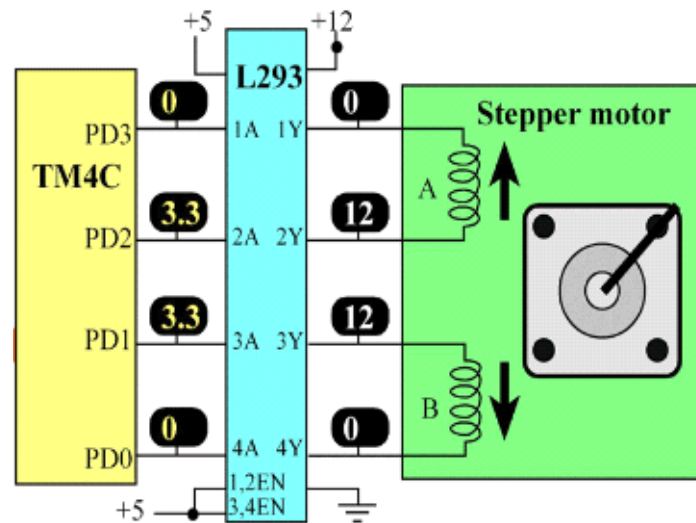# ELE504A/412P: Embedded Systems Design Lab

Experiment-5: Interfacing Stepper Motor with TM4C

Aim: To control the position and speed of a stepper motor with TM4C

Components: TM4C board, stepper motor, L293D motor driver IC/board, connecting wires, 12V power supply

Stepper motor connections:

Stepper motor working principle:

Stepper motors are widely used in applications where angular position control is needed. This is accomplished by moving the motor in incremental steps. Step angle is the angle covered by the motor shaft per step. The two methods to energize the stepper motor are unipolar and bipolar method. The experiment will use bipolar method to energize the stepper motor.
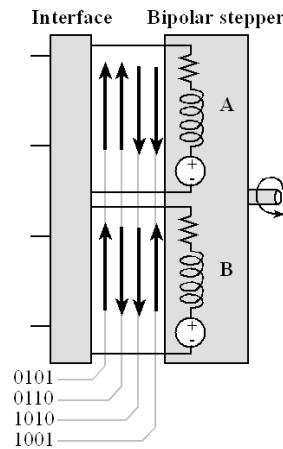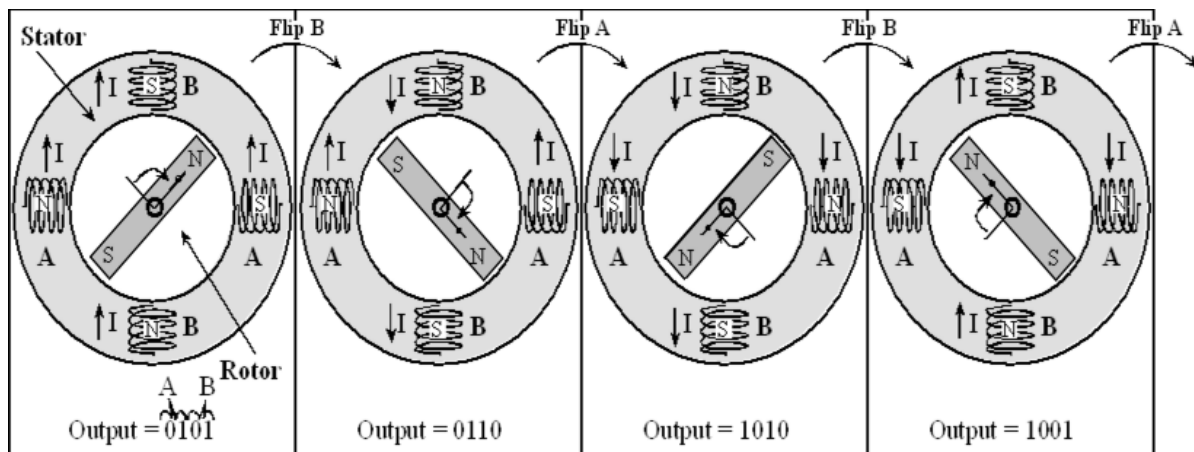
Fig 1: Bipolar stepper motor energizing sequence

Fig 2: To make a stepper motor move by one step, the interface flips the direction of one of the currents

Exercise 1: Write a program to interface the stepper motor with Tiva board. Energize the motor in sequence and determine the step angle of the motor.

Exercise 2: Generate PWM pulse using SysTick timer and run the servo to move from 0 to 180 degree and 180 degree to 0 degree.

Exercise 3: Write a program which rotates the stepper motor clockwise for 90 degree, and 180 degree in counter clockwise. Provide a delay of 1s between switching from clockwise to counter clockwise.

Post-Lab Exercise: Discuss, with a schematic, how stepper motors are used in the design and operation of a CNC PCB machine (about one page length, typed).