Project Report: Dimmer with Arduino

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1. Introduction

This project demonstrates how to control the brightness of an LED using a potentiometer and an Arduino. It utilizes the analog input and output functions of Arduino to create a simple dimmer circuit.

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2. Key Components

- Arduino UNO (or any compatible board)
- LED
- Potentiometer (10kΩ recommended)
- 220Ω Resistor (for LED)
- Breadboard
- Jumper Wires
- USB Cable (for Arduino)

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3. Working Principle

- A **potentiometer** acts as an analog input device whose resistance changes when rotated.
- The Arduino reads the potentiometer’s value (0 to 1023) from its analog pin **A0**.
- This read value is scaled down to match PWM (Pulse Width Modulation) range (0 to 255) suitable for controlling LED brightness.
- Using **analogWrite()** on pin 9, the Arduino adjusts the LED's brightness according to the potentiometer's position.
- The **Serial Monitor** displays the PWM value that is being written to the LED for monitoring purposes.

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4. Circuit Overview

- Connect the **middle pin** of the potentiometer to Arduino **A0**.
- Connect **one outer pin** of the potentiometer to **5V** and the other outer pin to **GND**.
- Connect the **positive leg (anode)** of the LED to Arduino **pin 9** through a **220Ω resistor**.
- Connect the **negative leg (cathode)** of the LED to **GND**.
- Upload the code to the Arduino and observe the LED brightness changing with potentiometer rotation.

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5. Code

```
/*Code written by -
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*/

/*Dimmer with Arduino*/

int potPin = A0;
int LEDPin = 9;
int readValue;
int writeValue;

void setup()
{
  pinMode(potPin, INPUT);
  pinMode(LEDPin, OUTPUT);
  Serial.begin(9600);
}
```

```
void loop(){


 readValue = analogRead(potPin);
 writeValue = (255./1023.) * readValue;
 analogWrite(LEDPin, writeValue);
 Serial.print("You are writing value of ");
 Serial.println(writeValue);
}
```

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6. Code Explanation

- **Variable Declaration:**
- int potPin = A0;
- int LEDPin = 9;
- int readValue;
- int writeValue;
    - potPin: Analog input pin A0 where the potentiometer is connected.
    - LEDPin: PWM capable digital output pin 9 where the LED is connected.
    - readValue: Stores the analog reading from the potentiometer.
    - writeValue: Stores the scaled value (0-255) for PWM output.
- **Setup Function:**
- void setup()
- {
- pinMode(potPin, INPUT);
- pinMode(LEDPin, OUTPUT);
- Serial.begin(9600);

- }
    - pinMode(potPin, INPUT): Sets the potentiometer pin as input.
    - pinMode(LEDPin, OUTPUT): Sets the LED pin as output.
    - Serial.begin(9600): Initializes serial communication for debugging at 9600 baud rate.
- **Loop Function:**
- void loop(){
- readValue = analogRead(potPin);
- writeValue = (255./1023.) * readValue;
- analogWrite(LEDPin, writeValue);
- Serial.print("You are writing value of ");
- Serial.println(writeValue);
- }
    - analogRead(potPin): Reads the potentiometer value (0–1023).
    - writeValue = (255./1023.) * readValue: Maps 0–1023 range to 0–255 PWM value.
    - analogWrite(LEDPin, writeValue): Sets the LED brightness based on potentiometer position.
    - Serial.print and Serial.println: Output the PWM value to the Serial Monitor.

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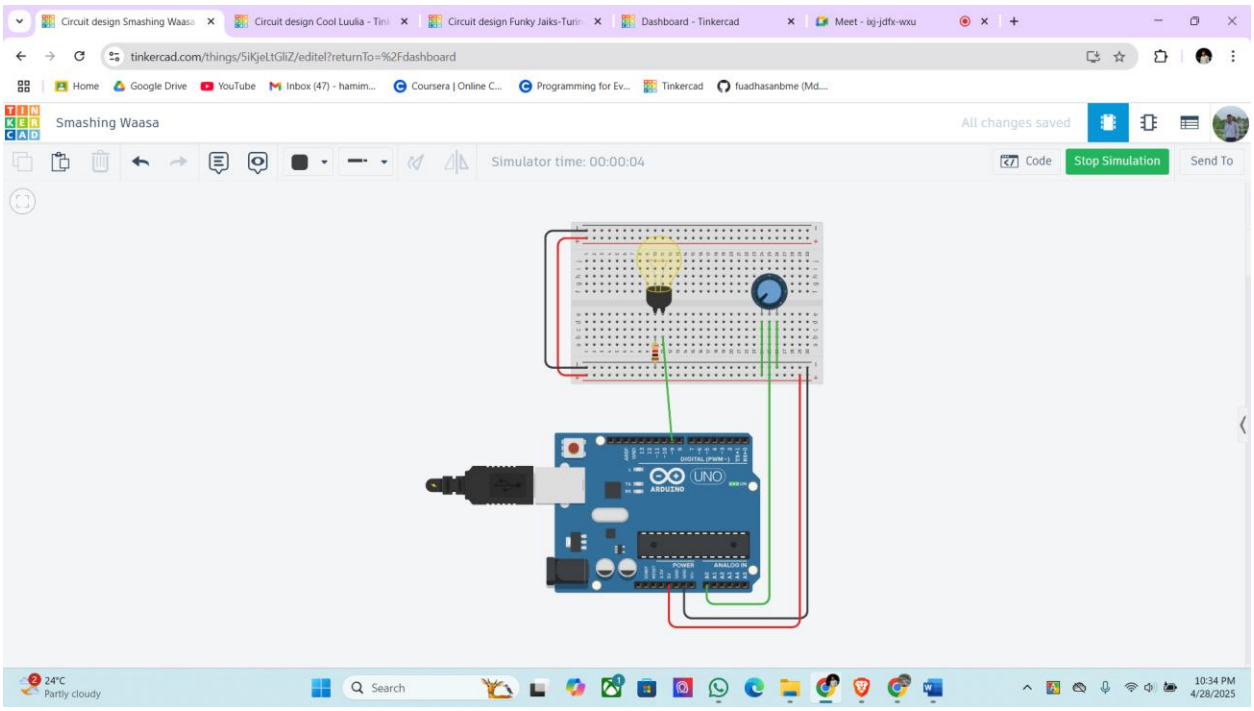
7. Conclusion

This project effectively demonstrates analog-to-digital interfacing and PWM control in Arduino. By varying the potentiometer, users can dynamically adjust the LED's brightness, making it a great beginner project to understand analog inputs and PWM outputs.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