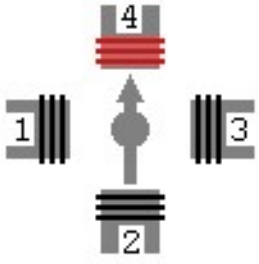
Stepper Motor Interfacing with PIC

A unipolar stepper motor has four fixed coils arranged around a magnetized rotor, as shown below. Typically, the coils are arranged in two centre tapped pairs, on opposing sides of the motor.



Driving current through any coil will cause the rotor magnet to be attracted to it, and by sequencing the drive current though each coil in turn, the motor can be made to rotate continuously. Higher torque can be achieved if two coils are energized at a time, and by alternating between one and two coil drive states, a half stepping mode can be realized.

Construction:

Inside the motor there are two center tapped coils available. **Red wire** is the common for both which will be connected at **VCC or 12V(depends on motor)** .

Other 4 wires will control the rotation depending on the electrical signal. Also, depending on the movement, this motor can be controlled using 3 steps. **Full drive mode**, **Half Drive mode** and **Wave drive mode**.

Three Driving Modes of Stepper Motor:

Full Drive: If two stator electromagnets are energized at a time, the motor will run at full torque referred as full-drive sequence mode.

Step	A	B	C	D
1	1	1	0	0
2	0	1	1	0
3	0	0	1	1
4	1	0	0	1

Half-Drive: When alternatively one and two phases are energized, the motor will run in half drive mode. It's used to increase the angular resolution. Drawback is less torque produced in this movement.

Step	A	B	C	D
1	1	0	0	0
2	1	1	0	0
3	0	1	0	0
4	0	1	1	0
5	0	0	1	1
6	0	0	0	1
7	1	0	0	1
8	1	0	0	0

Wave Drive: In this mode, one stator electromagnet is turned on. Its follows 4 steps same as Full-drive mode. It consumes low power with low torque.

Step	A	B	C	D
1	1	0	0	0
2	0	1	0	0
3	0	0	1	0
4	0	0	0	1

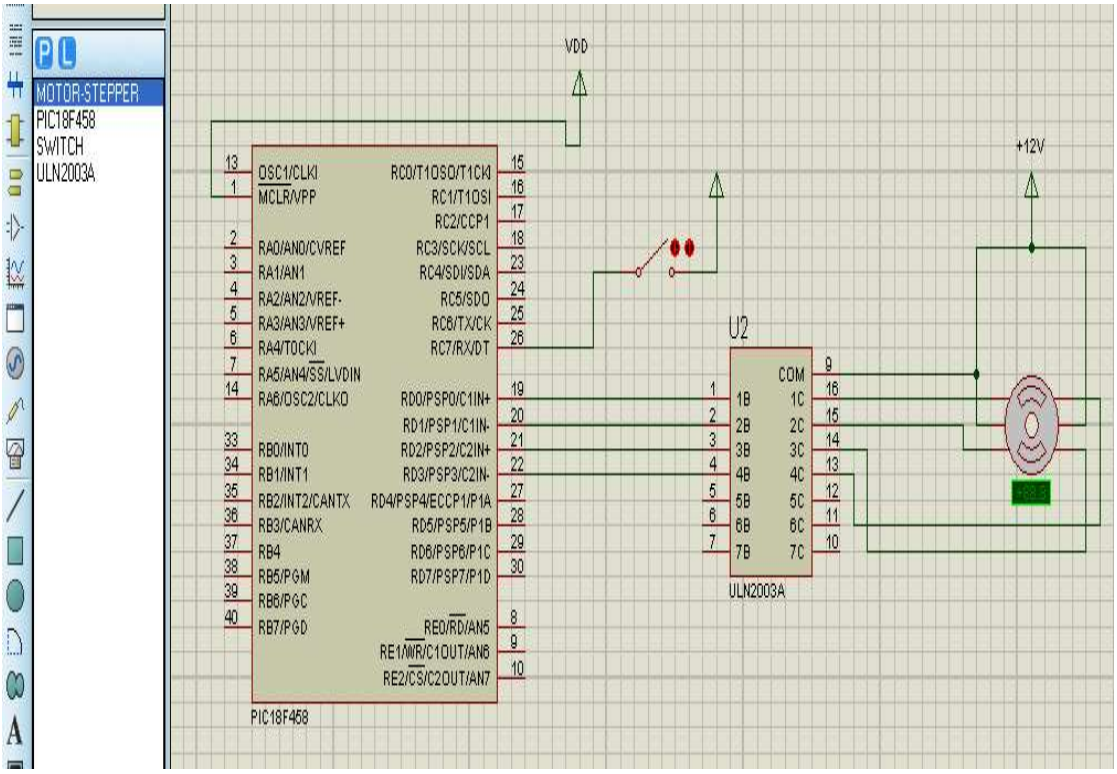
List of Questions:

1. Write a PIC18 C program to interface a Unipolar Stepper motor with PIC18F458 through ULN2003 driver and rotate it on either side based on the status of a switch connected to RB0.

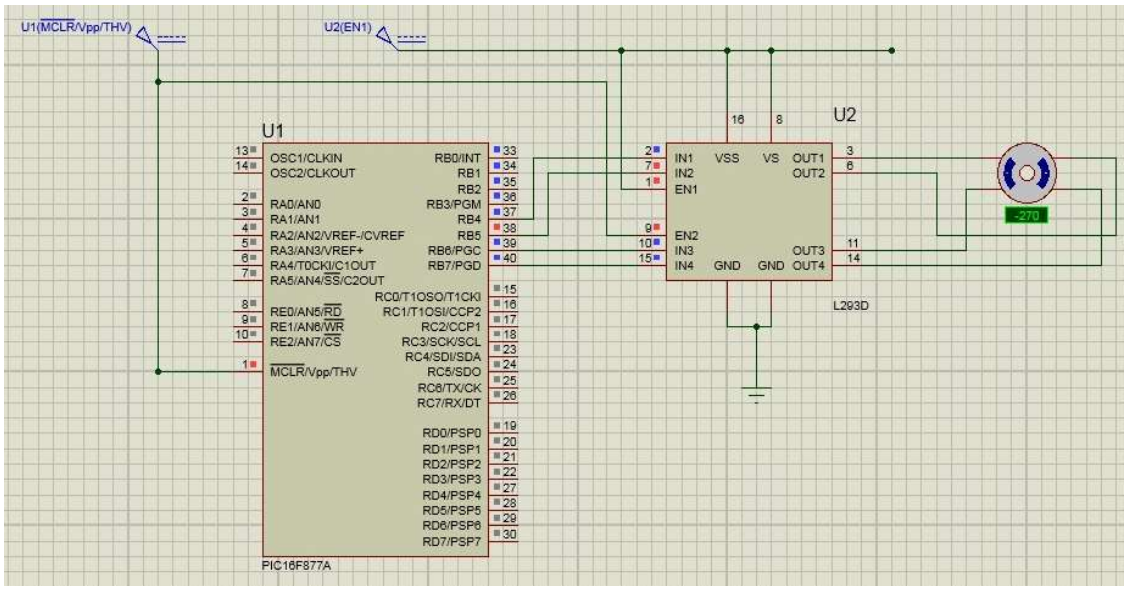
2. Write a PIC18 C program to interface a DC motor with PIC18F458 through L293 driver Chip and rotate it on either side based on the status of a switch connected to RB0.

Schematic Diagram for Motor Interfacing

Unipolar Stepper Motor Interfacing with PIC18F458



Bipolar Stepper Motor Interfacing with PIC18F458



DC Motor Interfacing with PIC18F