VISVESVARAYA TECHNOLOGICAL UNIVERSITY

"JnanaSangama", Belgaum -590014, Karnataka.

LAB REPORT on

INTERNET OF THINGS LAB

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 BENGALURU-560019 JUN-2023 to SEP-2023
(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" was carried out by **CHANDRASEKHAR PATIL(1BM21CS043),** 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 - (22CS5PCIOT)** work prescribed for the said degree.

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1. LED Blinking Aim:

Turns on an LED on for one second, then off for one second, repeatedly **Hardware**

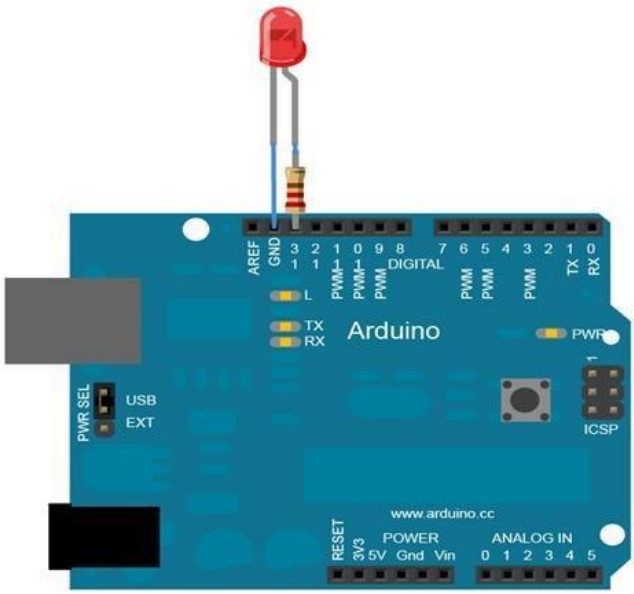
Required:

• Arduino Board

• LEDs

Pin connection:

- LED positive to pin 13.
- LED negative to ground.



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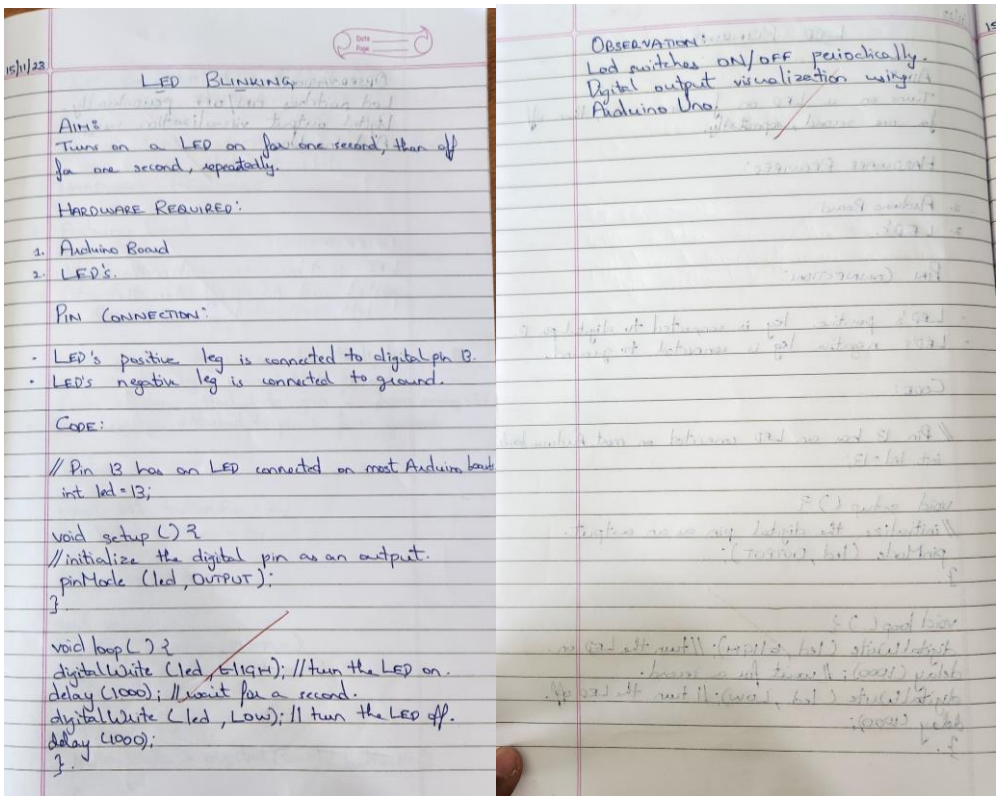


Code:

```
int led = 13;
void setup() // the setup routine runs once when you press reset
{
// initialize the digital pin as an output. pinMode(led,
OUTPUT);
} void loop()
{
digitalWrite(led, HIGH); // turn the LED on (HIGH is the voltage level) delay(1000);
// wait for a second
digitalWrite(led, LOW); // turn the LED off by making the voltage LOW delay(1000);
// wait for a second
}
```

Observation:

The LED blinks periodically.

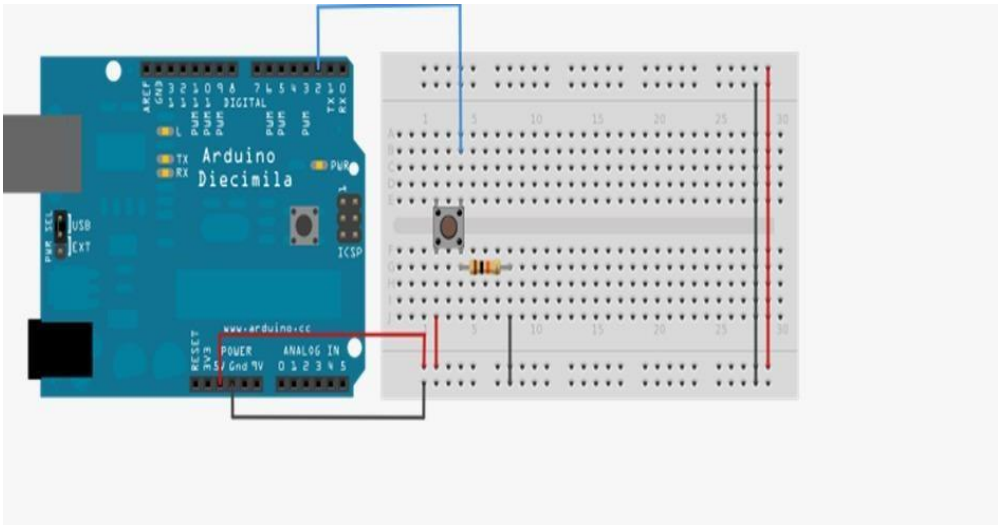
2.LED ON/OFF Using Pushbutton Aim:

Turn an LED ON /OFF using a Pushbutton.

Hardware Required:

- Arduino Board
- LED
- Push button **Pin connection:**

- LED positive to pin 13.
- LED negative to ground.
- Pushbutton leg to 5V.
- Pushbutton leg to ground. ● Pushbutton leg to pin 2.



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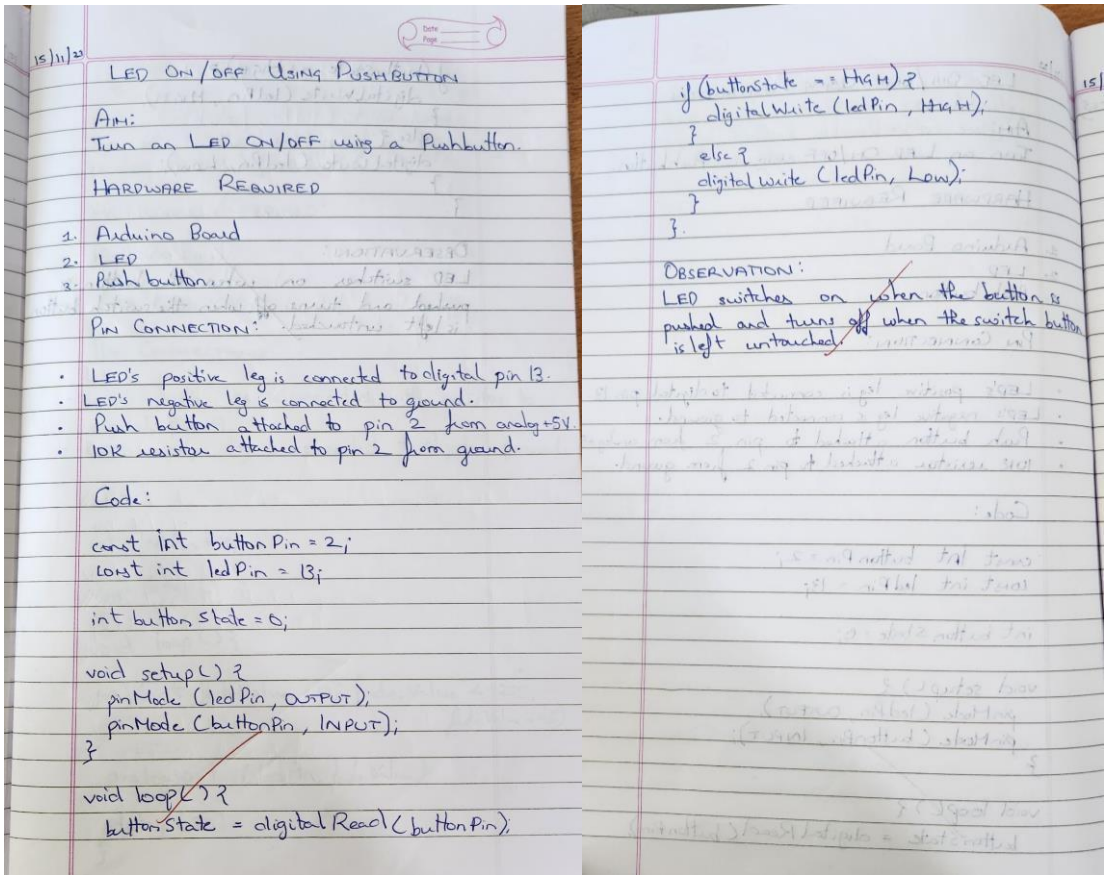


Code:

```
const int buttonPin = 2; // Pin connected to the push button const
int ledPin = 13;   // Pin connected to the LED
int buttonState = 0;     // Variable to store the state of the push button void
setup() {
  pinMode(ledPin, OUTPUT);    // Initialize the LED pin as an output
pinMode(buttonPin, INPUT);  // Initialize the push button pin as an input }


void loop() {
  buttonState = digitalRead(buttonPin); // Read the state of the push button
if (buttonState == HIGH) {  // If the button is pressed
digitalWrite(ledPin, HIGH); // Turn on the LED
  } else {                  // If the button is not pressed
    digitalWrite(ledPin, LOW);  // Turn off the LED
  }
```

}

Observation:

When the push button is pressed,the LED glows. When pushutton is released, LED is in OFF state.

3.LED Fading using Potentiometer

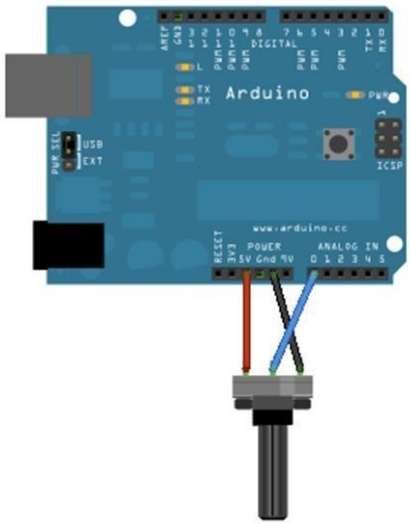
Aim:

To control the brightness of an LED using a Potentiometer.

Hardware Required:

- Arduino Board
- LED
- Potentiometer **Pin connection:**

- LED positive leg to digital pin 9.
- LED negative leg to ground.
- Potentiometer positive to 5V.
- Potentiometer ground to ground of arduino.
- Potentiometer to analog pin AO.



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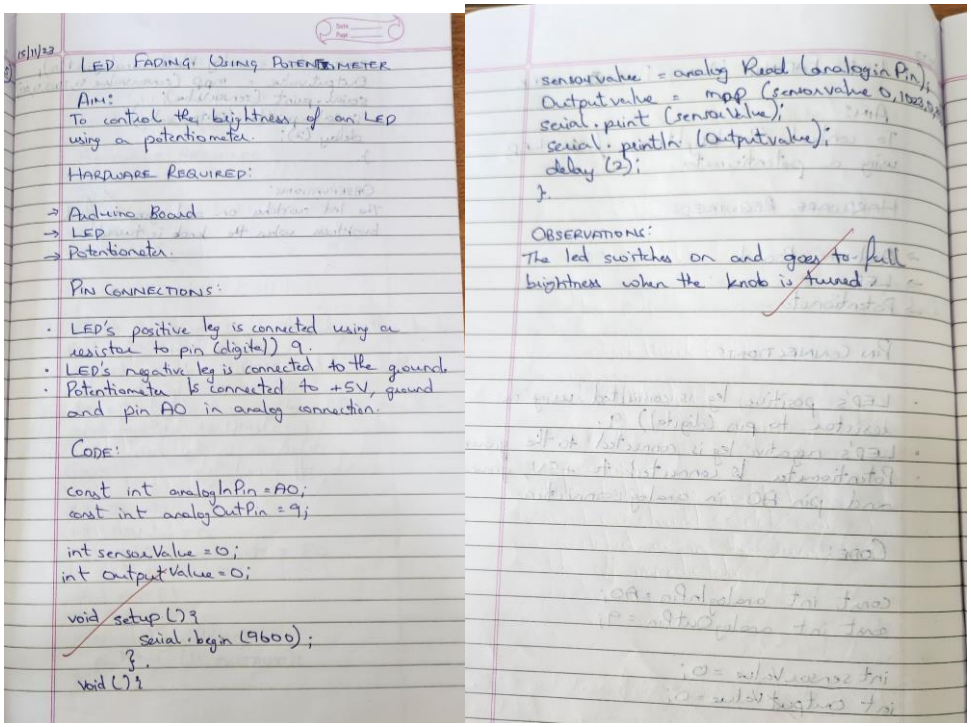


LED FADING USING POTENTIOMETER

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

HARDWARE REQUIRED:

-> Arduino Board
-> LED
-> Potentiometer.

PIN CONNECTIONS:

- LED's positive leg is connected using a resistor to pin (digital) 9.
- LED's negative leg is connected to the ground.
- Potentiometer is connected to +5V, ground and pin A0 in analog connection.

CODE:

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

int sensorValue = 0;
int outputValue = 0;

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

```
sensorValue = analogRead(analogInPin);
Output value = map(sensorvalue 0, 1023,
serial.print(sensorValue);
serial.println(outputvalue);
delay(2);
}
```

OBSERVATIONS:
The led switches on and goes to full brightness when the knob is turned.

Code:

```
const int potPin = A0; // Pin connected to the potentiometer

const int ledPin = 9; // Pin connected to the LED void

setup() {

  pinMode(ledPin, OUTPUT); // Initialize the LED pin as an output

} void loop()

{

  int potValue = analogRead(potPin); // Read the value from the potentiometer (0-1023)
int brightness = map(potValue, 0, 1023, 0, 255); // Map the potentiometer value to brightness (0-255)

  analogWrite(ledPin, brightness); // Set the brightness of the LED }
```

Observation:

The LED brightness is controlled by rotation of potentiometer.

4. Nightlight Simulation

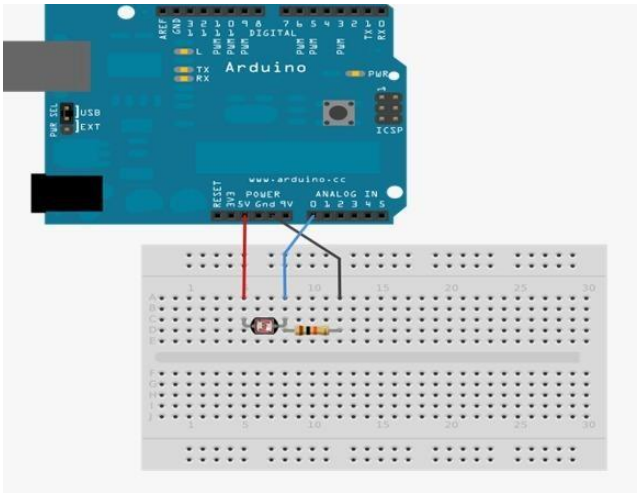
Aim:

Simulating a night light using LDR and PIR **Hardware**

Required:

- 1 LED
- 1 LDR
- 110K register **Pin connection:**

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



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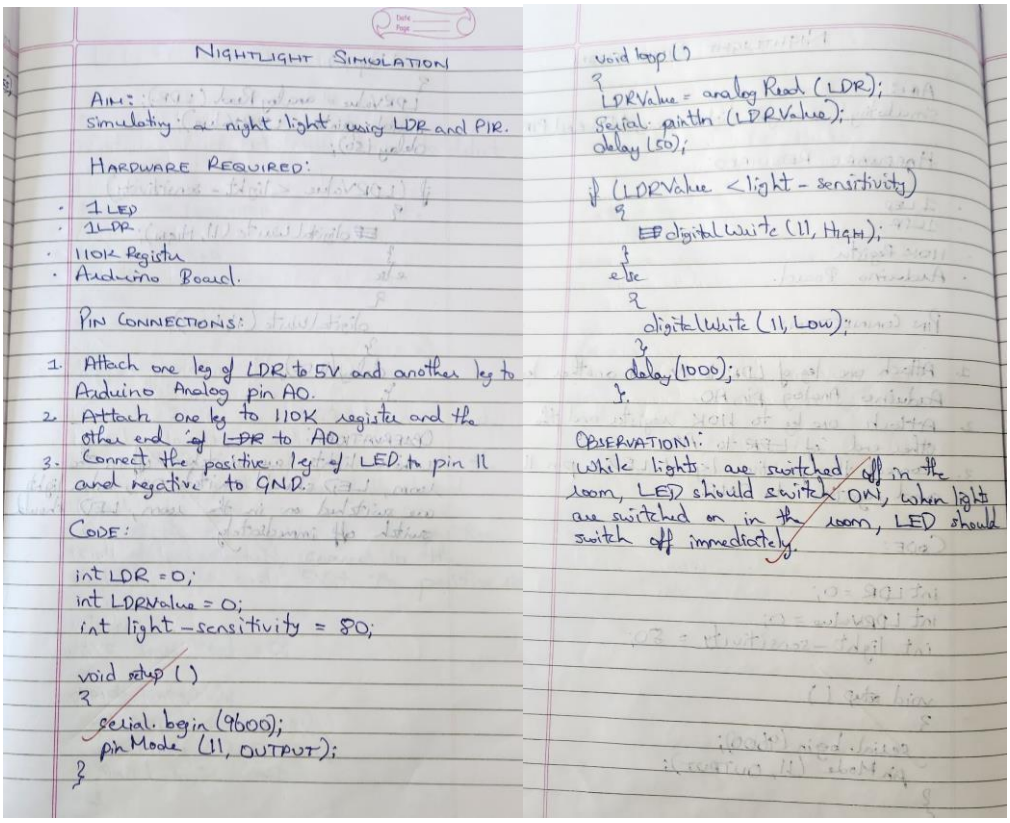


NIGHTLIGHT SIMULATION

AIM:
Simulating a night light using LDR and PIR.

HARDWARE REQUIRED:
- 1 LED
- 1 LDR
- 110K Register
- Arduino Board.

PIN CONNECTIONS:
1. Attach one leg of LDR to 5V and another leg to Arduino Analog pin A0.
2. Attach one leg to 110K register and the other end of LDR to A0.
3. Connect the positive leg of LED to pin 11 and negative to GND.

CODE:

```
int LDR = 0;
int LDRValue = 0;
int light_sensitivity = 80;

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

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);

}

Observation: Based on the readings from the LDR sensor, the LED light switches ON and OFF.

5.PIR with Arduino UNO

Aim:

To detect motion using PIR sensor.

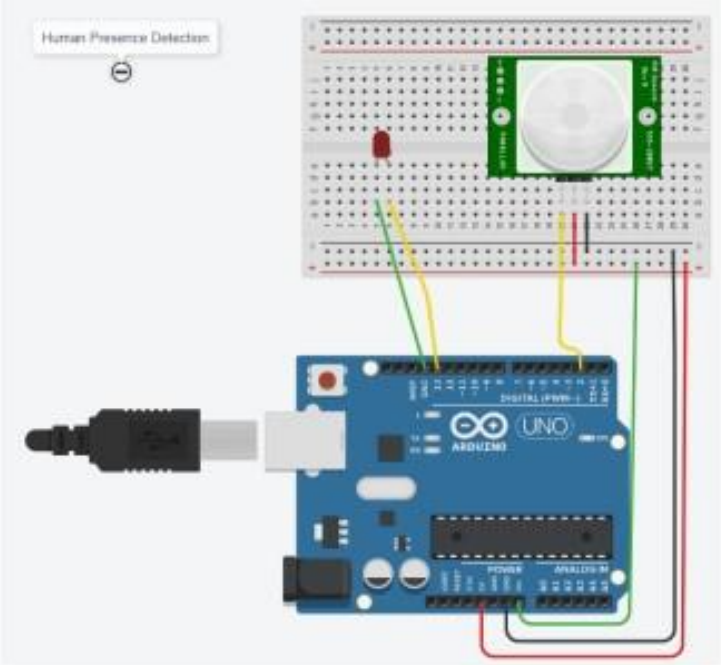
Hardware required:

- Arduino UNO board

- PIR sensor
- LED

Pin connection:

- LED positive to pin 13.
- LED negative to ground.
- PIR negative to ground.
- PIR positive to 5V. ● PIR pin to A0.



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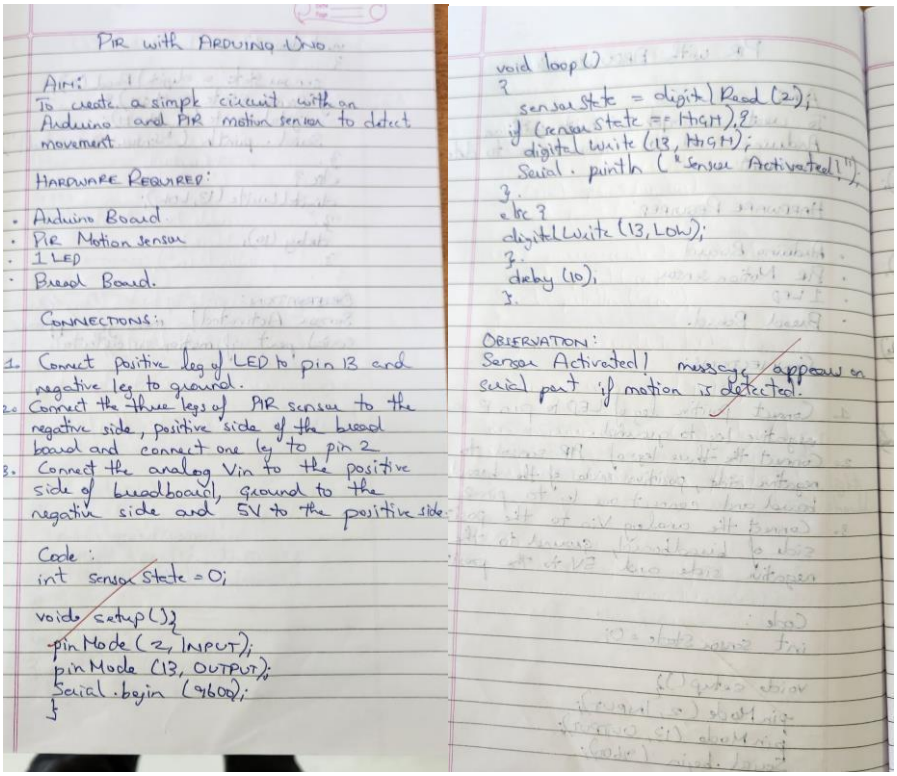

PIR with ARDUINO UNO

AIM:
To create a simple circuit with an Arduino and PIR motion sensor to detect movement

HARDWARE REQUIRED:
- Arduino Board
- PIR Motion sensor
- 1 LED
- Bread Board.

CONNECTIONS:
1. Connect positive leg of LED to pin 13 and negative leg to ground.
2. Connect the three legs of PIR sensor to the negative side, positive side of the bread board and connect one leg to pin 2
3. Connect the analog Vin to the positive side of breadboard, ground to the negative side and 5V to the positive side

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:
Sensor Activated! message appears on serial port if motion is detected.

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);
}
```

Observation:

On detecting motion through PIR, the LED lights up.

6.Ultrasound with Arduino UNO

Aim:

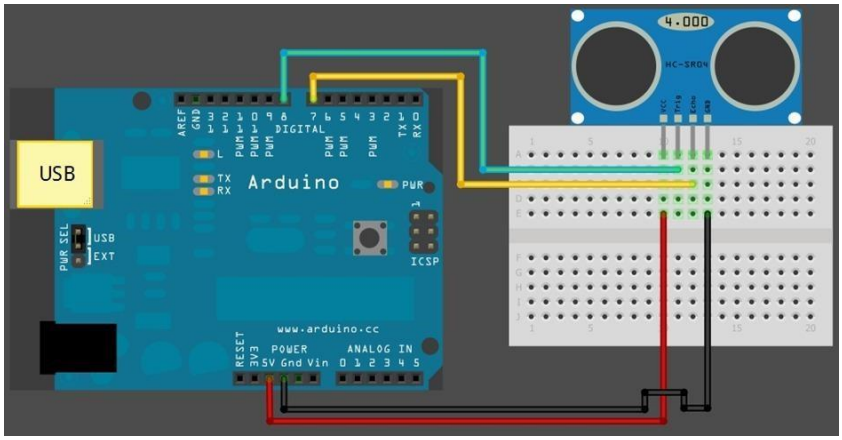
To detect proximity of objects using ultrasound.

Hardware required:

- Arduino UNO board

- Ultrasound **Pin connection:**

- Ultrasound ground to ground.
- Ultrasound echo pin to pin 6.
- Ultrasound trigger pin to pin 7. ● Ultrasound Vcc to 5V.



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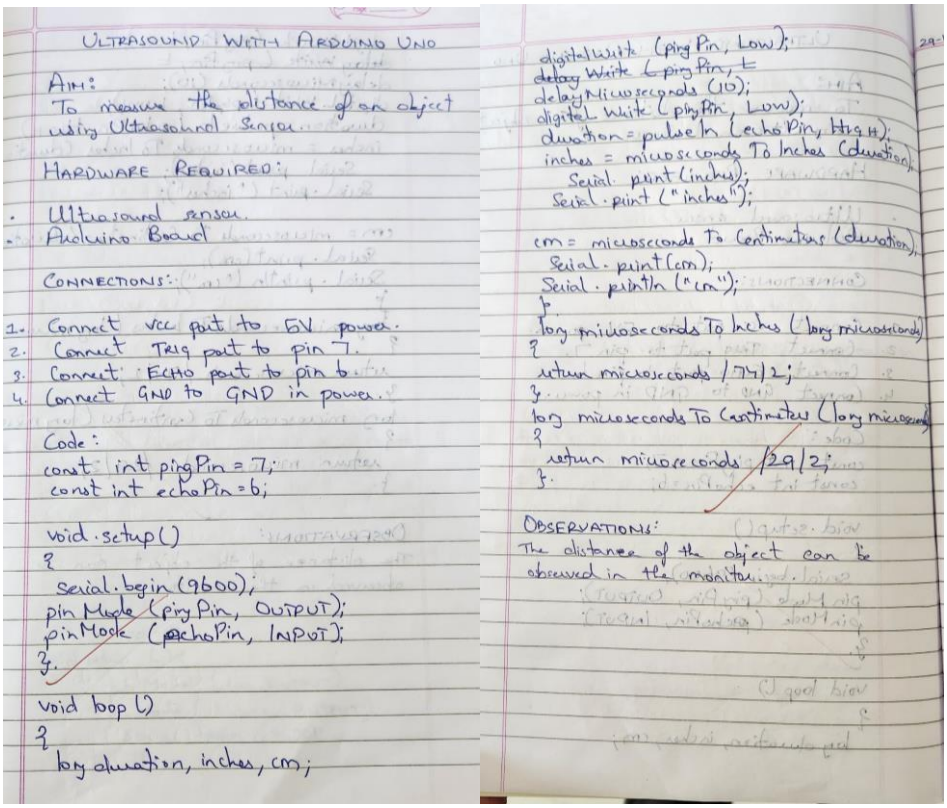


ULTRASOUND WITH ARDUINO UNO

AIM:
To measure the distance of an object using Ultrasound Sensor.

HARDWARE REQUIRED:

- Ultrasound sensor.
- Arduino Board

CONNECTIONS:

1. Connect Vcc port to 5V power.
2. Connect Trig port to pin 7.
3. Connect ECHO port to pin 6.
4. Connect GND to GND in power.

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 = microseconds To Inches (duration);
 Serial.print(inches);
Serial.print("inches");

cm = microseconds To Centimeters (duration);
 Serial.print(cm);
Serial.println("cm");
}
long microseconds To Inches (long microseconds)
{
 return microseconds / 74/2;
}
long microseconds To Centimeters (long microseconds)
{
 return microseconds /29/2;
}
```

OBSERVATIONS:
The distance of the object can be observed in the monitor.

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;
}
```

Observation:

Distance between objects and ultrasound is printed on the monitor in centimeters and inches.

7. Fire Alert Aim:

To simulate a fire alert system.

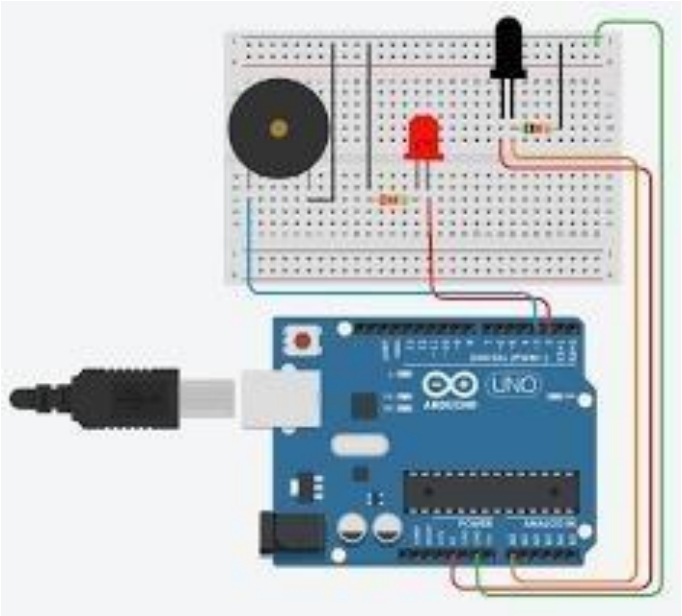
Hardware Required:

- Flame sensor (Analogue Output)
- Arduino
- LED

- Buzzer

Pin connections:

- Flame sensor Vcc to Arduino Vcc.
- Flame sensor ground to Arduino ground.
- Flame sensor A0 to Arduino A0.
- LED positive to pin 9.
- LED negative to ground.
- Buzzer positive to pin 12.
- Buzzer negative to ground.



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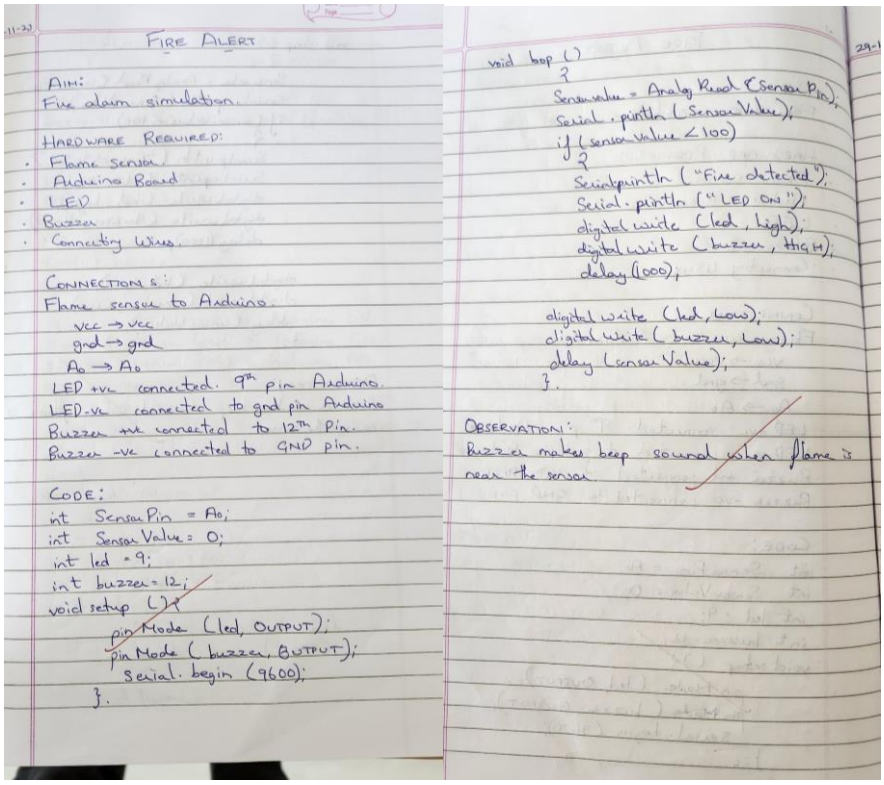


FIRE ALERT

AIM:
Fire alarm simulation.

HARDWARE REQUIRED:
- Flame Sensor
- Arduino Board
- LED
- Buzzer
- Connecting Wires.

CONNECTIONS:
Flame sensor to Arduino.
Vcc → Vcc
gnd → gnd
Ao → Ao
LED +ve connected. 9th pin Arduino.
LED -ve connected to gnd pin Arduino
Buzzer +ve connected to 12th Pin.
Buzzer -ve connected to GND pin.

CODE:
int SensorPin = Ao;
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:
Buzzer makes beep sound when flame is near the sensor

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);
}
```

Observation:

On detection of flame, the buzzer and the LED is switched on, issuing an alert.

8. Automatic irrigation controller simulation

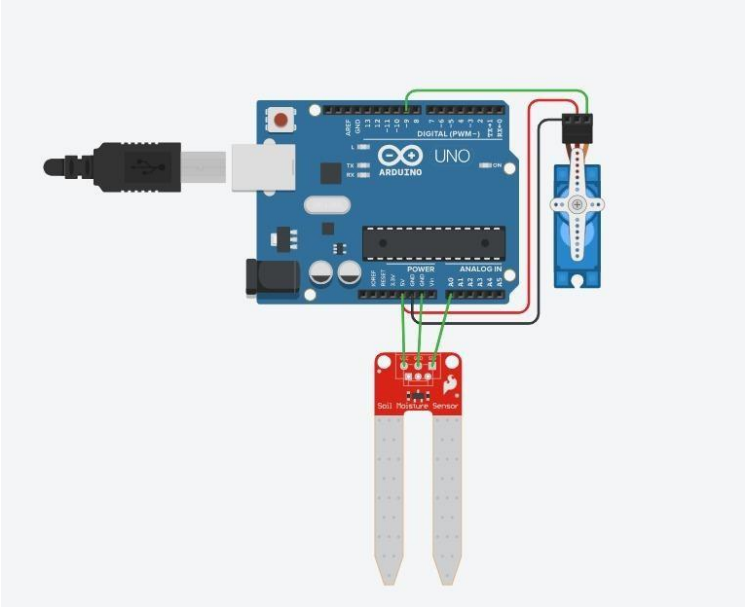
Aim:

To sense the soil moisture and sprinkle water accordingly.

Hardware Required:

- Arduino
- Moisture Sensor
- Min servo motor **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



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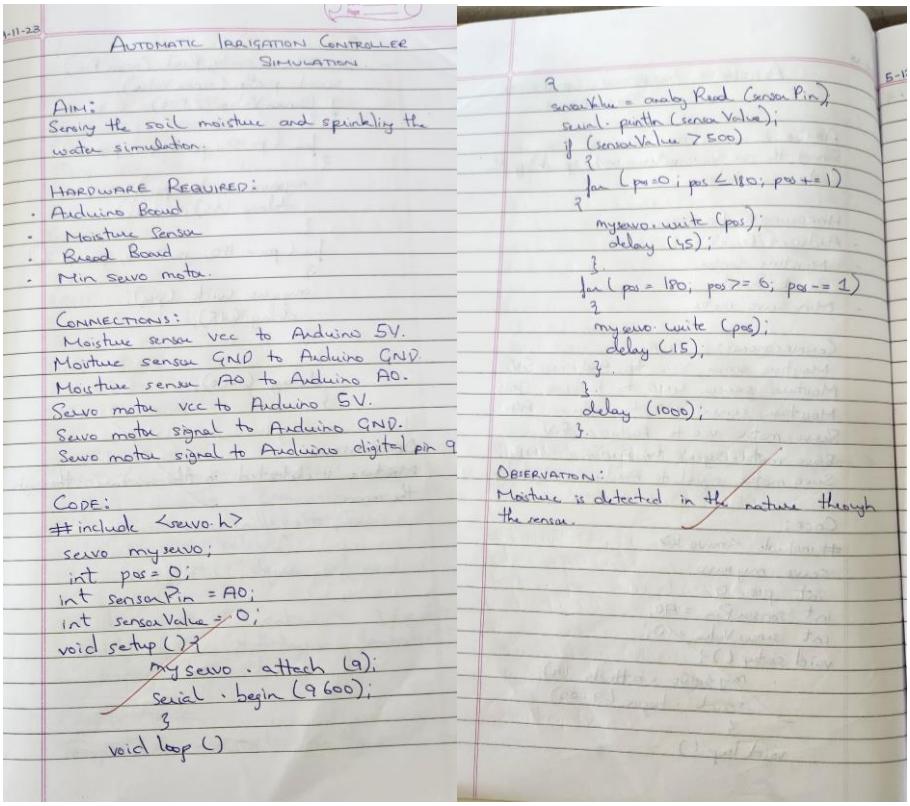

Code:

```
#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);
```

```
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 &#39;pos&#39; delay(15);
// waits 15ms for the servo to reach the position
} } delay
(1000);
}
```

Observation:

Based on the moisture sensor readings, the servo motor is switched on and off.

9. Reading the code present on RFID tag

Aim:

To read RFID tag number and print it onto the Serial monitor.

Hardware required:

- Arduino UNO board
- RFID tag

- RFID reader **Pin connection:**
- RFID reader Vcc to 5V.
- RFID reader ground to ground.
- Tx pin of RFID reader to pin 9.

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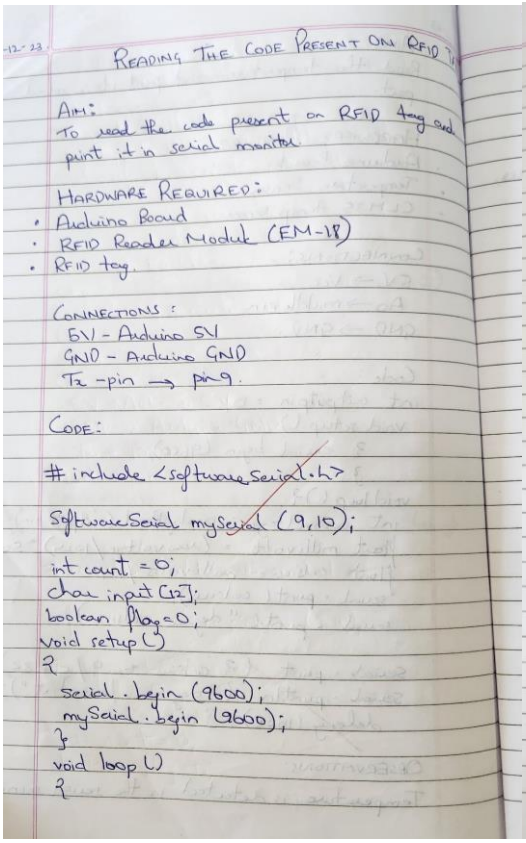
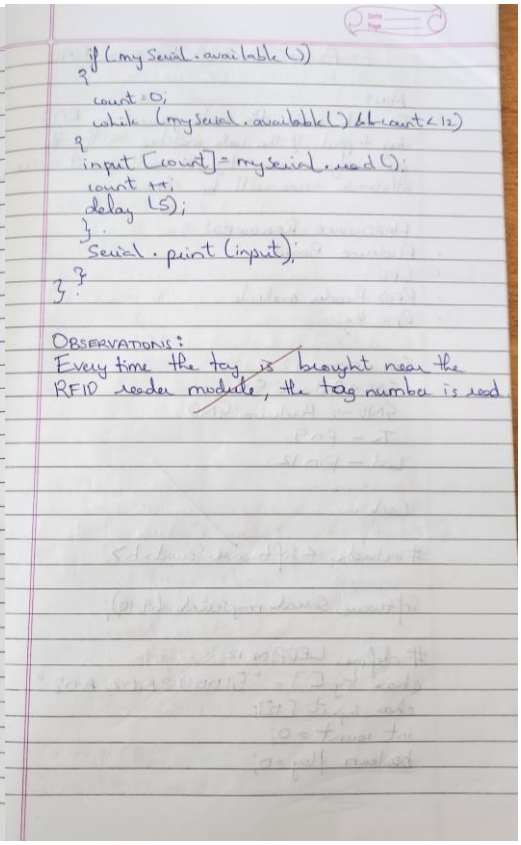




Code:

```
#include<SoftwareSerial.h>;
SoftwareSerial mySerial(9, 10);
int count = 0;                                  // count = 0
char input[12];                                  // character array of size 12  rduino
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)
    {
      input[count] =mySerial.read();
count++;        delay(5);
    }
    Serial.print(input);                    // Print RFID tag number
}
}
```

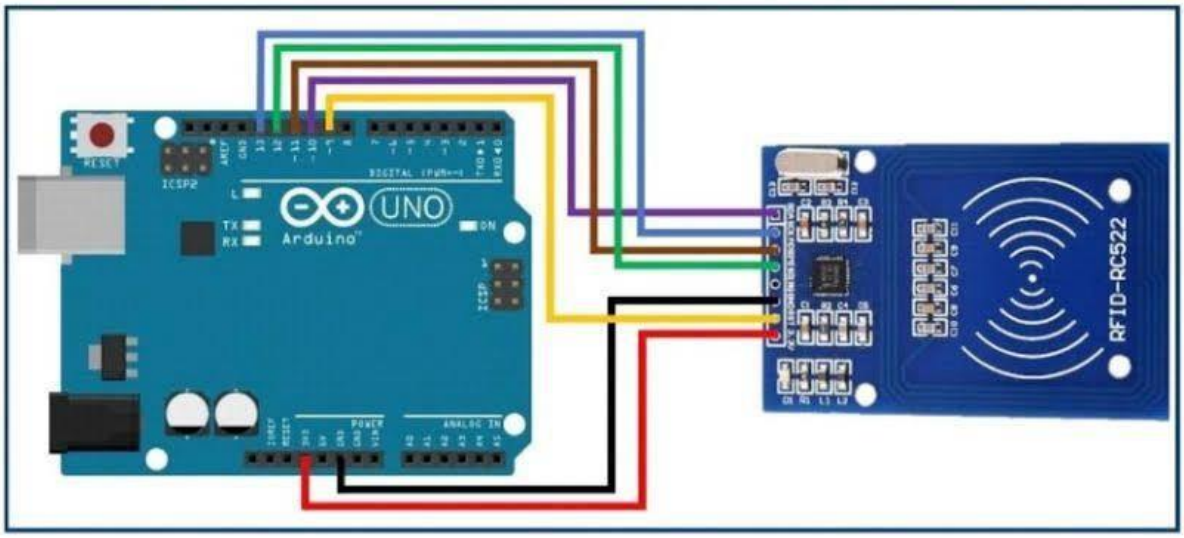
10. Access control through RFID Aim:

To authenticate access based on RFID tag number.

Hardware required:

- Arduino UNO board
- RFID tag
- RFID reader **Pin connection:**
- RFID reader Vcc to 5V.
- RFID reader ground to ground.
- Tx pin of RFID reader to pin 9.
- LED positive to pin 12.

- LED negative to ground.



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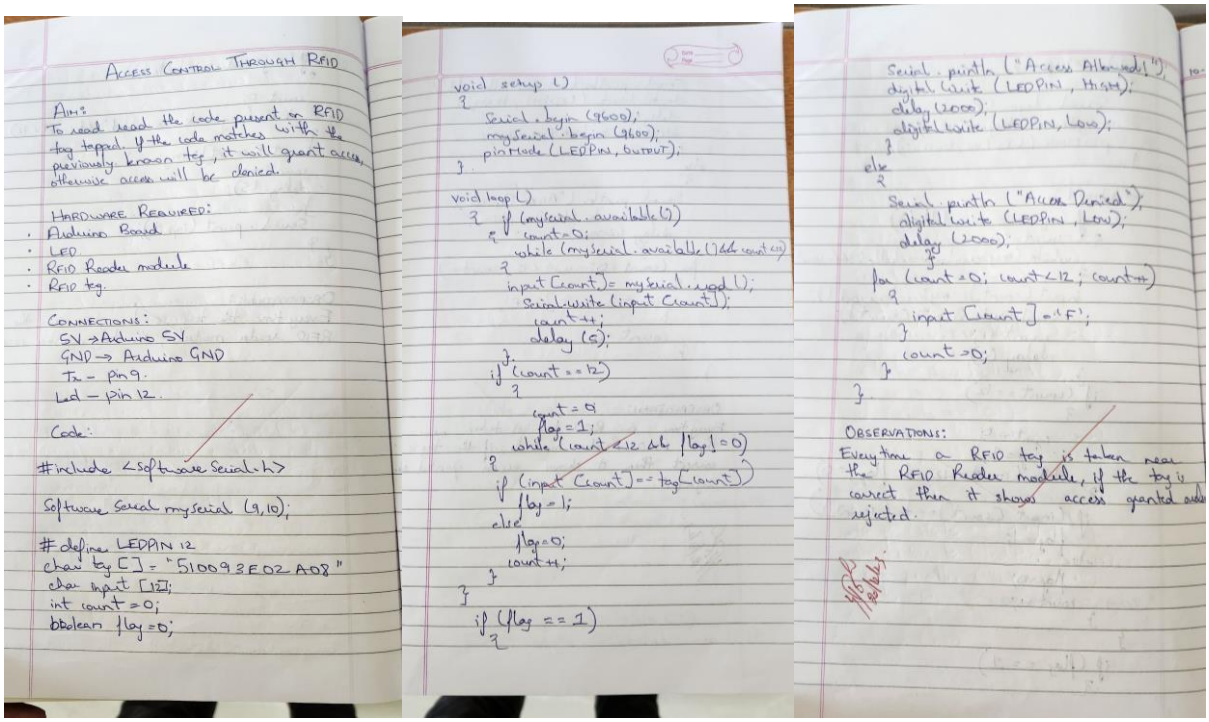


Code:

```
#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
rduino flag = 0; // A variable to store the Tag match status void
setup()
{
Serial.begin(9600);  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;
```

```
while(mySerial.available() &amp;amp;&amp;amp; count &amp;lt; 12)
{
input[count] = mySerial.read();
count++; // increment counter
delay(5); } if(count == 12)
{
count =0; // reset counter rduino to 0 flag
= 1;
while(count<12 && flag !=0)
{
if(input[count]==tag[count])
flag = 1;  else flag=0;
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);
}
for(count=0; count&amp;lt;12; count++)
{
input[count]= &amp;#39;F&amp;#39;;
}
count = 0; // Reset counter variable
}
```

}

Observation:

Only registered RFID tag numbers are allowed and unregistered RFIDs are denied access.

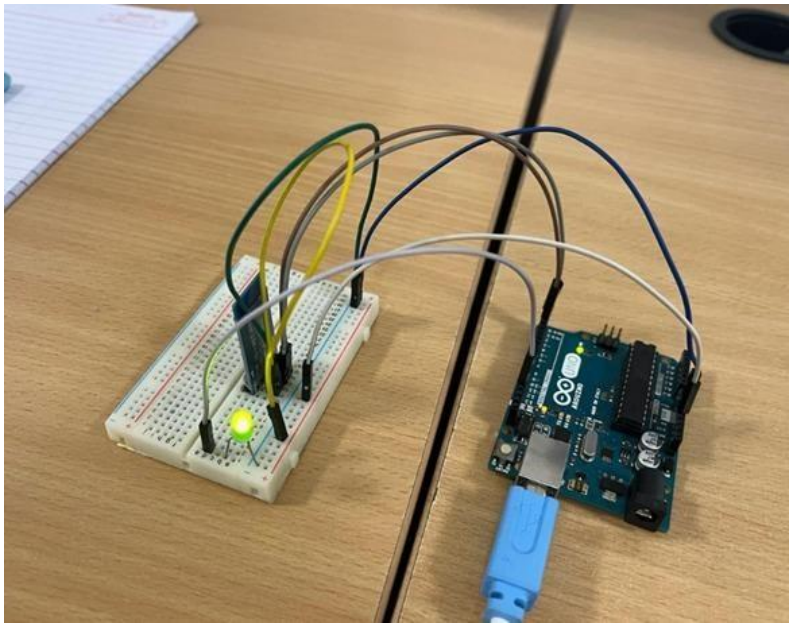
11. HC-05 Bluetooth Module Aim:

Design and implement a system to realize Bluetooth Master/Slave scenario.

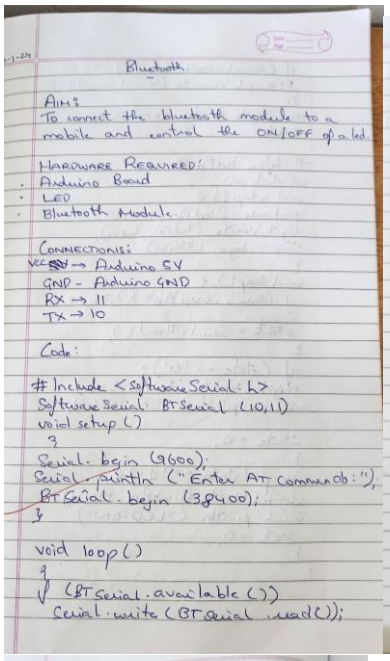
Hardware required:

- HC-05 bluetooth module
- Arduino UNO board **Pin connection:**

- Vcc to 5V of rduino.
- Bluetooth ground to ground of rduino.
- Tx rduinoh to pin 10.
- Rx rduinoh to pin 11.



Handwritten code:



Bluetooth

Aim:
To connect the bluetooth module to a mobile and control the ON/OFF of a led

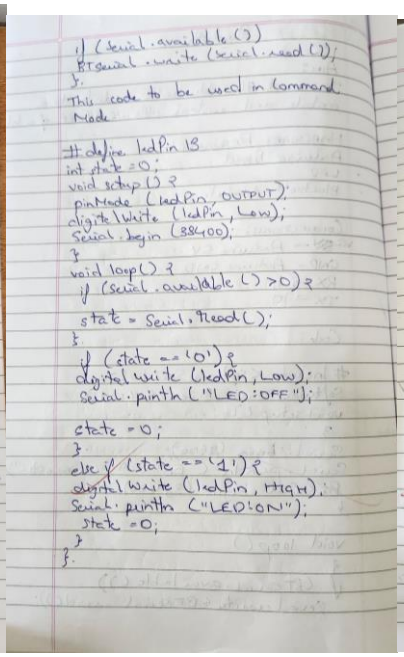
Hardware Required:
- Arduino Board
- LED
- Bluetooth Module

Connections:
Vcc → Arduino 5V
GND - Arduino GND
RX → 11
TX → 10

Code:

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

void loop ()
{
if (BTSerial.available ())
Serial.write (BTSerial.read());
```

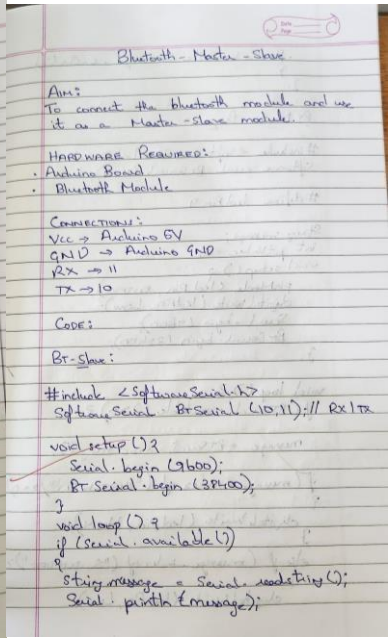


```
if (Serial.available ())
BTSerial.write (Serial.read ());
}
```

This code to be used in Command Mode

```
#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;
}
}
```



Bluetooth - Master - Slave

Aim:
To connect the bluetooth module and use it as a Master - Slave module.

Hardware Required:
- Arduino Board
- Bluetooth Module

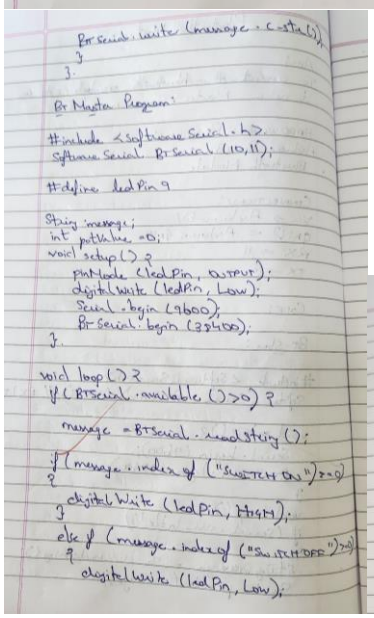
Connections:
Vcc → Arduino 5V
GND → Arduino GND
RX → 11
TX → 10

Code:

Bt-Slave:

```
#include <SoftwareSerial.h>
SoftwareSerial BTSerial (10,11); // RX | TX

void setup ()
{
Serial.begin (9600);
BT Serial.begin (38400);
}
void loop ()
{
if (Serial.available ())
{
string message = Serial.readString ();
Serial.println (message);
```



```
BTSerial.write (message.c_str());
}
}
```

Bt Master Program:

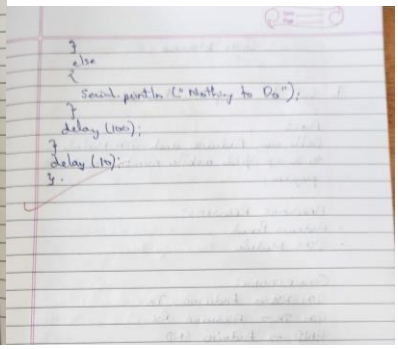
```
#include <SoftwareSerial.h>
SoftwareSerial BTSerial (10,11);

#define ledPin 9

String message;
int pinValue = 0;
void setup ()
{
pinMode (ledPin, OUTPUT);
digitalWrite (ledPin, Low);
Serial.begin (9600);
BTSerial.begin (38400);
}

void loop ()
{
if (BTSerial.available () > 0)
{
message = BTSerial.readString ();

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);
}
```

Code:

(For this program to work, HC-05 must be in command mode)

```
#include <SoftwareSerial.h>;
SoftwareSerial BTSerial(10, 11); // RX | TX void
setup()
{
  Serial.begin(9600);
  Serial.println(“Enter AT commands:’);
  BTSerial.begin(38400);  // HC-05 default speed in AT command more
} void
loop() {
  if (BTSerial.available())
Serial.write(BTSerial.read());   if
(Serial.available())
    BTSerial.write(Serial.read());
}
```

HC-05 Controlled by mobile Code:

(For this code to work, HC-05 must be in DATA mode and Arduino Bluetooth App)

```
#define ledPin 13 int state =
0; void setup() {
pinMode(ledPin, OUTPUT);
digitalWrite(ledPin, LOW);
  Serial.begin(38400);
  // Default communication rate of the Bluetooth module
} void loop()
{
```

```
 if(Serial.available() < 0){
 // Checks whether data is I from the serial port     state =
Serial.read(); // Reads the data from the serial port
 }  if (state ==
“0”) {
 digitalWrite(ledPin, LOW); // Turn LED OFF
 Serial.println(“LED: OFF”);
state = 0;  }  else if (state ==
“1”) {   digitalWrite(ledPin,
HIGH);
 Serial.println(“LED: ON”);;
state = 0;
 }
}
```

BT-Master Slave

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() {
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){
message = BTSerial.readString();
if(message.indexOf("SWITCH ON")<=0)
    {
     digitalWrite(ledPin, HIGH); // LED ON
    }
    else if(message.indexOf("SWITCH OFF")<=0)
    {
      digitalWrite(ledPin, LOW); // LED OFF
    }
   delay(100);  }
delay(10);
}
```

Observation:

- Commands can be sent to rduinoh module to configure them.
- LED state can be controlled by rduinoh module.
- Bluetooth master/slave configuration is simulated.

14. GSM Module

1. GSM Module: Call to a particular number Aim:

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

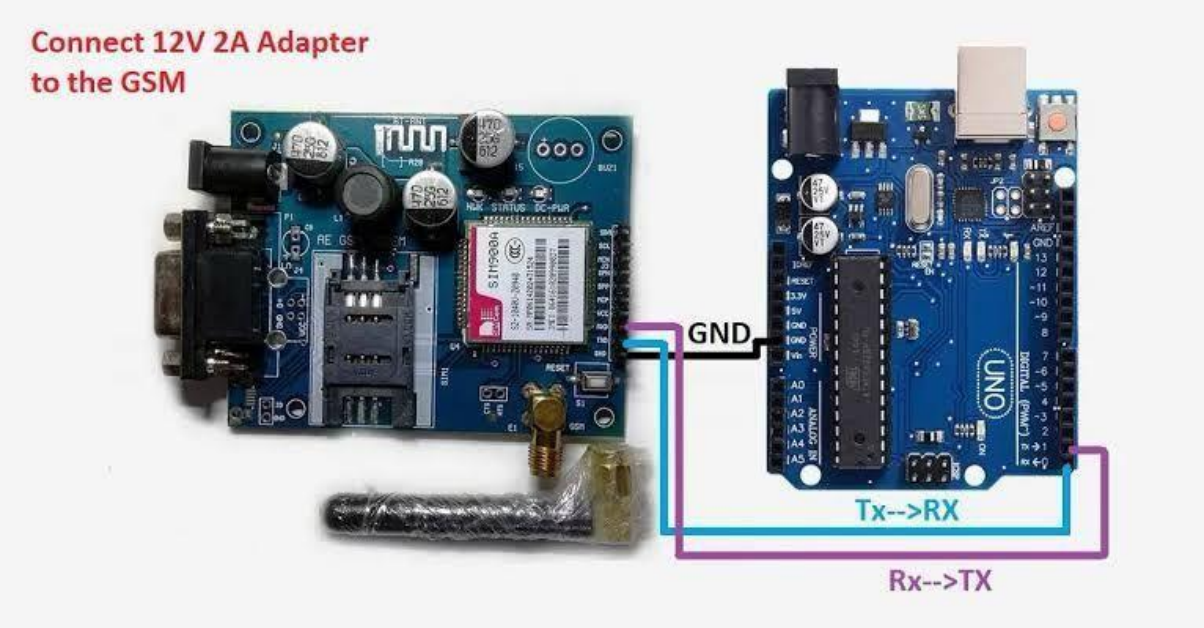
Hardware required:

- Arduino UNO board
- GSM module

- SIM card

Pin connections:

- GSM Tx to rduino pin 2.
- GSM Rx to rduino pin 3.
- GSM ground to ground of rduino.



Program:

```
#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()
{
}
```

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”.

Pin connection:

- Flame sensor Vcc to Arduino Vcc.
- Flame sensor ground to Arduino ground. ● Flame sensor A0 to Arduino A0.

Program:

```
#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 }

}
```

2. **Sending and Receiving Message Aim:**

2) 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.

Program:

Note: According to the code, message will be sent and received when ‘s’ and ‘r’ are pressed through serial monitor respectively. #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); delay(1000);

}

```
voidRecieveMessage()
{ mySerial.println("AT+CNMI=2,2,0,0,0");
delay(1000);
}
```

4. Controlling LED through received messages:

Aim:

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

Pin connection:

- Attach LED to pin 13 and GND.

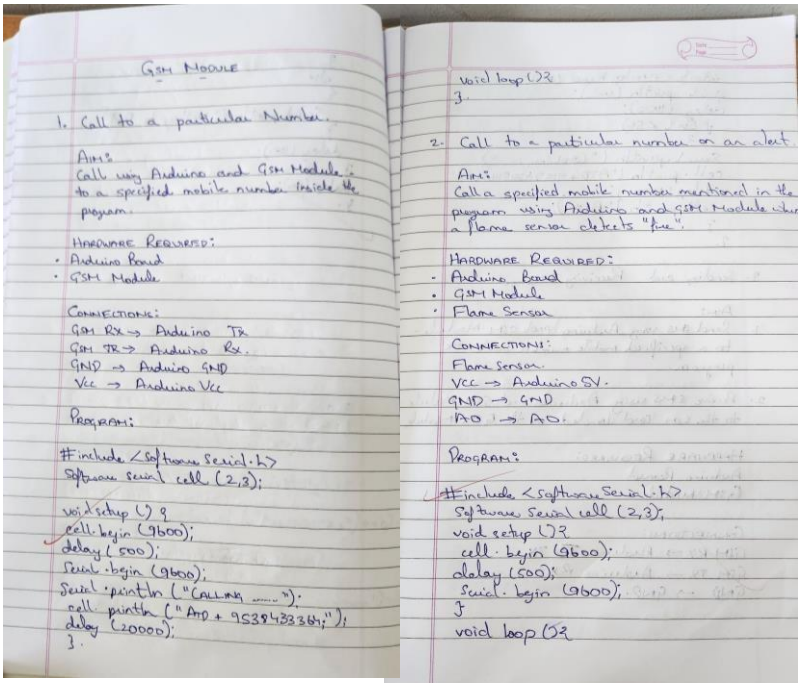
Program:

```
#include <SoftwareSerial.h>
SoftwareSerial cell(2,3);
Void readfn()
{
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();
//New SMS alert cell.println(“AT+CNMI=1,2,0,0,0”);
}

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...”);
}
}
}
```

Handwritten code:



GSM MODULE

1. Call to a particular Number.

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

HARDWARE REQUIRED:
- Arduino Board
- GSM Module

CONNECTIONS:
GSM Rx → Arduino Tx
GSM Tx → Arduino Rx.
GND → Arduino GND
Vcc → Arduino Vcc

PROGRAM:

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

void setup () {
cell.begin (9600);
delay (500);
Serial.begin (9600);
Serial.println ("CALL***.....");
cell.println ("AT+ 9538433361;");
delay (20000);
}
```

```
void loop ()
}
```

2. Call to a particular number on an alert

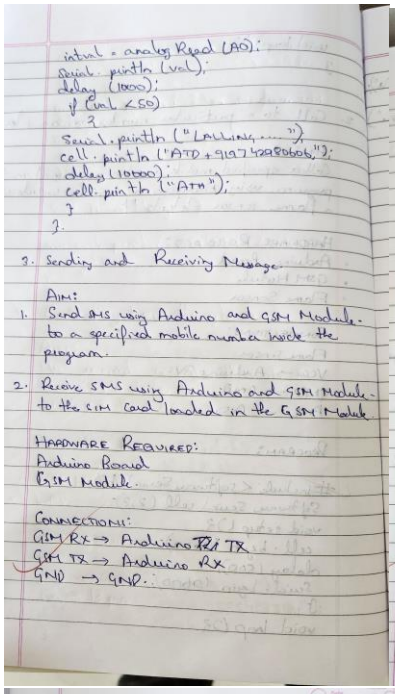
AIM:
Call a specified mobile number mentioned in the program using Arduino and GSM Module when a flame sensor detects "fire".

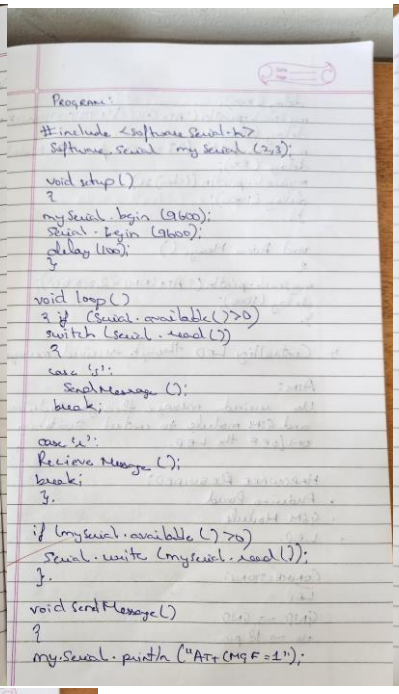
HARDWARE REQUIRED:
- Arduino Board
- GSM Module
- Flame Sensor

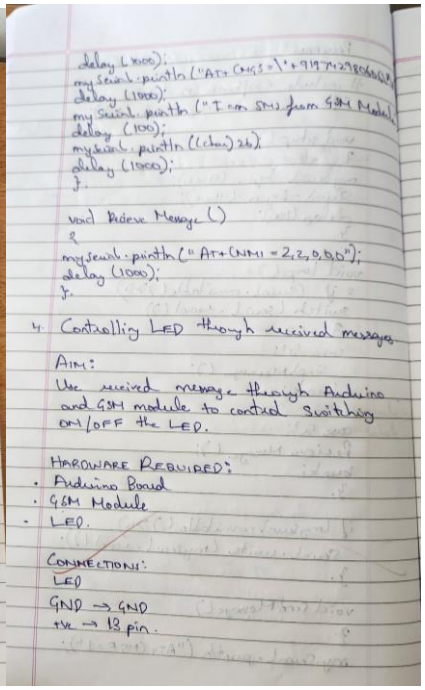
CONNECTIONS:
Flame Sensor
VCC → Arduino 5V.
GND → GND
AO → A0.

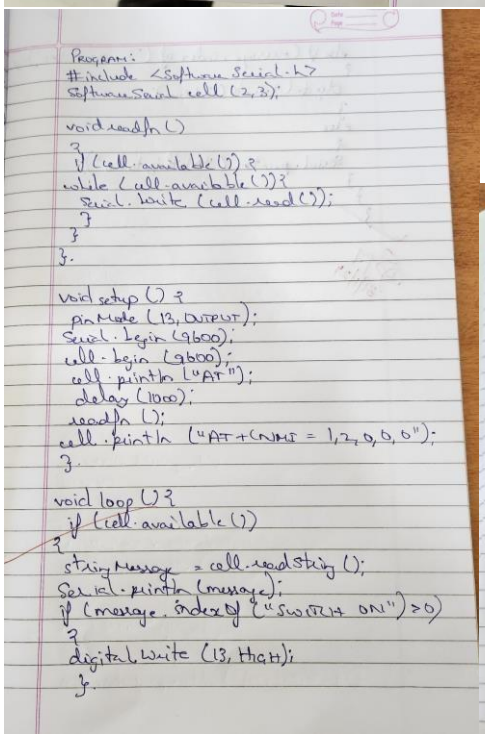
PROGRAM:

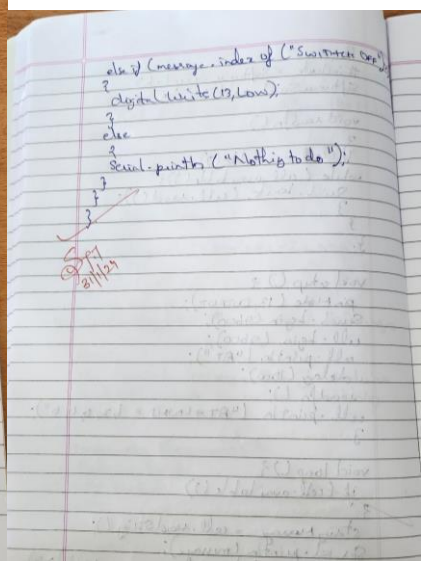
```
#Include <SoftwareSerial.h>
 SoftwareSerial cell (2,3);
 void setup ()
  cell.begin (9600);
 delay (500);
  Serial.begin (9600);
 }
 void loop ()
```











Observation:

- A call to a specified number is placed using the GSM module.
- SMS messages are sent and received through the GSM module.
- An LED can be controlled using a GSM module.