Some Notes

On

Day 2: Microcontrollers and Programming

By

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To

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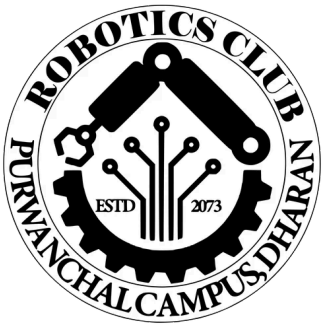

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Q) ***Is it possible to create a simulation in Tinkercad where an LED is dimmed and brightened using PWM with an Arduino? If yes, explain how you would implement this simulation step by step, including the circuit setup and example code. If not, explain why it is not possible.***

Ans: Yes, it is absolutely possible to create a simulation in Tinkercad where an LED is dimmed and brightened using PWM (Pulse Width Modulation) with an Arduino. Before starting step by step implementation, we need to undersrtand `"what is PWM?"`.

PWM (Pulse Width Modulation) is a technique used to simulate analog output using digital signals by turning the signal ON and OFF at high speed. We can control the brightness of an LED by varying the duty cycle of the PWM signal.

Step-by-Step Implementation in Tinkercad:-

1. **Components Needed**
   - Arduino Uno
   - LED
   - Resistor (220Ω)
   - Breadboard (optional, for neat wiring)
   - Jumper wires
2. **Circuit setup(Connect the LED)**
   - Long leg (anode) of the LED ⟶ Arduino pin 9 (PWM pin)
   - Short leg (cathode) ⟶ One end of 220Ω resistor
   - Other end of resistor ⟶ GND of Arduino
3. **Example code**

```
 int ledPin = 9; // PWM pin

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

void loop() {
  // Brighten the LED
  for (int brightness = 0; brightness <= 255; brightness++) {
    analogWrite(ledPin, brightness);
    delay(10);
  }

  // Dim the LED
  for (int brightness = 255; brightness >= 0; brightness--) {
    analogWrite(ledPin, brightness);
    delay(10);
  }
}
```

4. **What Happens in Simulation?**
   - he LED will gradually brighten from off to full brightness.
   - Then it will gradually dim back to off.

- This loop will repeat continuously.
- This simulates PWM control using analogWrite().