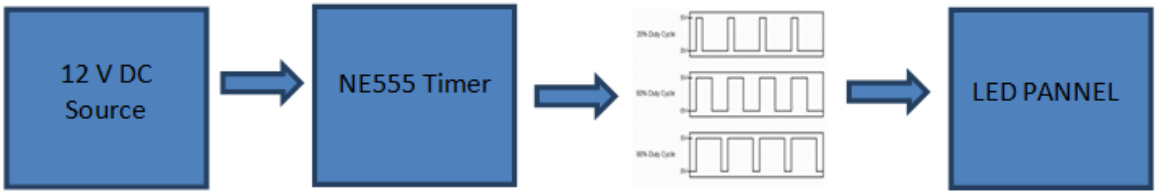
PWM LED Dimmer Using NE555

Introduction:

The Pulse Width Modulation (PWM) plays an important role in controlling the circuits. If you want to control the speed of the motor PWM plays a key role. The width of pulse will give the command to the machine to work either slow or fast. If we can control the pulse width we can easily control the machine. In this project we will use this PWM to dim the intensity of light of the LED.

Block Diagram of LED Dimmer:

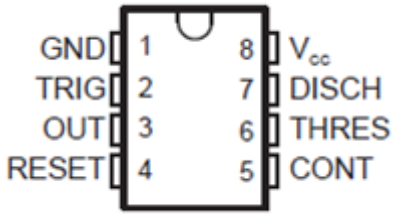


The DC source is given to the NE555 timer. NE555 timer is used to generate the PWM signal. The width of the PWM signal always depends on the duty cycle, so we can vary the duty cycle through NE555, if we can vary duty cycle we can generate the pulse with various width.so we use timer to generate the PWM to dimmer the LED or increase brightness of the LED.

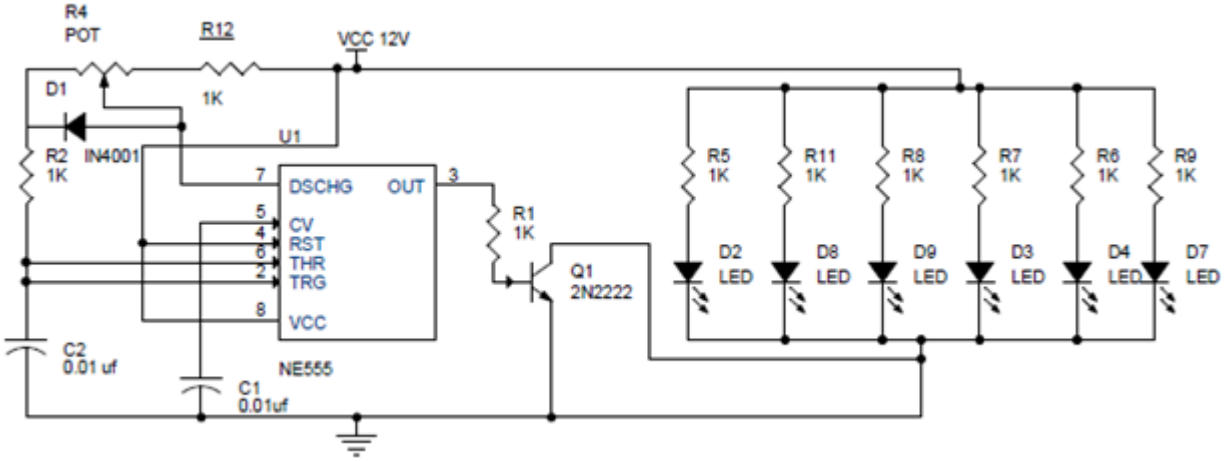
NE555:

NE555 is developed by Texas instruments (T1).the ne555 has 8 pins the VCC pin is used to give the main supply voltage to the IC the operating voltage may vary from 3v to 15V.the threshold and voltage control pins are used to vary the voltage to generate the PWM in various duty cycles. Reset pin is used to reset the complete IC if there is any error. The IC output can be taken from the out pin. The NE555 timer can work in monostable or astable operations.it had features like timing for micro second through hours, adjustable duty cycles and ability work in various voltages etc.it had wide range of applications like lamp dimmers, motor control, joysticks etc.

Pin Diagram of NE555:



Circuit Diagram of PWM LED Dimmer Using NE555:



Explanation:

- The 12V DC supply is given to the VCC for operating voltage of 555 timer. The reset pin also directly connecter to the 12V as shown in the circuit diagram for resetting the IC if there is any error while circuit is working. The pin5 or voltage control pin is not used in this application so we grounded pin5 with the capacitor C1. The trigger pin (pin2) and threshold pin (pin 6) are connected the VCC through the resistance R12, R2, potentiometer R4 and capacitor C2 for varying the voltage to generate the PWM in various duty cycles. The out pin is connected to the LED panel through a transistor.Pin7 is connected to a transistor internally which will act as a switch and generate the pulse according the duty cycles or frequency generated by the pin2 and pin6.
- Here in this project the NE555 should operate in the astable multivibrator. The resistors R12, R2, potentiometer R4 and capacitor C2 will play the important role. Pins 2 and 6 have upper comparator and lower comparator respectively. The upper comparator has the value 2/3 of the vcc and lower comparator has 1/3 of the vcc.
- If the astable multivibrator is high at starting and capacitor C2 is started to charge through R12, R2 and pot R4. When the capacitor reaches the voltage of 2/3 its vcc then upper comparator makes the astable multivibrator to goes low. Then the voltage in the capacitor starts to discharge when it reaches the voltage of 1/3 its vcc then lower comparator flips and make the astable multivibrator to go high .Here diode D1 plays the key role diode will allow the voltage when the capacitor is discharging and it will not allow reverse current when the multivibrator is at high or capacitor is charging. The high and low of the multivibrator we generate a pulse. According to resistance generated by the potentiometer we can generate the width of the pulse.
- The output of the NE555 is taken form pin 3 and connected to the led panel through the transistor Q1 and resistor R1. The resistor R1 is used to limit the base current of the transistor and transistor is used as a amplifier to limit or enhance the current which is given to the LED panel.

Source: http://www.electronicshub.org/pwm-led-dimmer-using-ne555/