

Experiment 5

Actuators: Stepper and Servo motors

Controlling Stepper and Servo motors

Precautions

1. As we are introducing external voltage, turn on the circuit only after verifying it with a TA. Please double check the connections or ask in case of doubt. Do not blow up the electronic components.
2. Please upload all your files clearly name in the format ***ME381_E5_Name_RollNumber_GroupNumber_.pdf.***
3. **Please tidy up after your work. Return the equipment and clean your workspace.**

Materials Required

Please ensure that the kit provided to you have the following components

1. Arduino Uno
2. Motor Driver Easydriver
3. Stepper motor with its datasheet
4. Power supply module/battery
5. Connecting wires and breadboard
6. Servo motor and potentiometer

Parts of the Experiment

1. Familiarizing with stepper motor and driver (Time: 15 mins)
2. Running the stepper motor in full and micro-stepping modes (Time: 30 mins)

Part 1: Familiarizing with the Stepper motor and driver

1. Observing the parts and their identifying the function

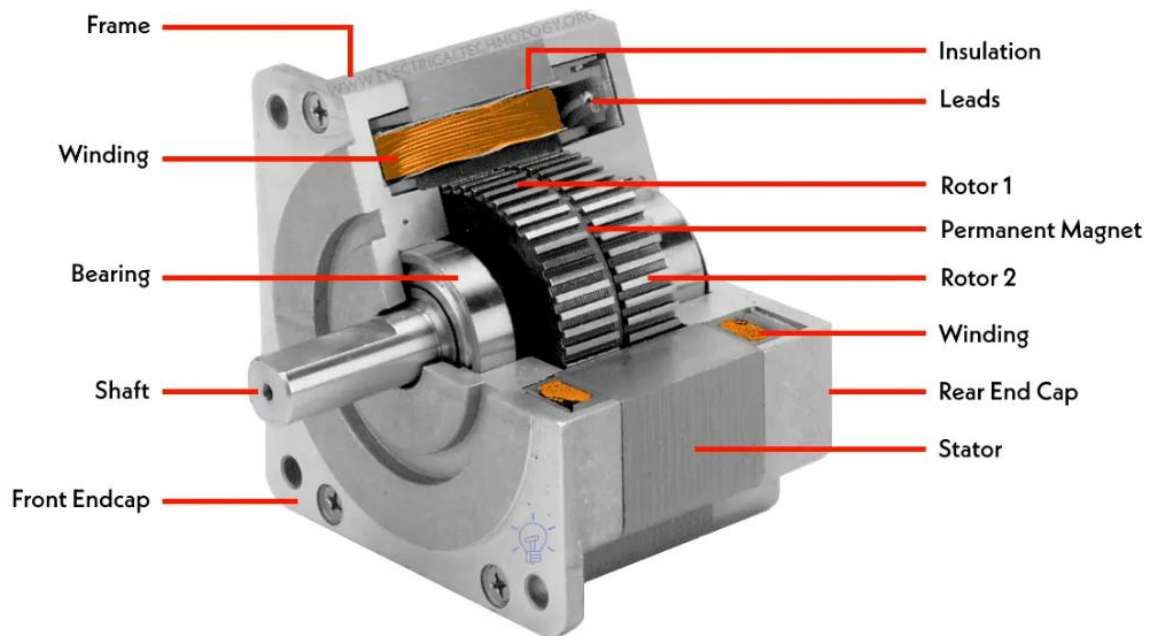


Figure: Parts of a stepper motor (Ref: www.electricaltechnology.org)

2. Calculating the step angle of the stepper motor

$$\text{Step angle} = 360 / (\text{No. of phases} * \text{No. of rotor teeth})$$

3. Identify coils A and B using a multimeter
 - a. Use a multimeter to check continuity between the wires. Wires of the same coil will show continuity.
 - b. Check the resistance between the wires using a multimeter

- Familiarize yourself with the terminals and functioning of the motor driver

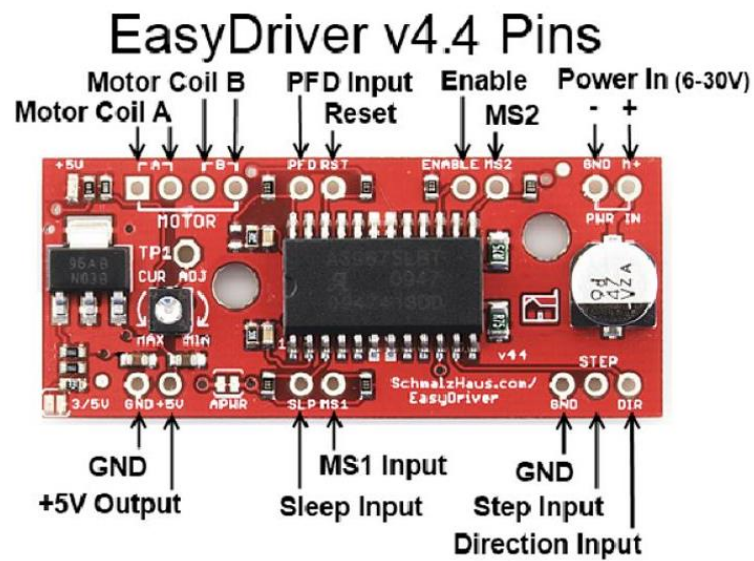


Figure: EasyDriver v4.4 (More info: [A3967-EDMOD_Manual.pdf](#))

MS1	MS2	Resolution
low	low	Full Step (2 phase)
high	low	Half step
low	high	Quarter step
high	high	Eight step

Figure: Micro-Stepping modes in Easydriver

- Make the connections to the motor from the driver and Arduino as shown in the figure below.

Bi-polar configuration

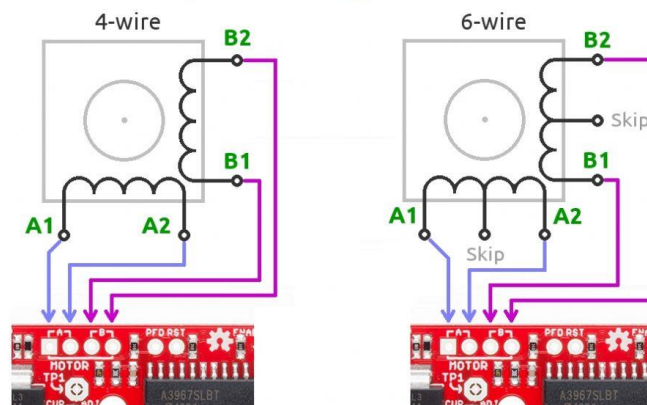


Figure: Connections to the driver

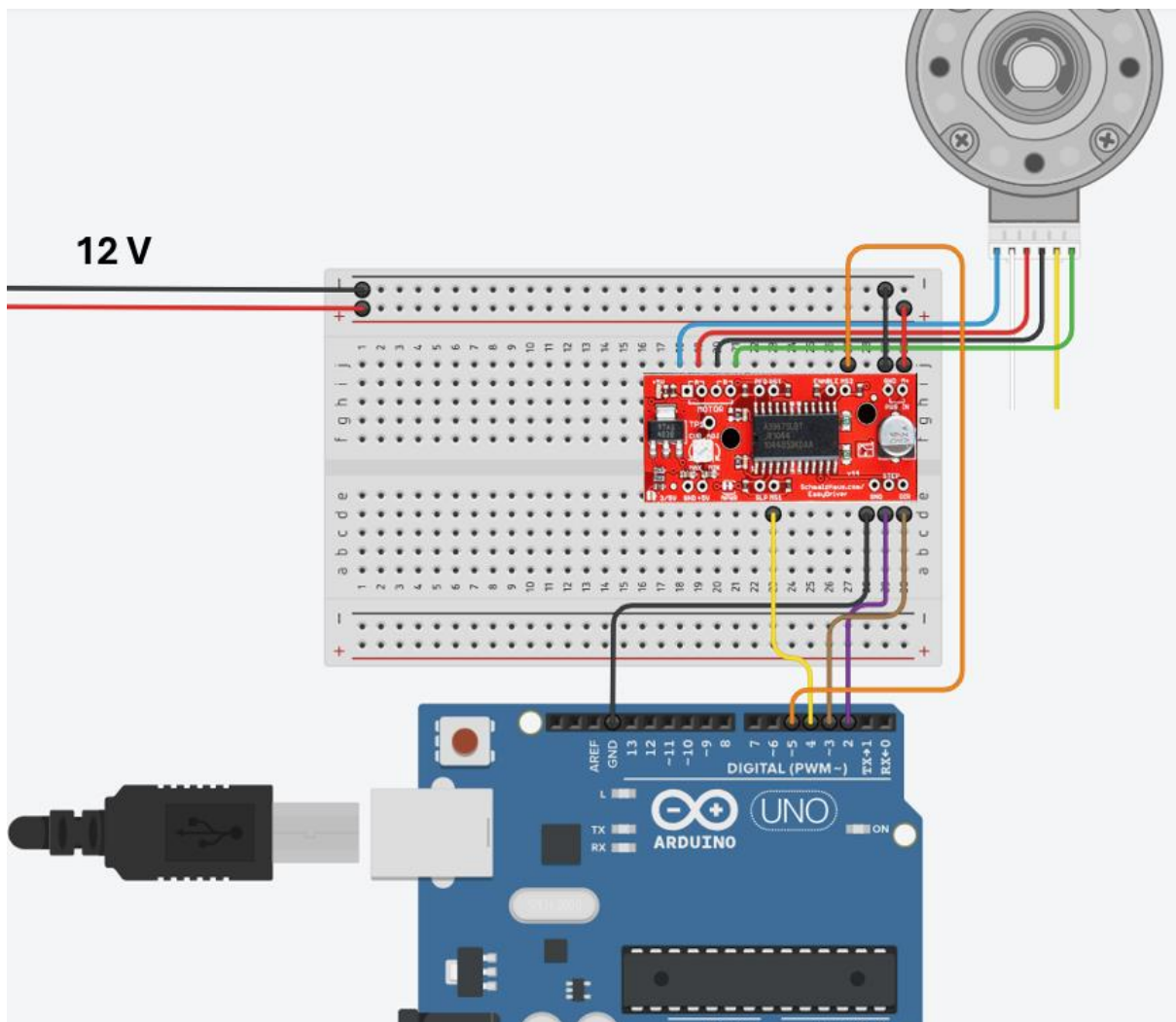


Figure: Connections to the Arduino

6. Use the Part 1 code in Arduino IDE. Upload the code to the microcontroller.
7. Calculate the steps required to turn the motor by 90 degrees in full step, half step, quarter step and one-eighth step. Fill the table

Lab Report

Section 1

1. Fill the below table

Type of stepping	Number of steps required for 90-degree rotation
Full	
Half	
Quarter	
One-eighth	