Stepper motors are famous for their accuracy especially when using techniques like micro stepping or half step. In the following pages there will be a demonstration how to wire and control 3 stepper motors with their drivers.

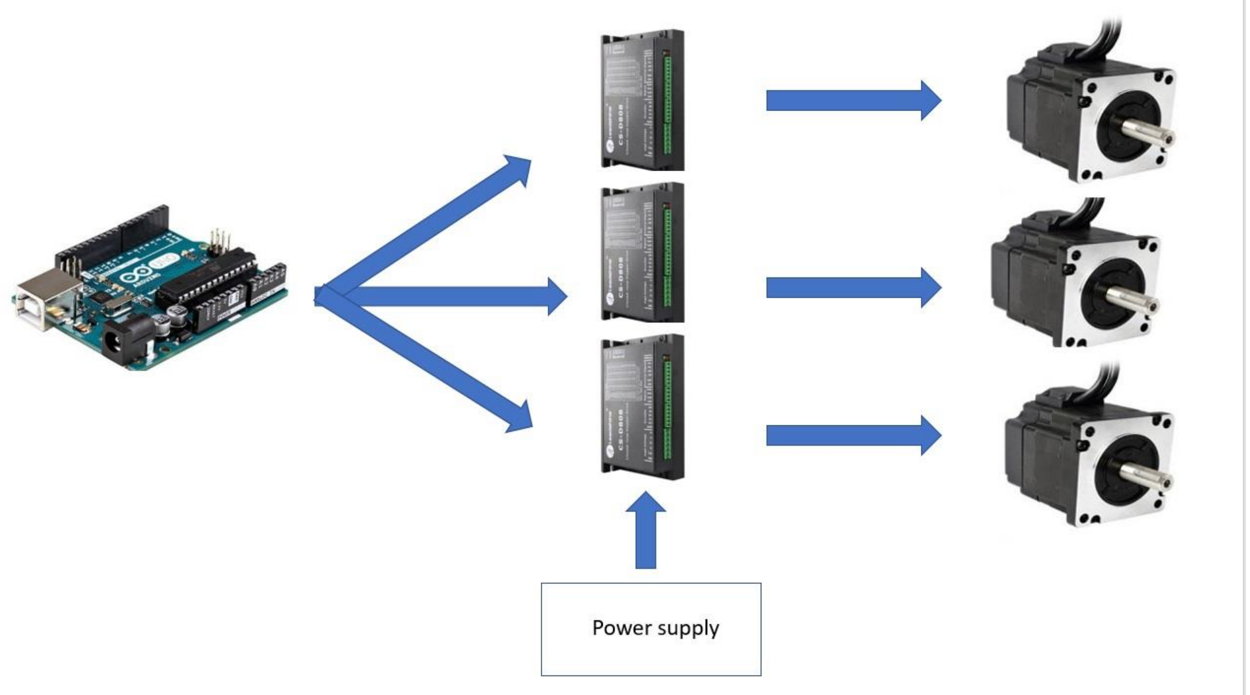
The motors used: CS-M23480

The drivers used: CS-D1008

Their data sheet:

http://www.ram-e-shop.com/ds/motor/NEMA34_8Nm.rar

as can be seen from their data sheet, the motor current/phase is rated as 6A. While the driver max output current is 8A. so each motor must be wired to its own driver. We will assume that we want to do a simple movement of the motors. A general connection is shown in the next picture:



As can be seen from the date sheet: the voltage that will be supplied to the drivers is typically 48,30,70 volt. This voltage will be supplied in parallel for all three drivers, while the Arduino supply is the regular 5-volt USB.

For simple movement as we assumed, we will use the following pins in the driver:

PUL+

PUL-

DIR+

DIR-

(A+, A-, B+, B-) these will be connected to the motor .

(AC (+), AC (-)) these two will be connected to the supply.

The rest which are encoder pins, Pend and ALM will not be used. They are used to determine position of the motor direction, for fault signal and so on. The motor can operate without them but for more complex projects they can be used.

Note that ENA+ and ENA- are by default enabled so no need to wire them.

First, we will need 2 pins from the Arduino digital side to the drivers, if you want each motor to rotate differently then you will wire 2 different pins to each driver and take that in consideration while coding the Arduino. For simplicity we will assume all motors will rotate the same.

assume Pins D2, D3 are used: they will be wired with DIR-, PUL- respectively for each motor.

The 5V from the Arduino will be common to both DIR+, PUL+ for each motor.

For wiring motors with their driver notice the wires colors that can be seen from the data sheet of the motor, the wiring is follow:

Black wire from the motor will be connected to A+.

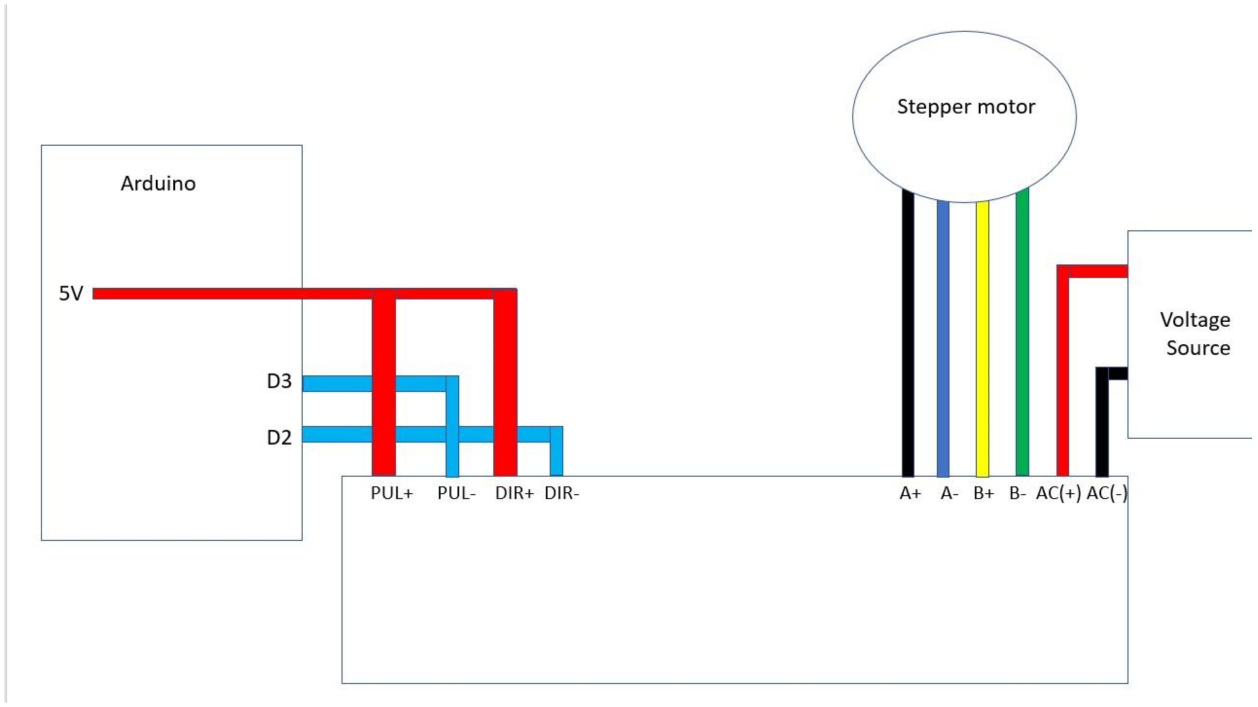
Yellow wire from the motor will be connected to B+.

Green wire from the motor will be connected to B-.

Blue wire from the motor will be connected to A-.

Assuming The voltage is DC, supply will be connected to the AC AC pins.

The following picture show details of the connection (assuming the Arduino is powered):



This connection in the previous picture is for one motor, for the same movement PUL+, PUL-, DIR+, DIR- are the same which mean all three drivers are connected to 5V, D3, D2 like in the previous picture. Take in consideration point 5.2 from page 8 from the date sheet : (connect each stepper drive directly to the shared power supply separately).

In appendix B. in the driver date sheet, it shows the current/voltage calculation for recommended power supplies.

For example, model RPS488: when its output voltage is 48V it has a continuous current of 7.3A.

After wiring we can program the Arduino (and there are libraries for big stepper motors) as follow:

- Define D3, D2 as outputs.
- Define Boolean variable and give in initial state (for example call it ROT).
- In Loop:
- Digital write ROT to DIR-(D2) //set the direction
- Digital write HIGH to PUL-(D3)
- Delay microseconds by 2.5 micro or more
- Digital write Low to PUL-(D3)
- Delay microseconds by 2.5 micro or more
- ROT = !ROT // reverse ROT value between HIGH, LOW to reverse the direction

as seen from this we created a pulse going to the D3 pin to drive the motor, notice that the minimum pulse width for the driver is 2.5us, to stay in the safe side use larger value.

for reversing the rotation, you can toggle between HIGH and LOW for the pin(D2). And that is why we added ROT = !ROT .

In this code the pulse will rotate the motor for a very short time and then rotate it back and so on. For continuous rotation in one direction you can delete ROT = !ROT .

It can be improved upon by adding a switch to toggle the direction.