VISVESVARAYA TECHNOLOGICAL UNIVERSITY

"JnanaSangama", Belgaum -590014, Karnataka.

LAB REPORT
on

INTERNET OF THINGS LAB

Submitted by

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(1BM21CS135)

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 lab" carried out by **Prajwal R (1BM21CS135),** 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.

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TABLE OF CONTENTS

Program no: **01** Program Title: **LED BLINK** Date:23/11/2023

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

Hardware/components Required

Arduino Uno board - 1

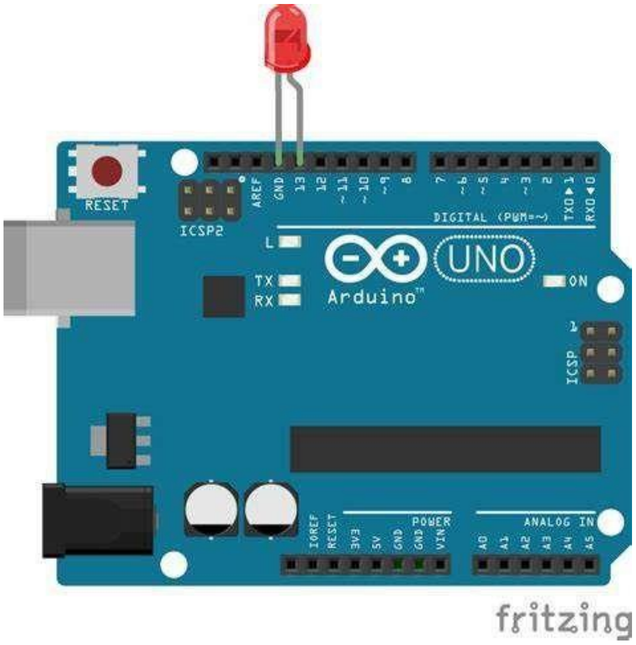
USB Cable - 1

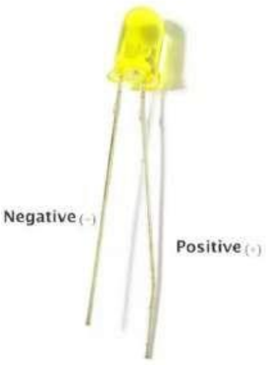
LED - 1

Jumper wires

Circuit Diagram / Pin connection

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

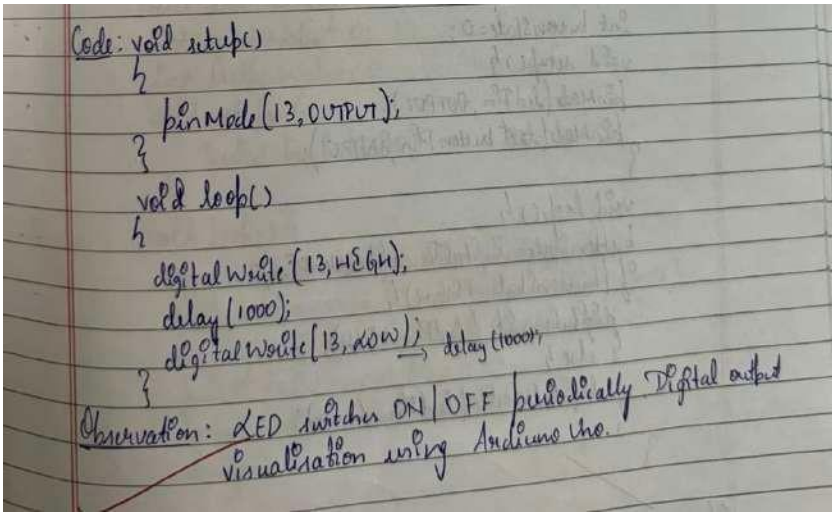




Code:

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

// the loop function runs over and over again forever
void loop()
{
  digitalWrite(13, HIGH);
   delay(1000);
   digitalWrite(13, LOW);      }
```

Handwritten code pic:



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

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

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

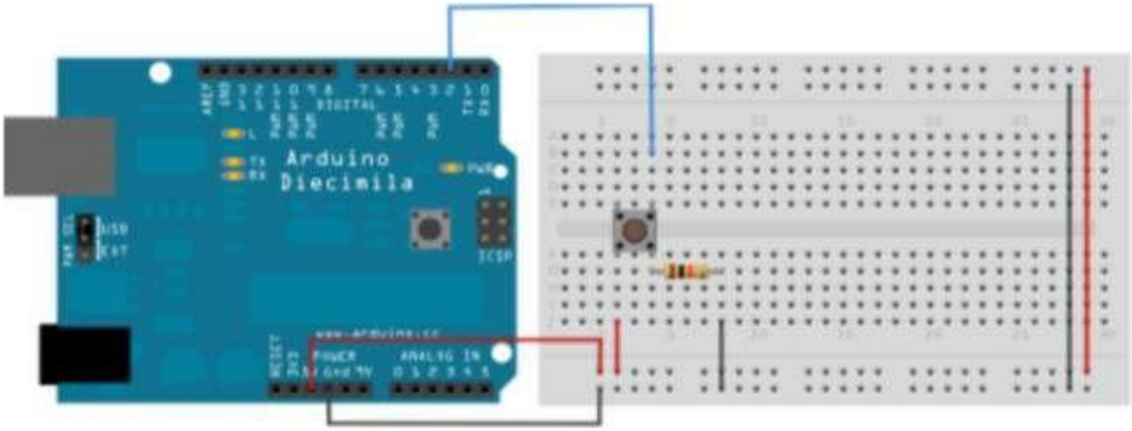
Program no: **02** Program Title: **LED ON/OFF** Date:23/11/2023

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

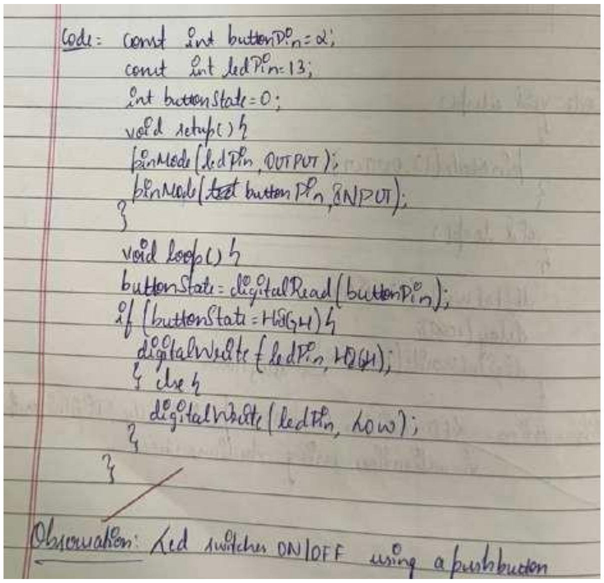


Code:

```
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:



Code:
```
const int buttonPin=2;
const int ledPin=13;
int buttonState=0;
void setup(){
 pinMode(ledPin,OUTPUT);
 pinMode(~~test~~ buttonPin,INPUT);
}

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

Observation: Led switches ON/OFF using a pushbutton

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** Date:23/11/2023

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

Hardware/components Required

Arduino Uno board - 1

USB Cable - 1

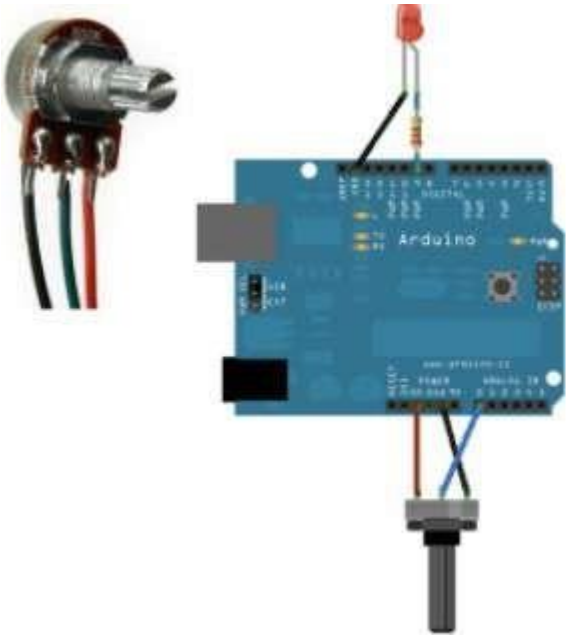
LED - 1

Potentiometer

Jumper wires

Circuit Diagram / Pin connection

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

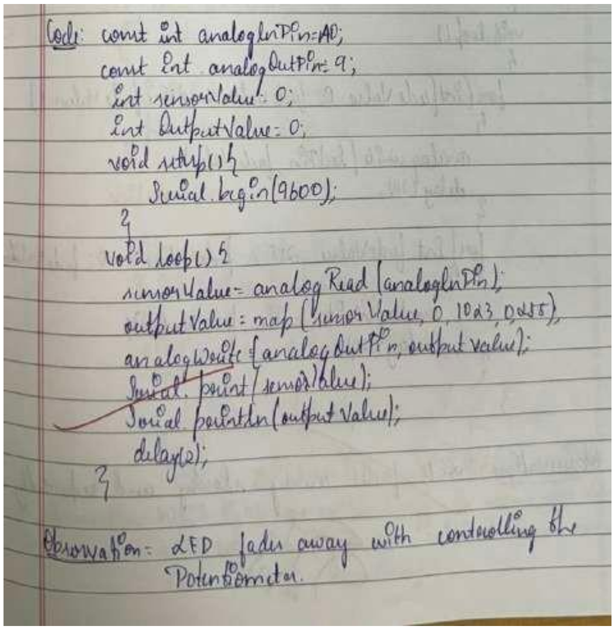


Code:

```
const int analogPin=A0;
const int analogOutPin=9;
int sensorValue=0;
int outputValue=0;
void setup()
{ Serial.begin(9600);
}
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:



Code:
```
const int analogInPin=A0;
 const int analogOutPin=9;
  int sensorValue=0;
  int OutputValue=0;
  void setup(){
      Serial.begin(9600);
  }
 void loop(){
  sensorValue=analogRead(analogInPin);
  outputValue=map(sensorValue,0,1023,0,255);
  analogWrite(analogOutPin,output value);
  Serial.print(sensorValue);
  Serial.println(output Value);
  delay(2);
 }
```

Observation: LED fades away with controlling the Potentiometer.

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** Date:23/11/2023

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

Hardware/components Required

Arduino Uno board - 1

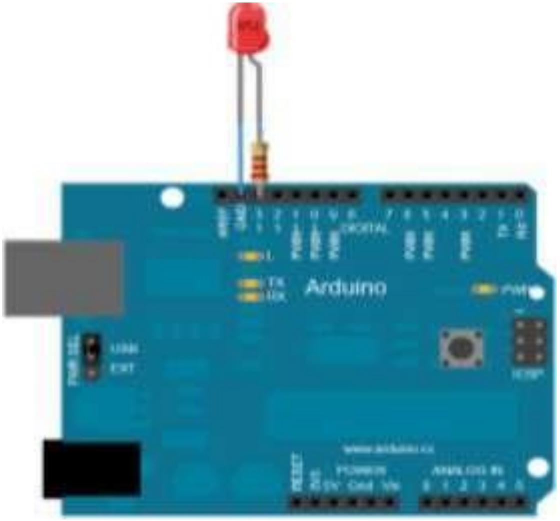
USB Cable - 1

LED - 1

Jumper wires

Circuit Diagram / Pin connection

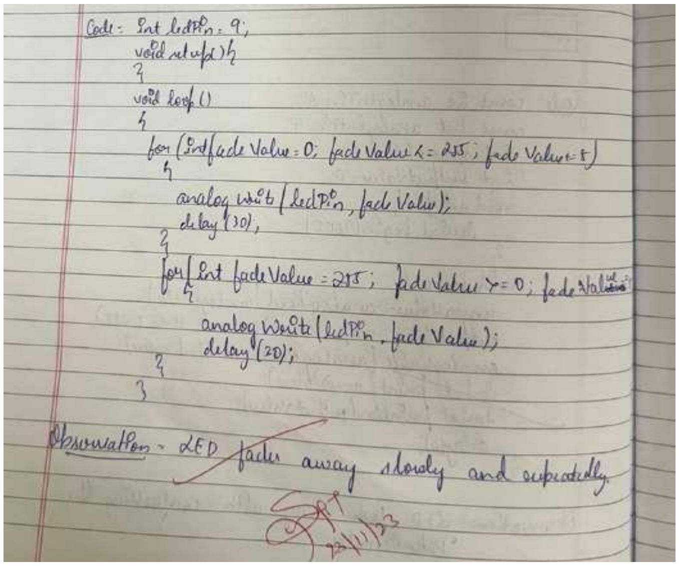
LED positive to pin 9 ,negative to ground



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);  }  }
```

Handwritten code pic:



```
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(20);
        }
      }
```

Observation - LED fades away slowly and repeatedly.

22/11/23

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

Program no: **05** Program Title: **Nightlight Simulation** Date:07/12/2023

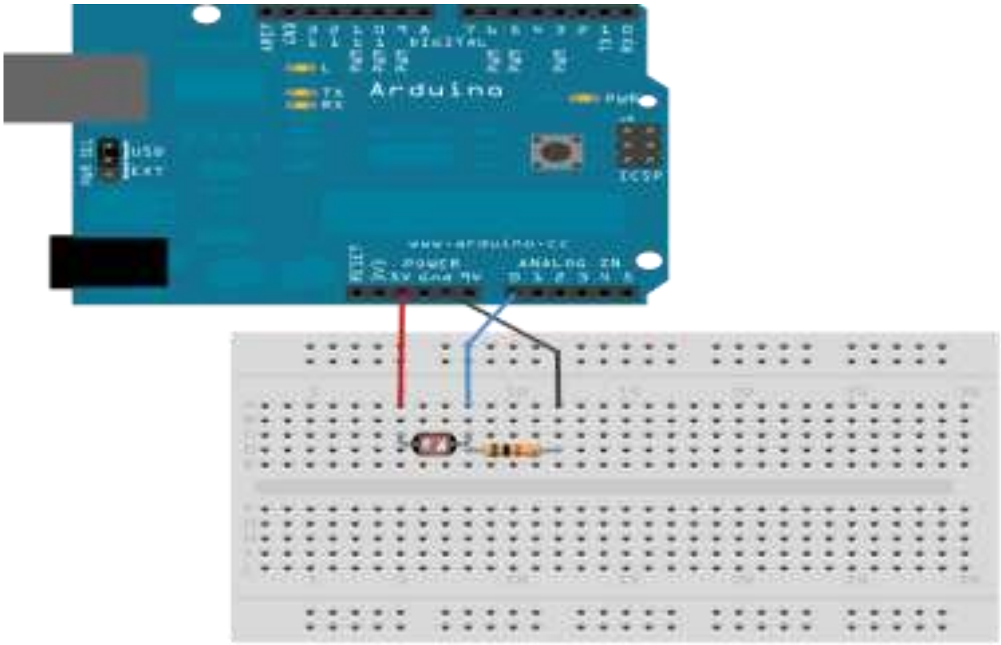
Aim: Simulating a night light using LDR

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

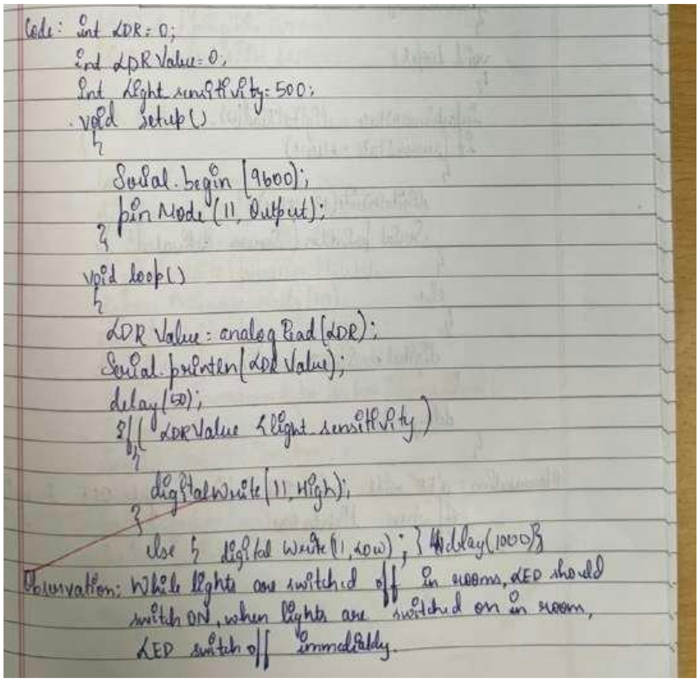


Code:

```
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:



```
Code: int LDR=0;
      int LDRValue=0;
      int Light_sensitivity=500;
      void Setup()
       {
         Serial.begin(9600);
         pinMode(11, Output);
       }
      void loop()
       {
        LDR Value=analogRead(LDR);
        Serial.println(LDR Value);
        delay(50);
        if(LDRValue <light_sensitivity)
         {
           digitalWrite(11,High);
         }
          else { digital Write(11,Low); } delay(1000)}
Observation: While lights are switched off in rooms, LED should
             switch ON, when lights are switched on in room,
             LED switch off immediately.
```

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

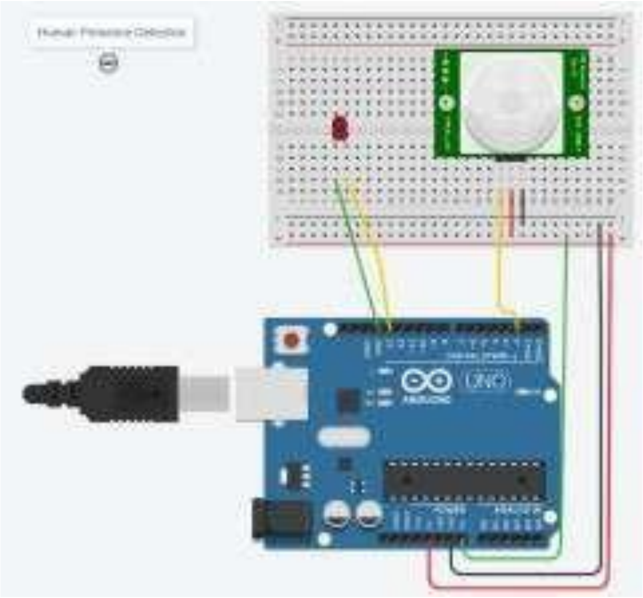
Program no: **06** Program Title: **Nightlight Simulation** Date:07/12/2023

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

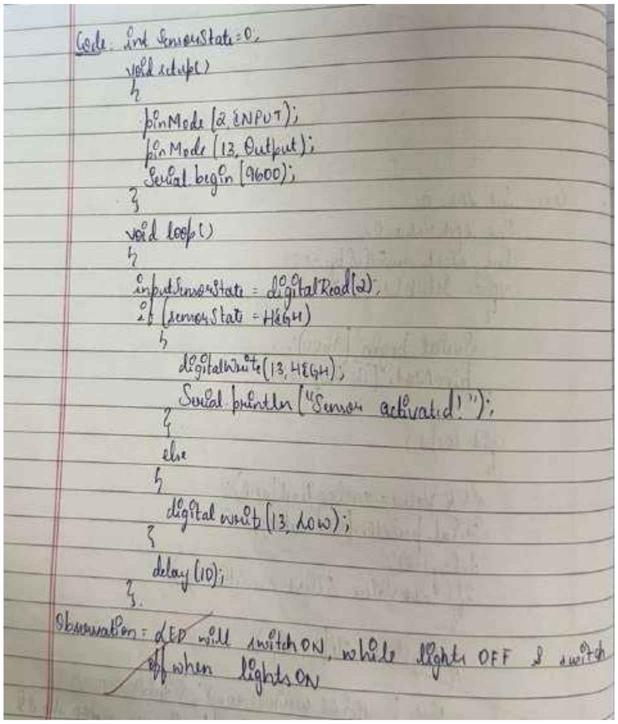


Code:

```
int sensorState = 0;

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

 }

void loop()
```

```
 // 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:



```
Code: int SensorState=0;
      void setup()
      {
        pinMode(2,INPUT);
        pinMode(13,Output);
        Serial.begin(9600);
      }
      void loop()
      {
       inputSensorState = digitalRead(2);
       if (sensorState = HIGH)
         {
           digitalWrite(13,HIGH);
           Serial.println("Sensor activated!");
         }
         else
         {
           digital write(13,LOW);
         }
        delay(10);
      }.
```

Observation: LED will switch ON, while lights OFF & switch off when lights ON

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** Date:07/12/2023

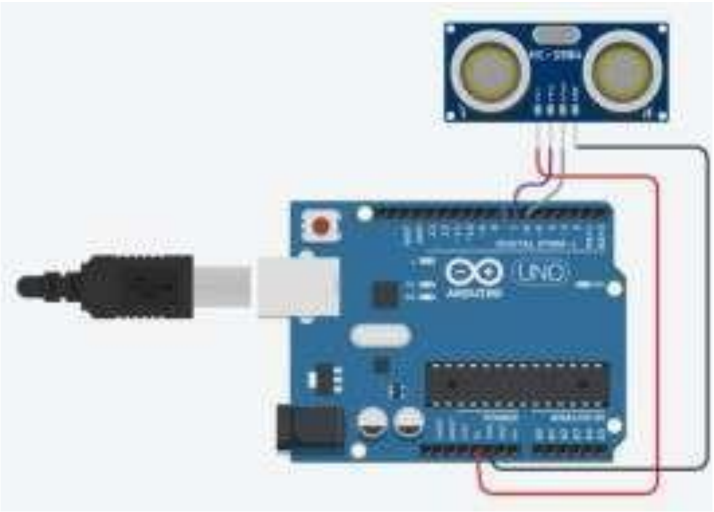
Aim: Simulating ultrasound with Arduino UNO and Ultrasonic sensor

Hardware/components Required

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

Circuit Diagram / Pin connection

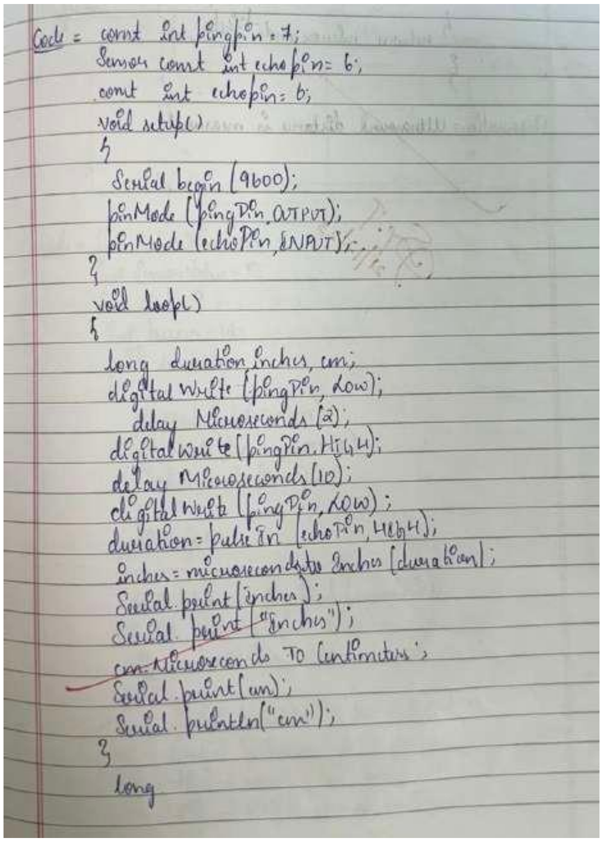
VCC-5V , GND-GND , pingpin-7 , echopin - 6



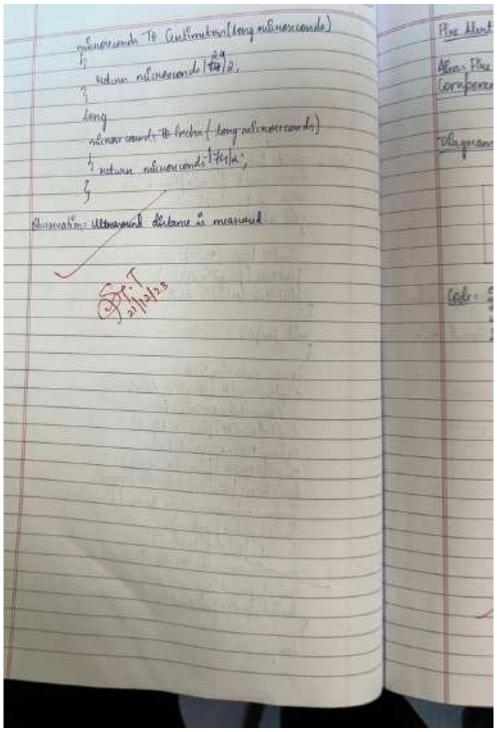
Code:

```
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:



```
Code = const int pingpin = 7;
       Sensor const int echopin = 6;
       const int echopin = 6;
       void setup()
       {
        Serial begin (9600);
        pinMode (pingPin, OUTPUT);
        pinMode (echoPin, INPUT);
       }
       void loop()
       {
        long duration inches, cm;
        digitalWrite (pingPin, Low);
          delay Microseconds (2);
        digitalWrite (pingPin, HIGH);
        delay Microseconds (10);
        digitalWrite (pingPin, LOW);
        duration = pulseIn (echoPin, HIGH);
        inches = microsecondsto Inches (duration);
        Serial.print (inches);
        Serial. print ("Inches");
        cm = Microseconds To Centimeters;
        Serial.print (cm);
        Serial. println ("cm");
       }
        long
```



```
microseconds To Centimeters (long microseconds)
{
  return microseconds / 29 / 2;
}
long
  microseconds To Inches ( long microseconds)
{ return microseconds / 74 / 2;
}
```

Observation: Ultrasound distance is measured

21/12/23

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

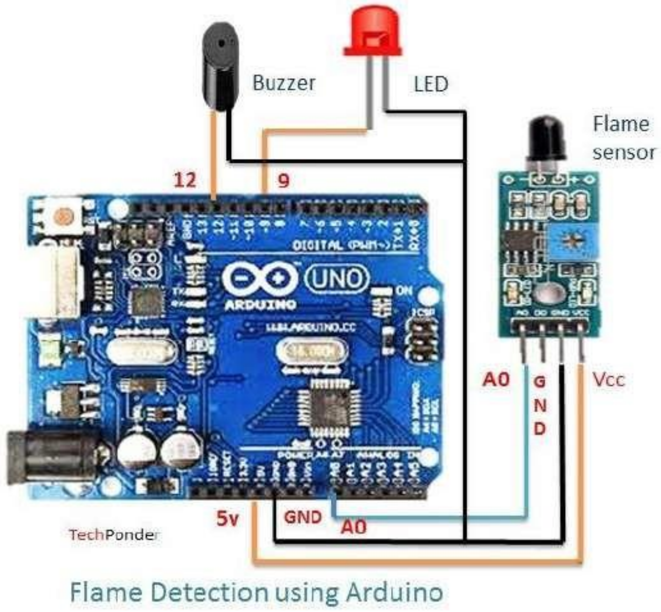
Program no: **08** Program Title: **Fire Alert** Date:07/12/2023

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

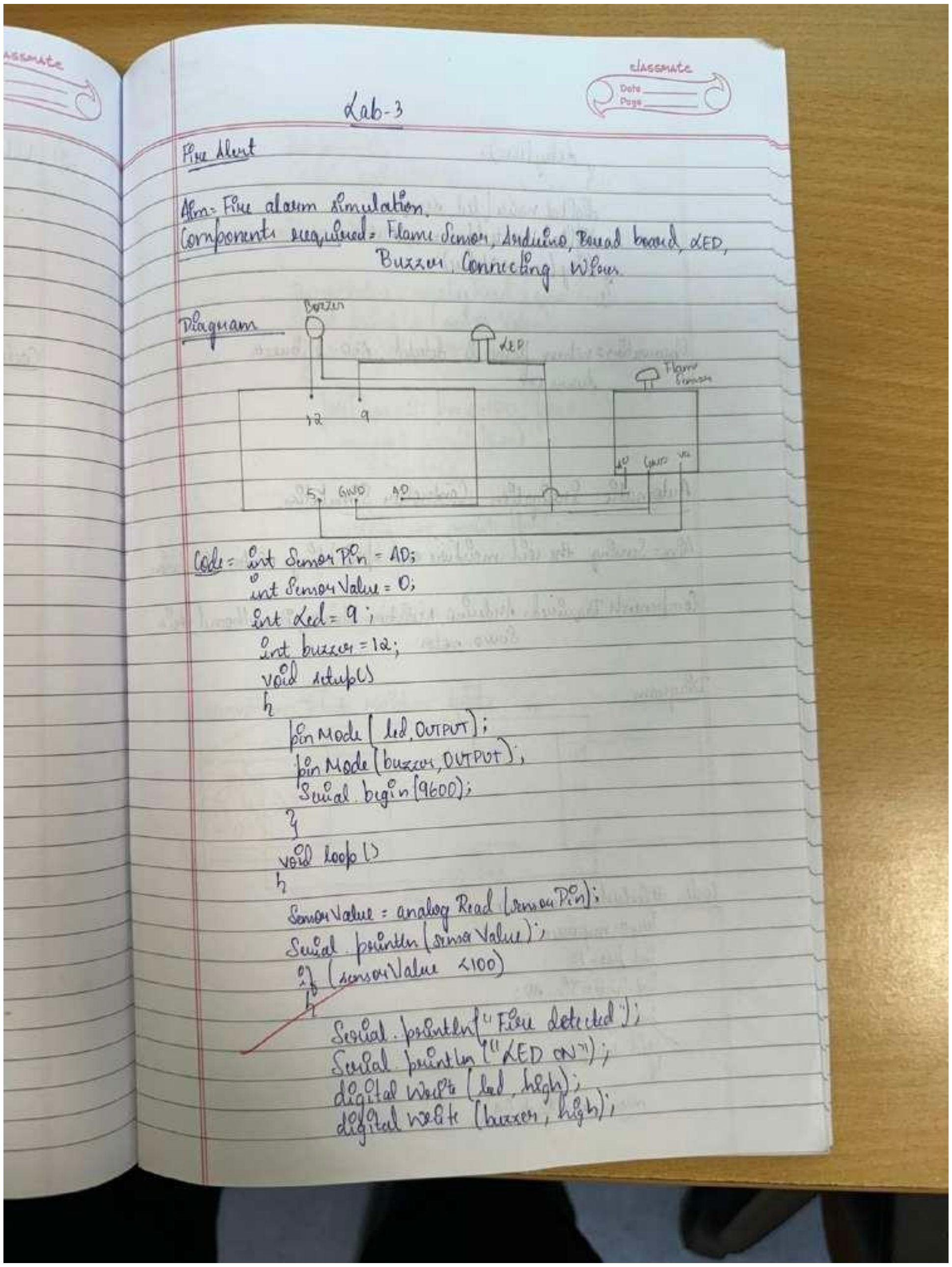
Buzzer +ve is connected to **12th pin** of Arduino

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:



Lab-3

Fire Alert

Aim- Fire alarm simulation.

Components required- Flame Sensor, Arduino, Bread board, LED,
Buzzer, Connecting Wires.

Diagram

Buzzer
LED
Flame Sensor
12
9
5V
GND
A0
A0
GND
VCC

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);
```

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

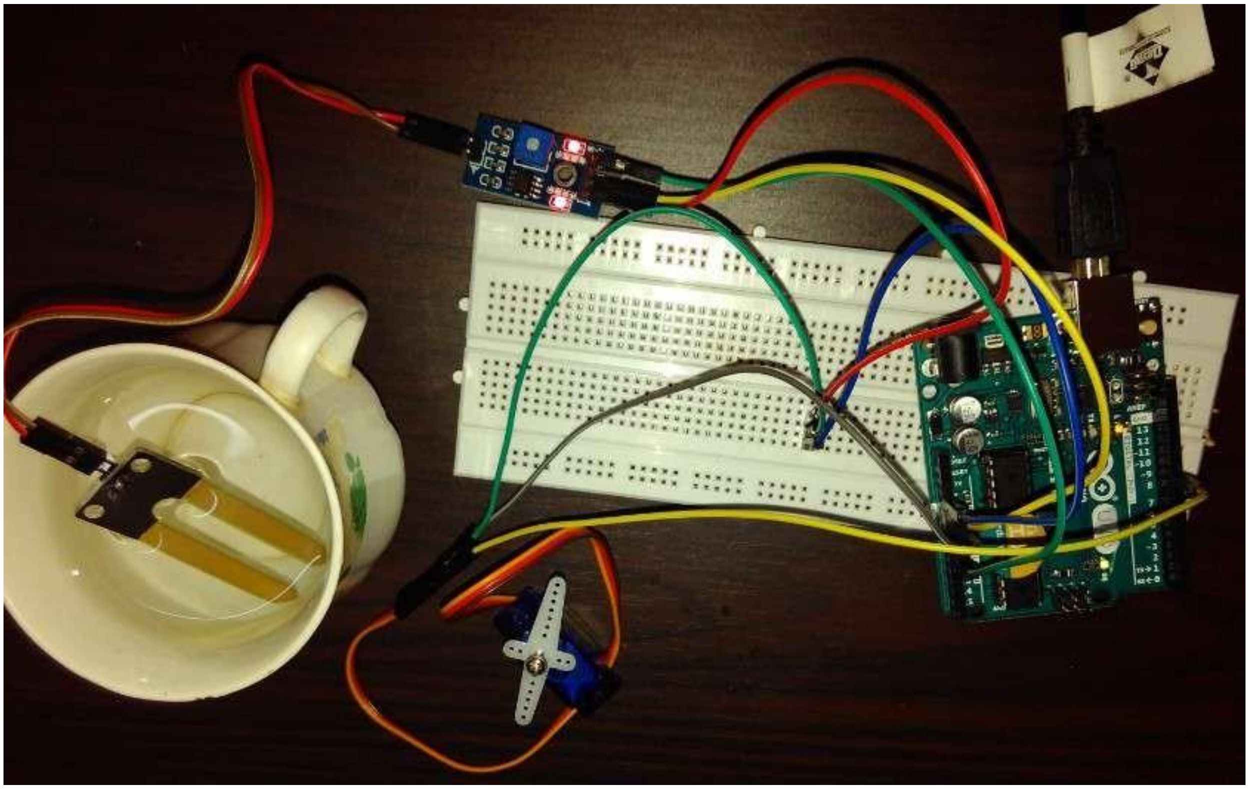
Program no: **09** Program Title: **Automatic Irrigation** Date:07/12/2023

Aim: Sensing the soil moisture and sprinkling the Water simulation

Hardware Required

Arduino
Moisture Sensor
Breadboard
Min servo motor

Circuit diagram



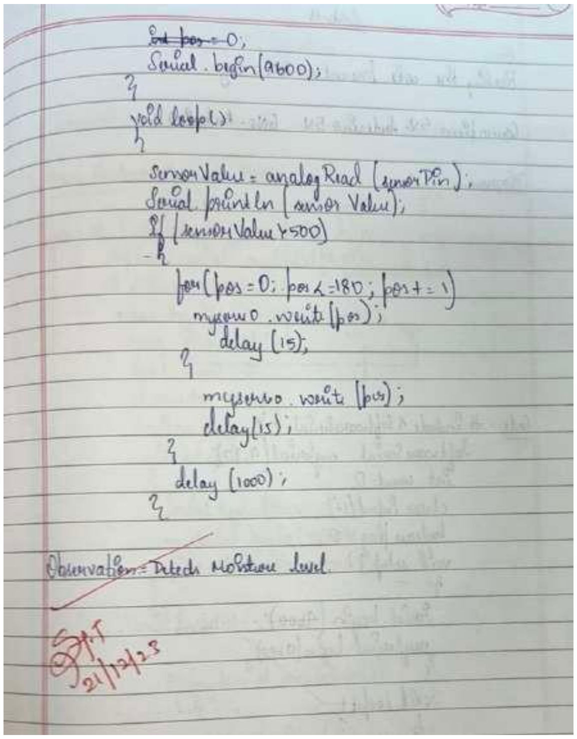
Moisture sensor VCC to Arduino 5V
Moisture sensor GND to Arduino GND
Moisture sensor A0 to Arduino A0

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:



```
    ~~int pos~~ = 0;
    Serial.begin(9600);
  }
  void loop()
  {
    sensorValue = analogRead (sensorPin);
    Serial.println (sensor Value);
    if (sensorValue<500)
    {
      for(pos = 0; pos <=180; pos+= 1)
        myservo.write(pos);
          delay (15);
      }
        myservo.write (pos);
        delay(15);
    }
    delay (1000);
  }
```

Observation:- Detects Moisture level.

21/12/23

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** Date:21/12/2023

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

Hardware/components Required

Arduino Uno board - 1

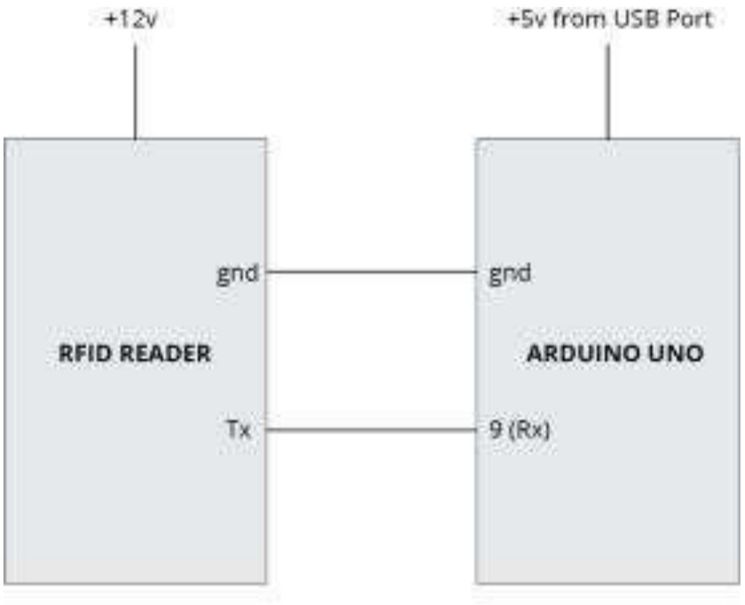
USB Cable - 1

RFID tag

Jumper wires

Circuit Diagram / Pin connection

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



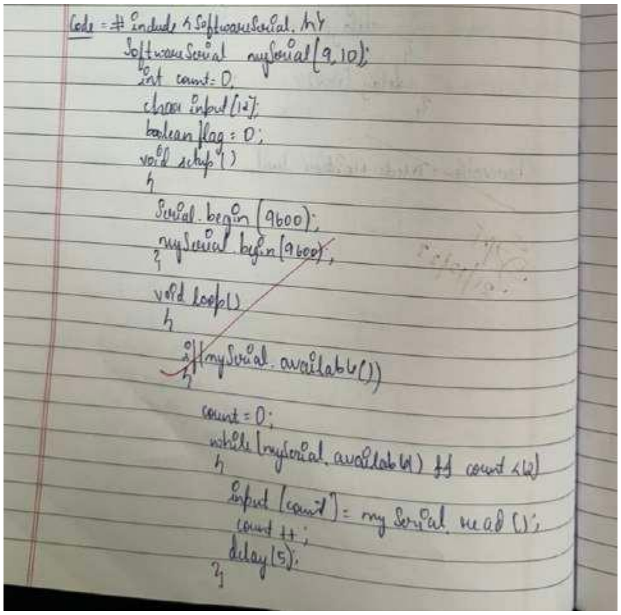
Interfacing RFID Reader to Arduino

Code:

```
#include<SoftwareSerial.h>

SoftwareSerial mySerial(9, 10);

int count = 0; // count = 0
```

```
char input[12];
boolean flag = 0; // flag =0void 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:



```
Code = #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] = my Serial.read();
               count ++;
               delay(5);
             }
```

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** Date:21/12/2023

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

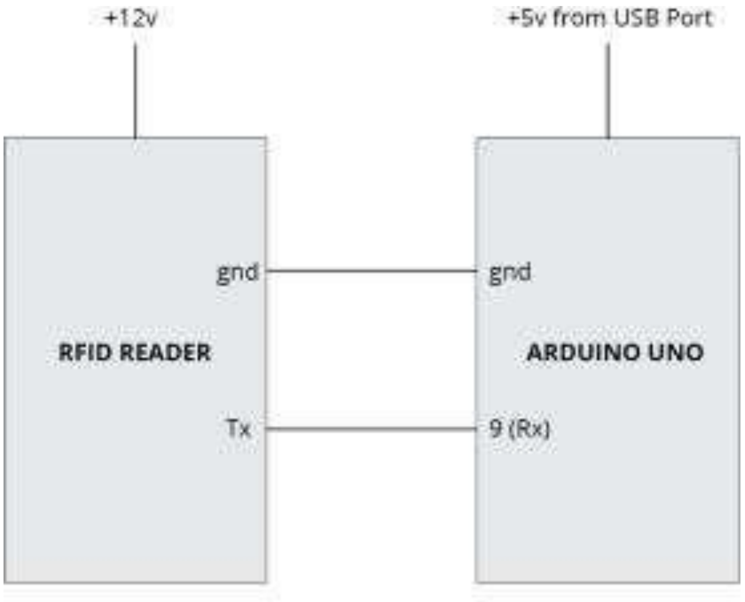
USB Cable - 1

RFID tag

Jumper wires

Circuit Diagram / Pin connection

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



Interfacing RFID Reader to Arduino

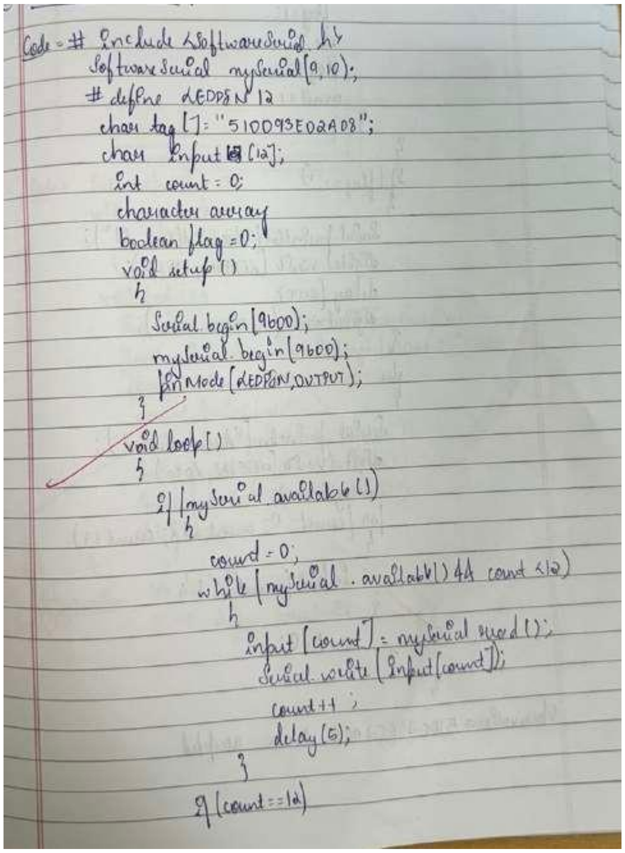
Code:

```
#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)
            {
```

```
to 1                                    if(input[count]==tag[count])
                                              flag = 1; // everytime the values match, we set the flag variable

                                        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 MessagedigitalWrite(LEDPIN,LOW);
  delay(2000);
              }
                        \/* Fill the input variable array with a fixed value 'F' to
                      overwriteall 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:



```
Code = # include <SoftwareSerial.h>
       SoftwareSerial mySerial(9,10);
       # define LEDPIN 12
        char tag[] = "510093E02A08";
        char input[12];
         int count = 0;
         character array
         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)
```

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

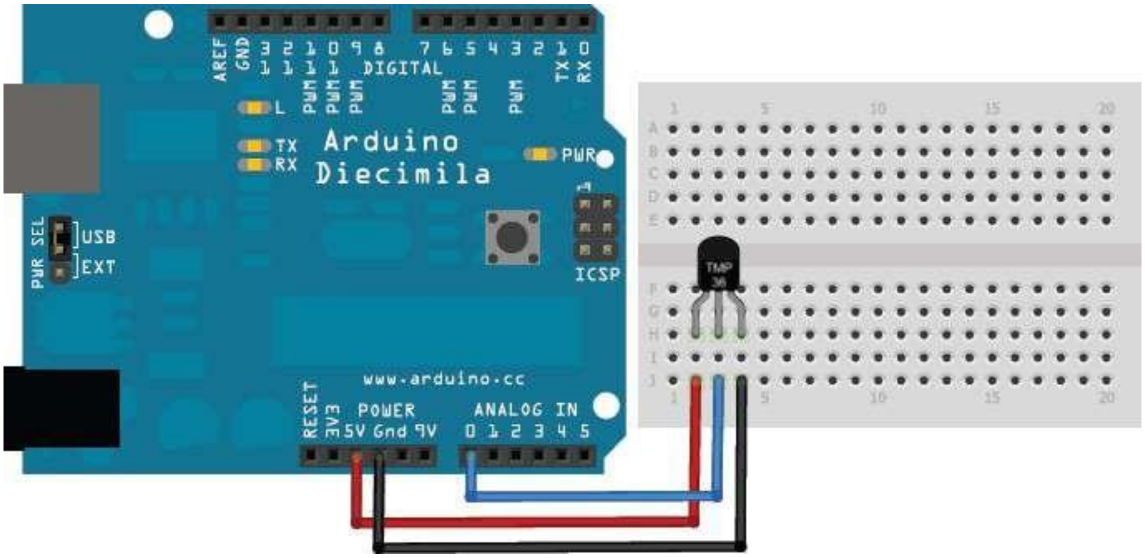
Program no: **12** Program Title: **TEMPERATURE SENSING** Date:21/12/2023

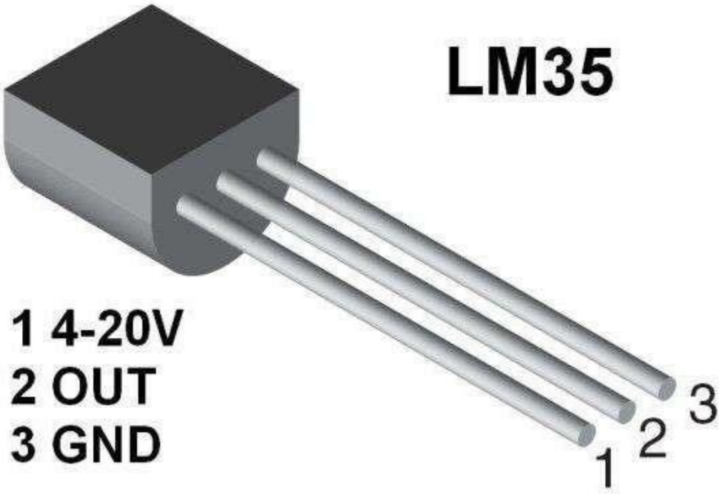
Aim: To monitor the temperature using LM35.

Hardware/components Required

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

Circuit Diagram / Pin connection

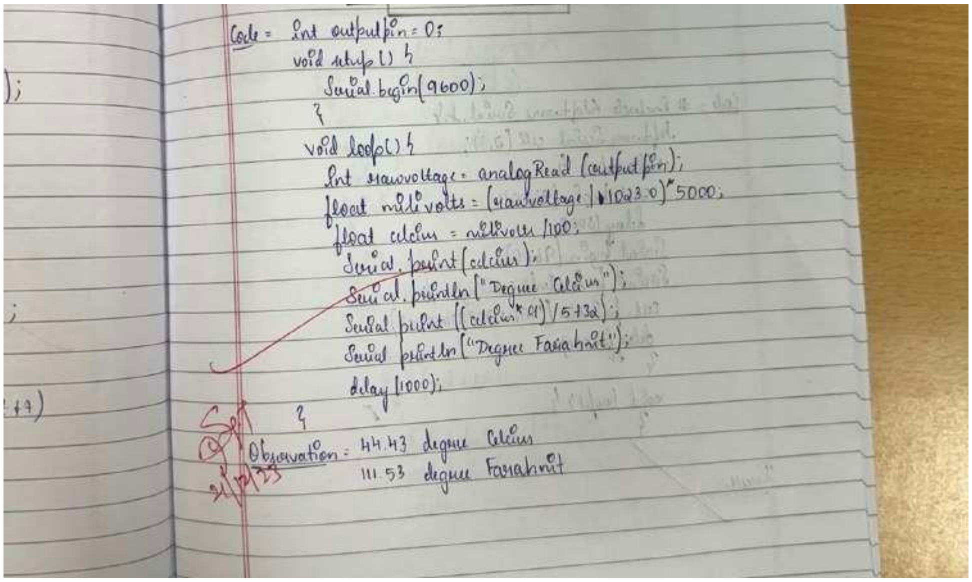




Code:

```
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)

/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:



```
Code = int outputpin = 0;
       void setup() {
          Serial.begin(9600);
        }
        void loop() {
          int rawvoltage = analogRead(outputpin);
          float millivolts = (rawvoltage / 1023.0)*5000;
           float celcius = millivolts /100;
            Serial.print(celcius);
            Serial.println("Degree Celcius");
            Serial.print((celcius*9)/5+32);
            Serial.println("Degree Farahnit");
            delay(1000);
        }
Observation = 44.43 degree Celcius
              111.53 degree Farahnit
```

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

Program no: **13** Program Title: **GSM CALLING** Date:28/12/2023

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

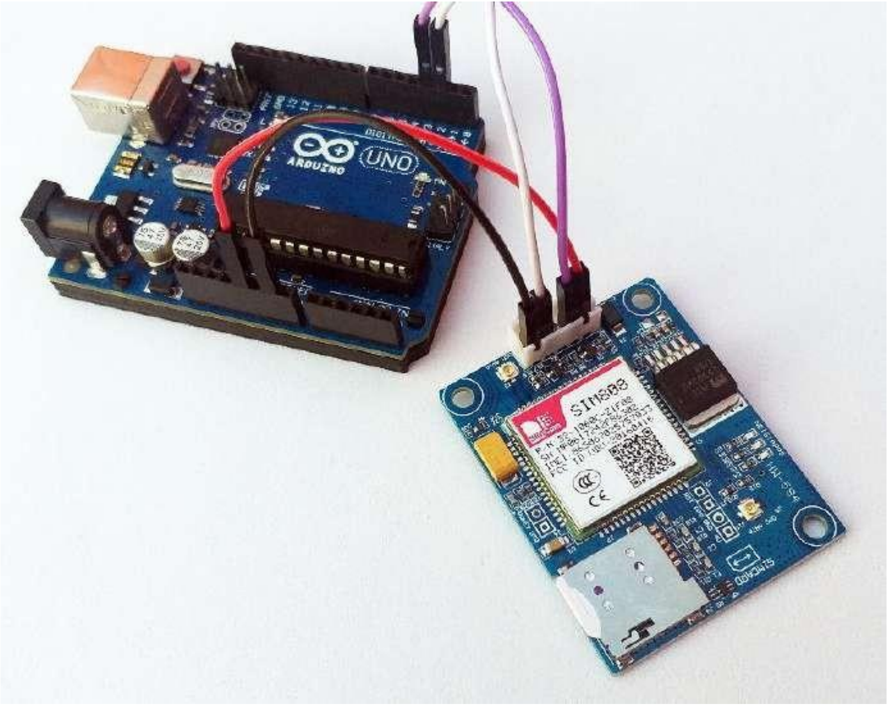
GSM module

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.

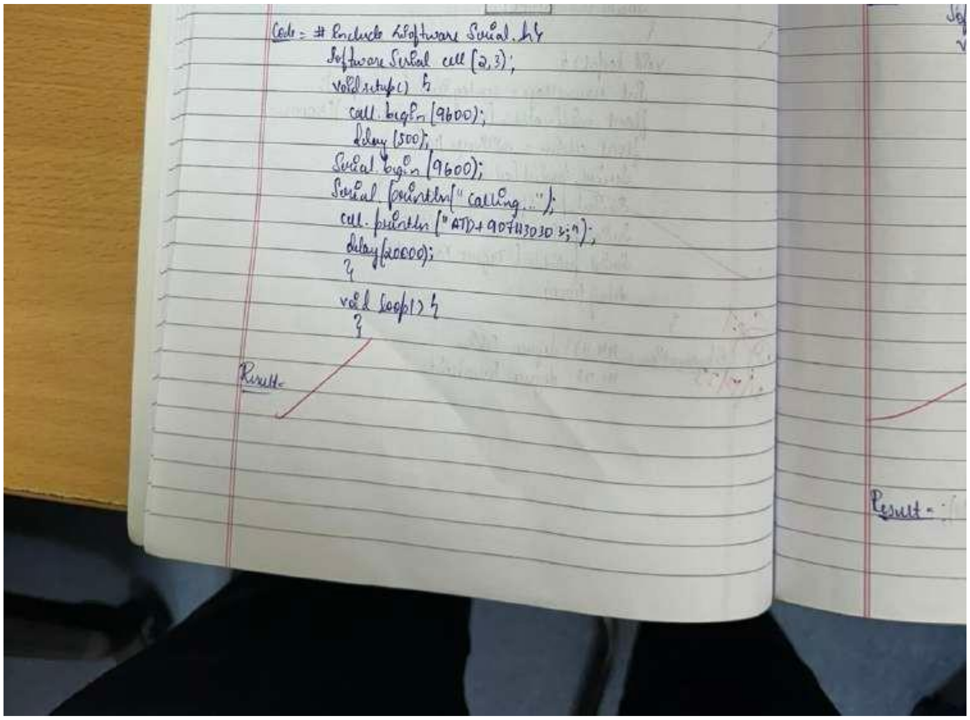


Code:

```
#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:



```
Code = # include <Software Serial.h>
       Software Serial cell (2,3);
       void setup() {
         cell.begin (9600);
          delay (500);
       Serial.begin (9600);
       Serial.println(" calling..." );
        cell.println ("ATD+907113030 ;");
         delay(20000);
        }
        void loop() {
         }
```

Result -

Result -

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

Program no: **14** Program Title: **GSM CALLING FIRE ALERT** Date:11/01/2024

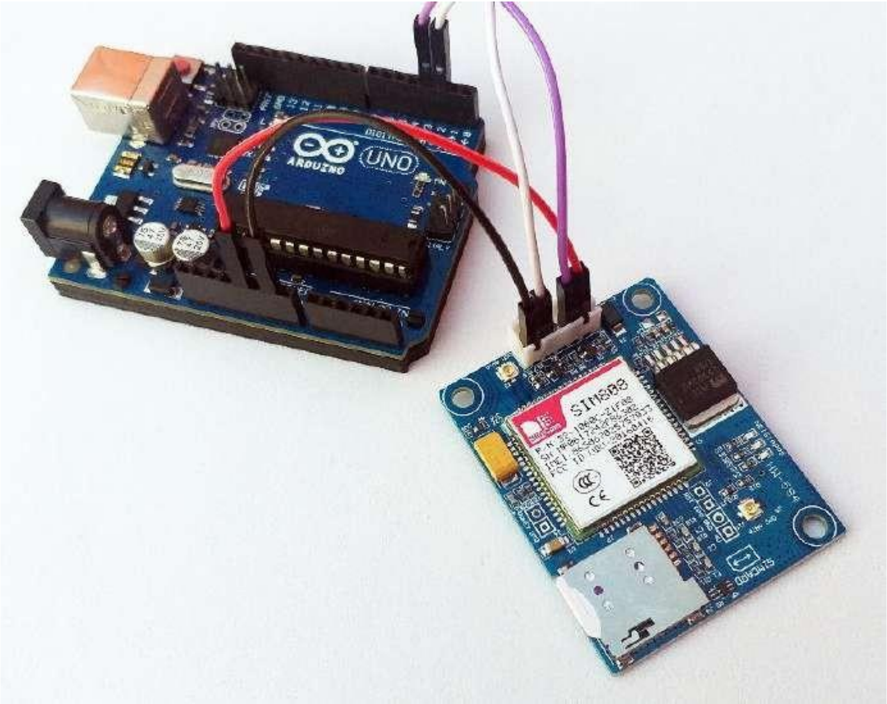
Aim: Call a specified mobile number mentioned in the program using Arduino and GSM Module when a flame sensor detects "fire".

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.

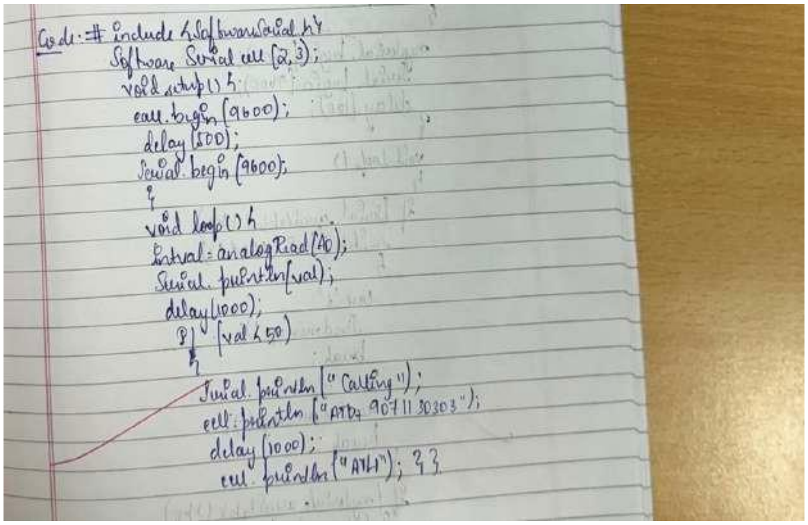


Code:

```
#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:



```
Code:- # include <SoftwareSerial.h>
        SoftwareSerial cell (2,3);
         void setup() {
          call.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+ 9071130303");
                  delay (1000);
                   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** Date:11/01/2024

Aim:

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

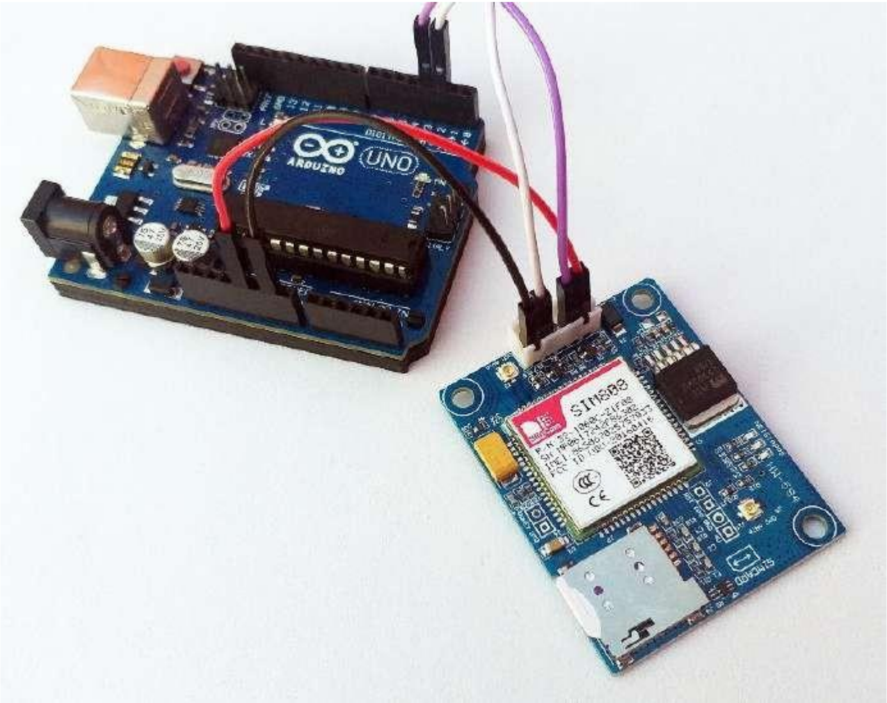
GSM module

SIM slot

Jumper wires

Circuit Diagram / Pin connection:

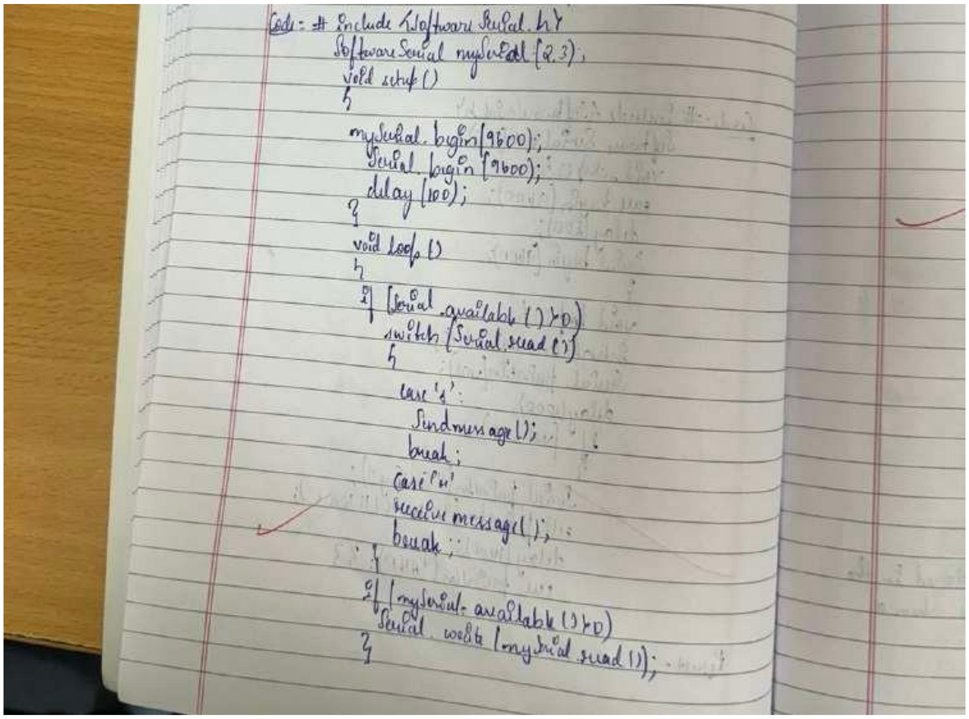
GSM Tx –>Arduino Rx (Here pin 2)
GSM Rx –>ArduinoTx. (Here pin 3)
Make the ground common between Arduino and GSM modem.



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())
    {
  case '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 pic:



```
Code: # include <SoftwareSerial.h>
      SoftwareSerial mySerial (2,3);
      void setup()
      {
       mySerial.begin(9600);
        Serial.begin(9600);
        dilay(100);
      }
      void loop()
      {
       if (Serial.available()>0)
         switch (Serial.read())
         {
          case 's':
            Sendmessage();
            break;
          case 'r'
          recieve message();
          break;
        }
       if (mySerial.available()>0)
        Serial.write(mySerial.read());
       }
```

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

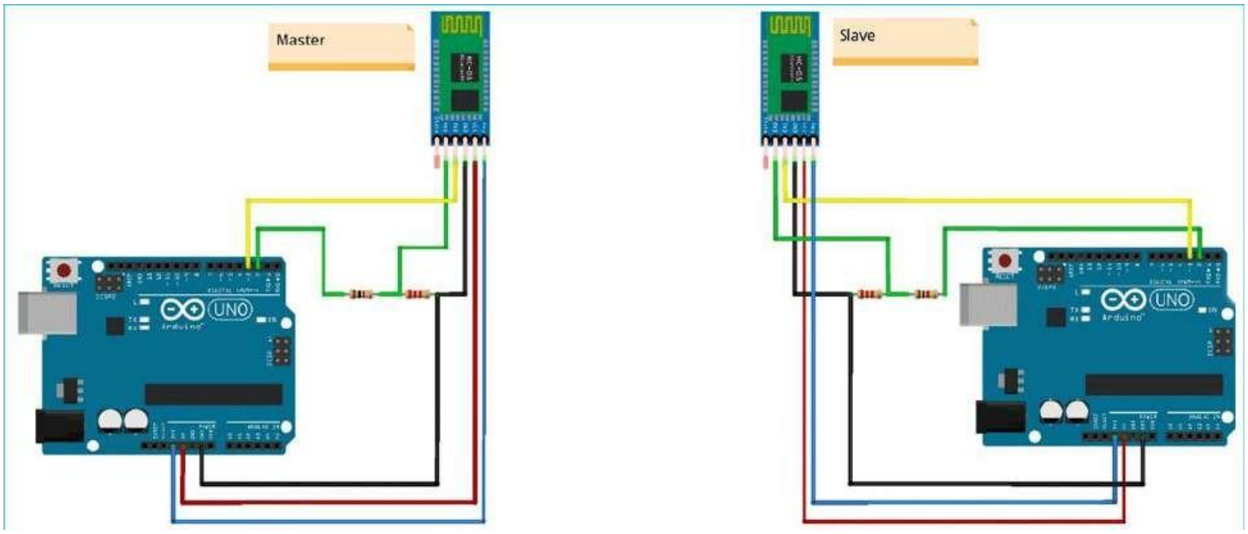
Program no: **16** Program Title: **BLUETOOTH MASTER SLAVE** Date:18/01/2024

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 devicesAT+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.

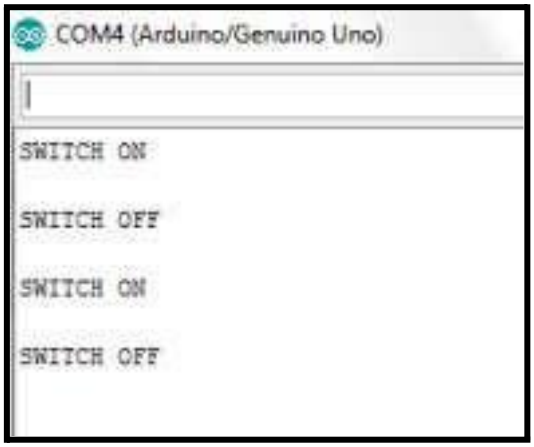
BT-Slave Program:

```
#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:

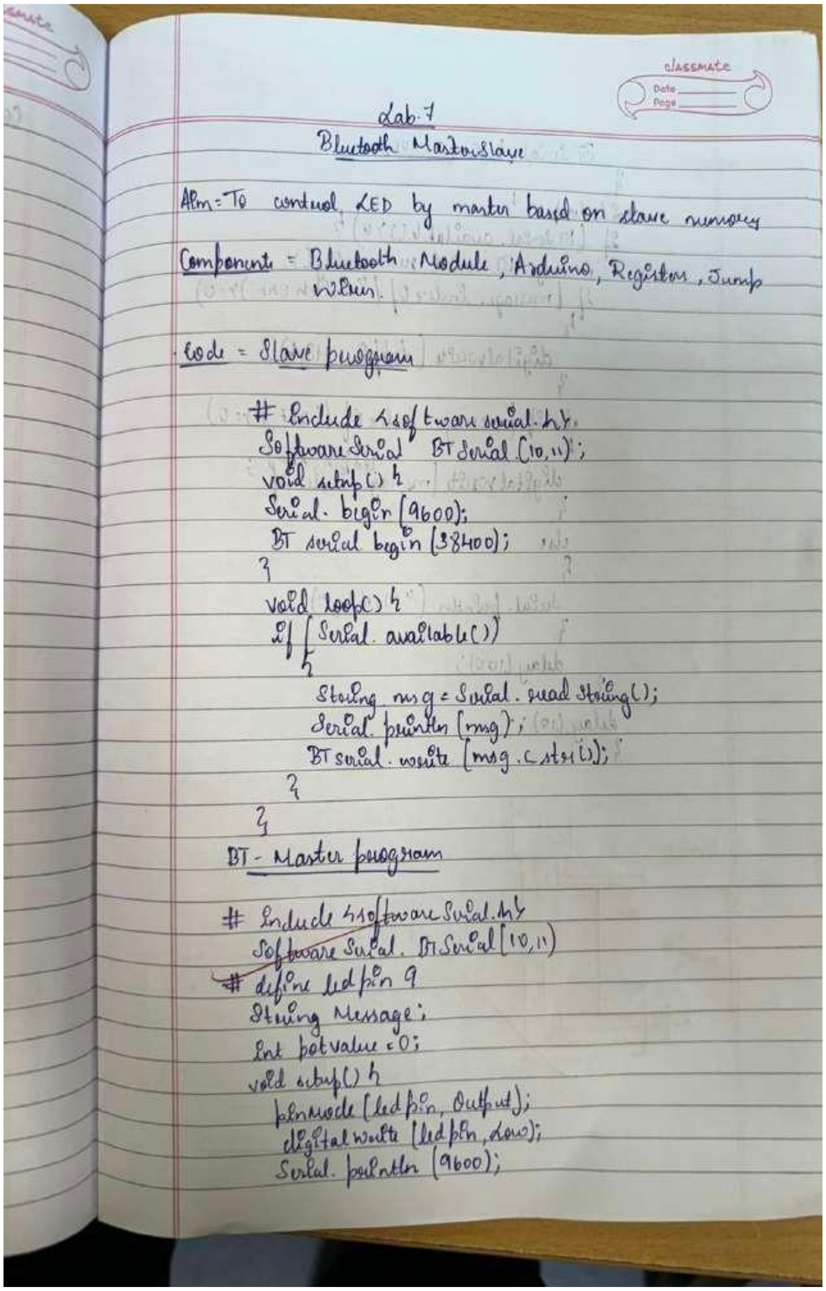
```
#include <SoftwareSerial.h>

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:



Lab.7

Bluetooth MasterSlave

Aim= To control LED by master based on slave memory

Components = Bluetooth Module, Arduino, Register, Jump wires.

Code = Slave program

```
 #include <software serial.h>
  SoftwareSerial BTSerial (10,11);
  void setup() {
  Serial. begin (9600);
   BT serial begin (38400);
  }
  void loop() {
   if (Serial. available())
    {
      String msg = Serial. read String();
      Serial. println (msg);
      BT serial. write (msg.c_str());
    }
  }
```

BT- Master program

```
# include <softwareSerial.h>
  SoftwareSerial. BTSerial(10,11)
# define ledpin 9
  String Message;
  int potvalue =0;
  void setup() {
    pinmode (ledpin, Output);
     digitalwrite (ledpin, Low);
    Serial. println (9600);
```

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.