

CS499 - Fundamentals of Robotics

Assignment #1

Pulse width modulation is a technique that requires only a single digital input to cause the effect of a variable voltage delivered to a load. For an LED, this allows the intensity of the LED to be varied; for a DC motor, this can be used to control the speed.

Experiment #1

This experiment will use a momentary switch (for digital input) and an LED for output. Initially, the LED should be off. Pushing the switch the first time should cause the LED to turn on with low intensity. Pushing the switch a second time should increase the intensity of the LED. This pattern should continue, such that the fourth push should turn the switch on for maximum brightness. One additional push should turn the LED off. Adjust the PWM so that each increment “appears” to increase the intensity by equal amounts.

Experiment #2

This experiment will explore the effect of the speed at which an LED turns on and off on our perception. Use the same apparatus as above. However, this time use a 50% duty cycle on the LED, but vary the speed at which the LED is turned on and off. Start at a fairly low frequency - say 5 Hz - at which you can see the actual “flicker” of the LED. Each time the switch is push, increase the frequency of the cycle. Determine the approximate frequency at which the individual cycles are no longer perceptible (this may vary from individual to individual).