## 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:

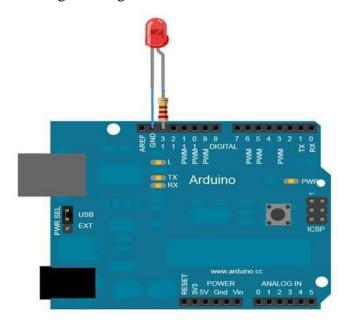
Turns on an LED on for one second, then off for one second, repeatedly **Hardware** 

## Required:

- Arduino Board
- LEDs

## **Pin connection:**

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



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1. Let's negative leg is connected to ground.

Cope:

Pin 12 has an Let connected to ground.

Cope:

Pin 13 has an Let connected an most Andrice lad interest and alter an
```

```
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:**

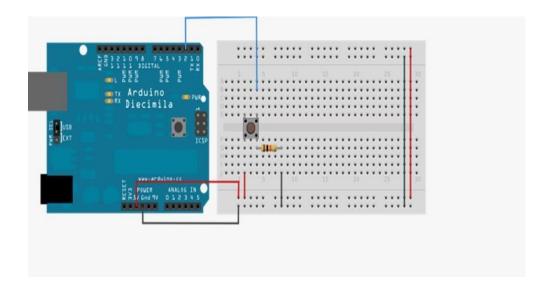
The LED blinks periodically.

#### **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.



Am: Tima  HARD  1. Addu  2. LED  3. Righ  Pin C  LED's  LED's  Puh  Code  Code	on LED ONJOFF using a Publisher.  where Required  ind Board  button and the wife has been a former or meeting to digital pin 13.  positive leg is connected to digital pin 13.  negative leg is connected to ground.  button attached to pin 2 from ground.  existen attached to pin 2 from ground.		Observation:  LED switches on when the button is pushed and truns of when the switch but is left untouched.
Am: Tun  HARD  1. Addu  2. LED  3. Righ  Pin C  LED'S  Puh  IOR  Code	an LED ON/OFF using a Publisher.  WARE REQUIRED  ina Board  button on white has been a former or the last of the l		Pelse?  cligital write (Irdfin, Low):  }  Observation:  LED switches on when the button is pushed and truns of when the switch but is left untouched.
1. Addu 2. LED 3. Rah Pin C . LED's . LED's . Push . IOK	buttoning and the sales of the pin 13.  positive leg is connected to digital pin 13.  positive leg is connected to ground.  button attached to pin 2 from ground.		Pelse?  cligital write (IrdPin, Low);  }  Observation:  LED switches on when the button is pushed and truns of when the switch but is left untouched.
1. Addu 2. LED 3. Rah Pin C . LED's . LED's . Push . IOK	buttoning and the sales of the pin 13.  positive leg is connected to digital pin 13.  positive leg is connected to ground.  button attached to pin 2 from ground.		Observation:  LED switches on when the betton is pushed and truns of when the switch but is left untouched.
HARD  1. Ardin  2. LEP  3. Righ  Pin C  LED'S  . LED'S  . Push  . lok  Code	buttoning and the sales of the pin 13.  positive leg is connected to digital pin 13.  positive leg is connected to ground.  button attached to pin 2 from ground.		OBSERVATION:  LED switches on when the button is pushed and truns of when the switch but is left untauched with a wind when the switch but is left untauched with a wind with the switch but is left untauched with a wind with the switch but with the switch but with the switch but with the switch but with the switch and the switch but with the switch and the switch but with the switch but with the switch and the switch but with the switch and the switch but with the switch and the switch but with the switch but with the switch and the switch but with the switch b
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2. LED 3. Right Pin C . LED's . Pugh . IOK . Code	positive leg is connected to digital pin 13.  regative leg is connected to ground.  button attached to pin 2 from ground.	Tanking .	Deservation:  LED switches on over the button is pushed and truns of when the switch but is left untracked without and without and without and and and a standard without a standard without and a standard without a standard with a standard without a standard without a standard w
2. LED 3. Right Pin C . LED's . Pugh . IOK . Code	positive leg is connected to digital pin 13.  regative leg is connected to ground.  button attached to pin 2 from ground.	Tanking .	DESERVATION: LED switches on when the button is pushed and truns of when the switch but is left untauched with a switch but
Pin C  LED'S  LED'S  Push  IOK  Code	positive leg is connected to digital pin 13.  regative leg is connected to ground.  button attached to pin 2 from ground.  Lesistar attached to pin 2 from ground.	Tanking .	DESERVATION: LED switches on when the button is pushed and truns of when the switch but is left untauched with a switch but
Pin C  LED'S  LED'S  Push  IOK  Code	positive leg is connected to digital pin 13.  regative leg is connected to ground.  button attached to pin 2 from ground.  Lesistar attached to pin 2 from ground.	Tanking .	LED switches on when the button is pushed and turns of when the switch but is left untauched without it is left untauched.
Pin C  LED'S  LED'S  Puh  TOK  Code	positive leg is connected to digital pin 13.  regative leg is connected to ground.  button attached to pin 2 from analy +54.  exister attached to pin 2 from ground.	Tanking .	pushed and truns of when the switch but is left untouched
· LED'S · LED'S · Puh · lok · Code	positive leg is connected to digital pin 13.  regative leg is connected to ground.  button attached to pin 2 from ground.  esister attached to pin 2 from ground.	Tanking .	listest untouched mile amond in
· LEP'S · Puh · IOK · Code	regative leg is connected to ground.  button attached to pin 2 from analy+54.  exister attached to pin 2 from ground.	Tanking .	Interpret between ight witness igal.  Interpret between ight witness igal.
· LEP'S · Puh · IOR · Code	regative leg is connected to ground.  button attached to pin 2 from analy+54.  exister attached to pin 2 from ground.	Tanking .	home at between a get where egal.
· Push · lok · Code	button attached to pin 2 from ground.	Mandage !	and & mg of behalt rettind day .
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	int led Pin = 13;		ist - without this trial
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int b	utton state = 0;		
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Lion	setup()?		
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pni	the Charles to the control of		(Total offst) shotton
3 bur	tode (led Pin, OUTPUT);		(Arthole Chatter A. MART)
5			2
	21/23		
void l	sopk)?		F ( ) god low
but	on State = aligital Read (button Pin);		which I should be a destroyed

```
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 }
```

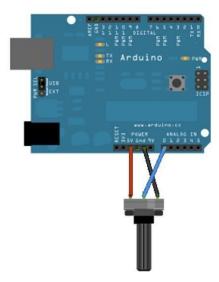


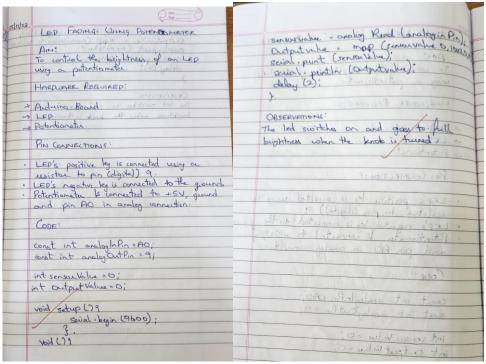
#### Aim:

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.





```
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.

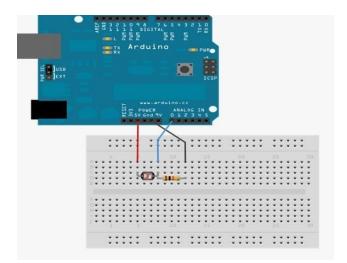
### 4. Nightlight Simulation

#### 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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1	NIGHTLIGHT SIMULATION	word loop () many marked !
3		3 1011.001
**	Ami: (191) heel polare adorsay	DRValue = aralog Read (LDR); Section printer (LDRValue);
	Simulating a night light using LDR and PIR.	Serial pinth (LDRValue);
1	(02) unleso	delay (50);
	HARDWARE REQUIRED:	CANDON DANGER
	1 to the season of the season	if (LDRValue < light - sensitivity)
	T LED	a de la companya de l
	11 pp (wait II) street I trails #3	Eligibli Wite (11, High);
	Mok Registre & Addition Board.	Estimital write (1), High);
	Ardrino Board.	ele hant which .
	A STATE OF THE STA	2
	YIN CONNECTIONS: ) THE HOLD	digitalunta (11, Low); mand ani
	· · ·	}
1.	Attach one leg of LDR to 5V and another leg to	the delay (000) per les de la
	Hiduing Hoolog nie An	Andrew Andrew Die HO.
2.	Attack one by to 110K register and the other end ig L-PR to AD Correct the positive leg of LED to pin 11 and regative to 9ND.	s potenti one to those wante and
	other end of LDR to ADV MATER	OBJERVATIONS: OF STATE OF STATE OF
3.	Correct the positive leg of LED to pin 11	while lights are wirtched all in the
11/10/	and regative to GND.	soon, LED should switch on, when light
Quarte	THE most of in no but thing on	and still a strong who light
	CODE: Stabourni to Astruct	are switched on in the worn, LED should
		switch of immediately
	intlpr=0;	
1	int LDRValue = 0;	intipe = 0;
	int light - sensitivity = 80;	103 = thirtiens - the thi
	The lighter serial trees of o,	103 = xt14/t12/22 - the tai
	void setup ()	
	_	(1 gets biox
	(1) 1 - 101 - 0	CAS DION
	gerial. bgin (9600); pin Mode (11, OUTPUT);	(1000) ried bills
	pin war (11, OUTPUT);	1 1000 A 11 1 1 1 1 1 1 1 1 1 1 1 1 1 1
	4	the Mode (II contract)
		\$

```
digitalWrite(11, LOW);
} delay(1000);
}
Observation: Based on the readings from the LDR sensor, the LED light switches ON and
```

## **5.PIR with Arduino UNO**

#### Aim:

OFF.

To detect motion using PIR sensor.

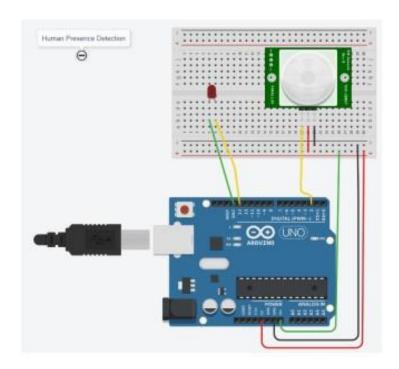
## Hardware required:

• 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.



```
PIR with ARDVING Who
  To create a simple circuit with an
Arduing and PIR motion sensor to detect
movement
                                                                                                                      serval state = sugeth (Read (2));
if (Repart State = High),?
if (Repart State = High),?
digital write (13, High);
Serial pinth (Serial Active Heal)
  HARDWARE REQUIRED
                                                                                                                     else?
digital write (13, Low);
 Arduino Board
 Pie Motion Jenson
1 LED
                                                                                                                      deby (10);
 Bread Bourd.
   CONNECTIONS:
                                                                                                              ORIERNATION:
Senson Activeted ! message
suid part if mation is det
  Cornect positive leg of LED to pin 13 and
connect fostive leg of CED to pin 15 and regative leg to grand.

Regative leg to grand. AR senses to the regative side, positive side of the broad board and connect one leg to pin 2.

Connect the analog Vin to the positive side of breadboard, ground to the regative side and SV to the positive side.
 int senger State = 0;
  voide setup ()}
     pin Mode (2, IMPUT);
pin Mode (13, OUTPUT);
Secial begin (9600);
```

```
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

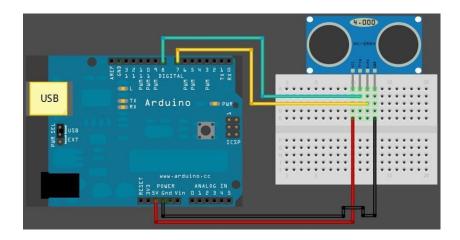
### Aim:

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.



```
digitalwith (ping Pin, Low);

delay With (ping Pin, tow);

delay Micoseconds (10);

digital White (ping Pin, Low);

duation = pulse h (enha Pin, Hag H);

inches = micoseconds To Inches (duation)

Seiral punt (inches);

Seiral punt ("inches");
            ULTRASOUND WITH ARDUND UNO
      To measure the solutance of an object using Ultrasound Senjar
      HARDWARE REQUIRED!
      Ultrasound senson
                                                                                           cm = microseconde to Continutors (duration)
Scial print(con);
Scial printle ("cm");
      CONNECTIONS:
2. Connect ver got to EV power.
2. Connect Trug port to pin T.
3. Connect Etho port to pin b.
                                                                                             log microsconds To Inches (by microscond)
                                                                                             return microsconds /74/2;
                                                                                            log microscords To Cartinater Clay micros
      Code
                                                                                              retur minorecondo /29/2;
     const int ping Pin = 7;
const int echo Pin = b;
      void setup ()
                                                                                         The distance of the object can be observed in the monitor.
     Serial begin (9600);
pin Mark (ping Pin, OUTPUT);
pin Mook (pichoPin, INPOT);
     void bop ()
         by quation, inches, cm;
```

```
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.

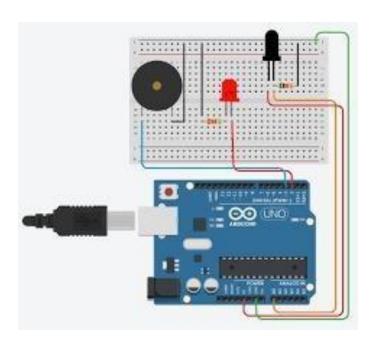
### **Hardware Required:**

- 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.



```
FIRE ALERT
AIH
Fire alarm simulation
                                                                     Serial . pintly ( Senson Value);
                                                                                Value 2 100)
HARDWARE REQUIRED:
Flame Senson.
Admino Board
                                                                        Sendpointh ( "Fire detected )?
                                                                         Serial println ("LED ON");
digital write Cled, high);
 LED
 Connecting Wises.
                                                                         digital write (buzza, High);
                                                                         delay (1000);
Connections:
                                                                     digital write (but, Low);
   yes succe
                                                                     delay (sensor Value);
   Ao -> Ao
LEP +ve connected 9th pin Arduno.
LEP -ve connected to god pin Arduno.
Busses one connected to 12th Pin.
                                                         OBSERVATION
Buzzer -ve connected to GND pin
                                                         Buzza makes beep sound when flame is
                                                         near the senson
int Senson Pin = Ao;
int Senson Value = O;
int led = 9;
 int buzzer= 12i
 void setup LX
        pintrode (led, OUTPUT);
         Pin Mode ( buzzer, BUTPUT);
Serial begin (9600);
```

```
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");</pre>
```

```
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.

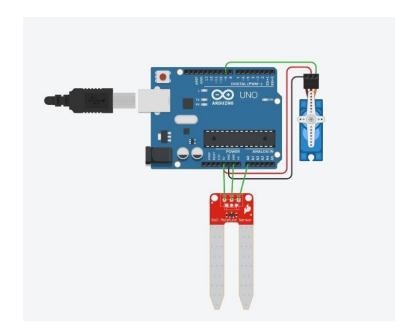
## 8. Automatic irrigation controller simulation

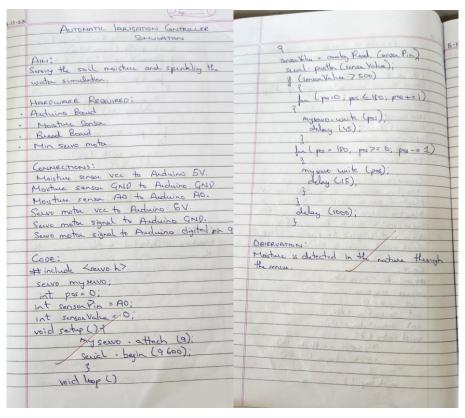
#### Aim:

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





```
#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);
}</pre>
```

#### **Observation:**

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

### 9. Reading the code present on RFID tag

#### Aim:

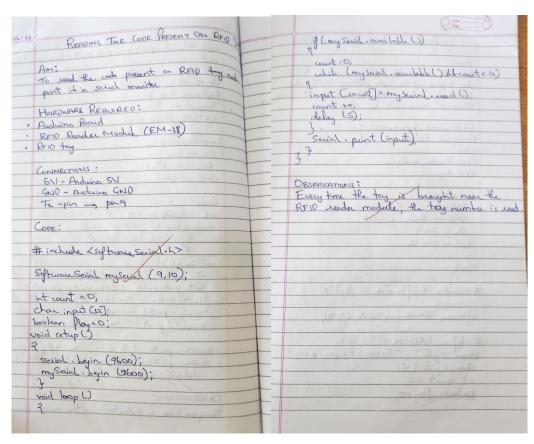
To read RFID tag number and print it onto the Serial monitor.

### 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.

#### **Handwritten Notes:**



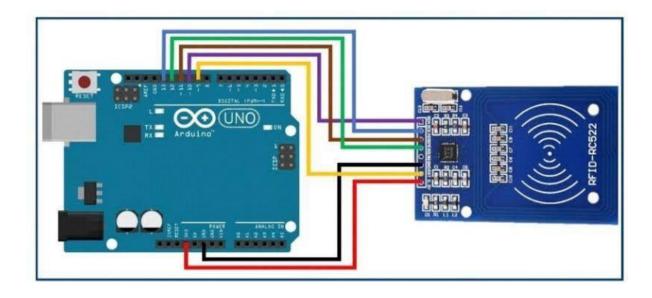
## 10. Access control through RFID Aim:

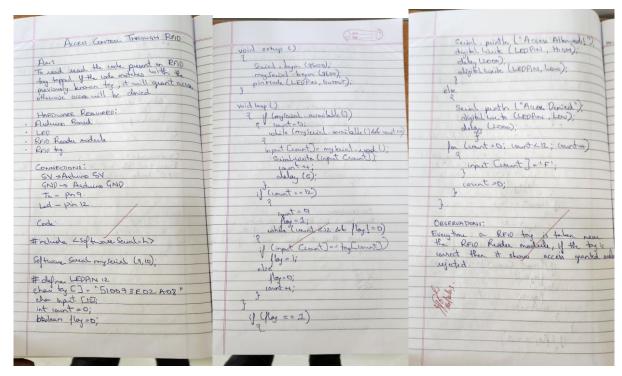
To authenticate access based on RFID tag number.

## 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.





```
#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; count & 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<12; count++)
{
input[count]= 'F';
}
count = 0; // Reset counter variable
}
```

#### **Observation:**

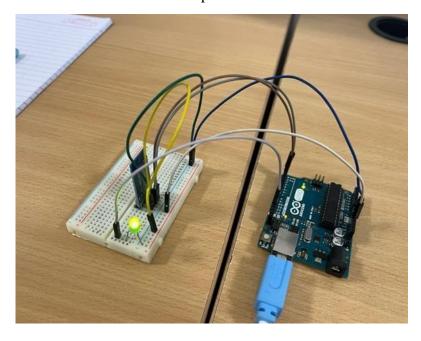
Only registered RFID tag numbers are allowed and unregistered RFIDs are denied access.

#### 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.



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Br Serial begin (38400);	Seint printly ("LEDION"):	BT Secial begin (38400);
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```
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
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){</pre>
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.

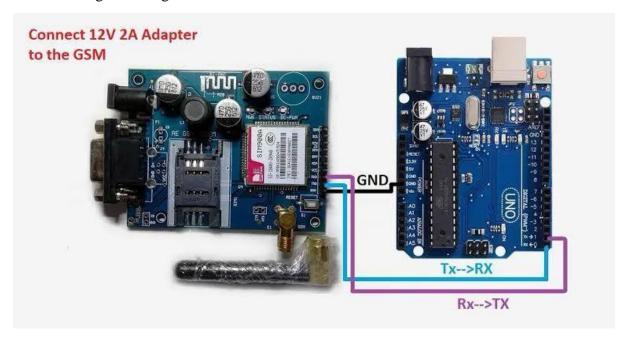
#### Hardware required:

- 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 }
}</pre>
```

#### 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.

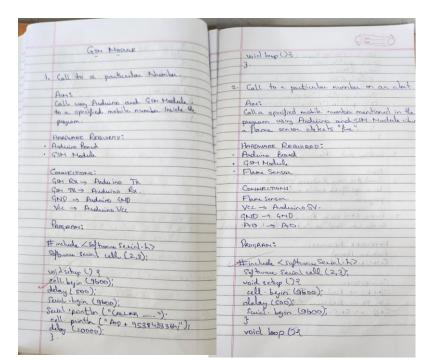
#### **Pin connection:**

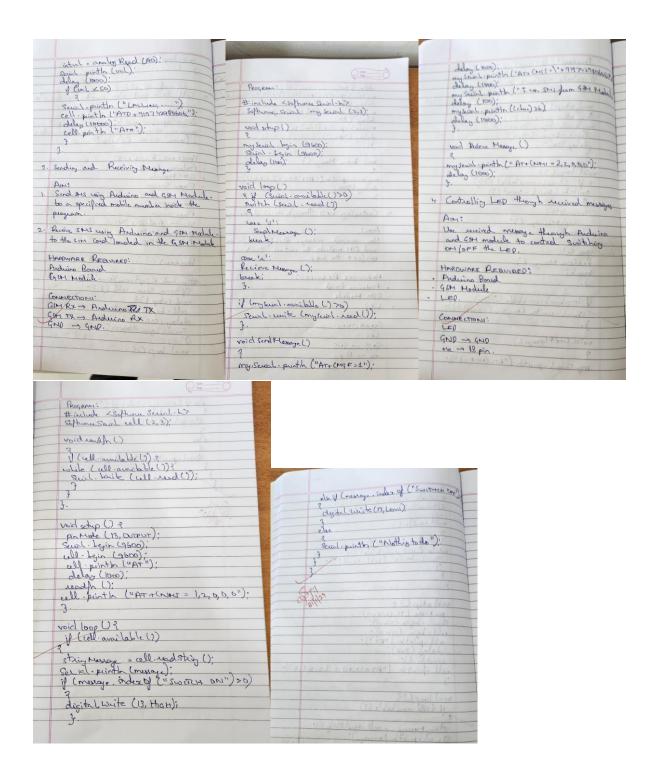
• Attach LED to pin 13 and GND.

#### **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...");
}
}
```





#### **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.