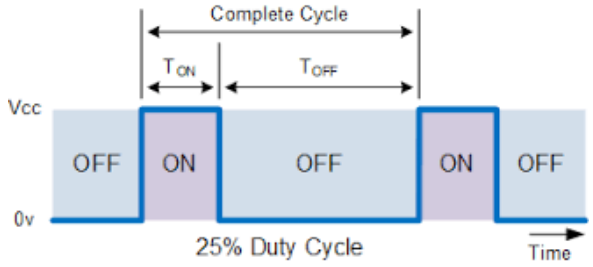
# Embedded Systems Design Lab

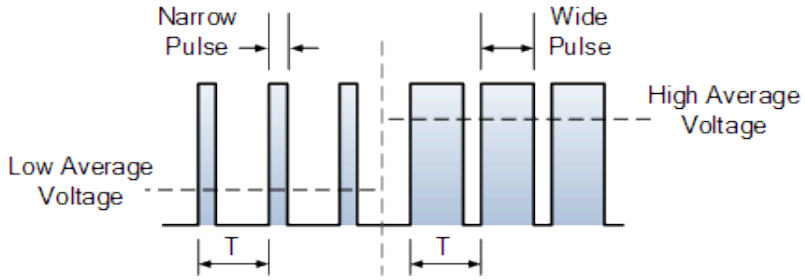
## Experiment: Interfacing DC Motor with TM4C

**Aim**: To generate PWM signal using SysTick timer to control speed and direction of DC motor with aid of L293D motor driver IC.

**Components:** Tiva Launchpad, DC motor, L293D and wires.

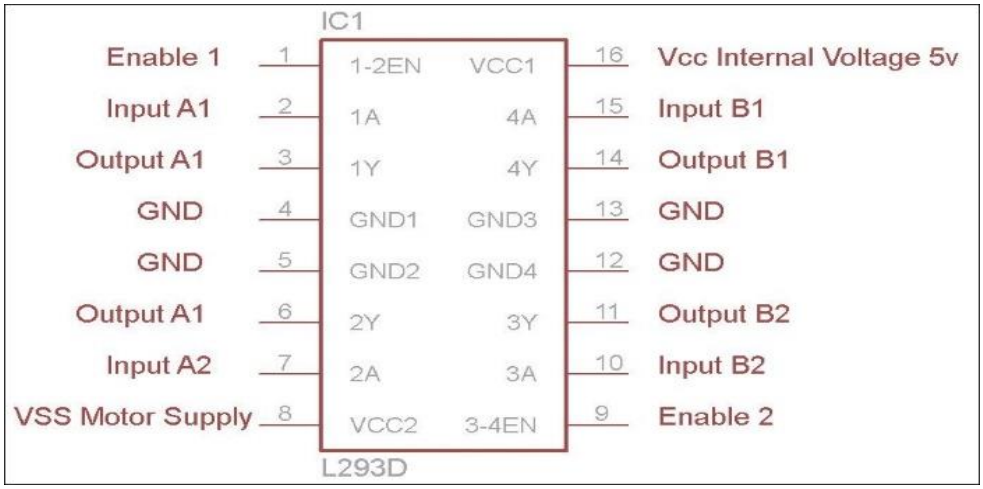
**Pulse width modulation** (PWM)**:** PWM is a technique widely used in motor control systems. By varying the duty cycle (= ON time/Complete one cycle time) of a high-frequency square wave, the average value of the control signal is varied.




In this experiment, with TM4C we will generate PWM pulses using the SysTick timer and provide appropriate duty cycle for the pulses.

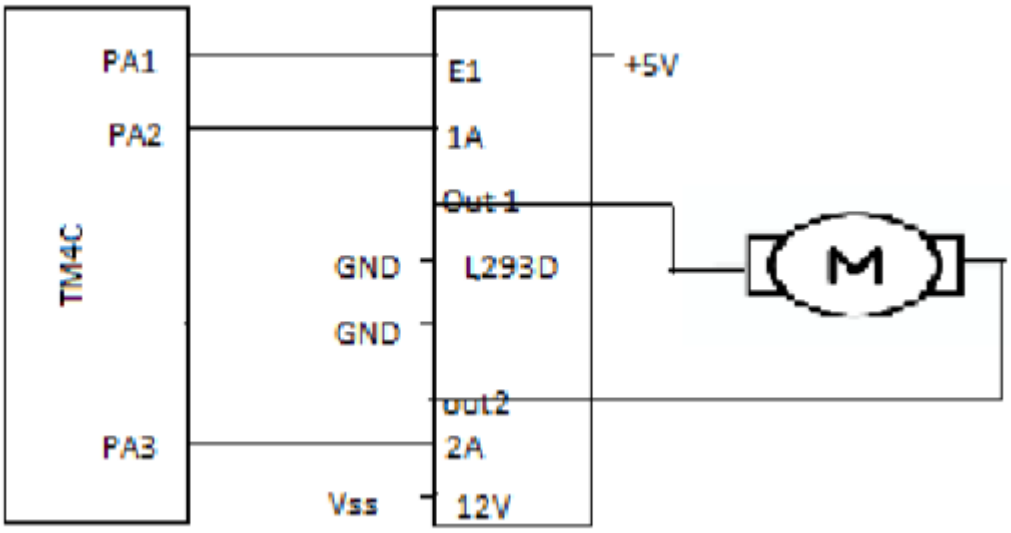
**L293D:** This is a low-cost high-current *dual* DC motor (or, single stepper motor) driver IC. It is widely used in motor control applications. Please refer to the datasheet for the internal circuitry and details on its use.



| Enable | Input 1 | Input 2 | Function |
|---|---|---|---|
| 1 | 0 | 0 | stop |
| 1 | 0 | 1 | right |
| 1 | 1 | 0 | left |
| 1 | 1 | 1 | stop |
| 0 | X | X | stop |

Control Logic

**Connection diagram**




**Exercise 1:** Interface a DC motor and control direction using on board switches.

**Exercise 2**: Interface a DC motor and control the motor speed using PWM pulse generated using Systick timer. Duty cycle should vary from 50% to 95%.

**Post-Lab**: Write a C program to control speed and direction of DC motor by setting different duty cycles. Use internal LEDs (green for CW, red for CCW) to indicate directions.