VISVESVARAYA TECHNOLOGICAL UNIVERSITY

"JnanaSangama", Belgaum -590014, Karnataka.



LAB REPORT on

INTERNET OF THINGS

Submitted by

UTKARSH(1BM20CS177)

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)
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B. M. S. College of Engineering,

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(Affiliated To Visvesvaraya Technological University, Belgaum)

Department of Computer Science and Engineering



CERTIFICATE

This is to certify that the Lab work entitled "INTERNET OF THINGS" carried out by UTKARSH(1BM20CS177), 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 2022-23. The Lab report has been approved as it satisfies the academic requirements in respect of Internet of Things Lab - (20CS5PEIOT) work prescribed for the said degree.

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Assistant Professor Department of CSE BMSCE, Bengaluru **Dr. Jyothi S Nayak**Professor and Head of
Department CSE
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Program no: **01** Program Title: **LED BLINK**

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

Components Required:

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

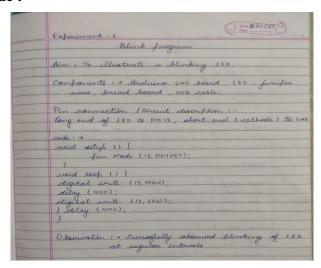
Pin connection:

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

Code:

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

Handwritten code:



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

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

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

Components Required:

```
Arduino Uno board - 1
USB Cable - 1
LED - 3
Jumper wires
```

Pin Connections:

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

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

```
Experiment -2.
             Tuaffic dimulator
dim: > To simulate traffic light simulation by blinking of LED's using audiino UNO bound
Confroments suguired: Adding UNO board, USB calle
jump wire, 3 LEDS (RYG), bread board
Pin connection:
LED 1 - long end (amode) to Pin OII, shout end to GND
LED 2 - long end (anode) to Piner, shout end to GND
LED3 - long end (anode) to Pin 13, wholt end to GND
Coole : →
Void setup () {
fin Mode (11, OUTPUT);
frin Mode (12, OUTPUT);
 frim Mode (13, OUTPUT);
void loop U {
digital write (13, HIGH);
delay (1000);
oligital write (13, LOW);
delay (1000);
digital write (12, HIGH);
delay (1000);
digital write (12, LOW);
dulay (1000);
digital write (11, HIGH);
delay (1000);
oligital write (11, 1013);
dulay (1000);
```

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

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

Aim : To simulate LED blink using digital input.

```
Components Required:
```

```
Arduino Uno board - 1
USB Cable - 1
Breadboard - 1
Push Button - 1
LED - 1
Jumper wires
```

Pin Connections:

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

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

Hanuw	ritten code:
	Experiment -03
	Push button with LED's
	A: · · · · · · · · · · · · · · · · · · ·
1 1 1 1 1	Aim: To simulate lighting up of LED's using a fuch button
	Carlos to selection
	Components required:
- Carlo	Arduino UNO board, LED, bread board, jump wire,
	hush button.
No.	Pin connections: > Long end of LED (anools) connected to
	pen 13, shout end (cathoole) connected to
	and, one end of just button connected to him 2 s
	off end connected to GND, third end connected to
	S.V supply.
	(1.13.50)
	Coole:→
	int button state = 0;
	void setup () {
	frin Moole (13, OUTPUT);
	frin Mode (2, INPUT);
	j'
	resid loop () {
	button state - dia tal Read (2)
	il 1 to the text == Buc 11)
	of toution state - ritgin
1	Sutton state = oligital Read (2); if (button state == HIGH) { oligital write (13, HIGH);}
	f oligital write (13, LOW):
	2
- 4	a facility to the second of th
-	
*	Observation: Successfully observed lighting up of LED on
	Observation: Successfully observed lighting up of LED on fushing the button
	, ,

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

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

Aim : To demonstrate analog output with fading LED

```
Components Required:
```

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

Pin Connections:

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

```
const int LedPin = 9;
void setup()

{
    pinMode(LedPin, OUTPUT);
}

    void loop()

{
    for(int fade value = 0; fade value <= 255; fade value += 255);
    {
        analogWrite(LedPin, fade value);
        delay(330);
    }

for(int fade value = 255; fade value <= 0; fade value -= 255);
    {
        analogWrite(LedPin, fade value);
        delay(330);
    }

}
```

Observation: The LED gradually fades away.

	Pin connection: Long end of LED to fin 9, shout end
	Pin connection: Long end of LED to fin 9, shout end connected to ground was bread board.
	I at more than had been to do the total
	Coole: +
	int led Pin = 9
	void setup ()
	{}
	void loop ()
	{ for l'int facle Value = 0 ; facle value <= 255 ;
	fade Value += 5)
	{ analog write (led Pin, fade Value); delay (30);
	dulay (30);
) I LL MA JAMA
	for (int fade value = 255; fade value >=0; fade value ==5)
	analog write (led Pin, facle Value); odelay (30); }.
	odelay (30); }
1	A STATE OF THE STA
	Observations: - Successfully observed fading of LED.

Aim : To demonstrate analog output with fading LED using potentiometer

Components Required:

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

Pin Connections:

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

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

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

	LED fading with potentiometer
	Sim: To simulate facing of LED's with the help a potentiometer [analog input to analog output]
	components rug; > Auduino UNO Isoaud, LED, bruas board, jump wirus, potentionetre
	Pin connection: > long end of LED (positive find)
-	bread board. One were of potentiometer to 5v outply, c end to GND. Middle were of potentiometer to the
-	analog input frin A.
1	Coole:
	int LED_Pin=9;
1	void setup ()
	{ secial . begin (9600);
	Pin mode (LED_PIN, OUTPUT) }
-	void loop ()
	int analog value = analog read (A);
-	int brightness = map (analog value, 0, 1023, 0, 2
	analog weet (LED Pin, buightness);
	Serial . fruint ("Analog");
	Serial fruint ("Analog value");
	Serial print ("bughtness");
	Serial fruint (brightness);
	Stelay (100); }
0	beganition - Successfully observed fading of LED using
	boundion -> Successfully observed fading of LED using frotentionneter.
	The same short would be a first to be a subject to

Aim : To demonstrate analog output with fading two LED

Components Required:

```
Arduino Uno board - 1
USB Cable - 1
LED - 2
Jumper wires
```

Pin Connections:

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

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

```
delay(1000);
}
}
```

```
Experiment -06

Sading effect of two 160's without the way of following of two 160's without the way of following of two 160's without the way of following the 160's without the way of following the wife broad broad, commercing calls

Pin connection: long and 1-ve) of two 160's in Pin 9.6

should and connected to 6NO was broad board

Cook:

int 160. Pin 1 = 9;

int 160. Pin 2 = 6;

word setup ()

I int fock value 1 = 0;

int fock value 2 = 265;

while (fock value 1 = 255; & & fock value 2 > 0)

I analog write (led Pin 1, fock value 2);

fock value 2 = 5;

fock value 2 = 5;

takey (70);

J fock value 1 = 255;

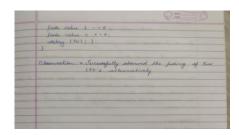
fock value 2 = 0;

while (fock value 1 > 0 & & fock value 2 = 255)

I analog write (led Pin 1, fock value );

analog write (led Pin 1, fock value);

Onalog write (led Pin 1, fock value);
```



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

```
Aim: To demonstrate LED with LDR control
```

```
Components Required:
```

```
Arduino Uno board - 1
Resistor - 1
USB Cable - 1
LED - 1
Breadboard -1
LDR - 1
Jumper wires
```

Pin Connections:

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

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

```
Experiment >07
            LDR with LED2
dim - To observe the glow of LED when LDR is rowwo
Components veg: + Didwino UNO, bread board, 4 jumps
      wired, LDR, LED, usable cable
Pin connection + Connect LDR on bread broad to the
       short end, connect a wine to he pin
and another to GNO The longer end of the LDR is connected to the 5V supply. Connect LED to Pin 13.
CODE : >
int value = 0 ;
void setup () {
pin Mode (13, Output);
pin Mode (Ao, input);
  word loop () {
  Value = analog Read (Ao);
if (Value < 200)
     ( digital write (13, HIGH)
       social fruintln ("light On");
       social println ( value); }
      { digital write (13,000)

sweal fruintly (" light off");

sweal fruintly (value); }
Observation + Successfully observed glowing of LED.
```

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

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

Aim : To sense the temperature of the environment

```
Components Required:
```

```
Arduino Uno board - 1
USB Cable - 1
LED - 1
Temperature Sensor - 1
Jumper wires
```

Pin Connections:

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

Code:

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

Handwritten code:

```
Especialist Co.

Line 2 to obtain anothering of temperature sensor and calculation of temperature sensor and calculation of temperature sensor and personal suggested to the sensor flat side facing a sight end will be appreciated by the description of the sensor flat side with well be consisted to by models with the description of the sensor flat side with well be consisted to by models with the consisted to be printed askept to a consisted to be printed askept to a consisted to be printed askept to a consisted to be printed askept to another the consistency of th
```

Observation: The current temperature in the environment is observed.

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

```
Components Required:
```

```
Arduino Uno board - 1
USB Cable - 1
LED - 1
HC - SR04 - 1
Jumper wires
```

Pin Connections:

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

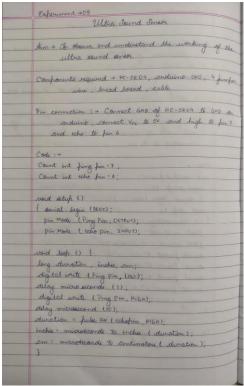
```
const int pingPin = 7;
       const int echoPin = 6;
       void setup()
{
        Serial.begin(9600);
       pinMode(pingPin, OUTPUT);
       pinMode(echoPin, INPUT);
       pinMode(13,OUTPUT);
}
       void loop()
{
       long duration, inches, cm;
       digitalWrite(pingPin, LOW);
       delayMicroseconds(2);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

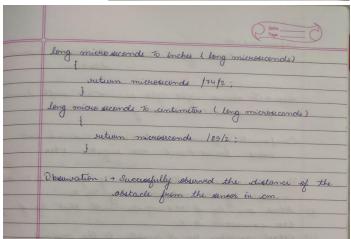
```
Serial.println();
delay(100);

long microsecondsToInches(long microseconds)

{
return microseconds / 74 / 2;
}
long microsecondsToCentimeters(long microseconds)

{
return microseconds / 29 / 2;
}
```





Observation: The distance between various objects were observed.

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

Aim: Nightlight Simulation with Human Presence Detection.

Components Required:

```
Arduino Uno board - 1
USB Cable - 1
Resistor(110K) - 1
LED - 1
LDR- 1
Jumper wires
```

Pin Connections:

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

```
int LDR = 0;
LDRValue = 0;
int calibrationTime = 30
long unsigned int pause = 5000;
boolean lockLow = true;
boolean takeLowTime;
int pirPin = 3;
int ledPin = 11;
void setup()
{
    Serial.begin(9600);
    buad pinMode(11, OUTPUT);
    pinMode(pirPin, INPUT);
    pinMode(ledPin, OUTPUT);
```

```
digitalWrite(pirPin, LOW);
       Serial.print("calibrating sensor ");
       for(int i = 0; i < light_sensitivity)
{
       digitalWrite(ledPin, HIGH);
       if(lockLow)
{
       lockLow = false;
       Serial.println("---");
       Serial.print("motion detected at ");
       Serial.print(millis()/1000);
       Serial.println(" sec");
       delay(50);
}
       takeLowTime = true;
}
        if(digitalRead(pirPin) == LOW || LDRValue >= light_sensitivity)
{
       digitalWrite(ledPin, LOW);
       if(takeLowTime)
{
       lowIn = millis();
       takeLowTime = false;
}
       if(!lockLow&&millis() - lowIn> pause)
{
       lockLow = true;
       Serial.print("motion ended at ");
       Serial.print((millis() - pause)/1000);
       Serial.println(" sec");
```

```
delay(50);
}
delay(100);
}
```

```
Experiment - 10
                        Night light simulation with human presence
      Sim > To obscure night light simulation with human fresunce eletection using LDR and PIR.
       Components Required + 1LED, 1LDR, orduing UNO
            board, buad board, 110 K sugister, I PIR
Pin connections: > Attach one leg of LDR to 5V and another leg to orduine analog Pin A.

ii) Attach one leg of 110K register with that leg of LDR connected to A.
iii) Ottach another leg of register to the ground
iv) Connect the +ve leg of LED to fin 11 and -ve to GND
v) Connect +ve leg of PIR to 54 and -ve leg to GND
v) Connect output Pin of PIR to edigital Pin 3
      Code: >
      int LDR = 0;
      int LDR Value = 0;
      int light sensitivity = 500;
      int callibration time = 30;
      long unsigned int low IN;
      ling unsigned int pause = 5000;
boolian leck LON = true;
     boolean take LOW Time;
     int piu Pin = 3;
     int led Pin = 11;
      void setup ()
```

```
Serial legin (9600);
Pin Mode (11,00TPUT);
pin Made (pinpin, INPUT);
pin Mode ( led pin, OUTPUT);
digital write ( pin Pin , LOW);
Social print (" Calibrating Sensor")
 for lint i=0; i < calibration Time; i++)
  { Serial print (".");
    delay (1000); }
 Social printly ("done");
 Serial frintln ("Senson Active");
delay (50); }
read loop ()
{ LDR value = analog Read (LDR); if ( roligital Read ( pix Pin ) = HIGH A4 LDR value < light sortifully
{ digital write ( led Pin, HIGH);
if (LockLOW) {
  lock low = false;
   Sarial . fruintly (" --- ");
  Serial . Juint ("motion detected at");
 Social fruint (millis ()/1000);
  Serial . Juintln (" pec");
   delay (50);
3 take LOW Time = true ; }
if Coligital Read (pix Pin) == LOW || LDR Value >= light
aligital Write (led PM, LOW);
{ low IN = millis ();
   take LOW Time = false;
```

```
if (! lock low 4k millis () - low IN > pause)

{ lock low = true;
    Sevial fruintly ("Motion ended at ");
    Sevial fruint (('millis L) - pause) /1000);
    Sevial fruintly ("Sec");
    olday (50);
}

delay (1000);
}

Observation: > Successfully observed the glowing of the
    LED when LDR is covered (in dark) and
    motion is surred by PIR sensor
```

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

Program no: 11 Program Title: FIRE ALERT

Aim: Fire alarm simulation

Components Required:

Arduino Uno board - 1 USB Cable - 1 Flame Sensor - 1 LED - 1 Buzzer - 1 Jumper wires

Pin Connections:

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

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

```
Him. About 15

Alim + The homelate the marking of fine releases easing begger to 15

Components may + Thome dender (making autiful), auditine, board board, to bugger a commerciary wine.

Pin Commerciars + Thome dender interfacing to and wine.

Those denders + Thome dender interfacing to and wine.

Those denders + Thome dender interfacing to and wine.

Vec + Vec , GPD + GPD + B, + B.

LED +VE is connected to 5th pin of auditine.

Bugger interfacing to acquire.

Bugger vec is connected to 12th pin of auditine.

Bugger vec is connected to 12th pin of auditine.

Code: +

th include & defense Social h?

int Screen Value 0;

wh led 15;

wh bugger 12:

word setup O 1

pin 196d thid, QUIPAT?;
```

```
Social begin (9600);

I void loop ()

Social punter ("Nolcome to the flame sensor telocial");

Social printle Localeg Read ( sensor Pin);

Social printle Localeg Read ( sensor Pin);

if ( Sensor Value < 100)

Social printle ("The Delected");

social printle ("The Delected");

social printle ("Loo ON");

digital write ( lod, 100);

digital write ( lod, 100);

digital write ( lod, 100);

oligital write ( bugger, 1000);

sleay ( Sensor Value);

I be some value);

Observation: + Successfully observed the blinking of ten and bugger working when flame is detected.
```

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

Program no: 12 Program Title: AUTOMATIC IRRIGATION CONTROLLER

SIMULATION

Aim: Sensing the soil moisture and sprinkling the Water simulation

Components Required:

```
Arduino Uno board - 1
USB Cable - 1
Min Servo Motor - 1
Moisture Sensor - 1
LED - 1
Buzzer - 1
Jumper wires
```

Pin Connections:

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

```
#include Servo myservo;
int pos = 0;
int sensorPin = A0;
int sensorValue = 0;
void setup()
{
    myservo.attach(9);
    Serial.begin(9600);
}
    void loop()
{
    sensorValue = analogRead(sensorPin);
    Serial.println (sensorValue);
    if(sensorValue>500)
```

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

```
Pin commercian : Madeline survey Vec to andune or

Moseture survey and to archine and

Moseture survey Re to archine A.

Some motor and to archine and

Some motor and to archine and

Some motor and to archine aligned pin 3.

Code: >

**Through & surve.h>

int per=0;

int survey pin=Ae;

int survey pin=Ae;

int survey pin=Ae;

int survey value: analog Read (Sonser Pin)

Sound Stup ()

{ Sonser value: 300)

{ (survey value: 500)

{ (survey value: 500)

{ (myeure: would (pos);

delay (15);
}
```

```
for (pai 130; pai 2:0; pai 2)

I myseume well (poi)

Oliay (1000);

Dhemvation > Eucoeofelly obtained the notation of molion when the moisture shower is not contact with water a observed alphing of mole when comes in contact with mosture.
```

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

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

Components Required:

```
Arduino Uno board - 1
USB Cable - 1
RFID reader module - 1
RFID tags - 1
Jumper wires
```

Pin Connections:

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

```
void setup()
{
       Serial.begin(9600);
}
       void loop()
{
       if(Serial.available()>0)
{
       Serial.write(Serial.read());
}
}
       #define LEDPIN 12
       char tag[] ="3C0087D597F9";
       char input[12];
       int count = 0;
       flag = 0;
       void setup()
{
       Serial.begin(9600);
```

```
mySerial.begin(9600);
       pinMode(LEDPIN,OUTPUT);
}
       void loop() { if(mySerial.available
{
       count = 0;
       while(mySerial.available() && count < 12)
{
       input[count] = mySerial.read();
       Serial.write(input[count]);
       count++;
       delay(5);
}
       if(count == 12)
{
       count = 0;
       flag=1;
       while(count);
}
```

1.11.12	Explument - 13			
200	RFID reader	(cand access)		
	Alm: + To count the num	ibu of RFID tags.	nead by	
	this RFID reader			
	0.1.	A STATE OF THE STA		
	Components required : " is			
	meant, KI	o tage, fumper wine		
	+180	+5V from L	isis port	
	GND	GND		
	RFID Readlie	ARDUINO UNO		
	Tx	9 (Rx)		
	interface RFID	reader to arduine		
	code :>			
	# include < software social . h >			
	software Social my Social (9,10);			
	void setup ()			
	{ Serial lugin (9600);			
	Secial Lugin (9600);	1 11/4/20		
	3			
	recid loop ()			
	1	and the same		
The Flan	if (social available	() >0)		
1/2				
	Serial write (serial read ());			
	3 3			
	21 12 120 1 120	whilly able to wood	the	
	Observation: > Was successfully able to mad the			
	KIID Id.	Der an ecces / 10 / 16 / 16 / 16		

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

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

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

Components Required:

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

Pin Connections:

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

#include <softwareSerial.h>

• RX to TX

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

```
}
       void loop {}
{
       if(MySerial.available());
{
       count=0;
       while(MySerial.available()&& count<12)</pre>
{
       input[count]=Myserial.read();
       Serial.Write(input[count]);
       count ++;
       delay(5);
}
       if(count==12)
{
       flag=1;
       while(count=12; && flag!=0)
{
       if(input[count]==flag[count])
       flag=1;
       else
       flag=0;
       count++;
}
}
       if(flag==1)
       Serial.println("Access Allowed");
       digitalWrite(LEDPIN,HIGH);
       delay(2000)
       digitalWrite(LEDPIN,LOW);
```

```
else

Serial.println("Access denied");
    digitalWrite(LEDPIN,LOW);
    delay(2000);

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

input[count]= 'F'

count=0;
}</pre>
```

```
Experiment + 184
Alim - To count the number of RFID tags wood by
         the RFID reader. ( Demonstration of RFID tog)
Components - Aduino, RFID suader module, RFID
                tag, jumpu wices, LED
Circuit conclusion -> RFID tag: Tx to Rx of audiina.
GND to GND
LED: + Longer end to fin 12 4 shorter end to GND
Code : >
# include < Software Social - h>
Software Social my Social (9,10);
# define led Pin 12
char tag [] = "510093802A08",
 int count = 0;
boolean flag = 0;
resid setup () {
 Sevial · lugin (9600);
my Social Jugin (9600);
Pin Mode (Jed Pin, OUTPUT);
void loop U
{ if (my social, available ()) { count = 0;
    while (my social available () &4 count (12)
 { Input I count ] = my social wad (); social with (Input I count ];
    count ++;
   delay (5);
```

```
ef (count == 12)

{ count = 0;

flag = 1

if (infut t count] = = tag t count])

flag = 1;

else

flag = 0;

count + + ; }

}

if (flag == 1)

{ Social puintly ("Access Demissor");

digital write (lsd Pin , Low);

diay (2000);

}

for ( count = 0; count < 10; count + +)

input t count] = 'f';

}

Observation > Euccessfully sourced glowing of tep when

REID key was ward & "access allowed" was

printed on swal monitor.
```

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

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

Aim: To establish the working of home automation.

Components Required:

```
Arduino Uno board - 1
USB Cable - 1
Bluetooth model - 1
Breadboard - 1
Jumper wires
```

Pin Connections:

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

Code:

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

Handwritten code:

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

Com	roment organized: Auduino UNO beaud, blue module [HC-05], jumpir wire
0.	Co. L. ode
Pin	connections: Command mode Acdume GND -> HC-05 GND
	Adding VCC - HC-05 VCC
	Acolumn II -> HC-05 RX
	Ardune 10 -> HC-05 TX
	skaune 10
dod	a mede:
Joan	Auduine GND -> HC-05 GND
	Acquire Vcc -> HC-05 Vcc
	Audumo RX - HC-05 TX
	Adding TX - HC 05 RX
	straune 1x - He o kx
Ced	: HC-05 at command frompt
	code to get to the the sent to week
	code for setup (for this code to work
-14	must be in command mode)
	rolude < doftware social . h>
	twork script BT serial (10,11); // Rx /T
000	id setup ()
1	
5	erial legin (9600);
5	eval - fruintln ("Enter the AT command")
B	T Serial lugin (38400);
3	
110	d loop ()

	Dute Prage
{	if (BT simil available ()) Sevial write (BT Sevial read ()):
	if (BT serial available ())
3	BT Serial write (Serial read ());

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

Components Required:

```
Arduino Uno board - 1
USB Cable - 1
Bluetooth model - 1
Android Phone - 1
Breadboard - 1
Jumper wires
```

Pin Connections:

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

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

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

	Code for HC-05 controlled by mobile
	(for this code to work HC-05 must be in DATA mode
	and Audiina Blutseth app)
	# Alfine led Pin 13
	int state = 0
	roid setup () {
= 11 -	Pin Mode (led Pin, OUTPUT);
	digital write (led Pin, 1000);
	Sevial Degin (38400);
	3
	word loop () {
	if (Swial available () >0)
	{ state / secial read ();
0).	3)
P.	if (state = = '0')
11	if (state = = '0') { digital write (led Pin, 1000);
	Serial frintly ("LED: OFF");
	stat = 0; }.
	else if
	(state = = 1)
	{ digital write (led Pin, low); Seval fruintln ("LED: ON");
	state = 0; 33
	Brate - C , J ,
	Observation + was able to controll led on off with
	mobile afth.

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

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

Components Required:

```
Arduino Uno board - 1
USB Cable - 1
Bluetooth model - 1
Android Phone - 1
4 - Channel Relay - 1
Breadboard - 1
Jumper wires
```

Pin Connections:

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

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

```
digitalWrite(ledpin = 2, LOW);

if( val == 'b' )

digitalWrite(ledpin = 3, HIGH);

if( val == 'B' )

digitalWrite(ledpin = 3, LOW);

if( val == 'C' )

digitalWrite(ledpin=4, LOW);

if( val == 'D' )

digitalWrite(ledpin=5, LOW);

if( val == 'c' )

digitalWrite(ledpin = 4, HIGH);

if( val == 'd' )

digitalWrite(ledpin = 5, HIGH);

}
```

	Home Automation
	dim: . To control working of relay through android,
	Components sug. → Ardwine, 4-channel sulay Blutooth module, android phone
	Pin connection : > southut 1 to Pin 4 (ordains beaud)
	outfut 2 to Pin 5
-	outfut 3 to Pin 6
	output 4 to Pin7
-	
	Bluttooth module Tx to Pin O
	Bluetooth module Rx to Pin 1.
*	Blustoth module Rx to Pint. Not of blustoth 4 sulay should be connected to andumo 5V
*	GND of blueteeth 4 sulay should be connected to audumo GND.
**	First uplead the code to ardwine, then connect the
	afth in your android mobile.
	A data transmission via blutooth
	Device 1 ON dent "a", Device 1 OFF dent "A"
-	Device 2 ON dent "b", Device 2 OFF pent "B"
	Device 3 ON stent "c", Device 3 Off stent "c"
	Device 4 ON sent "d", Device 4 OFF sent "D"
	Code: >
	chan Val;
	int led Pin = 2;

```
recid setup ()

{ pin Mode (ledpin = 2, autput);
 pin Mode (ledpin = 3, cotput);
 pin Mode (ledpin = 3, cotput);
 pin Mode (ledpin = 4, output);
 pin Mode (ledpin = 5, low);
}

social begin (3600);
}

wood = Senial wad ();

if (social wad ();

if (val = 'a')

{ digital write (ledpin = 2, HGH);}

if (val = 'A')

{ digital write (ledpin = 3, HGH);}

if (val = e')

{ digital write (ledpin = 3, LOW);}

if (val = e')

{ digital write (ledpin = 4, LOW);}

if (val = e')

{ digital write (ledpin = 4, LOW);}

if (val = e')

{ digital write (ledpin = 5, LOW);}

if (val = e')

{ digital write (ledpin = 5, HGH);}

if (val = e')

{ digital write (ledpin = 5, HGH);}

if (val = e')

{ digital write (ledpin = 5, HGH);}

if (val = e')

{ digital write (ledpin = 5, HGH);}

if (val = e')

{ digital write (ledpin = 5, HGH);}

if (val = e')

{ digital write (ledpin = 5, HGH);}
```

Observation: Home automation commands when connected through relay.

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

Aim: To Program Arduino with GSM Module

Components Required:

```
Arduino Uno board - 1
USB Cable - 1
GSM module - 1
Android Phone - 1
Airtel SIM card - 1
Breadboard - 1
Flame Sensor(For flame sensor program) - 1
Jumper wires
```

Pin Connections:

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

1. GSM Module: Call to a particular number

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

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

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

2. Call to a particular number on an alert

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

Connections for flame sensor:

```
Arduino to Flame Sensor
5V to VCC
GND to GND
Code:
#include SoftwareSerialcell(2,3);
void setup()
{
cell.begin(9600);
delay(500);
Serial.begin(9600);
}
void loop()
int val=analogRead(A0);
Serial.println(val);
delay(1000);
if (val<50)
Serial.println("Calling.....");
cell.println("ATD+;");
delay(10000);
cell.println("ATH");
}
}
```

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

3. Sending and Receiving Message

Aim:

- 1) Send SMS using Arduino and GSM Module to a specific mobile number inside the program
- 2) 2) Receive SMS using Arduino and GSM Module to the SIM card loaded in the GSM Module. Program: Note: According to the code, messages will be sent and received when 's' and 'r' are pressed through the serial monitor respectively.

```
#include SoftwareSerial mySerial(2, 3);
void setup()
mySerial.begin(9600);
Serial.begin(9600);
delay(100);
}
void loop()
{
if (Serial.available()>0)
switch(Serial.read())
case 's': SendMessage();
break;
case 'r': ReceiveMessage();
break;
if (mySerial.available()>0)
Serial.write(mySerial.read());
voidSendMessage()
mySerial.println("AT+CMGF=1");
delay(1000);
```

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

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

4. Controlling LED through received messages:

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

Pin Connections:

Attach LED to pin 13 and GND.

Code:

{

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

```
{
    digitalWrite(13,HIGH);
}
    else
    if(message.indexOf("SWITCH OFF")>0)
{
    digitalWrite(13,LOW);
}
    else
{
        Serial.println ("Nothing to do...");
}}
```

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