Dimmer Circuit:

Components Used:

- Arduino R3
- Potentiometer(250KΩ)
- Resistor(100Ω)
- Bulb
- Breadboard

Arduino: A microcontroller that processes input signals and controls output devices, making it the core controller of the dimmer circuit.

Resistor: Limits the current flowing through components, protecting them from excessive voltage or current damage.

Bulb: The output device whose brightness is controlled by the Arduino using PWM signals, simulating dimming effects.

Potentiometer:

A potentiometer is a variable resistor that allows for smooth adjustment of voltage in a circuit. It consists of three terminals: two fixed ends connected to a resistive track and a central wiper that moves along the track to vary resistance.

As the wiper moves, it changes the ratio of resistance between the two fixed terminals, thereby adjusting the output voltage. In an Arduino circuit, the potentiometer is often used as an analog input device, providing variable voltage readings between 0V and 5V.

Potentiometers are widely used for adjusting brightness in dimmer circuits, volume control in audio devices, sensor calibration, and user input in embedded systems.

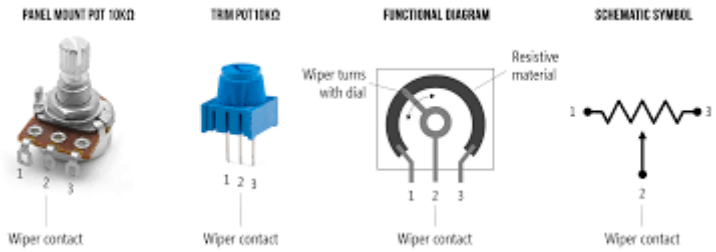

Fig20.1: Potentiometer

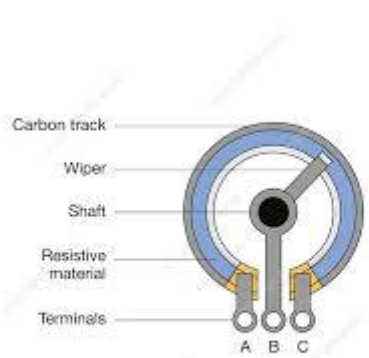

Fig20.2: Potentiometer Schematic Diagram

Project:

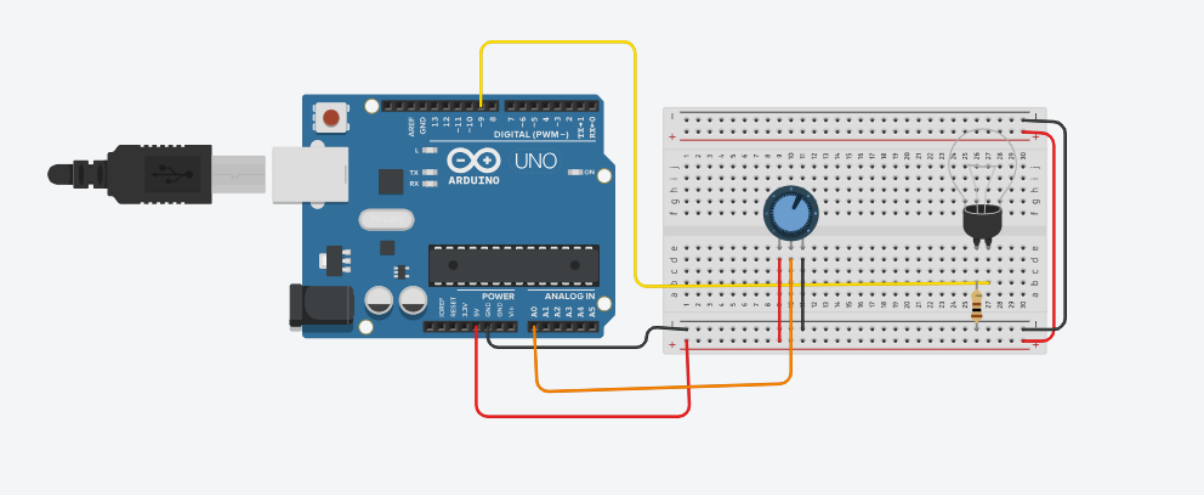

Fig20.3: Arduino based Dimmer Circuit

The Arduino-based dimmer circuit allows control of an LED's brightness using a potentiometer. The potentiometer, connected to analog pin A0, acts as a variable resistor, adjusting the input voltage between 0 and 5V. The Arduino reads this value using the analogRead() function and maps it to a corresponding PWM (Pulse Width Modulation) signal, which is sent to the LED on pin 9 through analogWrite().

As the potentiometer is turned, the analog input value (ranging from 0 to 1023) is mapped to a PWM output value (ranging from 0 to 255), adjusting the LED brightness accordingly. The Serial Monitor displays the mapped PWM value in real time, providing feedback on the intensity level. This circuit is useful for understanding how analog input can be used to control output devices, making it applicable in lighting control, motor speed regulation, and other automation systems.