

# Workshop 6: Stepper Motor Control

**Purpose:** Using the embedded controller control a stepper motor.

**Objective :** This workshop is designed to familiarize the student with elements of the embedded microcontroller.

**Real world application:** Controlling robotic appendages.

**Requirements:**

Hardware: Bipolar stepper motor (Supply Voltage <46Volts, Operating Current <4 Amps), L298 Stepper motor driver chip, 1K OHM potentiometer, Voltmeter

Software commands: Call AD1

**Procedure:** Design and implement a program that will rotate a robotic hand. The control input will taken at ADC1.

Move a stepper motor in the direction and the amount based on the following table:

0-1 volt - counterclockwise, one step

1-2 volts - counterclockwise, two steps

2 - 2.5 volts - counterclockwise, one rotation

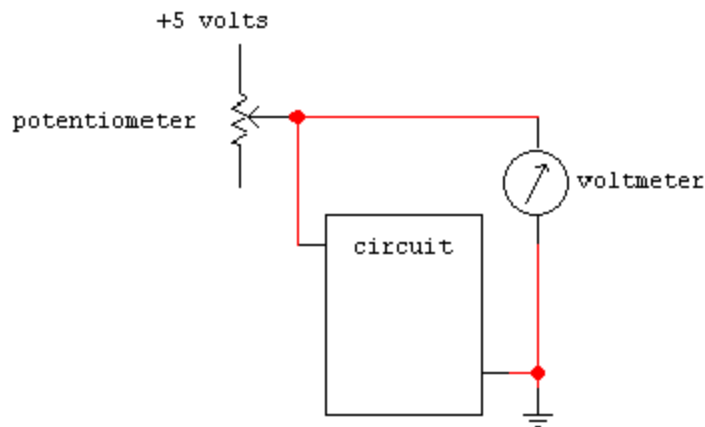
2.5 - 3 volts - clockwise, one step

3 - 4 volts - clockwise, two steps

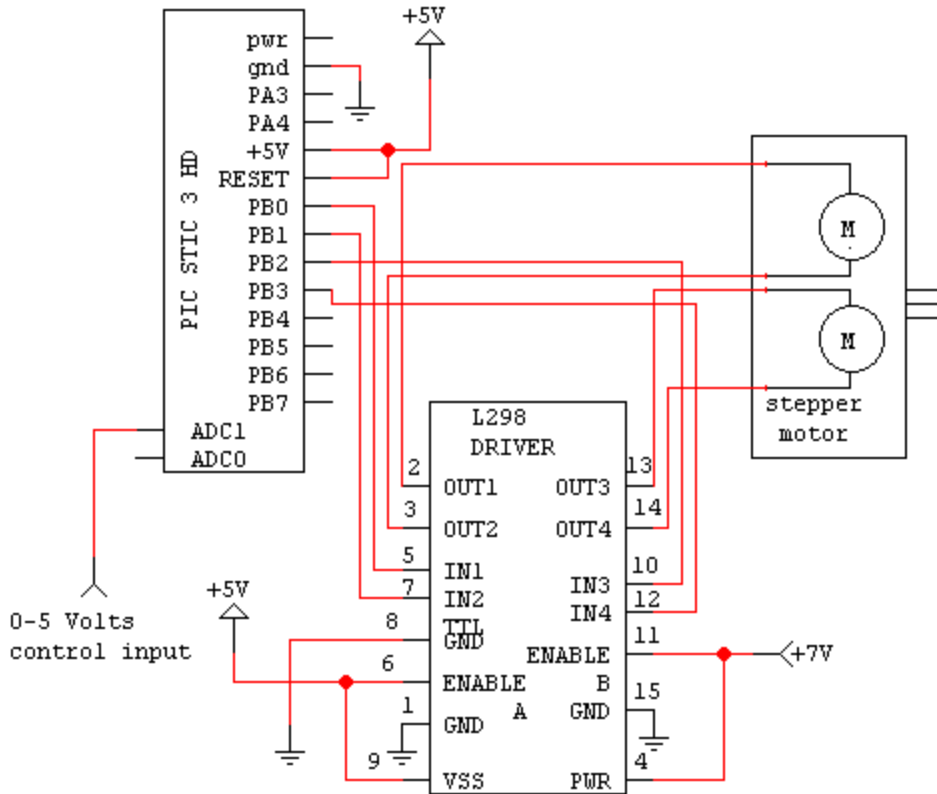
>4 volts - clockwise, one rotation

Set the inputs to L298 to 01/ 01 upon startup. Setup the program so that the it must be reset after each movement.

The potentiometer should be wired to the +5 volts power supply per the diagram below:



# Circuit Drawing for Workshop



## #6

## *PicBasic Code for Workshop #6*

```
'$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
'A program to rotate a robotic hand in the direction and magnitude
'depends on input voltage.
'Herb Wagner
'$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
symbol mv=w4 'designate mv to hold millivolt

set: 'initial stepper motor inputs
low 0: high 1: low 2: high 3
start: call ad1 'convert analog signal at ADC0
w0 = w10 * 6 / 5 'to a millivolts
w1 = w10 / 50
w2 = w10 / 1000
mv = w0 + w1 + w2
if mv <= 1000 then move1 'if less than or = to 1V
'move CCW one step
if mv > 1000 and mv < 2000 then move2 'if greater
'than 1V and less than 2V
'move CCW two steps
if mv >= 2000 and mv < 2500 then move3 'if greater
'than or = to 2V and less
'than 2.5V move CCW 1 rotation
if mv >= 2500 and < 3000 then move4 'if greater 'than or = to 2.5V and less
'than 3V move CW 1 step
if mv >= 3000 and mv < 4000 then move5 'if greater
'than or = 3V and less than 4V
'move CW two steps
```

```

if mv >= 4000 then move6 'if greater than 4V than
'move CW 1 rotation
goto set 'default
'*****

move1:
high 0: low 1: low 2: high 3 'move hand CCW one step
goto stop
'*****

move2:
high 0: low 1: low 2: high 3 'move hand CCW two steps
high 0: low 1: high 2: low 3
goto stop
'*****

move3:
high 0: low 1: low 2: high 3 'move hand CCW one rotation
high 0: low 1: high 2: low 3
low 0: high 1: high 2: low 3
low 0: high 1: low 2: high 3
goto stop
'*****

move4:
low 0: high 1: high 2: low 3 'move hand CW one step
goto stop
'*****

move5:
low 0: high 1: high 2: low 3 'move hand CW two steps
high 0: low 1: high 2: low 3
goto stop
'*****

move6:
low 0: high 1: high 2: low 3 'move hand CCW one rotation
high 0: low 1: high 2: low 3
high 0: low 1: low 2: high 3
low 0: high 1: low 2: high 3
'*****

stop:
end

```