

Controlling Bipolar Stepper Motors with Arduino [without library]

by [ahmadsaeed](#) on August 29, 2015

Table of Contents

Controlling Bipolar Stepper Motors with Arduino [without library]	1
Intro: Controlling Bipolar Stepper Motors with Arduino [without library]	2
Step 1: Understand how bipolar stepper motor works.	2
Step 2: Recognize the names of your stepper motor wires.	2
Step 3: Complete your wiring	3
Step 4: Decide which mode you'll use	4
Step 5: The Arduino Code	4
File Downloads	4
Related Instructables	4
Advertisements	5
Comments	5



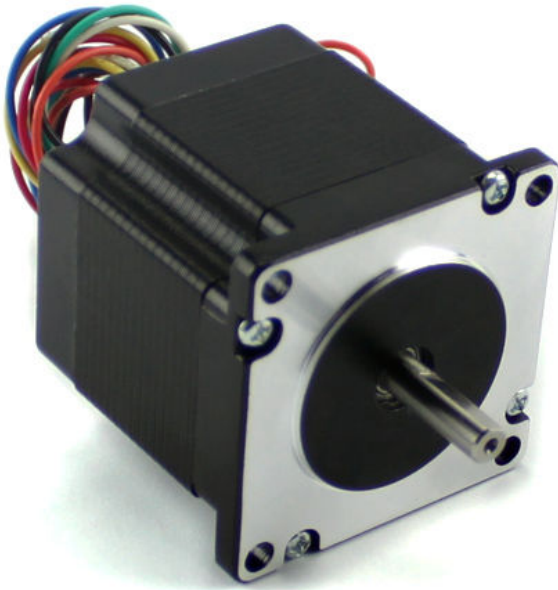
Author:ahmadsaeed

Maker, Mechatronics Student, and amateur Graphic Designer.

Intro: Controlling Bipolar Stepper Motors with Arduino [without library]

Tools:

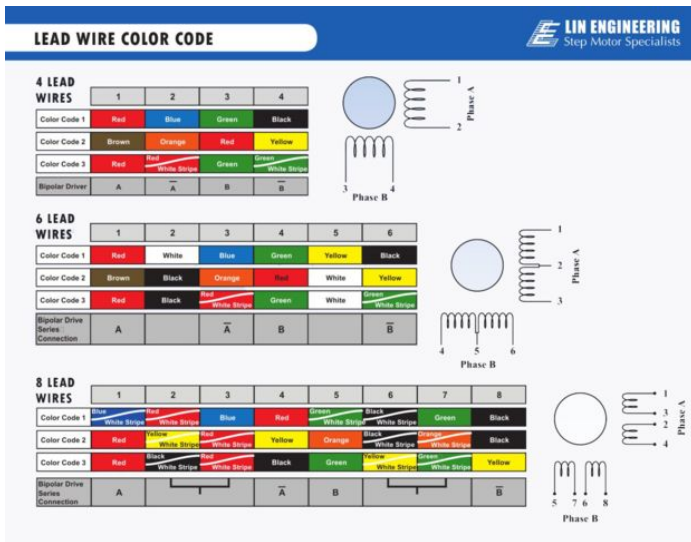
- Arduino UNO
- Breadboard
- L293D
- Stepper motor
- 12v adapter [or any power source that is suitable for your motor according to the datasheet]
- Jumper wires



Step 1: Understand how bipolar stepper motor works.

Please watch the first 14 minutes of the following video to understand the three excitation modes of the bipolar stepper motor:

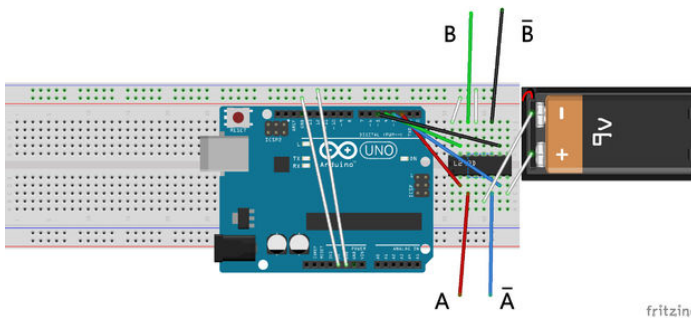
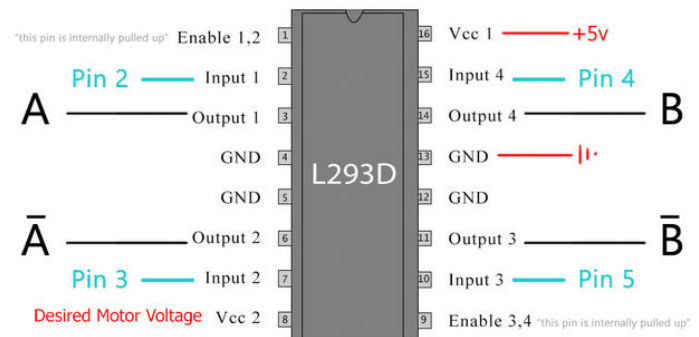
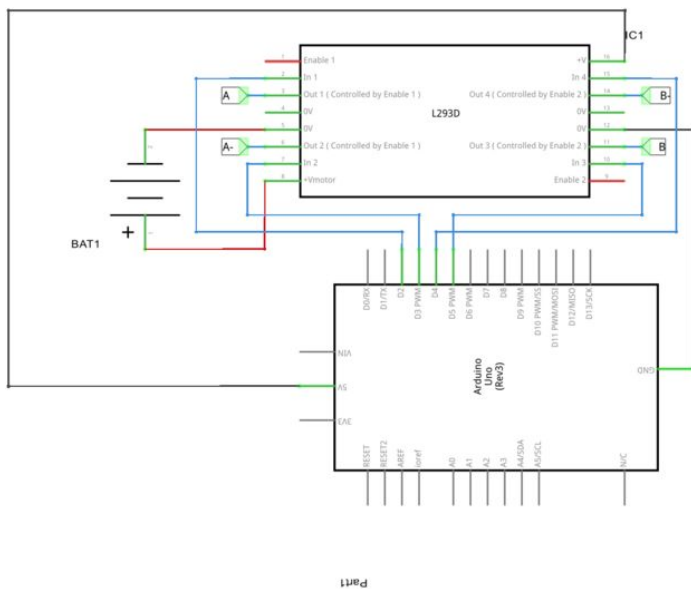
Step 2: Recognize the names of your stepper motor wires.



Step 3: Complete your wiring

Most of stepper motors draws very large amount of current that the arduino can't handle, so I'm using L293D dc motor driver [controlled by the Arduino] to provide the motor with the sufficient current. If you choose another DC motor driver, you should refer to its datasheet to know its proper wiring and whether you should wire flyback diodes or not.

Note that the L293D has its internal flyback diodes, so there is no need to put them.



Step 4: Decide which mode you'll use

The most common excitation modes are:

Two phase mode

One phase mode, which draws the least current, and provides less torque than the two phase mode.

Half stepping mode, which gives you more steps per revolution, but provides less torque.

Note that there is also the microstepping mode which I'll demonstrate in another instructable soon.

Using those tables, you'll be able to write a simple Arduino code to run your stepper (or jump to the next step).



	1	2	3	4
A	HIGH	LOW	LOW	LOW
\bar{A}	LOW	LOW	HIGH	LOW
B	LOW	HIGH	LOW	LOW
\bar{B}	LOW	LOW	LOW	HIGH

1- Wave drive (one phase)



	1	2	3	4	5	6	7	8
A	HIGH	HIGH	LOW	LOW	LOW	LOW	LOW	HIGH
\bar{A}	LOW	LOW	LOW	HIGH	HIGH	HIGH	LOW	LOW
B	LOW	HIGH	HIGH	HIGH	LOW	LOW	LOW	LOW
\bar{B}	LOW	LOW	LOW	LOW	LOW	HIGH	HIGH	HIGH

2- Half stepping



	1	2	3	4
A	HIGH	LOW	LOW	HIGH
\bar{A}	LOW	HIGH	HIGH	LOW
B	HIGH	HIGH	LOW	LOW
\bar{B}	LOW	LOW	HIGH	HIGH

3- Full step (two phase)

Step 5: The Arduino Code

File Downloads



Stepper_One_Phase.ino (2 KB)

[NOTE: When saving, if you see .tmp as the file ext, rename it to 'Stepper_One_Phase.ino']



Stepper_Two_Phase.ino (2 KB)

[NOTE: When saving, if you see .tmp as the file ext, rename it to 'Stepper_Two_Phase.ino']



Stepper_Half_Stepping.ino (3 KB)

[NOTE: When saving, if you see .tmp as the file ext, rename it to 'Stepper_Half_Stepping.ino']

Related Instructables



Arduino Stepper Motors by cornelam



Bipolar Stepper Motor Driver by martinhui



Automatic London Bascule bridge (Arduino based Student Project) by me_zain



Stepper Motor Easy Driver by williebme



ARDUINO UNO + TB6560 Stepper motor driver by Idrispo



Bi Polar Stepper Motor with L293D and Arduino by sureshmali

Comments