Arduino Project: LED Brightness Control using Potentiometer

Algorithm:

1. Start
2. Initialize Arduino & Components:
   - Connect LED to a PWM pin (D9) through a 220Ω resistor.
   - Connect potentiometer: VCC → 5V, GND → GND, middle pin → A0.
3. Read potentiometer value:
   - Use analogRead(A0) to get a value between 0–1023.
4. Map the potentiometer value to brightness:
   - Convert 0–1023 to PWM range 0–255 using map().
5. Output PWM to LED:
   - Use analogWrite(ledPin, brightness).
6. Repeat continuously in the loop.

Arduino Code:

```
int potPin = A0;     // Potentiometer pin
int ledPin = 9;      // LED connected to PWM pin
int potValue = 0;    // Variable to store pot value
int brightness = 0;  // LED brightness (0-255)

void setup() {
  pinMode(ledPin, OUTPUT);
}

void loop() {
  potValue = analogRead(potPin);           // Read potentiometer (0-1023)
  brightness = map(potValue, 0, 1023, 0, 255); // Map to 0-255
  analogWrite(ledPin, brightness);         // Set LED brightness
}
```

Circuit Connections:

```
Components Required:
- Arduino Uno
- 1 × LED
- 1 × 220Ω Resistor
- 1 × 10kΩ Potentiometer
- Jumper wires

Connections:
- Potentiometer VCC → Arduino 5V
- Potentiometer GND → Arduino GND
- Potentiometer middle pin → A0
- LED Anode (+) → Pin 9 (through 220Ω resistor)
- LED Cathode (–) → GND
```