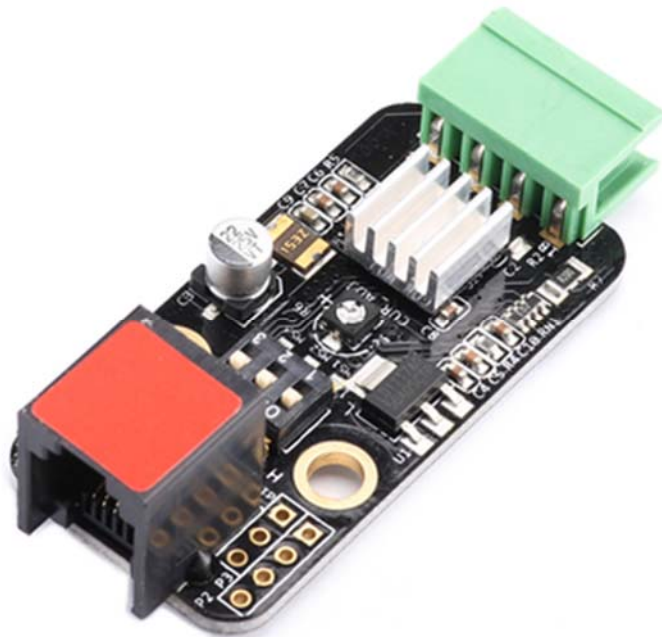# Me Stepper Driver

Overview

The Me Stepper Motor Driver module is designed to precisely drive the bipolar stepper motor. When pulse signals are input into the stepper motor, it rotates step by step. For each pulse signal, it rotates a certain angle. This module features adjustable drive current and microstepping hardware adjustment. It can be used in 3D printing, numerical control, Makeblock music robot, precise motion control, etc. Its red ID means that it should be connected to the port with red ID on Makeblock Orion by RJ25 wire.

Technical specifications

- Drive voltage: 6V-12V DC
- Maximum current: 1.35A
- Dimension: 51 x 24 x 18mm (L x W x H)

Functional characteristics

- Compatible with 4-wire bipolar stepper motor
- Simply two I/O ports to control stepping and direction
- Provide an adjustable potentiometer to adjust current and change the torque of stepper motor
- Provide onboard DIP switch to support the full, half, 1/4, 1/8, 1/16 stepping mode
- Provide grounding short-circuit protection and loading short-circuit protection
- Anti-reverse protection – connecting the power supply inversely will not damage IC
- White area of module is the reference area to contact metal beams
- Support mBlock GUI programming, and applicable to users of all ages
- Adopt RJ25 port for easy connection
- Provide pin-type port to support most development boards including Arduino series

Pin definition

The port of Me Stepper Motor Driver has seven pins, and their functions are as follows:

No.	Pin	Function
1	EN	Enable pin (usually low level)
2	RST	Reset pin (usually high level)
3	SLP	Sleep control pin (usually high level)
4	STP	Stepping control port
5	DIR	Direction control port
6	GND	Grounding
7	V-M	Motor power (8-12V)

Wiring mode

● Connecting with RJ25

Since the port of Me Stepper Motor Driver has red ID and the module is motor drive, you need to connect the port with red ID on Makeblock Orion when using RJ25 port.

Taking Makeblock Orion as example, you can connect it to ports No. 1 and 2 as follows:
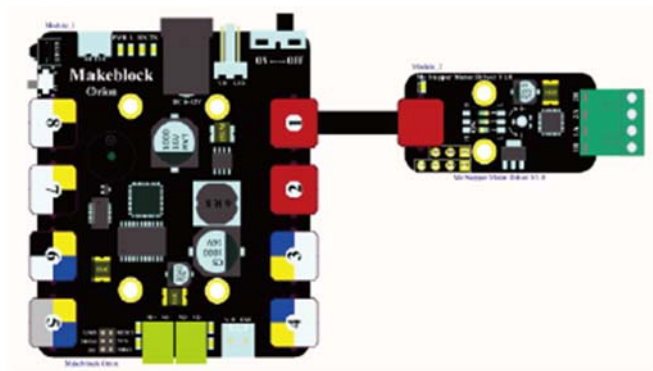

Figure 1 Connecting Me Stepper Motor Driver to Makeblock Orion
Note: If the drive board works for a long time, the chip will emit heat. Please note this point, and add a heat sink over the board on demand to help the chip for heat dissipation.

● Connecting with Dupont wire

When the Dupont wire is used to connect the module to the Arduino UNO Baseboard, its pin EN should be connected to low level, RST and SLP should be connected to high level, STP and DIR should be connected to digital ports (also can only be connected with STP and DIR pins) as follows:
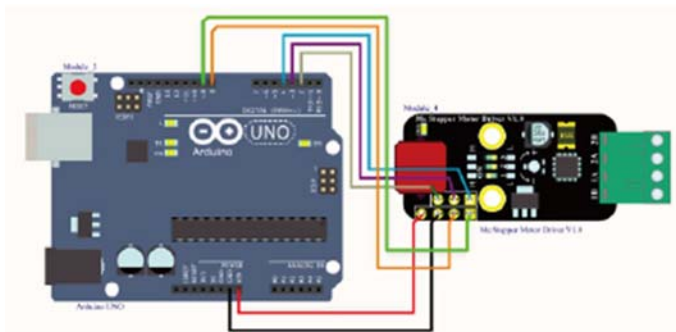

Figure 2 Connecting Me Stepper Motor Driver to Arduino UNO
Note: When Dupont wire is used, pin header should be welded on the module.

Guide to programming

● Arduino programming

If you use Arduino to write a program, the library Makeblock-Library-master should be invoked to control the Me Stepper Motor Driver. This program serves to make the motor rotating on demand through Arduino programming. (Input an integer between 0 to 4 on the serial port control tab and send it out).

```
01  #include  "MeOrion.h"
02  #include  <SoftwareSerial.h>
03  #include  <Wire.h>
04  #include  <AccelStepper.h>
05  int  dirPin  =  mePort[PORT_1].s1;
06  int  stpPin  =  mePort[PORT_1].s2;
07  AccelStepper  stepper(AccelStepper::DRIVER,  stpPin,  dirPin);
08  void  setup()
09  {
10          Serial.begin(9600);
11          stepper.setMaxSpeed(1000);
12          stepper.setAcceleration(20000);
13  }
14  void  loop()
15  {
16          if(Serial.available())
17          {
18                  char  a  =  Serial.read();
19                  switch(a)
20                  {
21                  case  '0':
22                          stepper.moveTo(0);
23                          break;
24                  case  '1':
25                          stepper.moveTo(200);
26                          break;
27                  case  '2':
28                          stepper.move(50);
29                          break;
30                  case  '3':
31                          stepper.move(100);
32                          break;
33                  case  '4':
34                          stepper.move(200);
35                          break;
36                  }
37          }
38          stepper.run();
39  }
```

Function List of Me Stepper Motor Driver

Function name	Function
AcclStepper(uint_8 interface,uint_8 stpPin,uint_8 dir Pin)	Select a port
setMaxSpeed(float Speed)	Set the maximum speed of stepper motor
setAcceleration(float acceleration)	Set the maximum acceleration of stepper motor
moveTo(int32_t absolute)	The motor rotates to
move(int32_t relative)	The motor rotates
run()	Start the motor

● mBlock programming

Me Stepper Motor Driver supports the mBlock programming environment and its instructions are introduced as follows:

Programming description	Introduction
set stepper motor Port1˚ speed 3000˚ distance 1000	parameter1: Select a port parameter2: Set the rotary speed parameter3: Set the stepping distance

This is an example on how to use mBlock to control the Me Stepper Motor Driver module. mBlock can make the stepper motor rotating from lower speed to higher speed again and again.
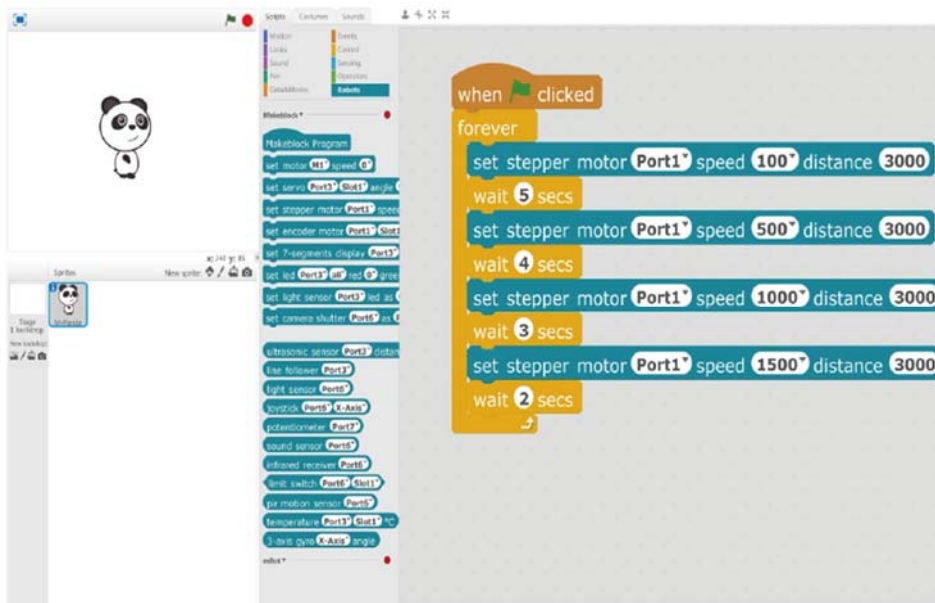
Principle analysis

Stepping motor is a kind of electromagnetic device to transform pulse signal into corresponding angular displacement or linear displacement. It is a special kind of motor.

Rotation of general motor is continuous, but stepper motor has two basic states – positioning and operating. When pulse signals are input to the stepper motor, it rotates step by step. For each pulse signal, it rotates a certain angle.

The main component of Me Stepper Motor Driver module is A4988 micro-step driver which is designed to operate the bipolar stepper motor in such stepping modes as Full, Half, 1/4, 1/8, and 1/16 step. When it is used, simply control the STEP and DIR. For example, when in the Full stepping mode, the motor should rotate a circle by 200 steps (i.e. 1.8° per step). If higher accuracy is required, we can choose other mode. For example, we choose the 1/4 stepping mode (that is, 0.45° per step), and then the motor should rotate by 800 micro steps to complete a round.

The stepping mode table of this module:

MS1	MS2	MS3	Stepping mode
L	L	L	Full step
H	L	L	Half step
L	H	L	1/4 step
H	H	L	1/8 step
H	H	H	1/16 step

The module has a potentiometer which can be used to adjust the torque of motor, However,over-torquing may burn the chip due to heat dissipation,so it's not recommended adjusting the torque to too large.

Schematic

J1
SCL 1
SDA 2
V-M 3 V-M
GND 4 GND
S1 5 DIR
S2 6 STEP
RJ25

D1
SS34
D2
SS14

F1
Fuse-1.5A

VM

U1
Vin 3 | +Vout 2
ADJ/GND 1 | 4
AMS1117-5.0

C4
0.1uF
GND

C5
0.1uF
5V
R3
2.2k
2.2k

D3
LED-red
GND

P2
4 V-M
3 GND
2 DIR
1 STEP
Header 4

R7
0.2R
0.2R
GND PGND

logo1
logo
makeblock

P3
3 SLEEP
2 RESET
1 EN
Header 3

P1
4 1B
3 1A
2 2A
1 2B
HT3.96-4p

logo2
logo
open source HW

VM
+C3
22uF 25V
PGND

R1 0.2R 0.2R
R2 0.2R 0.2R

C1 0.1uF
C2 0.1uF
PGND PGND

U2
A4988

R5 100k 100K
C6 0.1uF
C7 0.1uF
GND VM

2B 1 OUT2B
EN 2 ENABLE
PGND 3 GND
4 CP1
5 CP2
6 VCP
7 NC

21 1B
20 OUT1B
NC
19 DIR
18 PGND
17 REF
16 STEP
15 5V

VREG
MS1
MS2
MS3
RESET
ROSC
SLEEP

C9 220nF
PGND

RN1B 10k
RN1C 10k

C10 0.1uF
RN1A 10k GND

5V

R4 27K 27K
R6 20k
RN1D 10k PGND

C8 0.1uF
GND

SLEEP