Pulse Width Modulation (PWM) is a method for controlling the speed of a motor or the brightness of an LED. It is a method of turning a motor or LED off and on quickly enough that the motor doesn’t stutter or the LED doesn’t appear to blink. Some example PWM waveforms are shown in figure 1. A counter and a comparator can be used to create a digital PWM circuit, as shown in figure 2.

![Figure 1: A 50% duty cycle would operate a motor near half speed and an LED around half brightness.](image)

A simulation of the circuit in figure 2 creates figure 3. The key point to take away from the counter and comparator work together to generate the PWM signal.
Figure 2: A counter and a comparator can be used to build a PWM circuit that changes a 4 bit throttle input.

Figure 3: This simulation shows how a four bit PWM circuit operates.