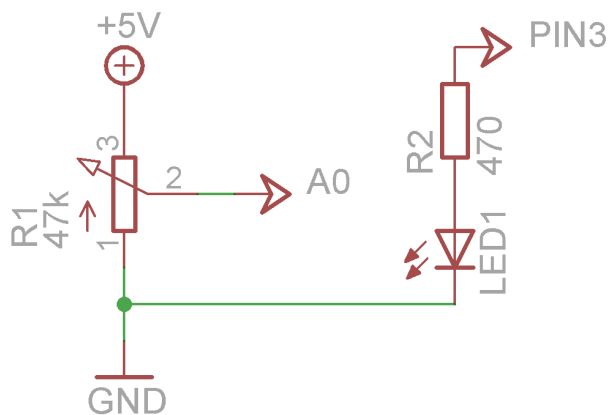**Dimming LEDs:**

PWM can be used to dim various types of LEDs, including standard 5mm LEDs, LED strips, and high-power LEDs. Lowering the voltage below the forward voltage level reduces current consumption, resulting in a dimmer light output. While using a potentiometer in series with an LED is a quick solution for dimming, it has drawbacks:

- Energy waste due to heat generated by the potentiometer.
- Need for robust and expensive potentiometers when dealing with high-current applications like long LED strips.

PWM works by switching between full power (5V) and off (0V), creating an effect that dims the light without changing voltage directly. Duty cycle is introduced as a key concept; it determines brightness based on the ratio of time spent on versus off during each cycle.

Implementing PWM with Arduino and Other Methods :

- The Arduino's `analogWrite` function generates PWM signals by taking values from 0 to 255, where lower values correspond to lower voltages.

- An alternative method using a 555 timer chip is discussed for generating square wave signals without needing a microcontroller. This allows control over duty cycles via another potentiometer.