

CS499 - Fundamentals of Robotics

Lab Assignment #4

Fall 2010

The purpose of this lab is to utilize a potentiometer (or “pot”) to produce an analog signal that is used to control the position of a stepper motor.

A *pot* is simply a resistor that has a variable “tap.” It is often used as a volume control, where an audio signal is connected to one end of the resistor, and the other end is connected to ground. The middle contact acts as a “wiper” on the resistor - the amount of the signal that is presented to the middle tap is determined by the tap’s position - the least amount of signal is available at the grounded end, and the full signal is available at the other end. As a sensor input to a microprocessor, usually one end is connect to a voltage source (for example, 5 volts), and the other end is grounded. The middle contact taps a portion of the voltage - this contact is connected to the Analog-to-Digital (A-to-D) input of the processor, where it is converted to a digital value, usually 0 to 255 (or similar).

For this exercise, you are to use a pot to control the position of a stepper motor. Moving the pot should move the stepper motor a corresponding amount. You can assume that the starting position of the stepper motor when your program starts is the 0 degree position. We have both single turn (actual rotation is approximately 300 degrees, slightly less than a full rotation) and ten turn pots (which rotate approximately ten turns from minimum to maximum). If you use the single turn pot, the stepper motor should position itself to the approximate position specified by the pot position. So, initially your program should move the stepper motor from the current (zero) position to the approximate position as determined by the pot position. Then, whenever the pot position is moved, the stepper should also move to reflect the new position. For the ten turn pot, a similar thing should happen, except that the stepper motor should rotate a maximum of ten turns in response to pot’s position.