



CLASS : _____

DATE : _____

Practical No.: _____ Topic : _____

Practical 1

Aim :-

Introduction to Arduino Circuits and breadboarding
 Blinking of LEDs

Simulation Environment :-

Tinkercad (Free online simulator)

Part A :-

Basics of Arduino Circuits.

Theory :-

Arduino is an open-source electronics platform that has gained immense popularity for its ease of use and versatility. It was created in 2005 by a group of Italian engineers and is now maintained and developed by the Arduino community.

The heart of the Arduino platform is a microcontroller, which is small, programmable computer on a single integrated circuit (IC) chip.

Arduino boards, which house these microcontrollers, provide a user-friendly environment for creating

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interactive electronic projects, prototypes, and various applications.

Key Components of Arduino :-

1. Microcontroller: The core of an Arduino board is the microcontroller. The most commonly used microcontroller in Arduino is the ATmega series from Atmel (now a part of Microchip Technology). These microcontrollers come in different variations and are the brains behind your Arduino projects.

2. Input/output Pins: Arduino boards have a set of digital and analog pins that can be used to read data (inputs) or send data (outputs). Digital pins work with binary signals (0 or 1), while analog pins can read a range of values. The number and types of pins vary among different Arduino board models.

3. Power Supply : Arduino boards can be powered via USB, an external power supply, or a battery. Some boards have built-in voltage regulators, which make them compatible with a range of power sources.

4. USB Port : Arduino boards often feature a USB port for programming and power supply. This allows you to connect the board to your computer and upload code.

5. Reset Button : A reset button is provided to restart the Arduino, allowing you to upload new code or reset the program.

6. LED Indicator : Many Arduino boards include a built-in LED (Light Emitting Diode) on pin 13, which can be used for testing and basic visual feedback.

Arduino Software :-

The Arduino platform comes with its integrated development environment (IDE). The Arduino IDE is a software tool that allows you to write, and upload code to the Arduino board.

Key features of the TDE include :

- Programming Language : Arduino uses a simplified version of the C/C++ programming language. It provides a set of libraries and functions tailored for easy interaction with the hardware.
- Code Library : Arduino has a vast library of pre-written code and functions that simplify common tasks, making it accessible to beginners.
- Serial Monitor : The TDE includes a serial monitor that allows you to communicate with the Arduino board and view debugging information.

- Community Support: The Arduino community is large and active, offering forums, tutorials, and extensive documentation to help users troubleshoot issues and learn.

Components required:

Component	Quantity
Arduino Uno R3	1
Red LED	1
1 kΩ Resistor	1

• Arduino Uno R3:

A programmable board you can use to build interactive circuits.

• LED:

Light-Emitting Diode that lights up when electricity passes through it in the correct direction.

• Resistor:

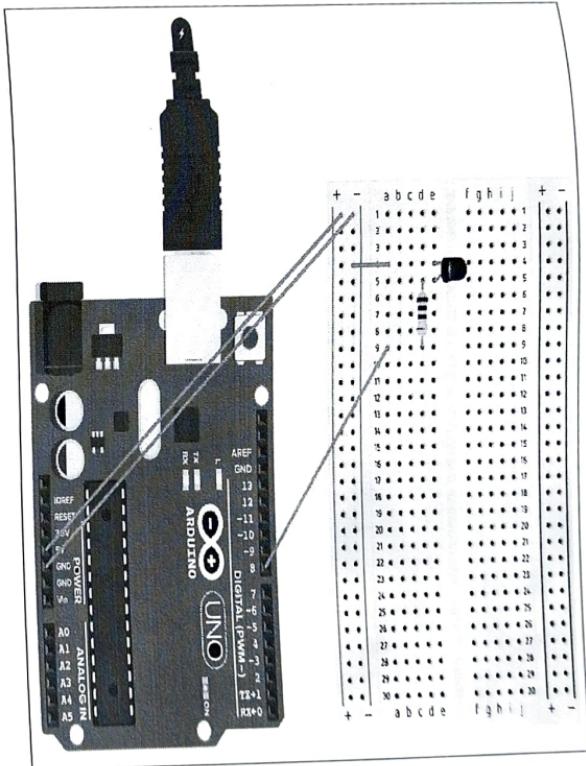
Restricts the flow of electricity in a circuit, reducing the voltage and current as a result.

Code :

```

int ledPin = 8;
void setup()
{
    pinMode(ledPin, OUTPUT);
}
void loop()
{
    digitalWrite(ledPin, HIGH); //On
    delay(1000); //1000 secs delay
    digitalWrite(ledPin, LOW); //OFF
    delay(1000); //1000 secs delay
}

```





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Practical 2

Aim:-

Program using Light Sensitive Sensors

Components required :

Component	Quantity
Arduino Uno R3	1
Light bulb	1
10 kΩ Resistor	1
1 kΩ Resistor	1
Photoresistor	1

• Arduino Uno R3 :

A programmable board you can use to build interactive circuits.

• Light bulb :

A 12V/3W incandescent light bulb.

• Resistor :

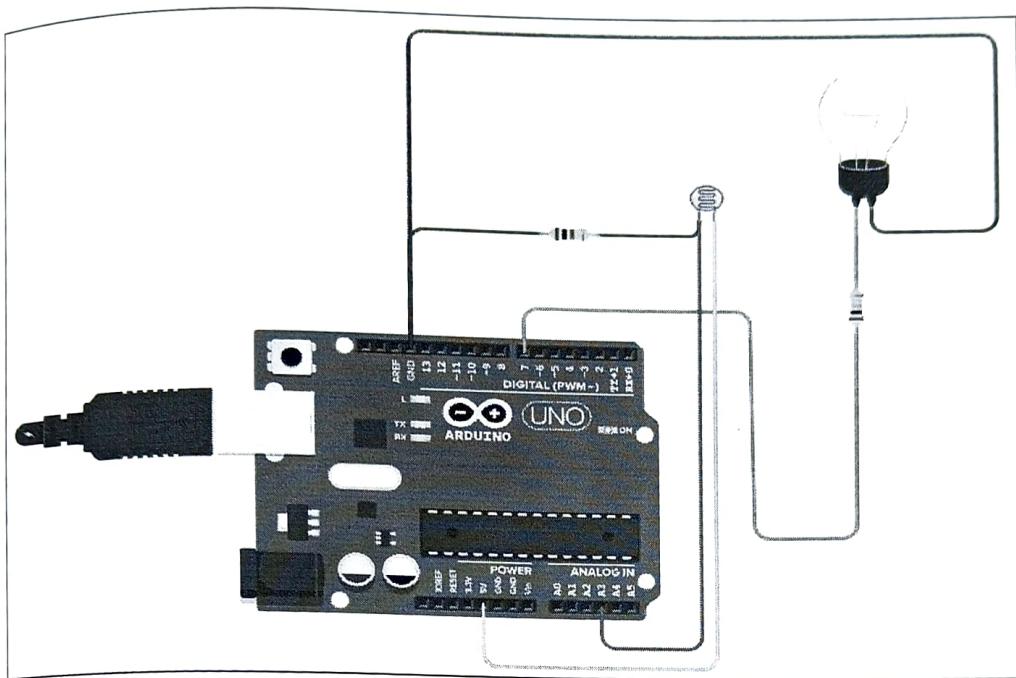
Restricts the flow of electricity in a circuit, reducing the voltage and current as a result.

photoresistor :

A sensor whose resistance changes based on the amount of light it senses.

Code :

```
int bulb = 7;  
int ldr = A3;  
  
void setup()  
{  
    pinMode(bulb, OUTPUT);  
    pinMode(ldr, INPUT);  
}  
  
void loop()  
{  
    if(analogRead(ldr) > 500)  
        digitalWrite(bulb, 0);  
    else  
        digitalWrite(bulb, 1);  
}
```





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Practical 3

Aim :-

Program using temperature sensors.

Components required:-

Component	Quantity
Arduino Uno R3	1
Temperature Sensor [TMP36]	1
Green LED	1
Blue LED	1
Yellow LED	1
1 kΩ Resistor	3

• Arduino Uno R3:

A programmable board you can use to build interactive circuits.

• Temperature Sensor [TMP36]:

A sensor that outputs different voltages based on the ambient temperature

• LED :

Light - Emitting Diode that lights up when electricity passes through it in the correct direction.

• Resistor:

Restricts the flow of electricity in a circuit, reducing the voltage and current as a result.

Code :-

```

int baselineTemp = 0;
int celsius = 0;
int fahrenheit = 0;

void setup()
{
    pinMode(A0, INPUT);
    Serial.begin(9600);
    pinMode(2, OUTPUT);
    pinMode(3, OUTPUT);
    pinMode(4, OUTPUT);
}

void loop()
{
    baselineTemp = 40;
    celsius = map((analogRead(A0) - 20) * 3.0), 0, 1023, -40, 125);
}

```

```

Fahrenheit = ((celsius * 9) / 5 + 32);
Serial.print(celsius);
Serial.print("C");
Serial.print(Fahrenheit);
Serial.print("F");
if(celsius < baselineTemp)
}

```

```

digitalWrite(2,LOW);
digitalWrite(3,LOW);
digitalWrite(4,LOW);
}

```

```

if(celsius >= baselineTemp && celsius <
baselineTemp + 10) {
    digitalWrite(2,HIGH);
    digitalWrite(3,LOW);
    digitalWrite(4,LOW);
}

```

```

if(celsius >= baselineTemp + 10 && celsius <
baselineTemp + 20) {
    digitalWrite(2,HIGH);
    digitalWrite(3,HIGH);
    digitalWrite(4,LOW);
}

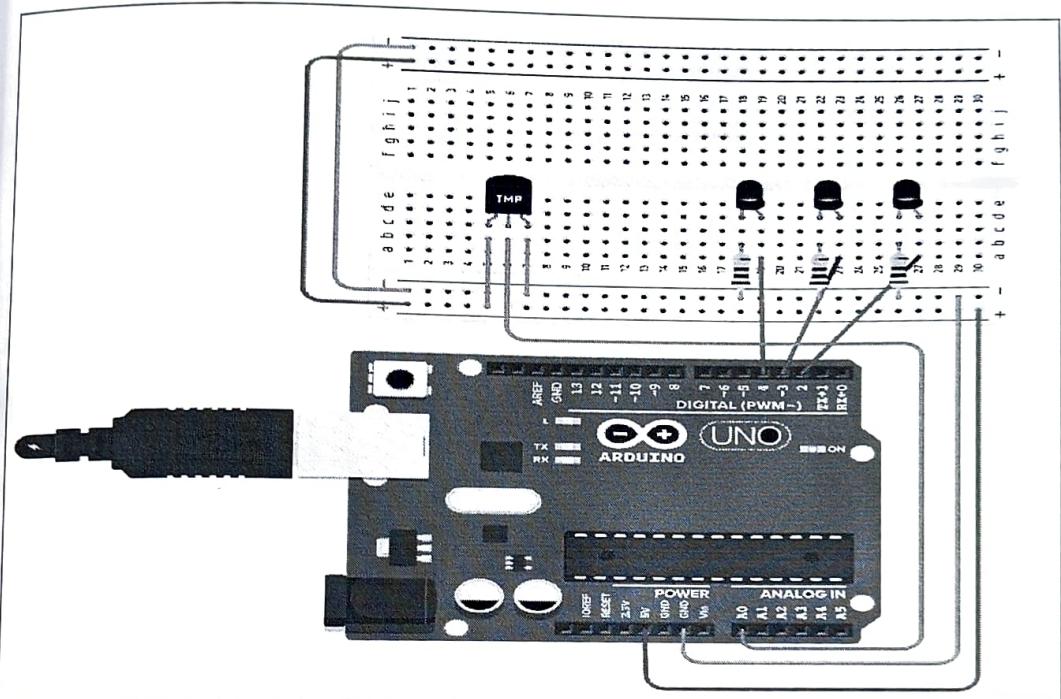
```

```

if(celsius >= baselineTemp + 20 && celsius <
baselineTemp + 30) {
    digitalWrite(2,HIGH);
    digitalWrite(3,HIGH);
    digitalWrite(4,HIGH);
}

```

```
if(celsius >= baselineTemp + 30){  
    digitalWrite(2,HIGH);  
    digitalWrite(3,HIGH);  
    digitalWrite(4,HIGH);  
    delay(1000);  
}
```





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Practical 4

Aim:-

Programs using humidity sensors.

Components required:-

Component	Quantity
Arduino Uno R3	1
250 k Ω Potentiometer	1

• Arduino Uno R3 :

A programmable board you can use to build interactive circuits.

• Potentiometer:

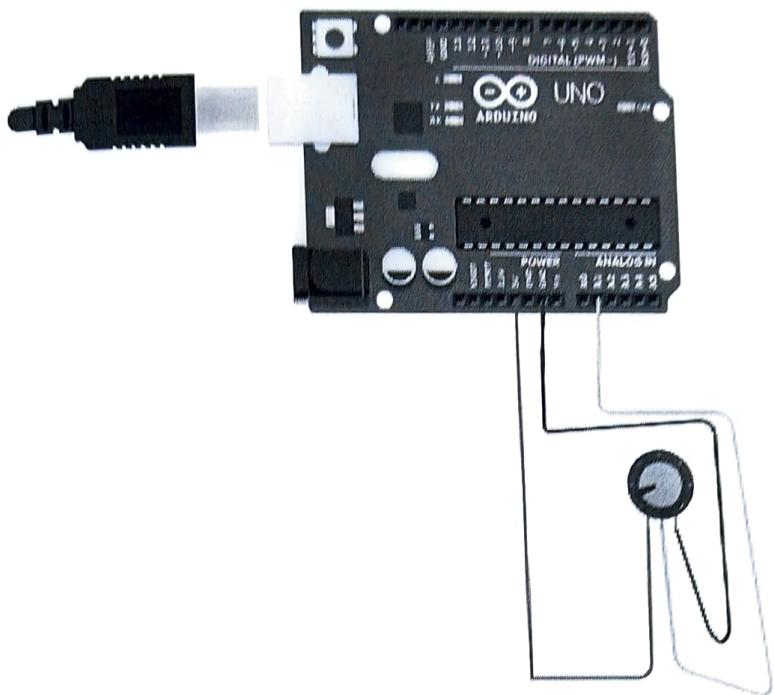
A type of resistor whose resistance changes at the turn of a knob.

Code:-

```
const int analogIn = A1;  
int humiditySensorOutput = 0;  
void setup() {  
    Serial.begin(9600);  
}
```

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```
void loop () {  
    humiditySensorOutput = analogRead (analogIn);  
    int humidityPercentage = map (humiditySensor  
        Output, 0, 1023, 10, 70);  
    Serial.print ("Humidity : ");  
    Serial.print (humidityPercentage);  
    Serial.println ("%");  
    delay (5000);  
}
```





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Practical

Aim:-

Program using Ultrasonic Sensors

Components required:-

Component	Quantity
Arduino Uno R3	1
Red LED	1
220 Ω Resistor	1
Ultrasonic Distance Sensor	1

• Arduino Uno R3:

A programmable board you can use to build interactive circuits.

• LED:

Light-Emitting Diode that lights up when electricity passes through it in the correct direction.

• Resistor :-

Restricts the flow of electricity in a circuit, reducing the voltage and current as a result.

• Ultrasonic Distance Sensor :-

A sensor that uses sound waves to determine how far away an object is from it.

Code :-

```
int trigger = 12;
int echo = 13;
int led = 8;
long duration = 0;
```

```
int cm = 0;
```

```
int inch = 0;
```

```
void setup()
```

```
{
```

```
Serial.begin(9600);
```

```
pinMode(trigger, OUTPUT);
```

```
pinMode(echo, INPUT);
```

```
pinMode(led, OUTPUT);
```

```
}
```

```
void loop()
```

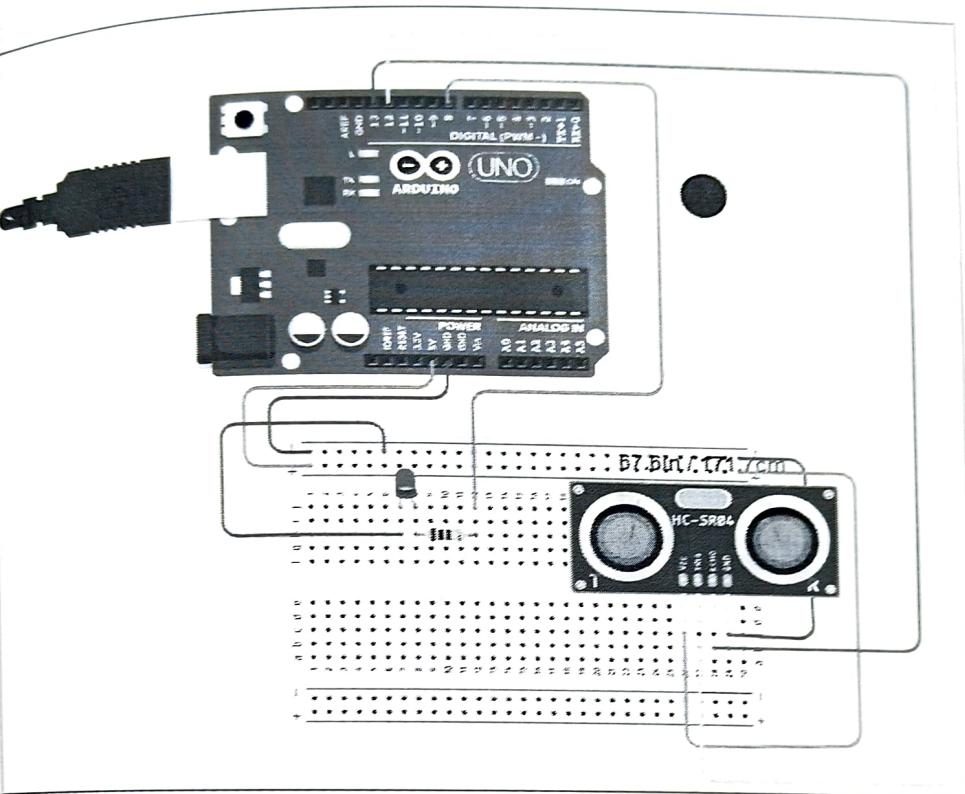
```
{
```

```
digitalWrite(trigger, LOW);
```

```

digitalWrite(trigger, HIGH);
digitalWrite(trigger, LOW);
duration = pulseIn(echo, HIGH);
cm = duration * 0.034 / 2;
inch = duration * 0.0133 / 2;
if (inch < 50) {
    digitalWrite(led, HIGH);
} else {
    digitalWrite(led, LOW);
}
if (inch < 100) {
    Serial.print("Inches: ");
    Serial.println(inch);
    Serial.print("cm: ");
    Serial.println(cm);
}
delay(5000);
}

```





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Practical

Aim:-

Programs using servo motors

Components required:-

Component	Quantity
-----------	----------

Arduino Uno R3	1
Positional Micro Servo	1

- Arduino Uno R3:

A programmable board you can use to build interactive circuits.

- Positional Micro Servo:

A motor whose position can be controlled using a microcontroller like an Arduino.

Code :-

```
#include <Servo.h>
Servo servoBase;
void setup() {
    servoBase.attach(A1);
    servoBase.write(0);
}
void loop() {
    for (int i = 0; i <= 180; i += 10) {
        servoBase.write(i);
        delay(2000);
    }
}
```

