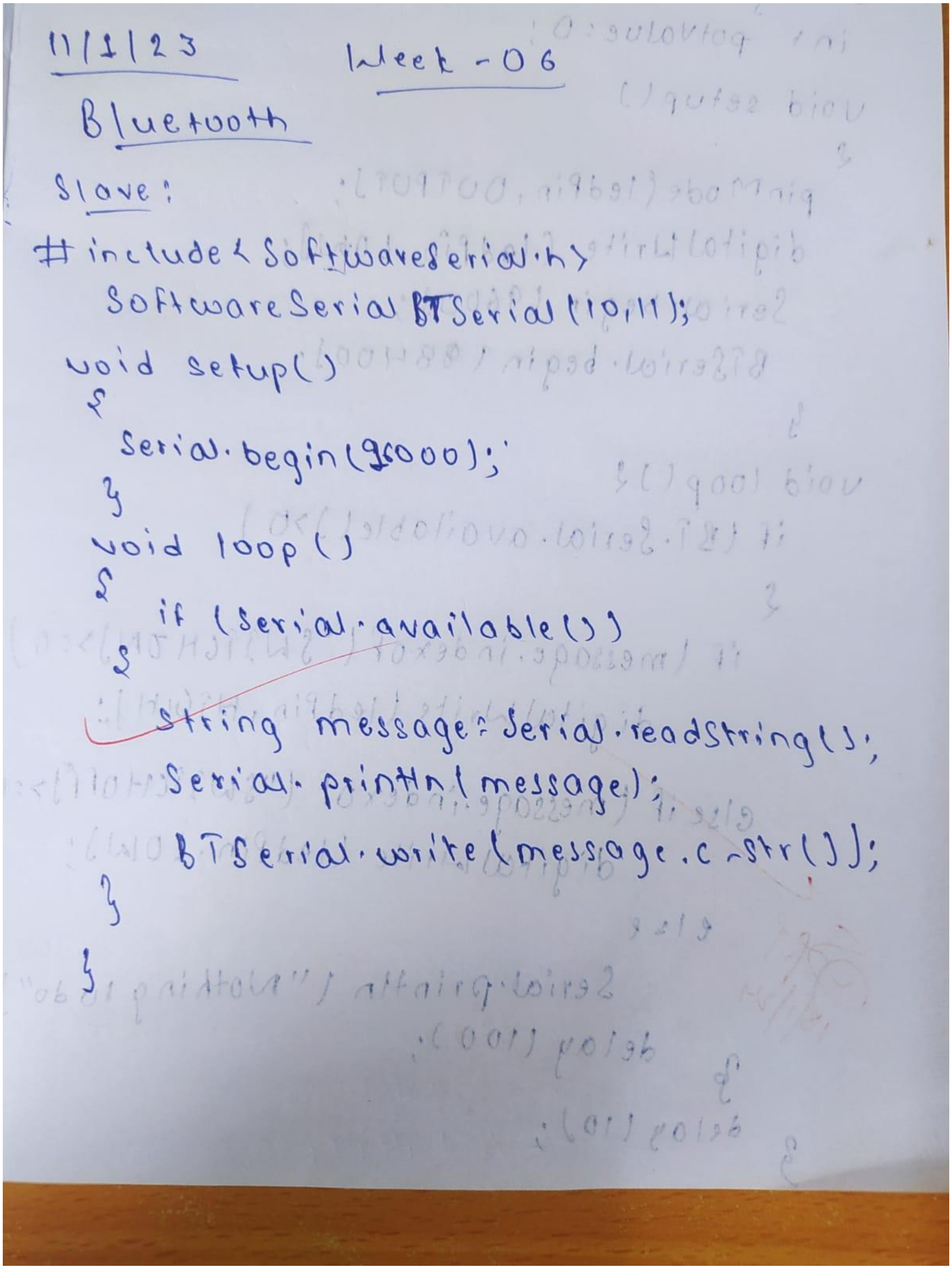
BT-Master Program:

```
#include <SoftwareSerial.h>

SoftwareSerial BTSerial(10, 11); // RX | TX

#define ledPin 9

String message;  int
potValue = 0;
void setup() {
  pinMode(ledPin, OUTPUT);
  digitalWrite(ledPin, LOW);
  Serial.begin(9600);
  BTSerial.begin(38400); // HC-05 default speed in AT command more }


void loop() {
if(BTSerial.available() > 0){
// Checks whether data is comming from the serial port //
    Reads the data from the serial port
    message = BTSerial.readString();  //
    Controlling the LED
    if(message.indexOf("SWITCH ON")>=0)
     {
     digitalWrite(ledPin, HIGH); // LED ON
    }
    else if(message.indexOf("SWITCH OFF")>=0)
     {
      digitalWrite(ledPin, LOW); // LED OFF
    }  else
     {
      Serial.println("Noting to do");
    }
   delay(100);

 }
delay(10);  }
```



```
SWITCH ON

SWITCH OFF

SWITCH ON

SWITCH OFF
```

Handwritten code pic:

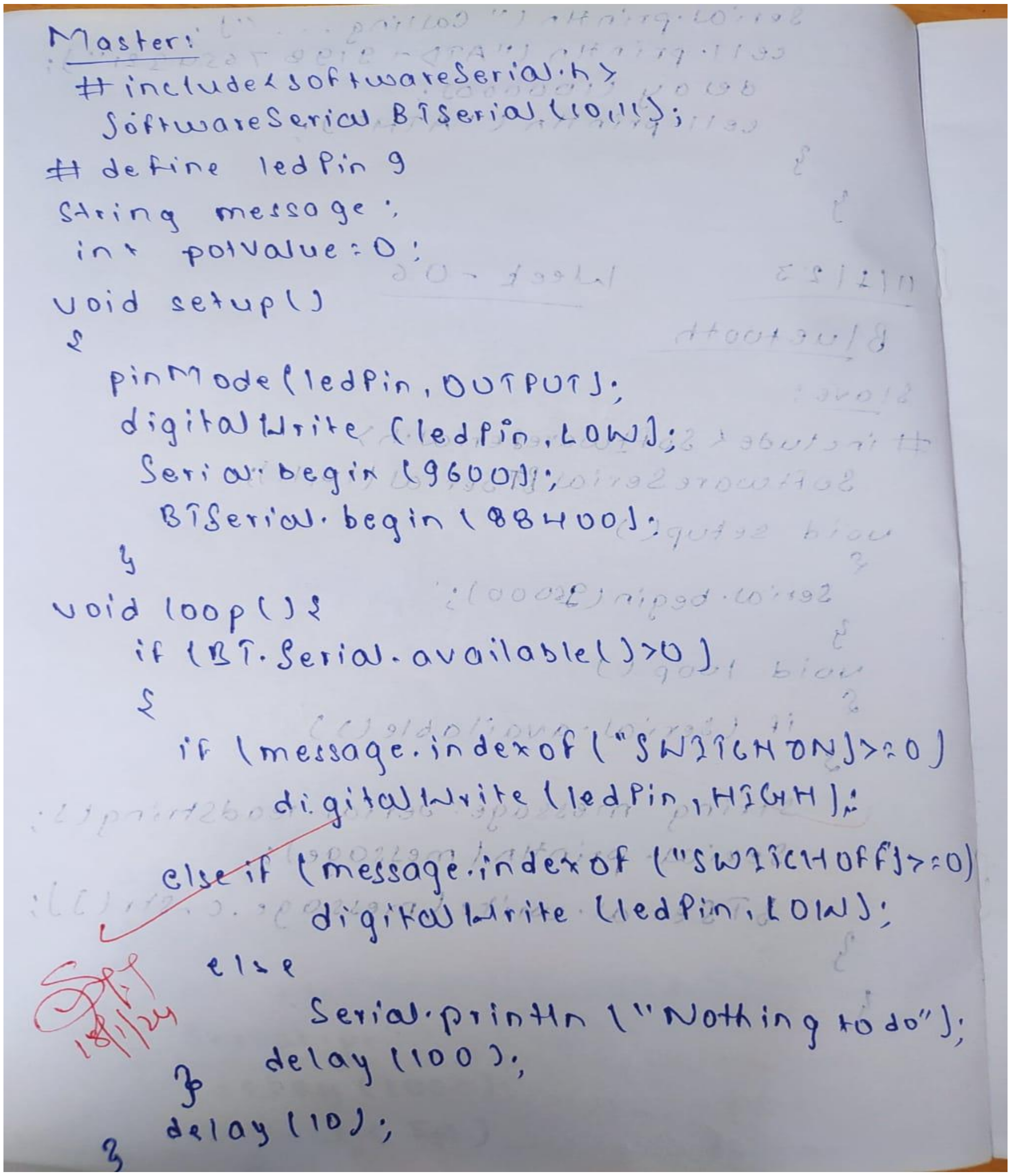


11/1/23 Week - 06

Bluetooth

Slave:

```
#include<SoftwareSerial.h>
  SoftwareSerial BTSerial(10,11);
void setup()
{
  Serial.begin(96000);
}
 void loop()
 {
   if (Serial.available())
 {
   String message=Serial.readString();
   Serial.println(message);
    BTSerial.write(message.c_str());
 }
}
```



```
Master:
 #include<softwareSerial.h>
  SoftwareSerial BTSerial(10,11);
#define ledPin 9
String message;
 int potValue=0;
void setup()
{
  pinMode(ledPin,OUTPUT);
  digitalWrite(ledPin,LOW);
   Serial.begin(9600);
    BTSerial.begin(88400);
}
void loop(){
  if(BT.Serial.available()>0)
  {
    if(message.indexOf("SWITCH ON")>=0)
       digitalWrite(ledPin,HIGH);
    else if(message.indexOf("SWITCH OFF")>=0)
       digitalWrite(ledPin,LOW);
   else
       Serial.println("Nothing to do");
  }  delay(100);
  delay(10);
}
```

18/1/24

Observation: Whenever Client device sends the message "SWITCH ON",LED turns ON and turns OFF if the message is "SWITCH OFF" otherwise it prints "Nothing to do" in the serial monitor.