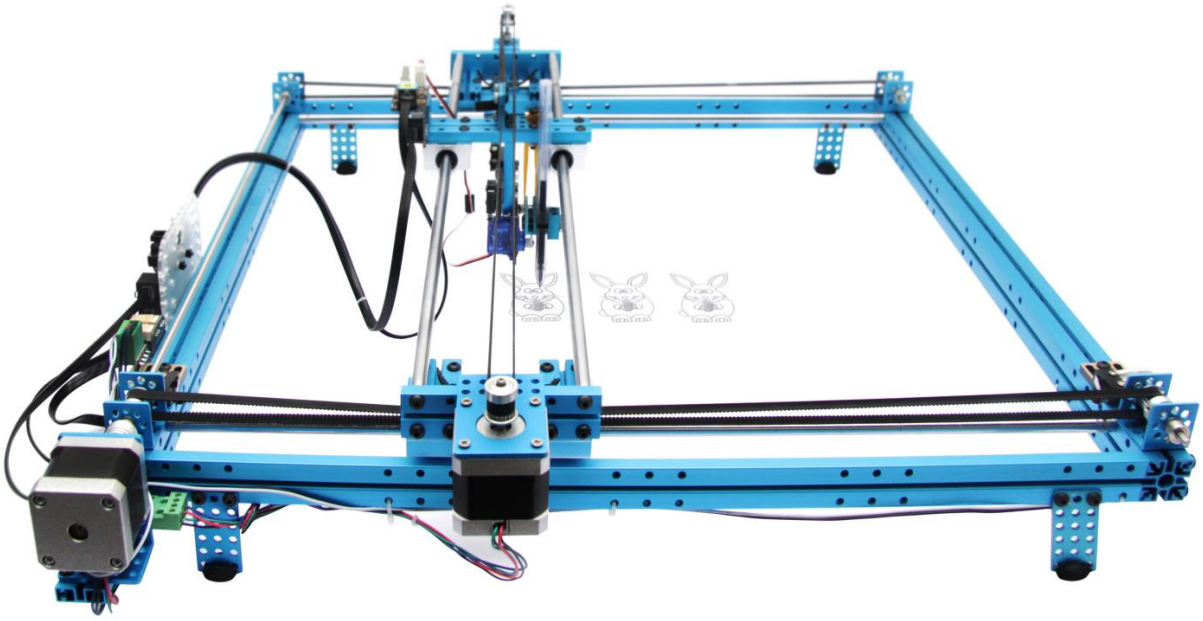
XY Plotter V2.0 User Guide – mDraw Version 1.0



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1. Before Get Start

1. Hardware：

XY Plotter V2.0 Kit

2. XY Plotter V2.0 Assembly instructions

3. Software:

   a. Must have：

   mDraw for Windows

   mDraw for Mac

   Inksape

   b. Optional：

   Arduino IDE

   Makeblock Windows Mainboard Driver *(PS: Please download driver for Mac OS system at our website)*

Note:mDraw is best for Makeblock Orion mainboard, it also supports Arduino Leonardo/Uno mainboard, for which need to upload firmware by Arduino IDE firstly. Please download the firmware at Here.

Tip 1

For the accuracy of your XY Plotter V2.0, please strictly follow the assemble instruction, and carefully adjust your robot. Please pay attention to the position of axles, transmission parts, servo arm, and the levelness of robot.

Tip 2

Pictures in this article is only for reference. Specifications and software are subject to change without notice, please pay attention to our website http://www.makeblock.cc.

2. Part List

XY Plotter V2.0 Part lists

1	Beam 0824-16	1		30	Wrench 7mm&5mm	1
2	Beam 0824-48	4		31	Screw M4x8	36
3	Beam 0824-80	1		32	Screw M4x14	30
4	Beam 0824-96	4		33	Screw M4x16	28
5	Beam 0824-112	2		34	Screw M4x22	12
6	Beam 0824-496	2		35	Screw M4x30	18
7	Beam 0808-072	1		36	Countersunk Screw M3x8	10
8	Beam2424-504	2		37	Headless Set Screw M3x5	26
9	Plate 3x6	5		38	Nut M4	50
10	Belt Connector	3		39	Plastic Rivet R4060	16
11	Cuttable Linkage 3	6		40	Plastic Rivet R4100	6
12	Bracket 3x3	2		41	Plastic Ring 4x7x2mm	20
13	Bracket U1	5		42	Nylon Cable Ties	30
14	42BYG Stepper Motor Bracket	2		43	Rubber band	5
15	9g Micro Servo Pack	1		44	Gasket	4
16	42BYG Stepper Motor	2		45	Me Baseboard 1.0	1
17	Timing Pulley18T	6		46	Me Stepper Motor Driver	2
18	Open-end Timing Belt (1.3m)	3		47	Me Micro Switch B	4
19	Threaded Shaft 4x39mm	1		48	Me RJ25 Adapter	3
20	D Shaft 4x56mm	2		49	Wall Adapter Power Supply - 12VDC	1
21	Linear Motion Shaft D4x80mm	1		50	6P6C RJ25 cable-20cm	2
22	Linear Motion Shaft D4x512mm	1		51	6P6C RJ25 cable-35cm	1
23	Linear Motion Shaft D8X496mm	4		52	6P6C RJ25 cable-50cm	2
24	Shaft Collar 4mm	10		53	USB 2.0 A-Male to Micro B-Male Cable	1
25	Flexible coupling 4x4mm	1		54	Micro Switch Cable-90cm	1
26	Linear Motion Slide Unit 8mm	6		55	Base Bracket B	1
27	Flange Bearing 4x8x3mm	10		56	XY QR Code Card	1
28	Cross &2.5mm HEX Screwdriver	1		57	Packing Case	1
29	HEX Allen Key 1.5mm	2				

3. Introduction

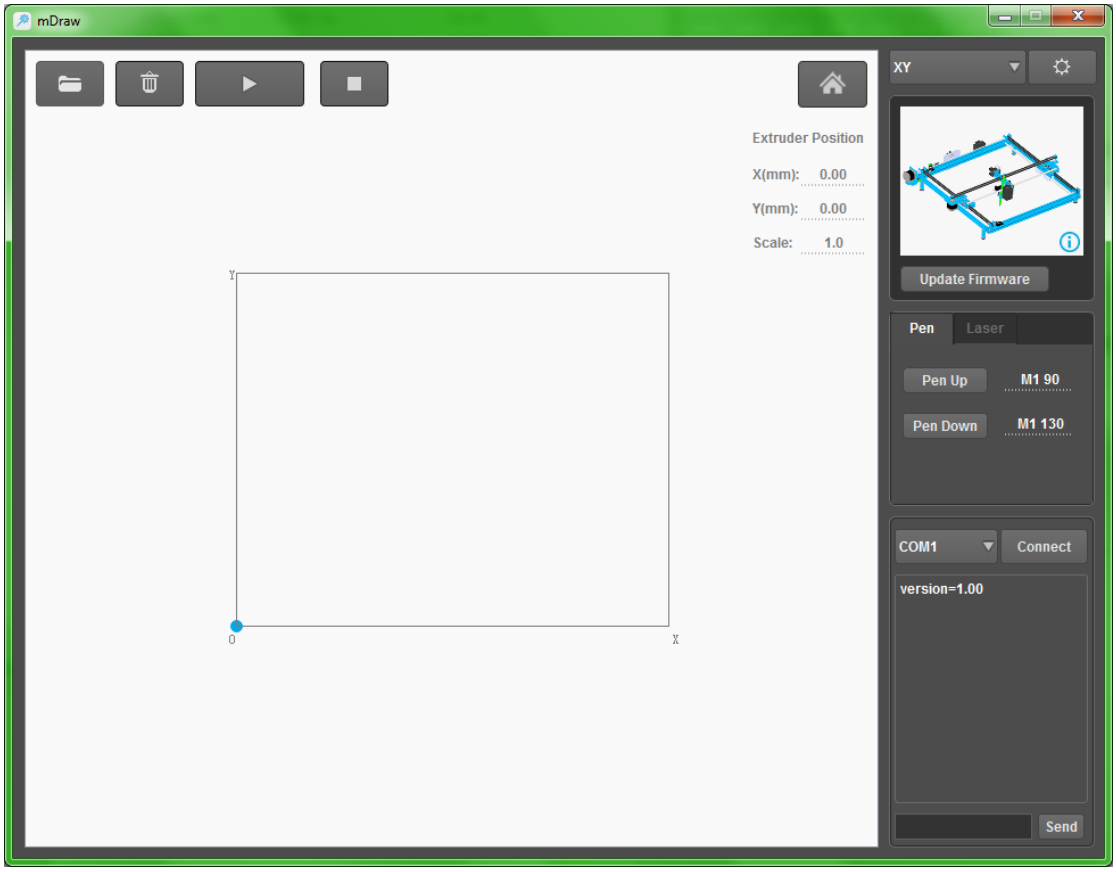
1. XY Plotter V2.0

XY Plotter is a drawing robot based on Makeblock platform, precision is 0.1mm, working area is 310mm×390mm. Besides the well-designed hardware, we designed a software for XY Plotter 2.0 – mDraw.

2. mDraw

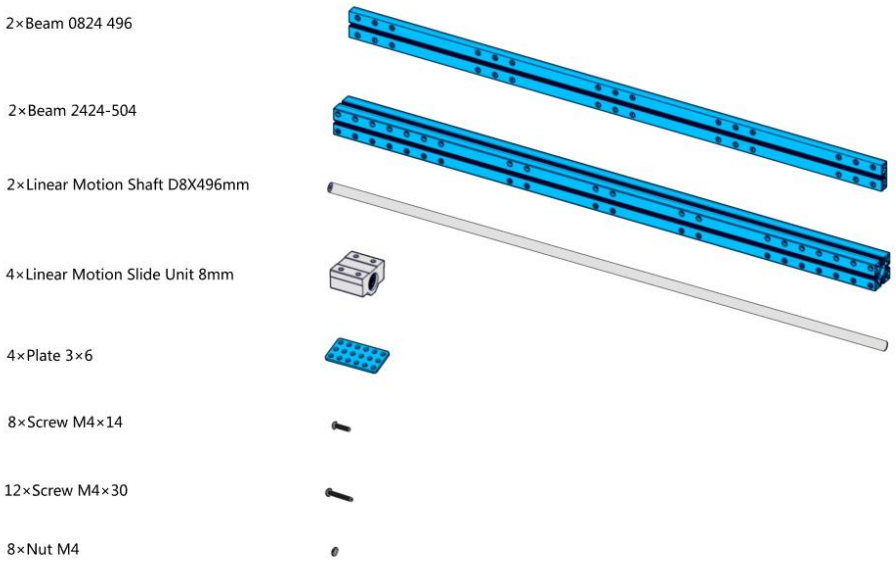
mDraw is a host computer software originally designed for 4-in-1 drawing robot mDrawBot, we developed the compatibility with XY Plotter 2.0 Servo mode and Laser mode.

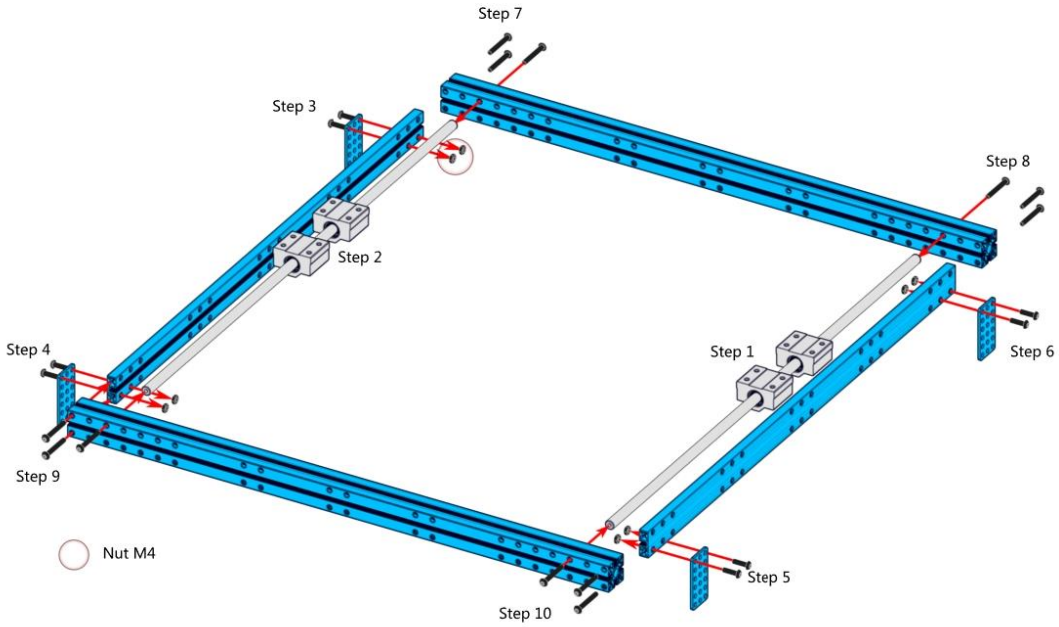
mDraw Main UI

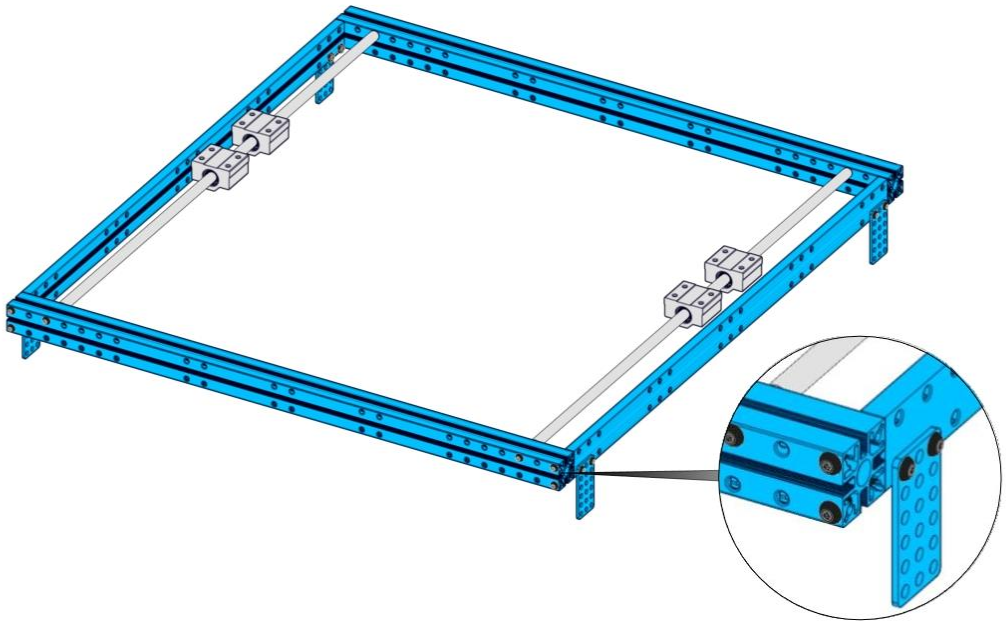


4. How to Assemble XY Plotter V2.0

Step 1





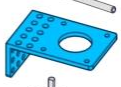


Step 2

2×Linear Motion Shaft D8X496mm

1×Linear Motion Shaft D4x80mm

1×42BYG Stepper Motor Bracket V2.1

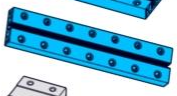


1×42BYG Stepper Motor

4×Beam 0824 48

4×Beam 0824 96

1×Beam 0824 112



2×Linear Motion Slide Unit 8mm

2×Flange Bearing 4x8x3mm

4×Headless Set Screw M3x5

2×Nut M4

5×Screw M4×8

16×Screw M4×14

2×Screw M4×16

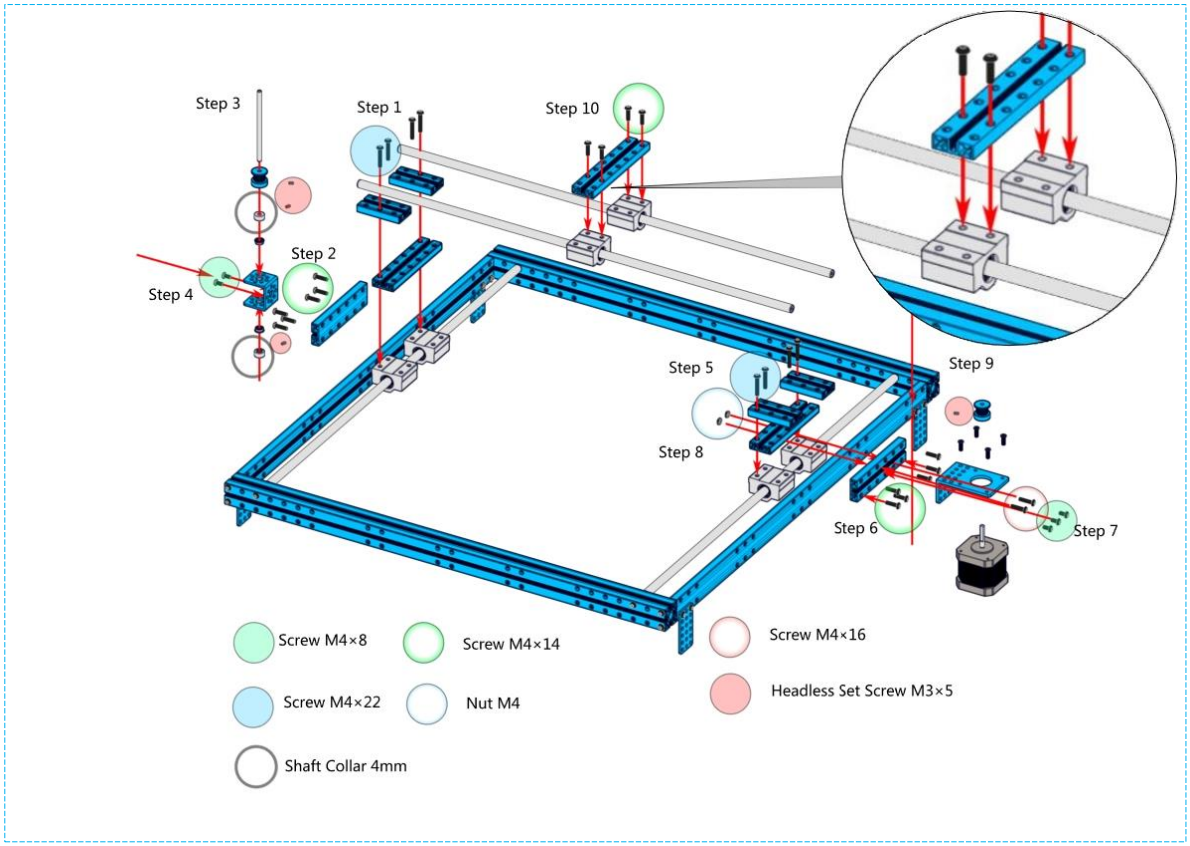
8×Screw M4×22

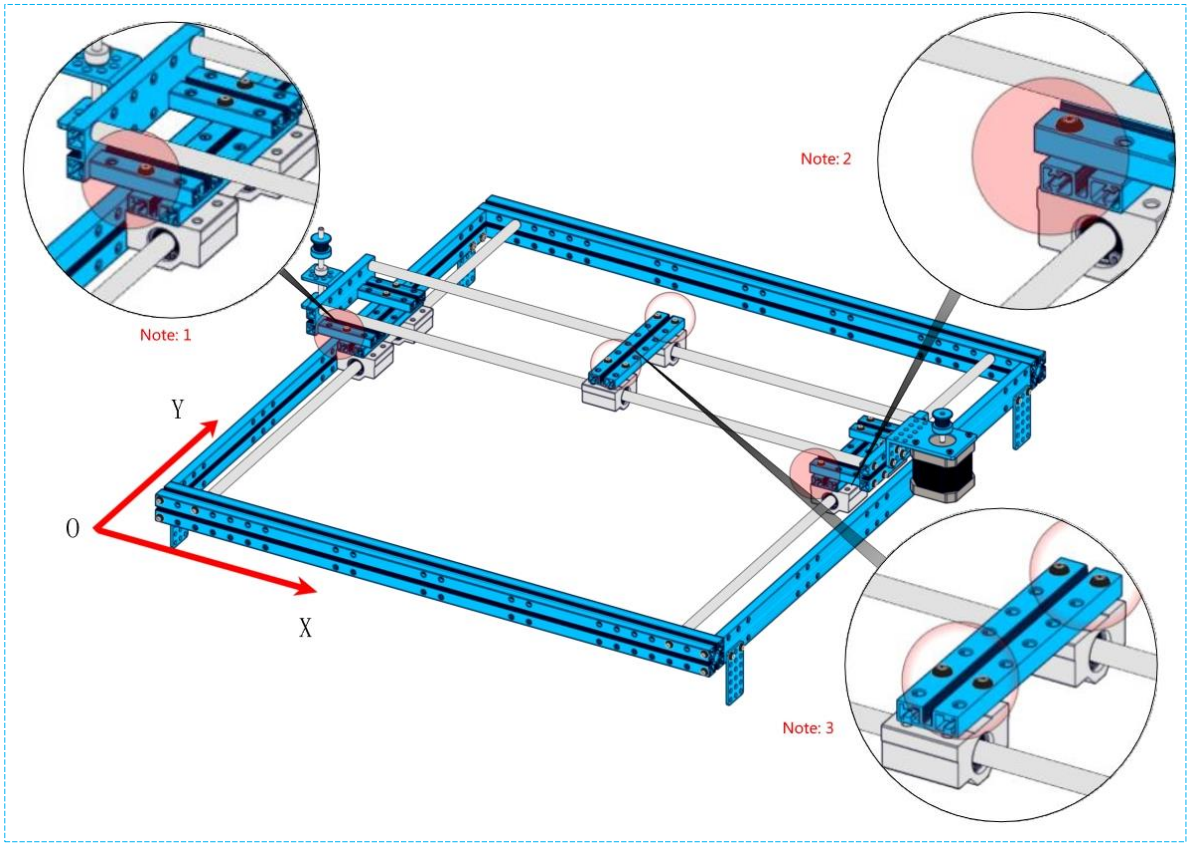
4×Countersunk Screw M3x8

2×Shaft Collar 4mm

2×Timing Pulley 18T

1×Bracket U1

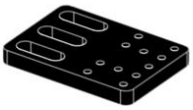

Step 3
Step 1
Step 10
Step 2
Step 4
Step 5
Step 9
Step 8
Step 6
Step 7
Screw M4×8
Screw M4×14
Screw M4×16
Screw M4×22
Nut M4
Headless Set Screw M3×5
Shaft Collar 4mm


Note: 2
Note: 1
Y
0
X
Note: 3

Step 3

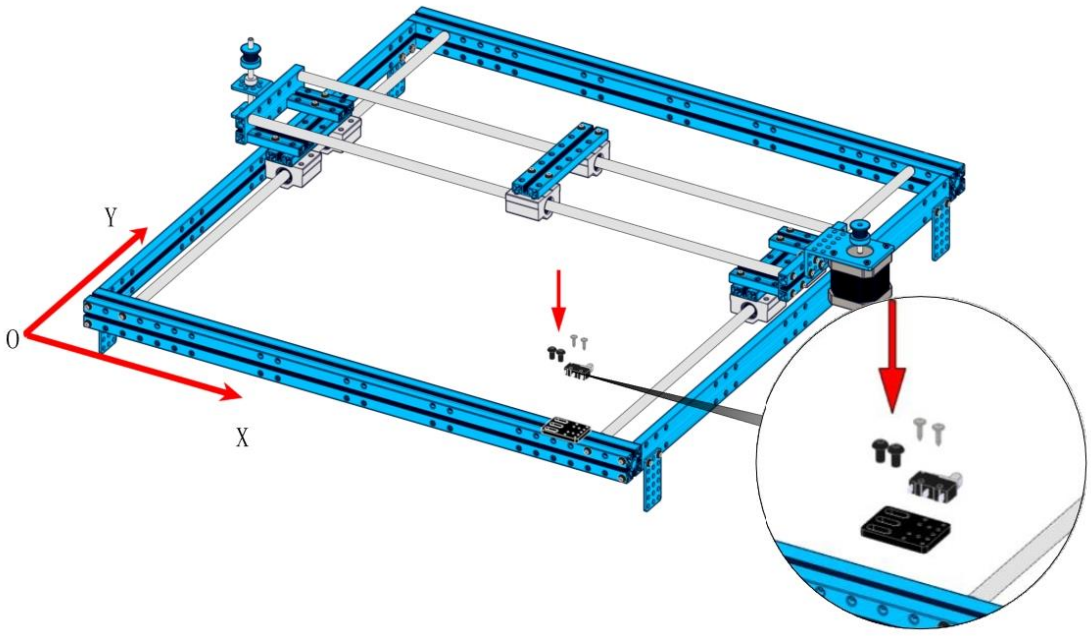
1×Micro Switch Button

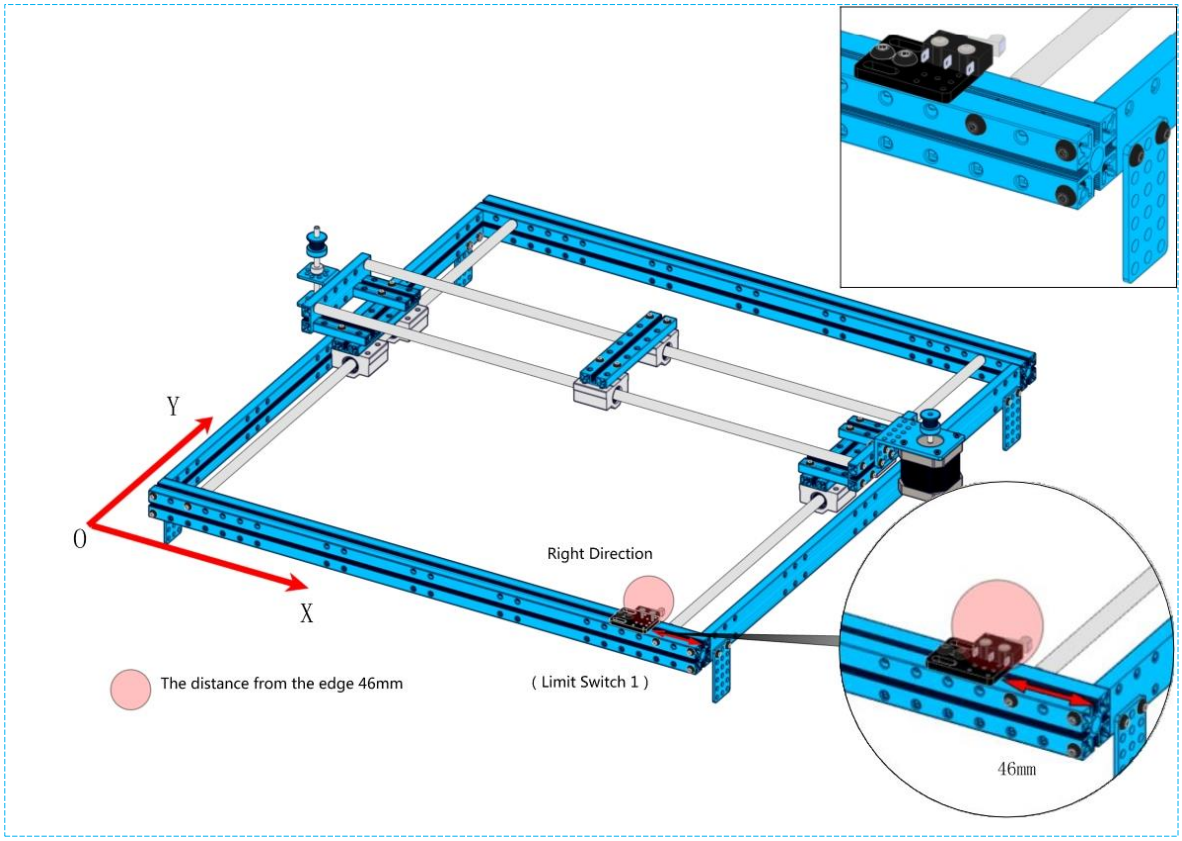
1×LS Bracket



2×Cross Recessed Pan Head Tapping Screws ST2.2×9.5

2×Screw M4×8



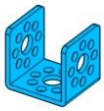


Step 4

1×Linear Motion Shaft D4x512mm

2×D Shaft 4x56mm

4×Bracket U1



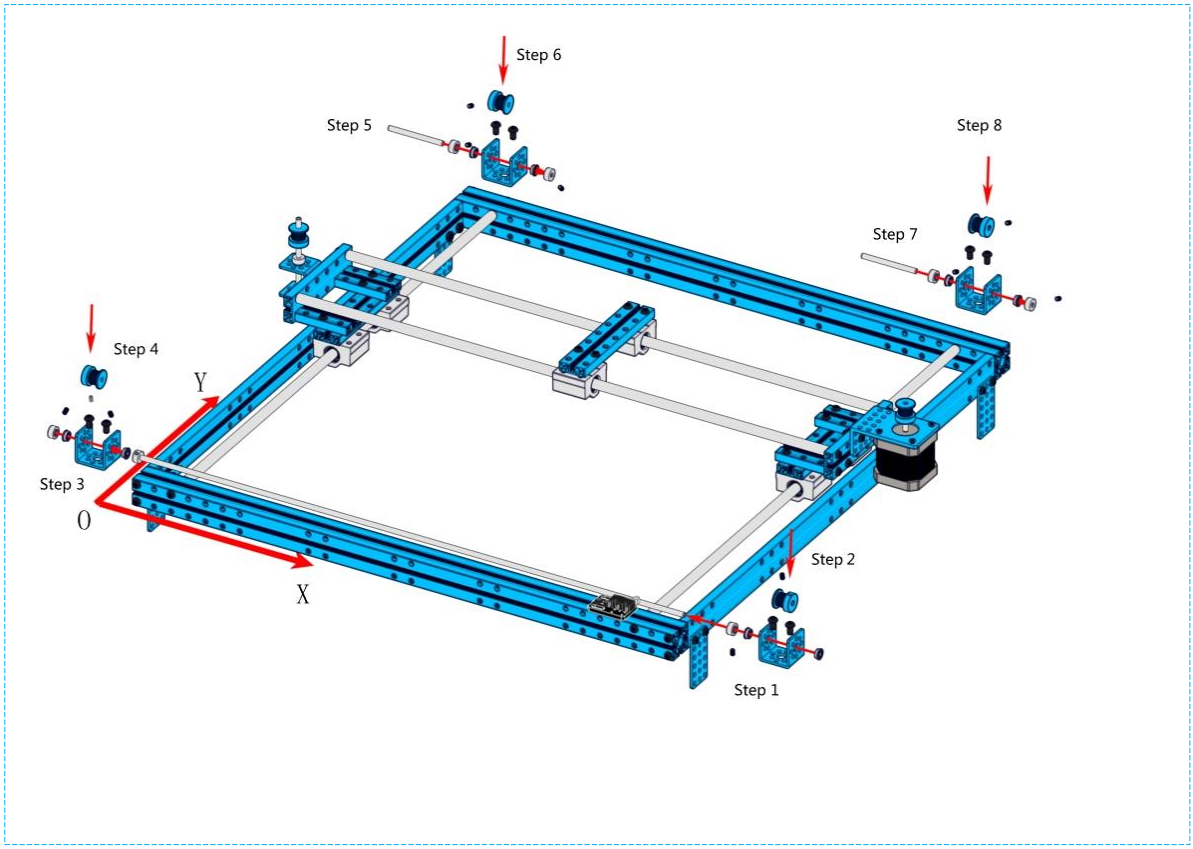
4×Timing Pulley18T

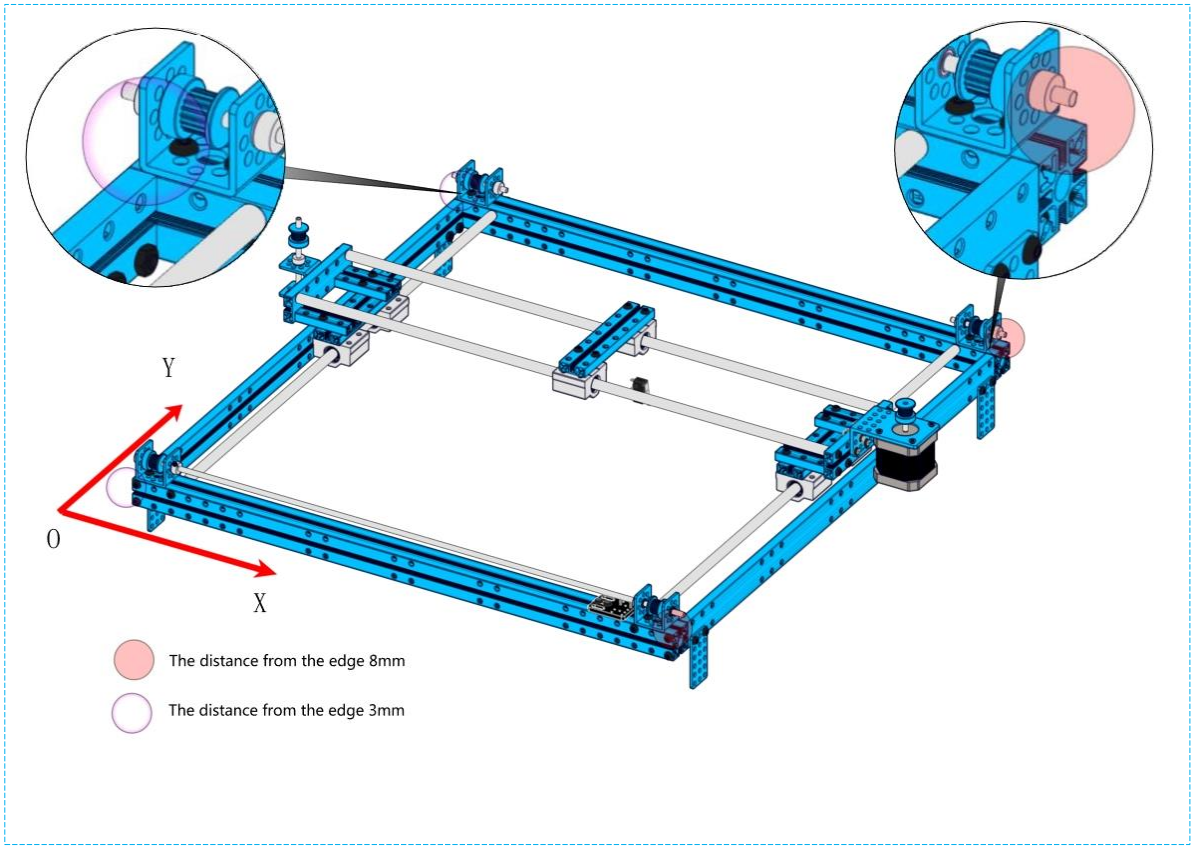
7×Shaft Collar 4mm

8×Flange Bearing 4x8x3mm

11×Headless Set Screw M3x5

8×Screws M4×8


Step 6
Step 5
Step 8
Step 7
Step 4
Y
Step 3
0
X
Step 2
Step 1


Y
0
X
The distance from the edge 8mm
The distance from the edge 3mm

Step 5

2×Open-end Timing Belt (1.3m)

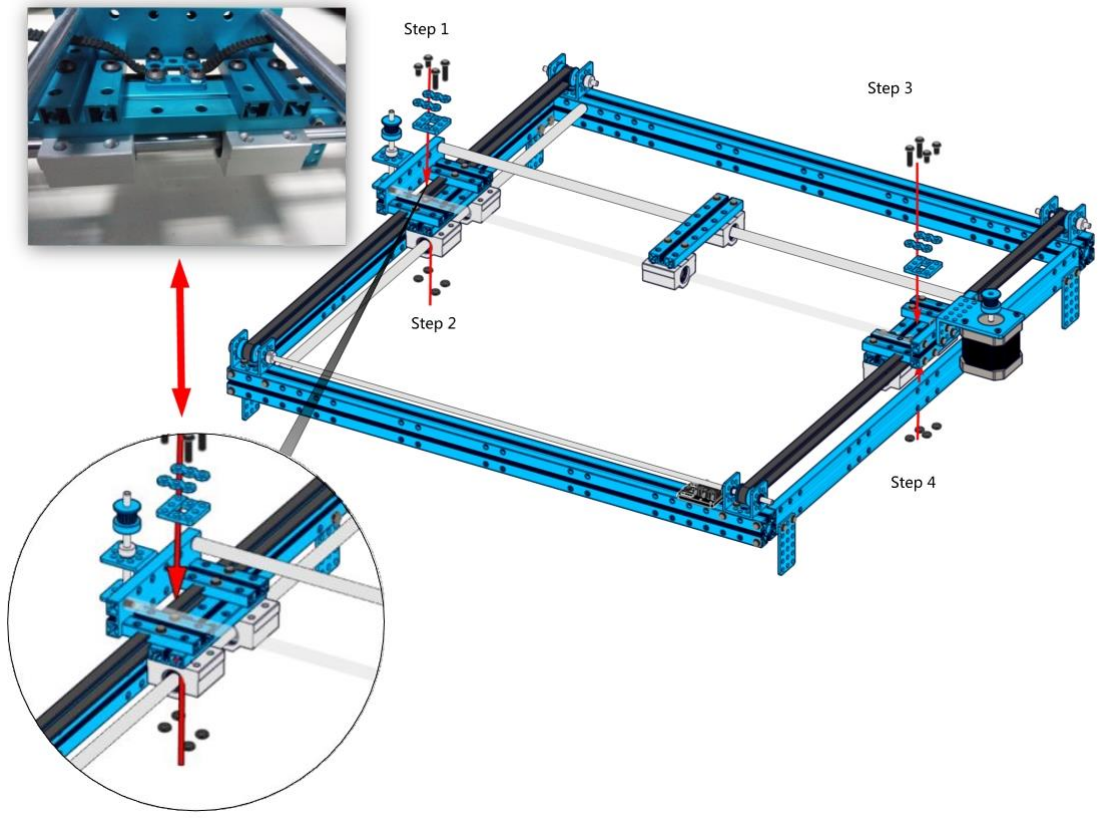
2× Belt Connector

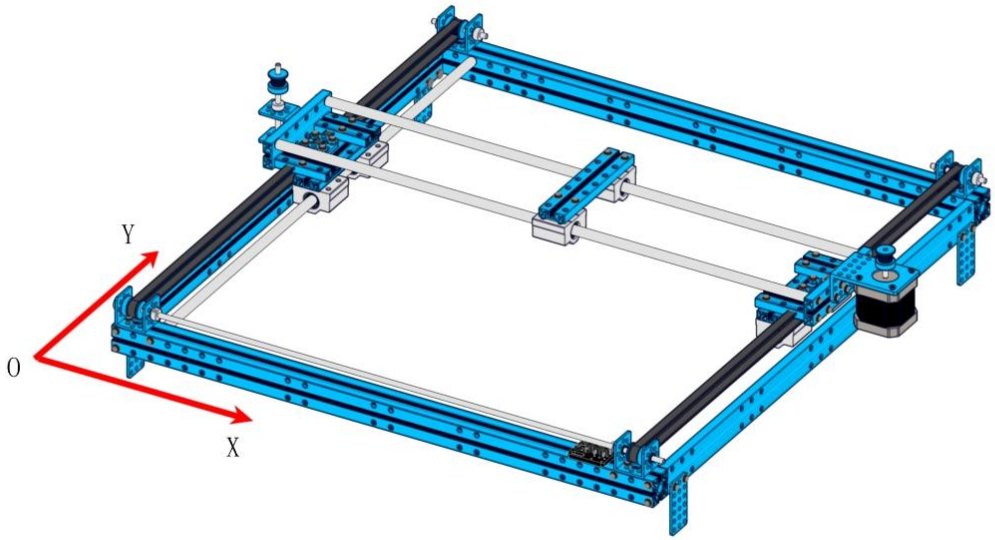
4×Cuttable Linkage 3

4×Screw M4×16

4×Screw M4×8

8×Nut M4





Step 6

1×Bracket 3×3

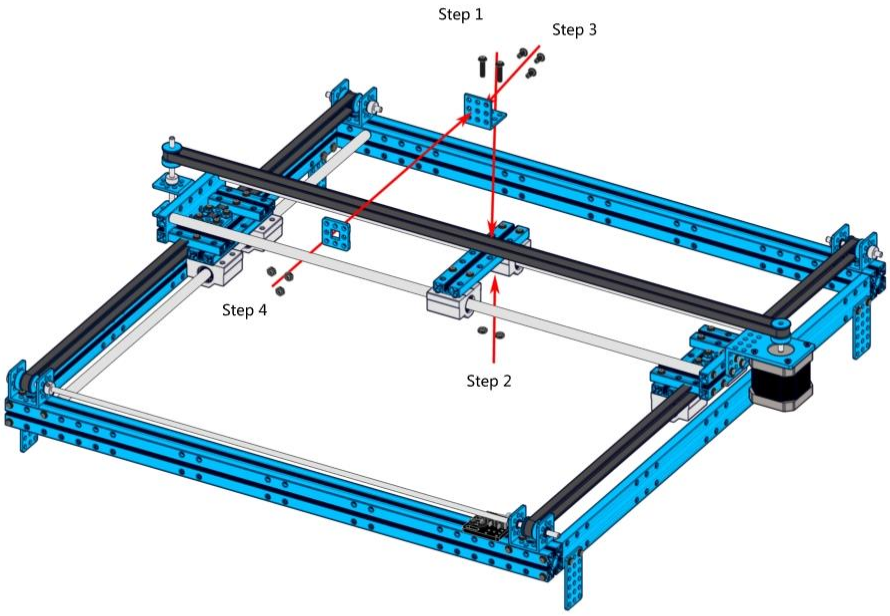
1× Belt Connector

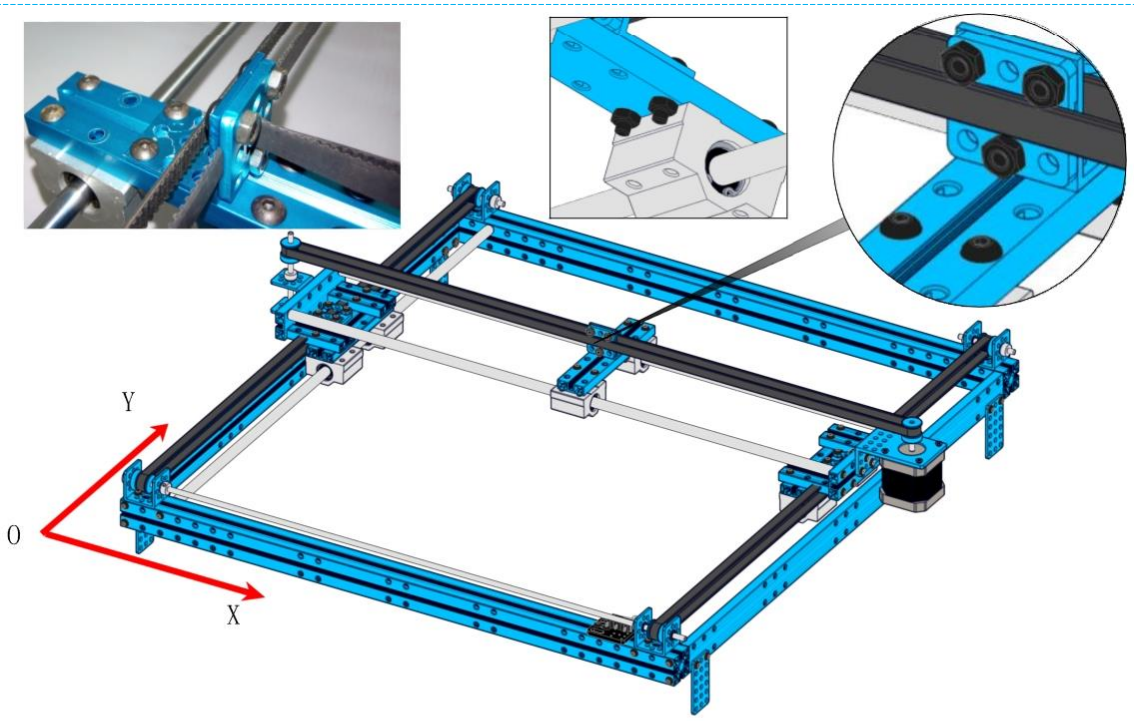
1×Open-end Timing Belt (1.3m)

2×Screw M4×16

3×Screw M4×8

5×Nut M4


Step 1
Step 3
Step 4
Step 2


Y
0
X

Step 7

1×42BYG Stepper Motor

1×42BYG Stepper Motor Bracket V2.1

1×Beam 0824 112

1×Flexible coupling 4x4mm

1×Plate 3×6

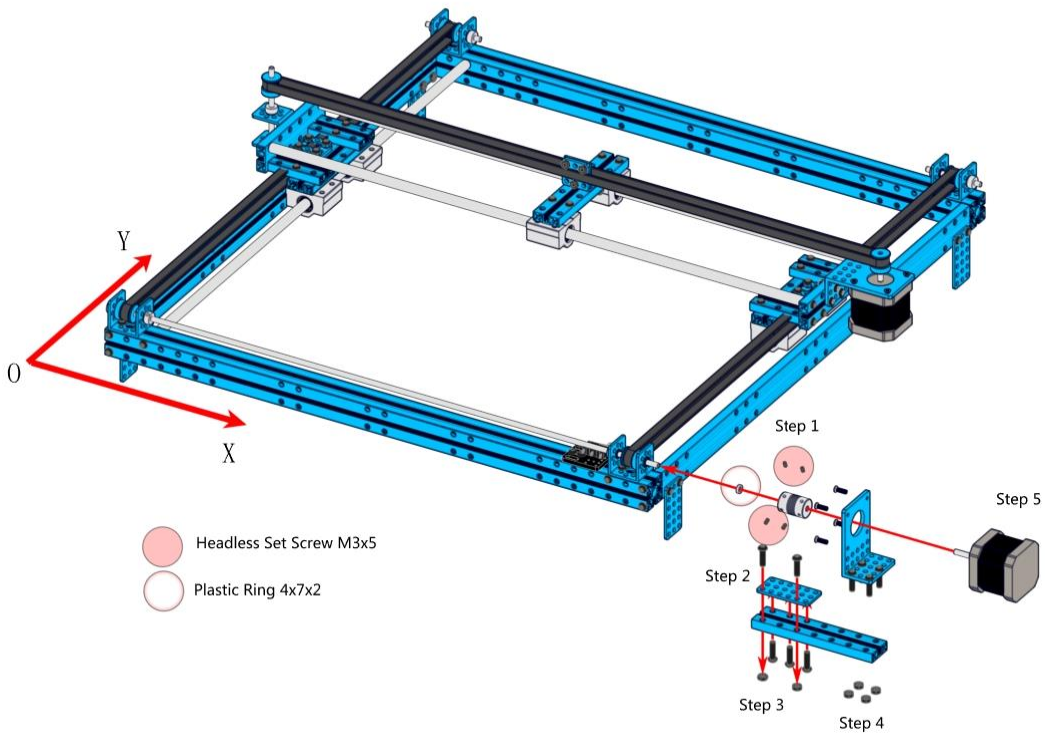
9×Screws M4×16

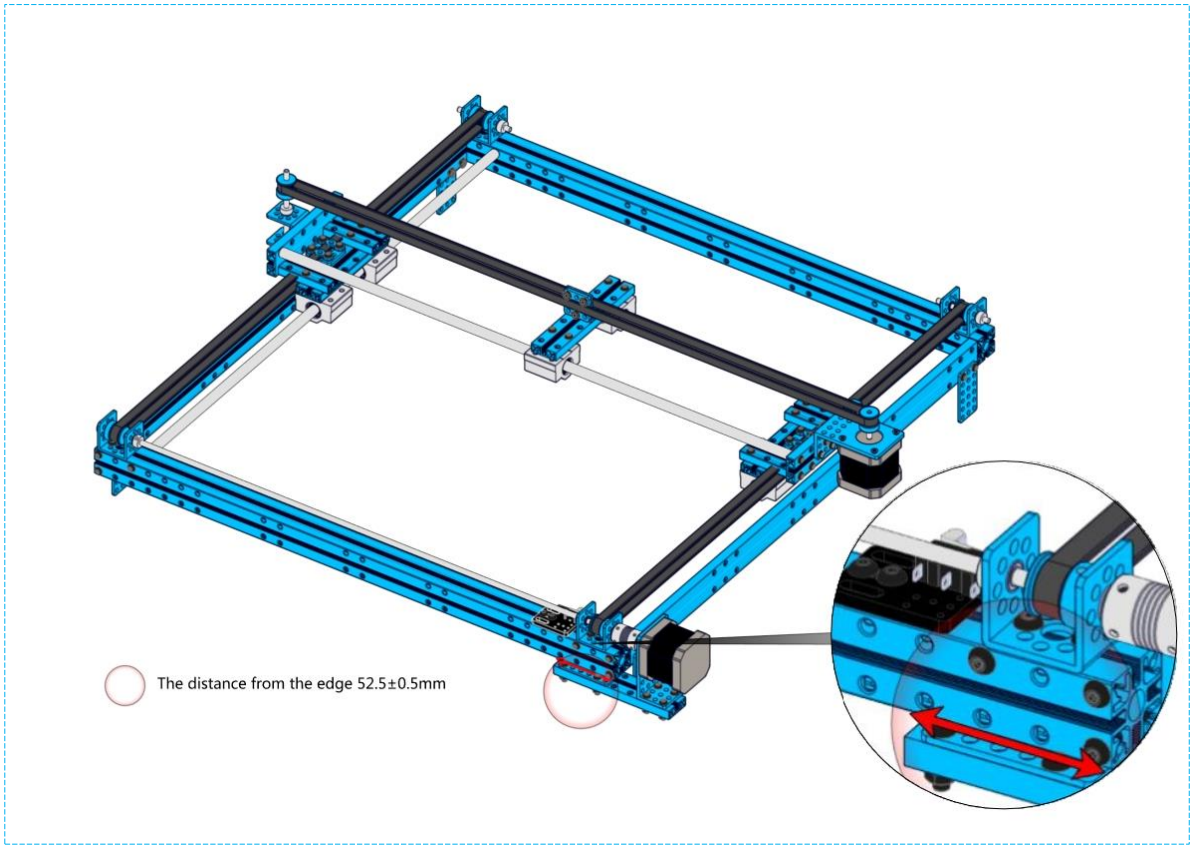
6×Nut M4

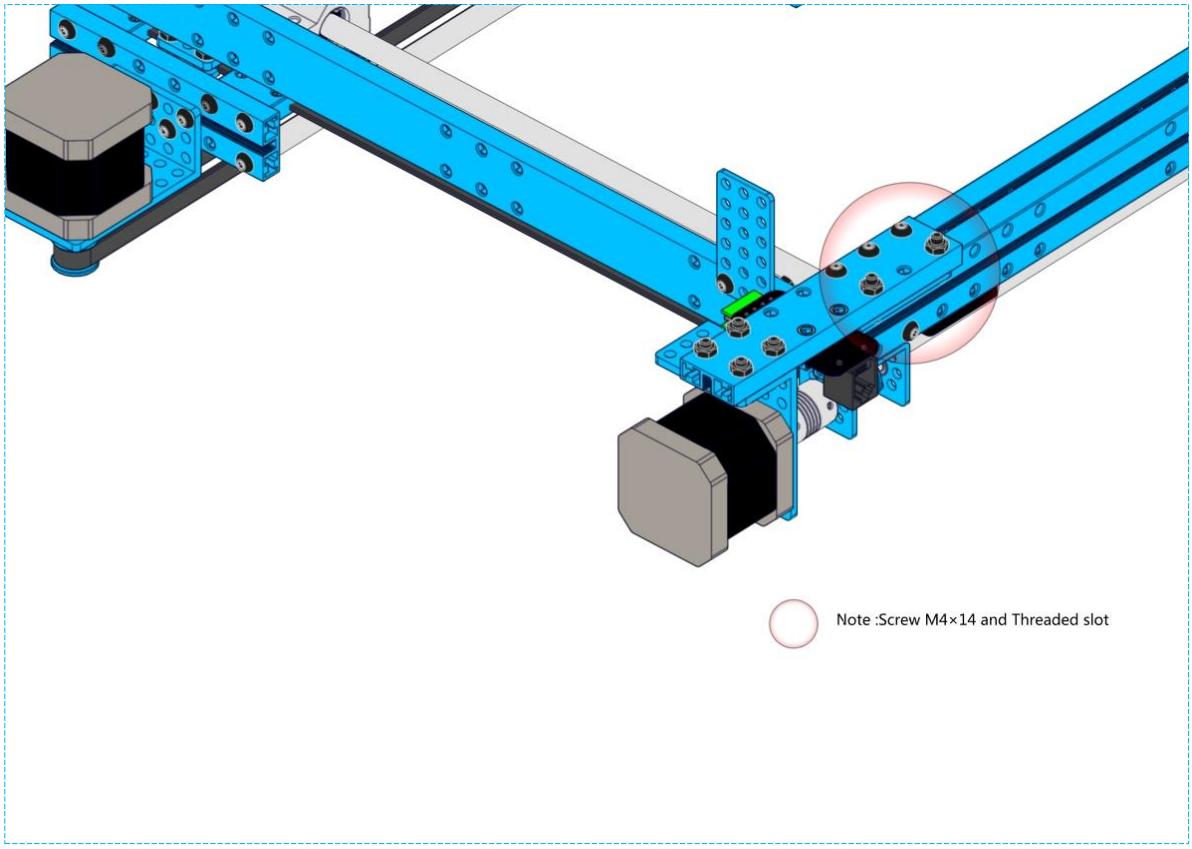
4×Screw Countersunk M3x8

4×Headless Set Screw M3x5

1×Plastic Ring 4x7x2

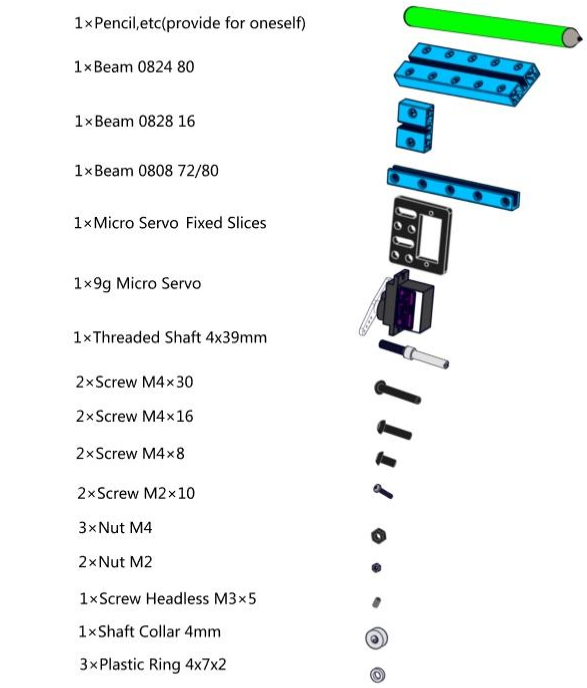


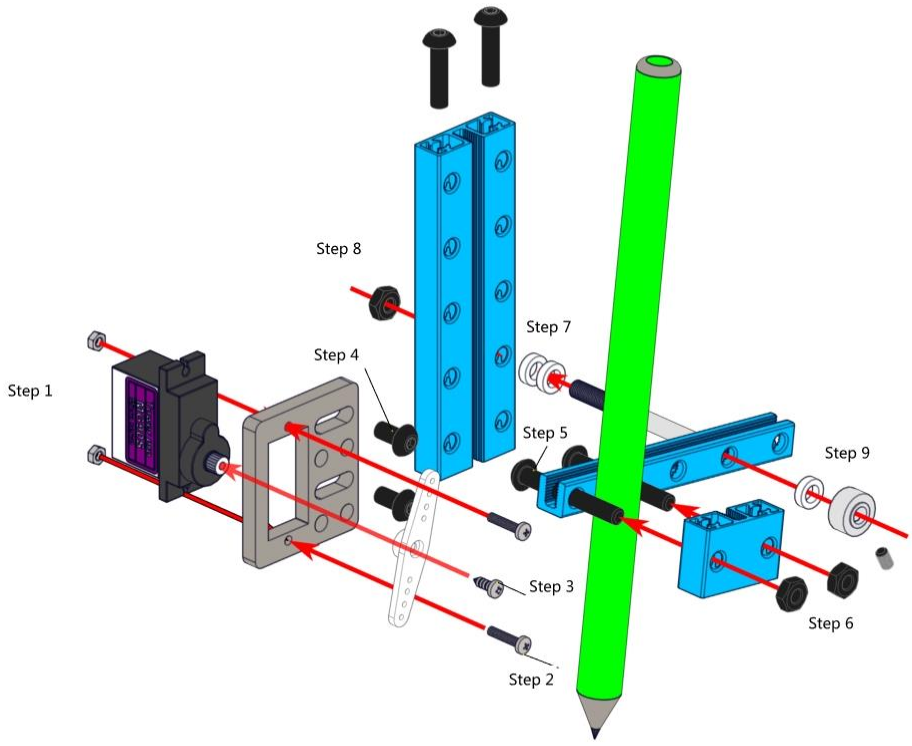

The distance from the edge 52.5±0.5mm

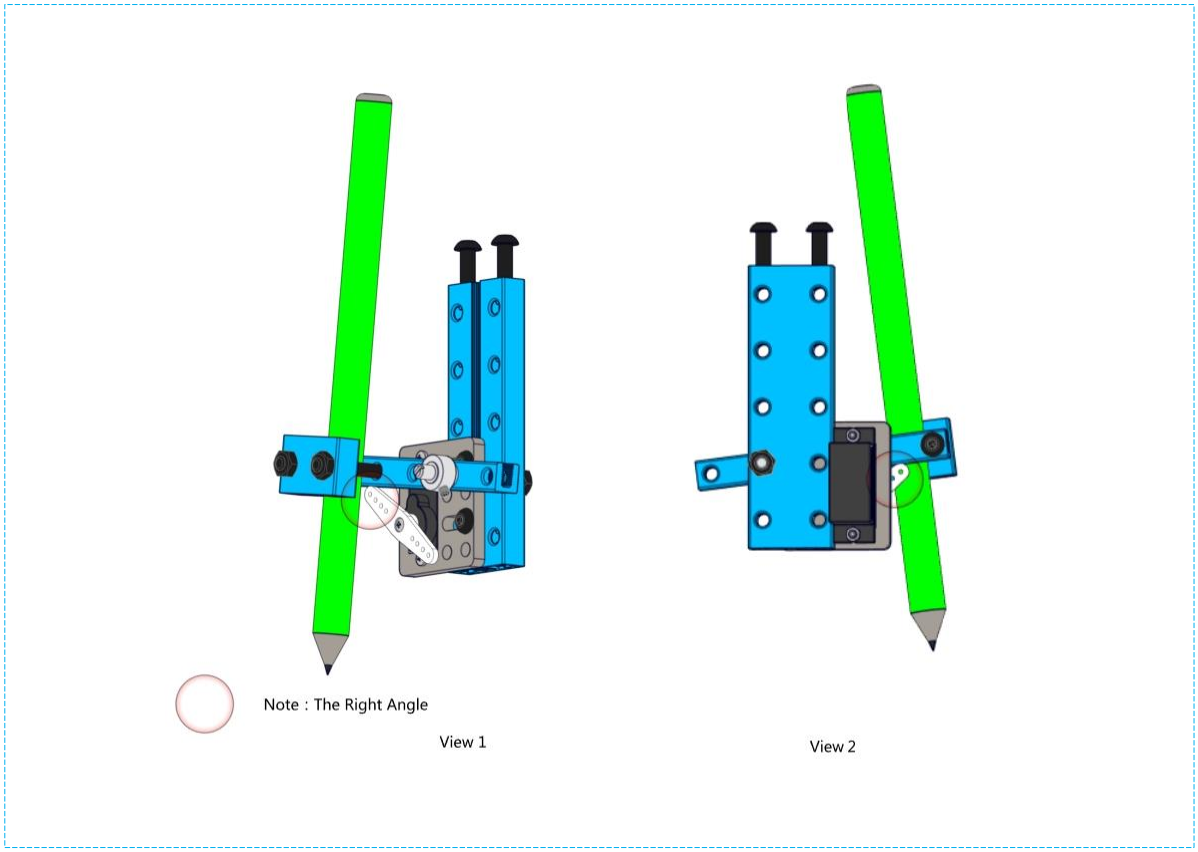

Note :Screw M4×14 and Threaded slot

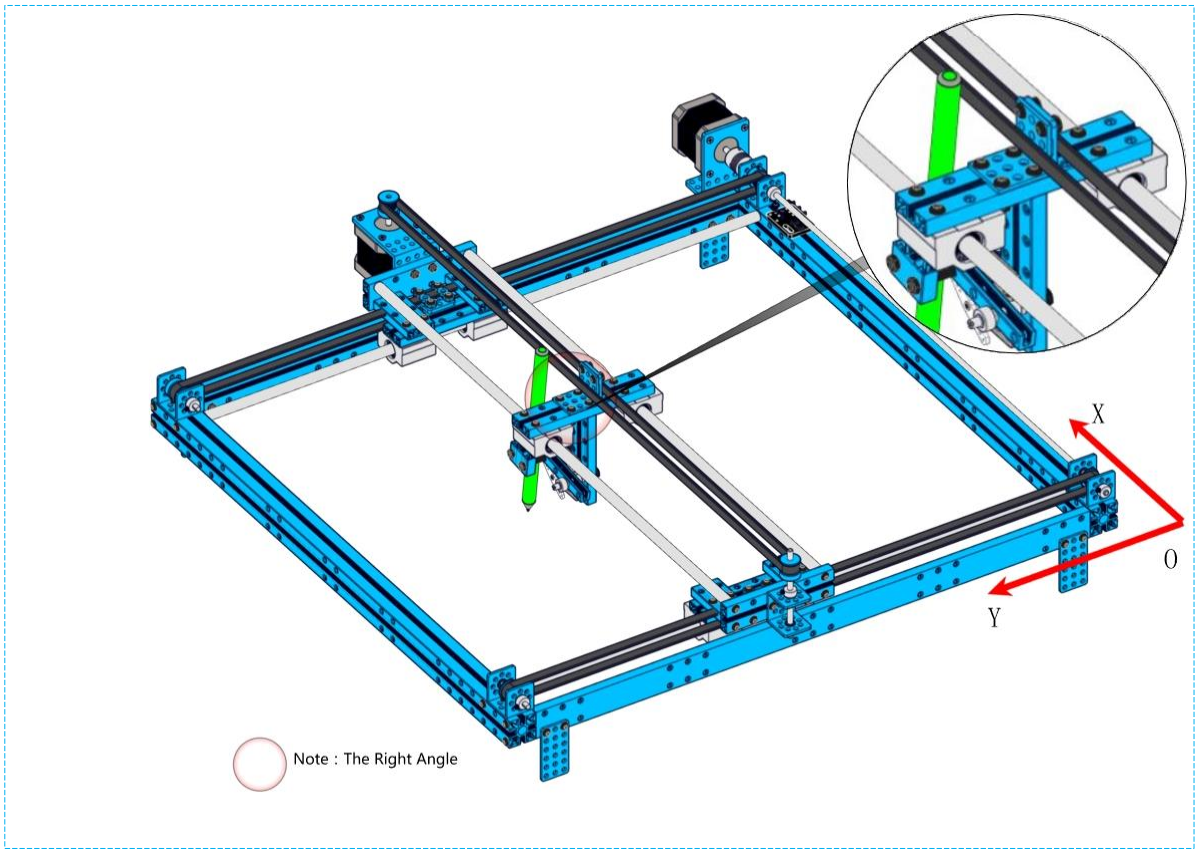
Step 8

1×Pencil,etc(provide for oneself)
1×Beam 0824 80
1×Beam 0828 16
1×Beam 0808 72/80
1×Micro Servo Fixed Slices
1×9g Micro Servo
1×Threaded Shaft 4x39mm
2×Screw M4×30
2×Screw M4×16
2×Screw M4×8
2×Screw M2×10
3×Nut M4
2×Nut M2
1×Screw Headless M3×5
1×Shaft Collar 4mm
3×Plastic Ring 4x7x2






Note : The Right Angle
View 1
View 2


X
O
Y
Note : The Right Angle

Step 9

3×Micro Switch Button

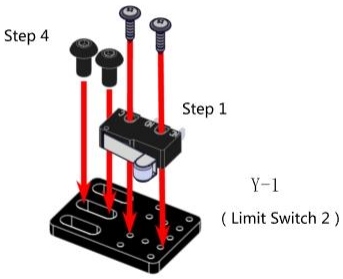
3×LS Bracket

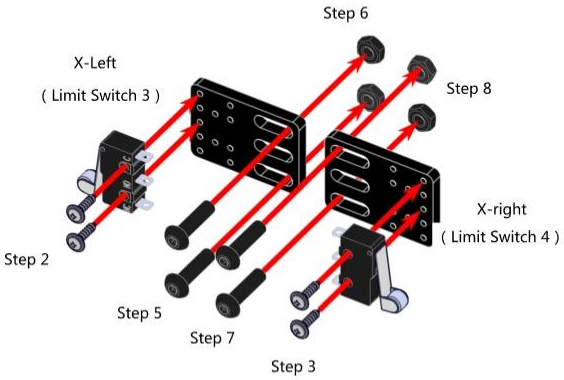
6×Cross Recessed Pan Head Tapping Screws ST2.2×9.5

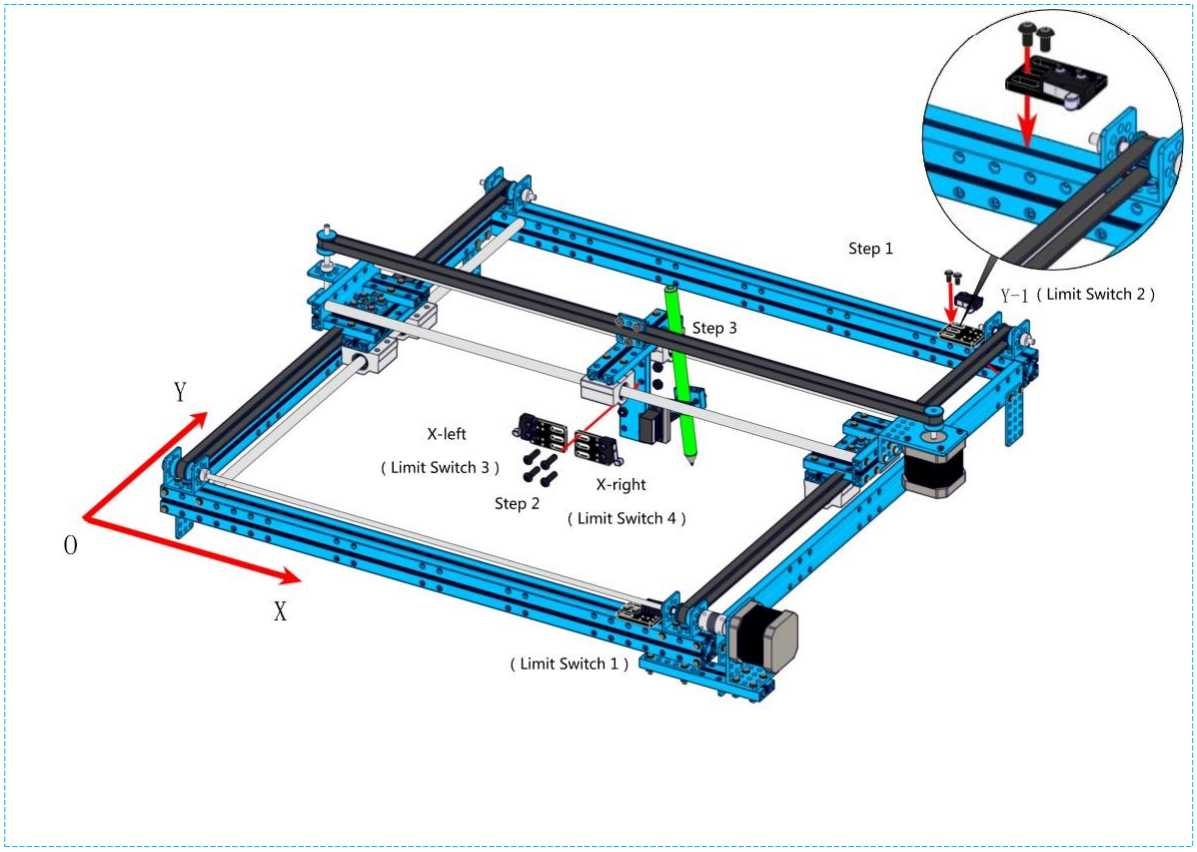
2×Screw M4×8

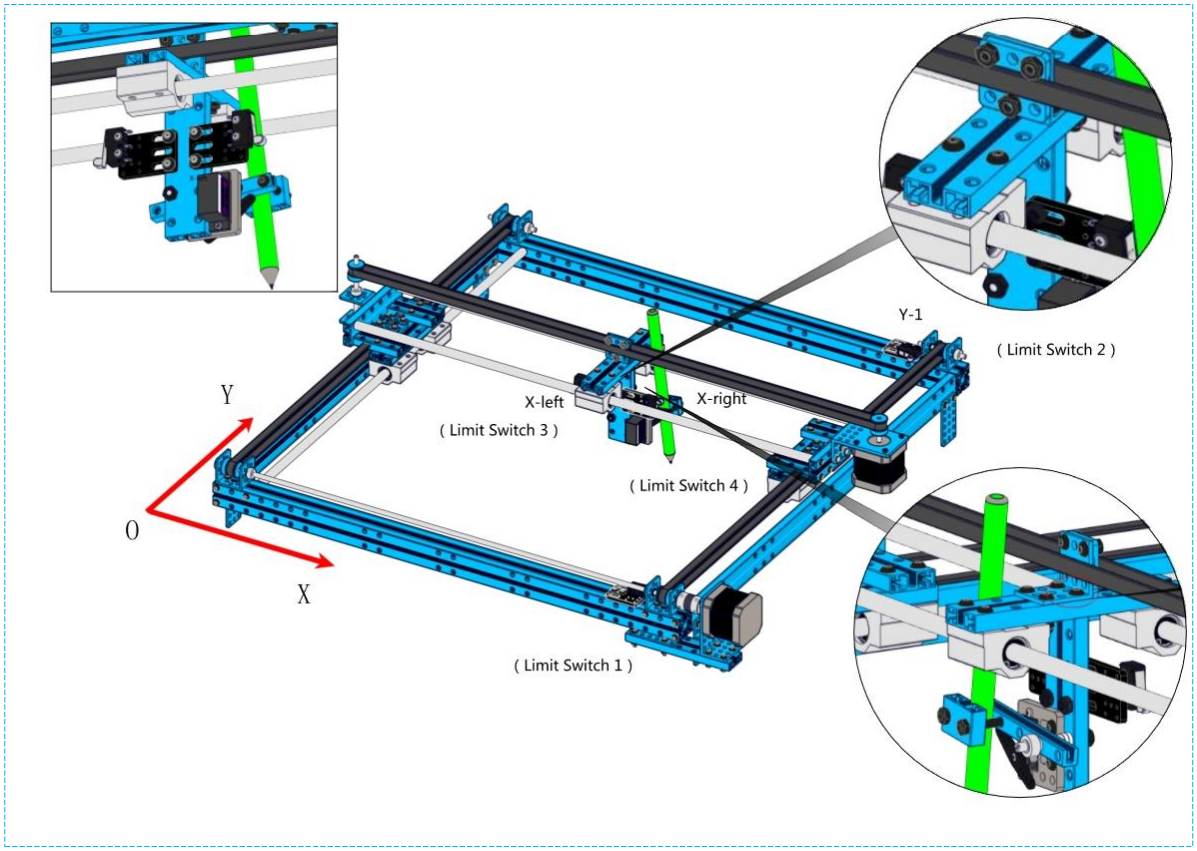
4×Nut M4

4×Screw M4×16



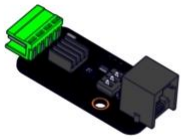



Step 1
Y-1 (Limit Switch 2)
Step 3
Y
X-left
(Limit Switch 3)
X-right
Step 2
(Limit Switch 4)
0
X
(Limit Switch 1)

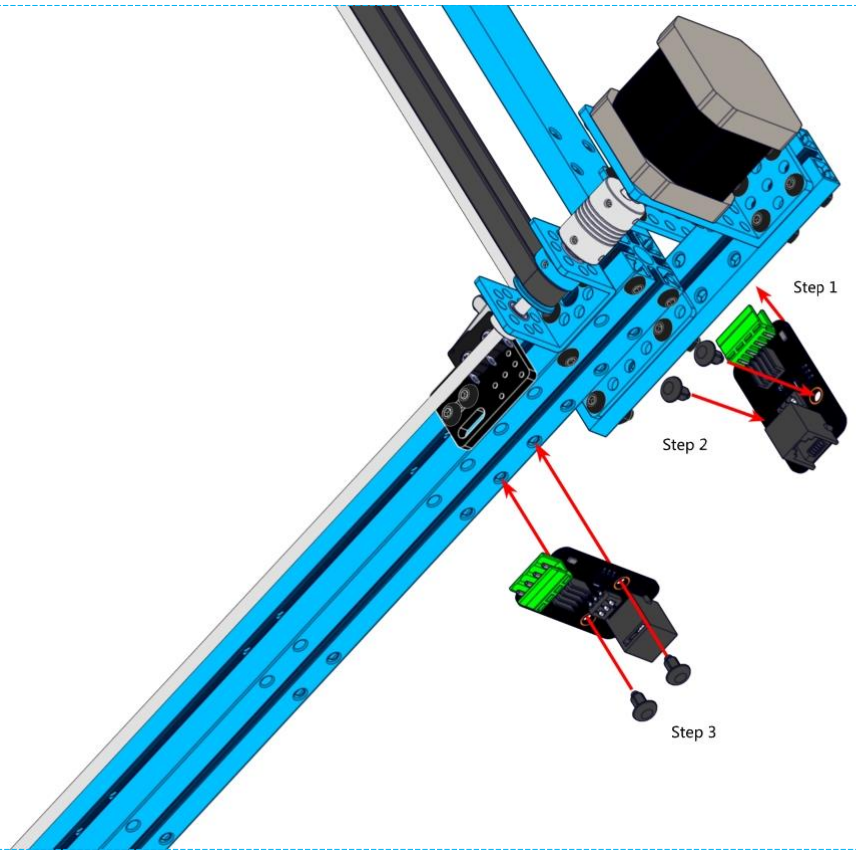

Y-1
(Limit Switch 2)
Y
X-left
(Limit Switch 3)
X-right
(Limit Switch 4)
0
X
(Limit Switch 1)

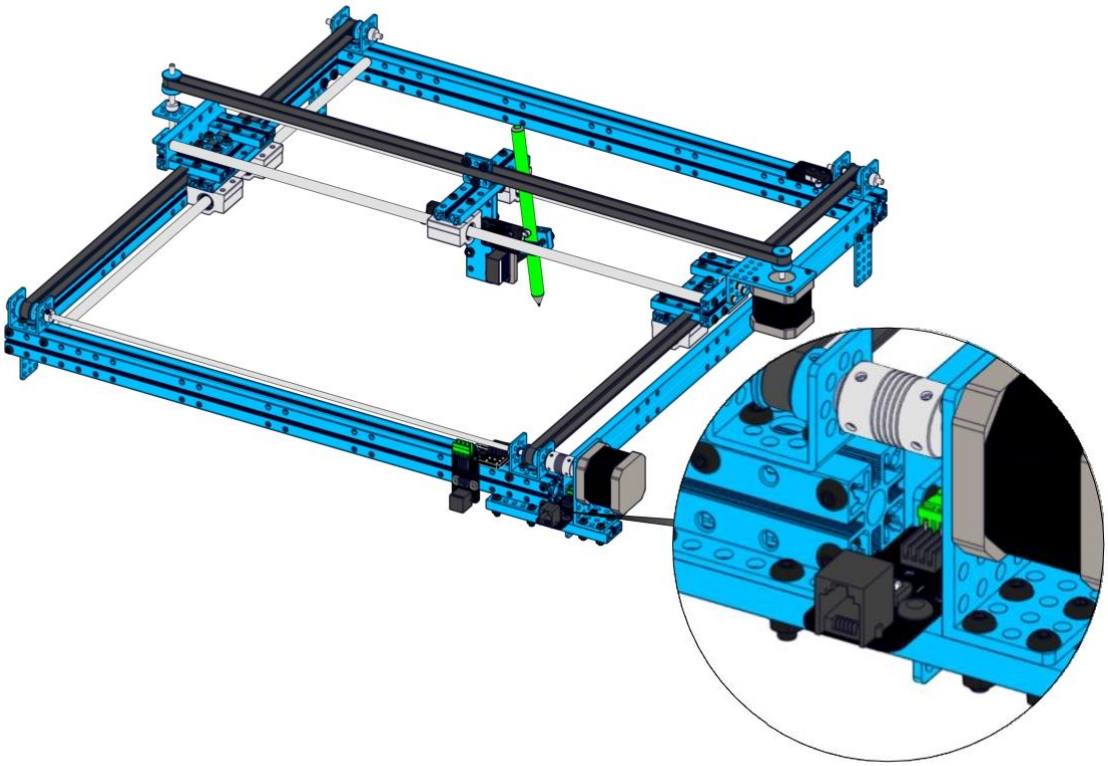
Step 10

2×Me Stepper Driver V1.0



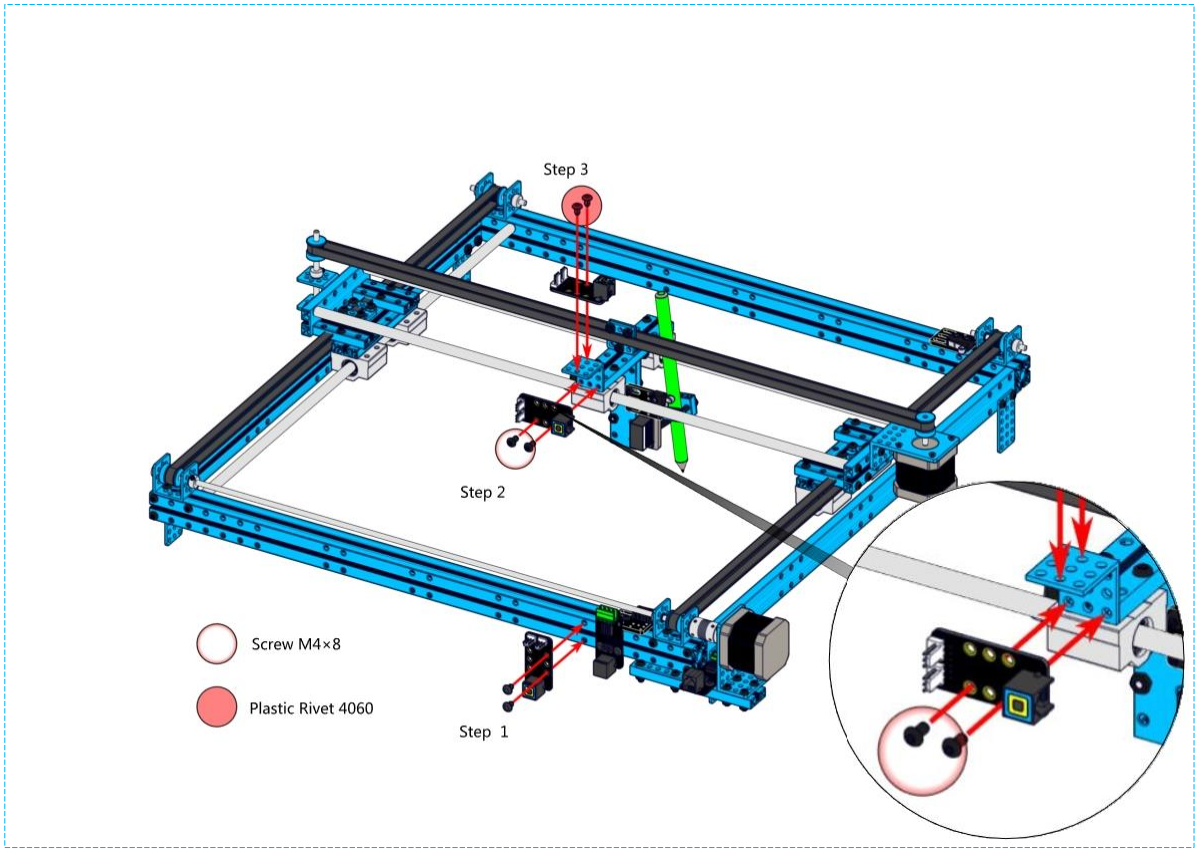
4×Plastic Rivet 4060

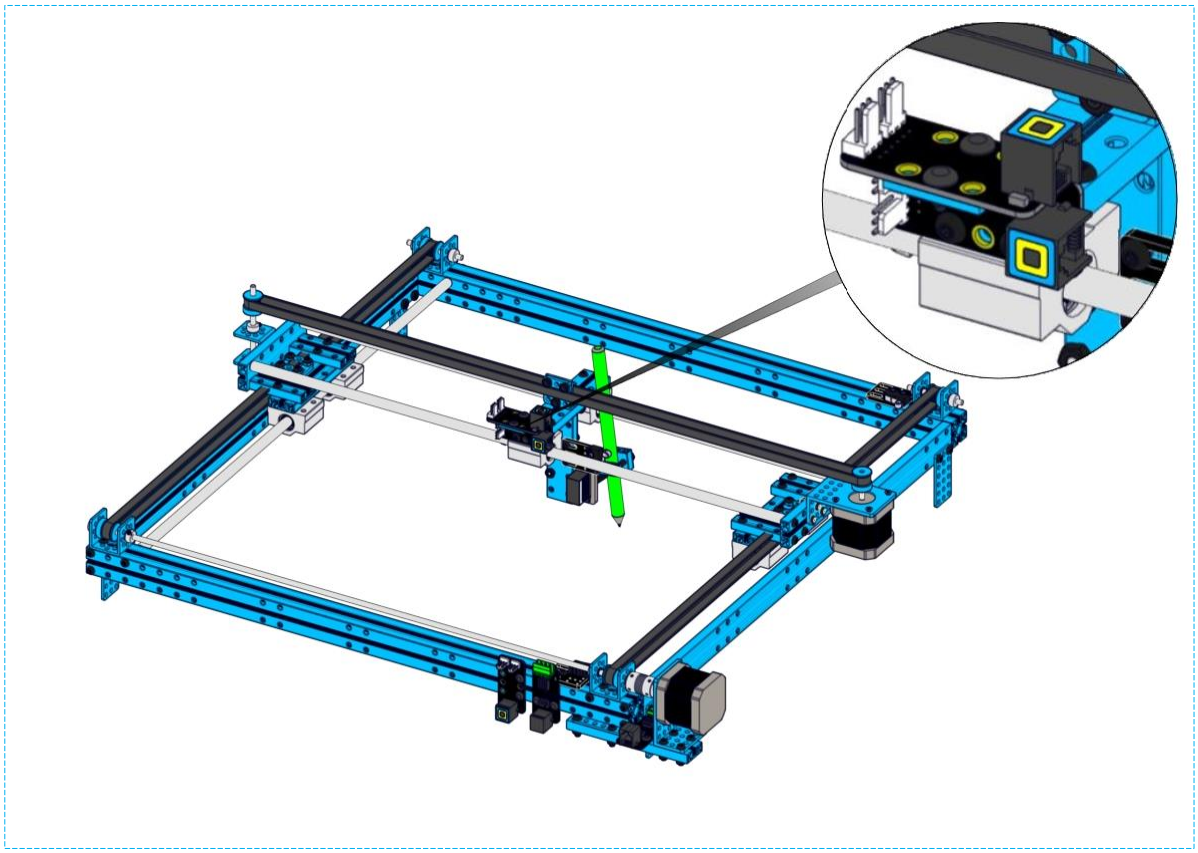




Step 11

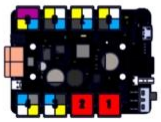
3×Me RJ25 Adapter	
1×Bracket 3×3	
2×Screw M4×8	
4×Plastic Rivet 4060	


Step 3
Step 2
Screw M4×8
Plastic Rivet 4060
Step 1

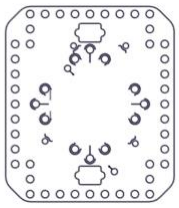


Step 12

1×Me Baseboard

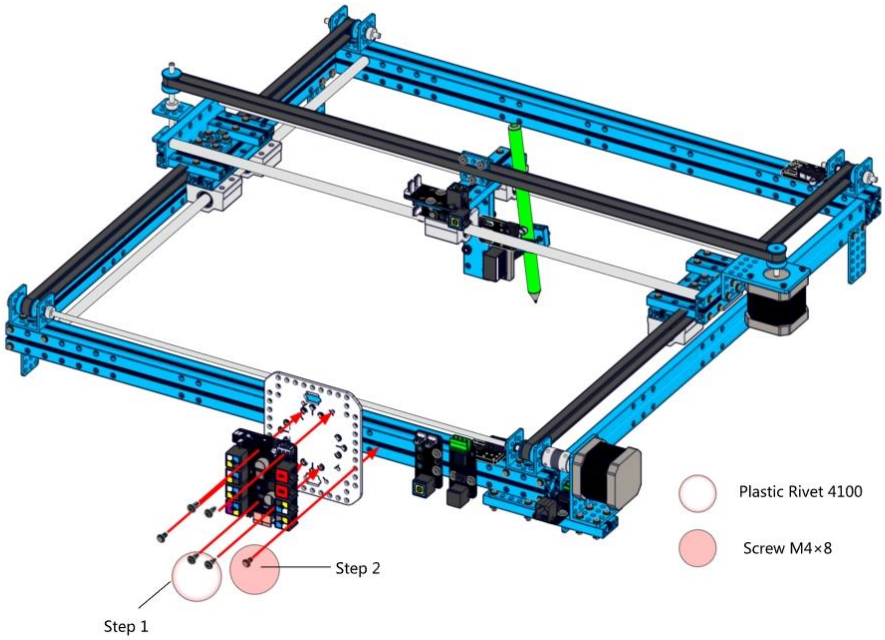


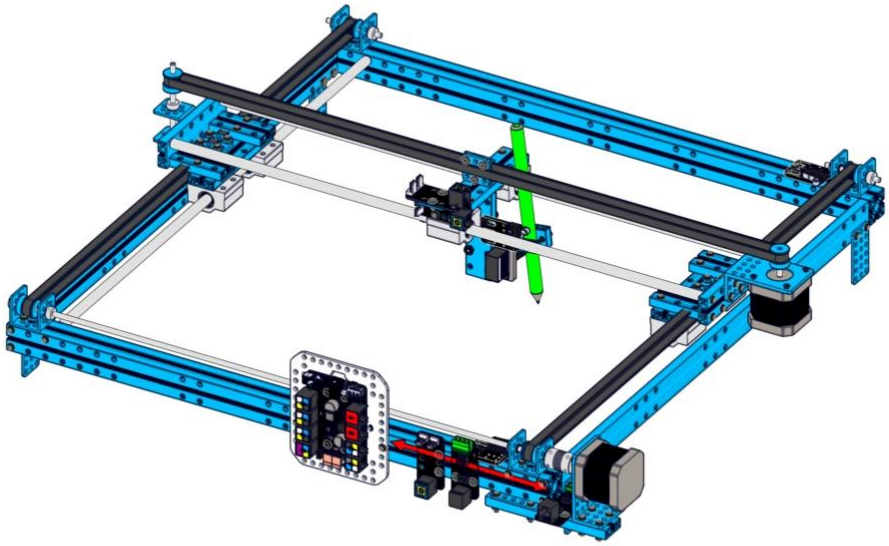
1×Base Board Plate



2×Screw M4×8

4×Plastic Rivet 4100



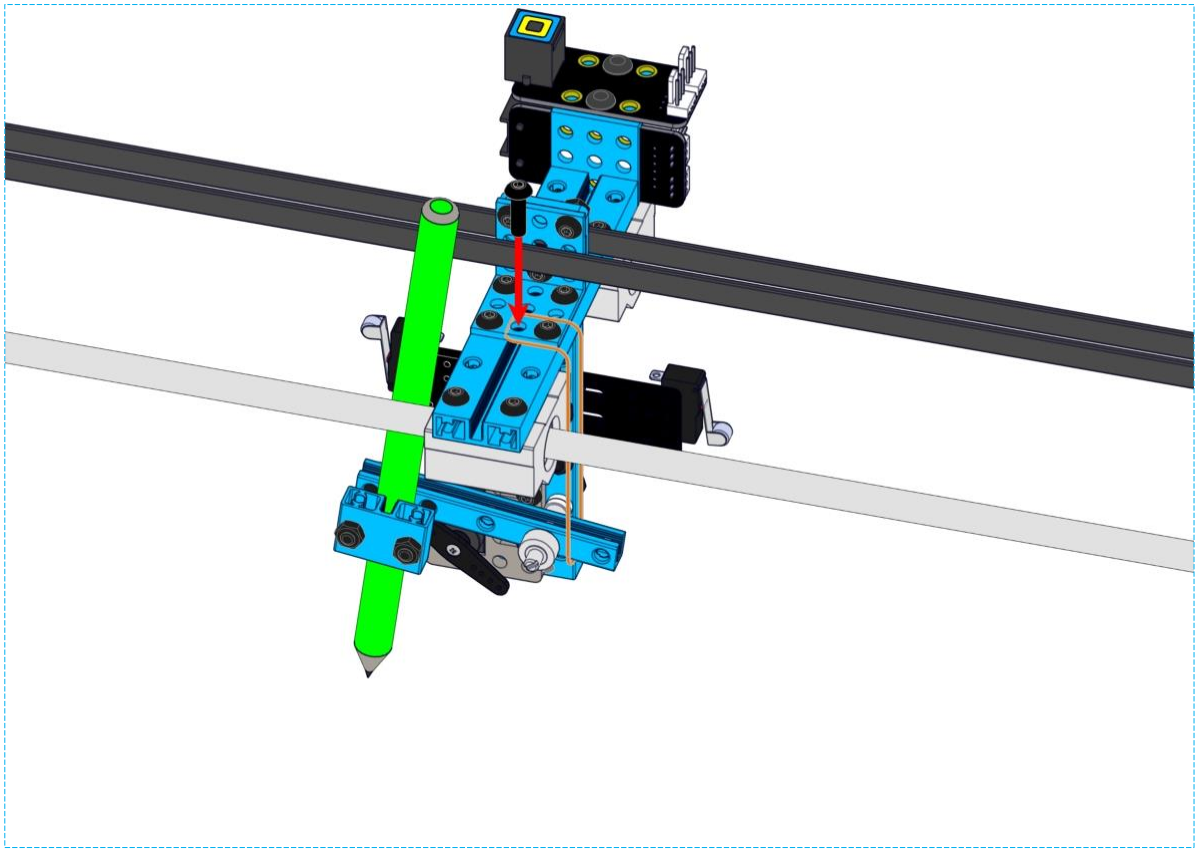


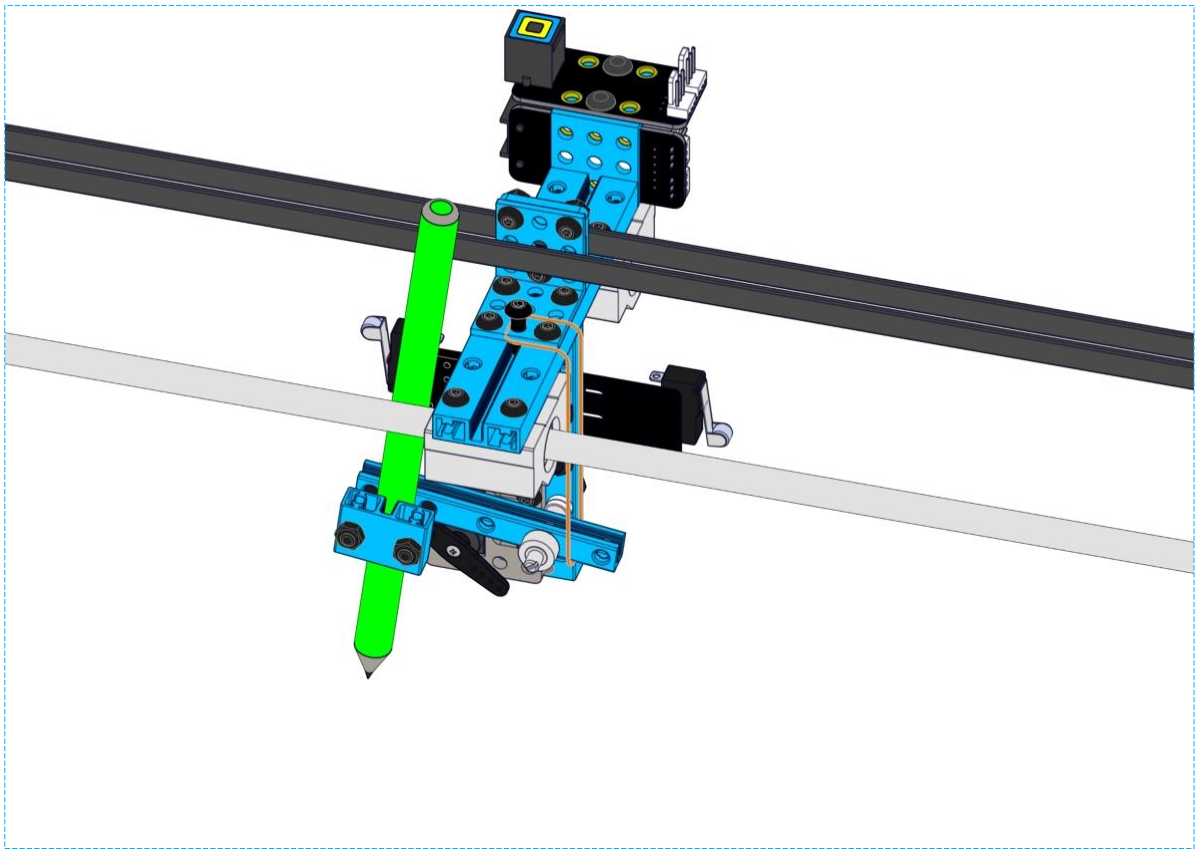
The distance from the edge 142±3mm

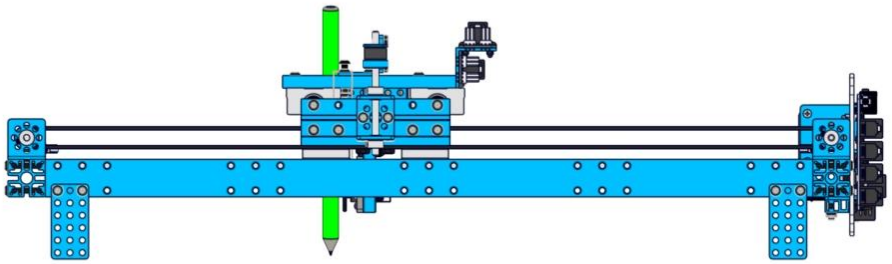
Step 13

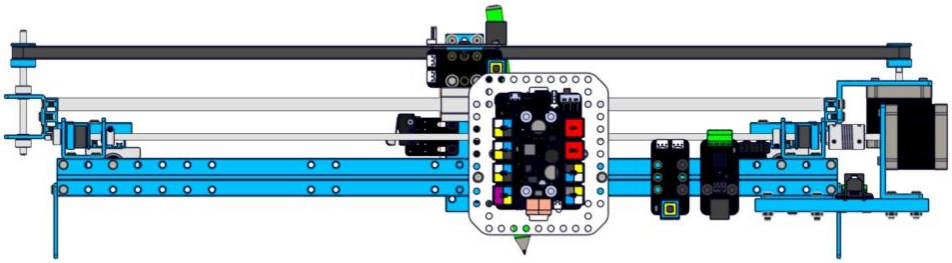
1×Screw M4×14

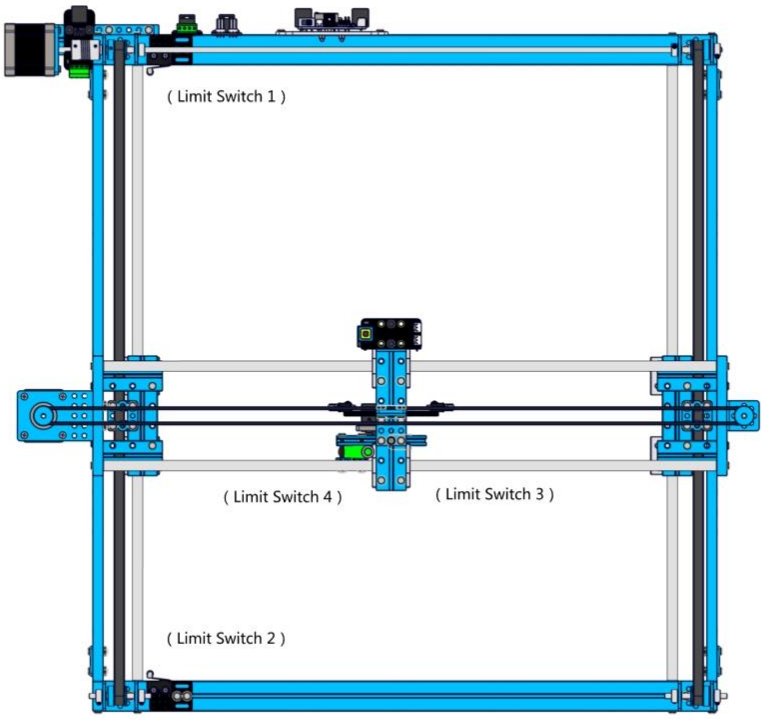
1×Rubber band



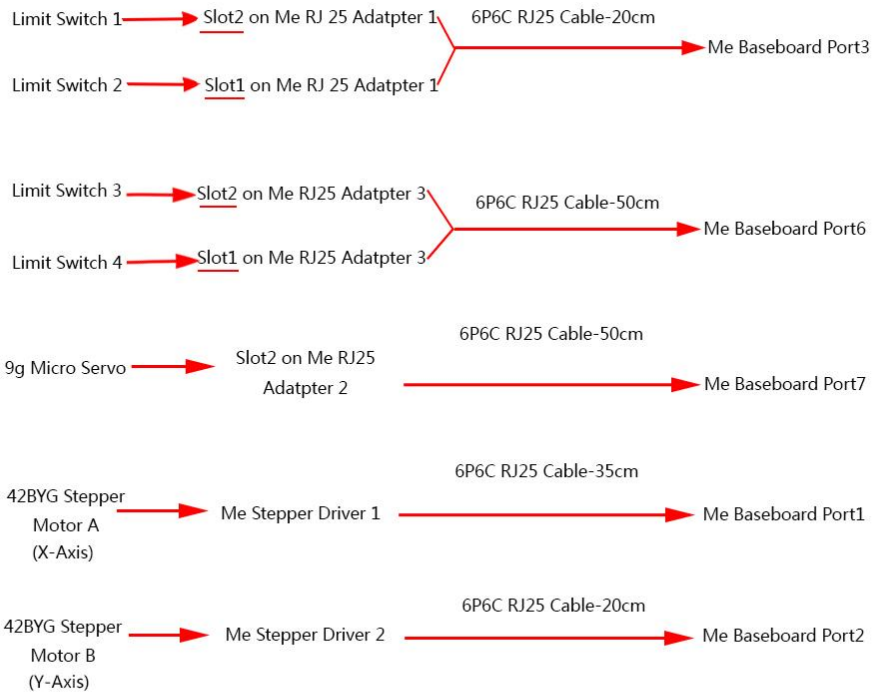


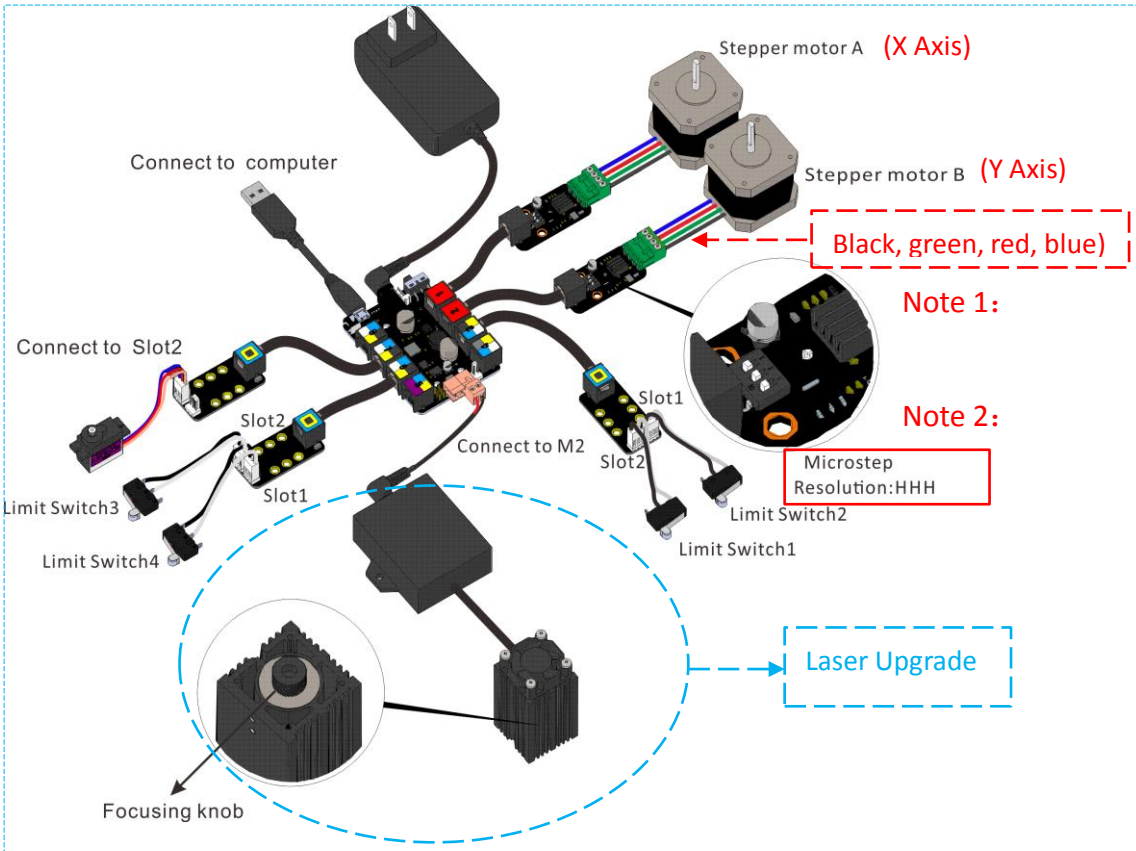




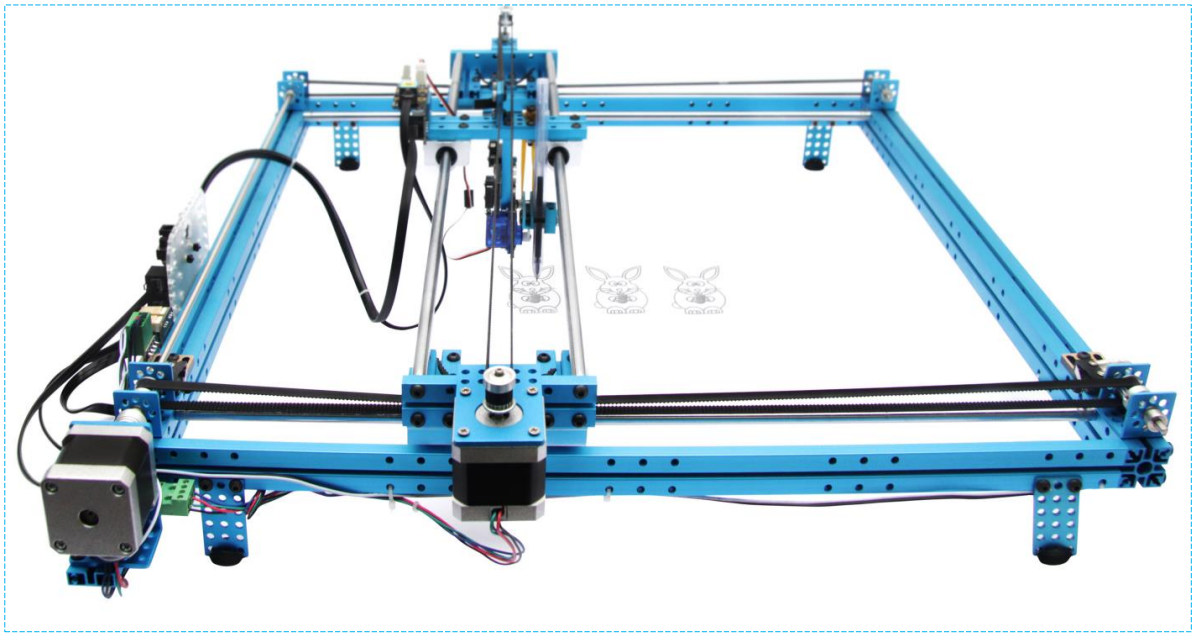

(Limit Switch 1)
(Limit Switch 4)
(Limit Switch 3)
(Limit Switch 2)

Step 14


Limit Switch 1
Slot2 on Me RJ 25 Adatpter 1
6P6C RJ25 Cable-20cm
Me Baseboard Port3
Limit Switch 2
Slot1 on Me RJ 25 Adatpter 1
Limit Switch 3
Slot2 on Me RJ25 Adatpter 3
6P6C RJ25 Cable-50cm
Me Baseboard Port6
Limit Switch 4
Slot1 on Me RJ25 Adatpter 3
6P6C RJ25 Cable-50cm
9g Micro Servo
Slot2 on Me RJ25 Adatpter 2
Me Baseboard Port7
6P6C RJ25 Cable-35cm
42BYG Stepper Motor A (X-Axis)
Me Stepper Driver 1
Me Baseboard Port1
6P6C RJ25 Cable-20cm
42BYG Stepper Motor B (Y-Axis)
Me Stepper Driver 2
Me Baseboard Port2



Attention: Due to the different host computer software, you should change the microstep settings from HHL to HHH.



After you finishing this step, congratulations! You can move forward to the next stage – using mDraw to control your robot. Here you go the introduction of software mDraw.

5. mDraw

1. Introduction of mDraw

mDraw is an cross-platform open-source software developed by Makeblock.

Compatibility: mDrawBot (mScara, mCar, mEggBot, mSpider), XY Plotter kit (servo mode, laser mode)

OS Environment: Windows, Mac, Linux

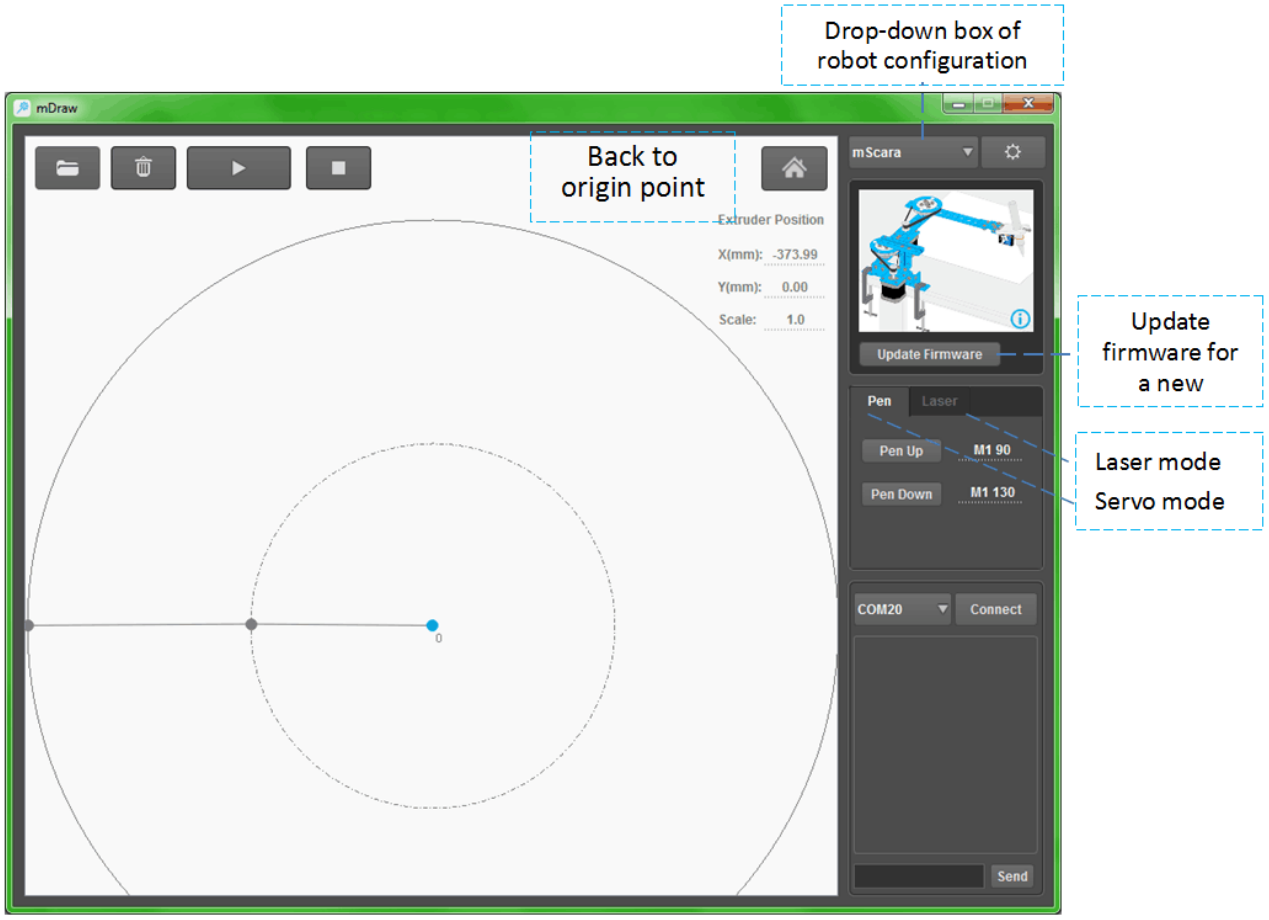
Supported File Type: *.svg, *.bmp (convert to *.svg)[1]

2. Installation

Download and open the installation pack of mDraw, follow the prompts to install mDraw.[2]

3. Button Function in Main UI

Click in the Drawing zone, robot will move accordingly. Drag the loaded SVG graphics in drawing zone could adjust the size and position of graphics. Size can be adjusted by inputting values in the right-down window directly.

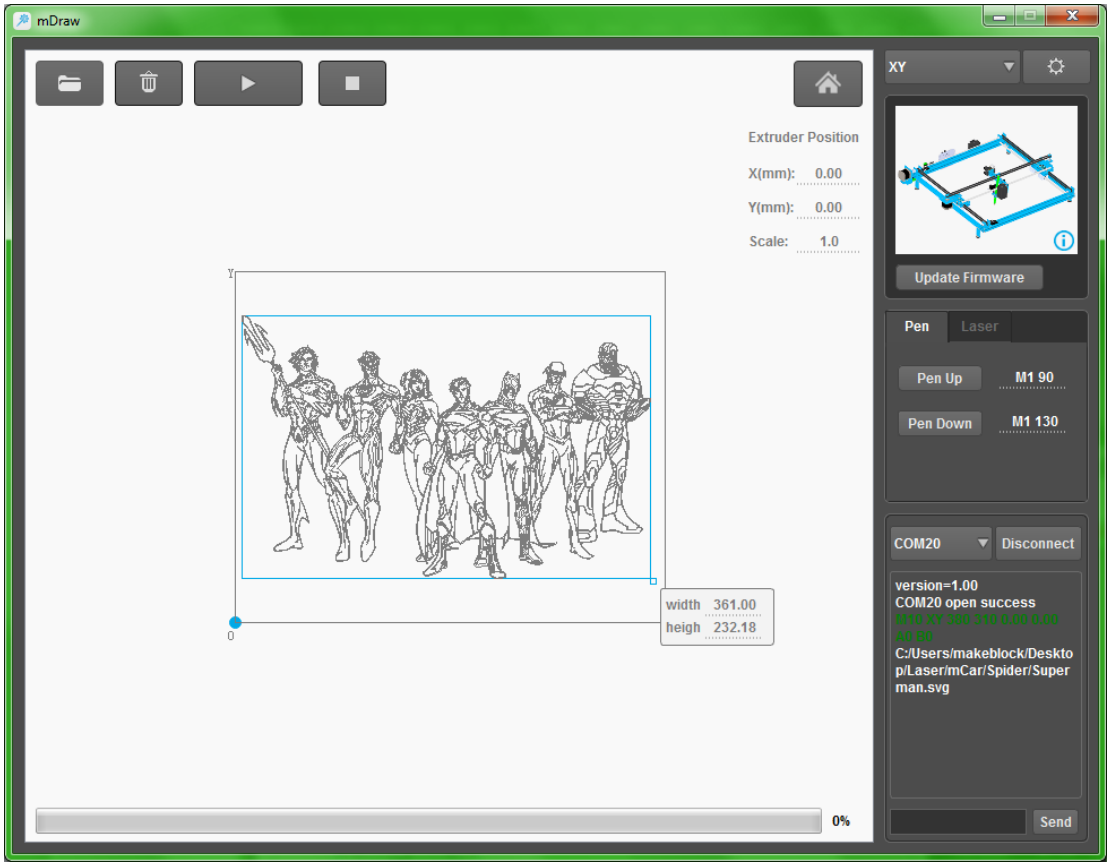


[1] All file must be named in English.

[2] The installation directory must be named in English.

Load in BMP file, mDraw will pop out a dialogue for converting SVG file. Follow the prompts, BMP file can be converted into SVG file.

Load in SVG file, drawing is as follows.



4. Setting

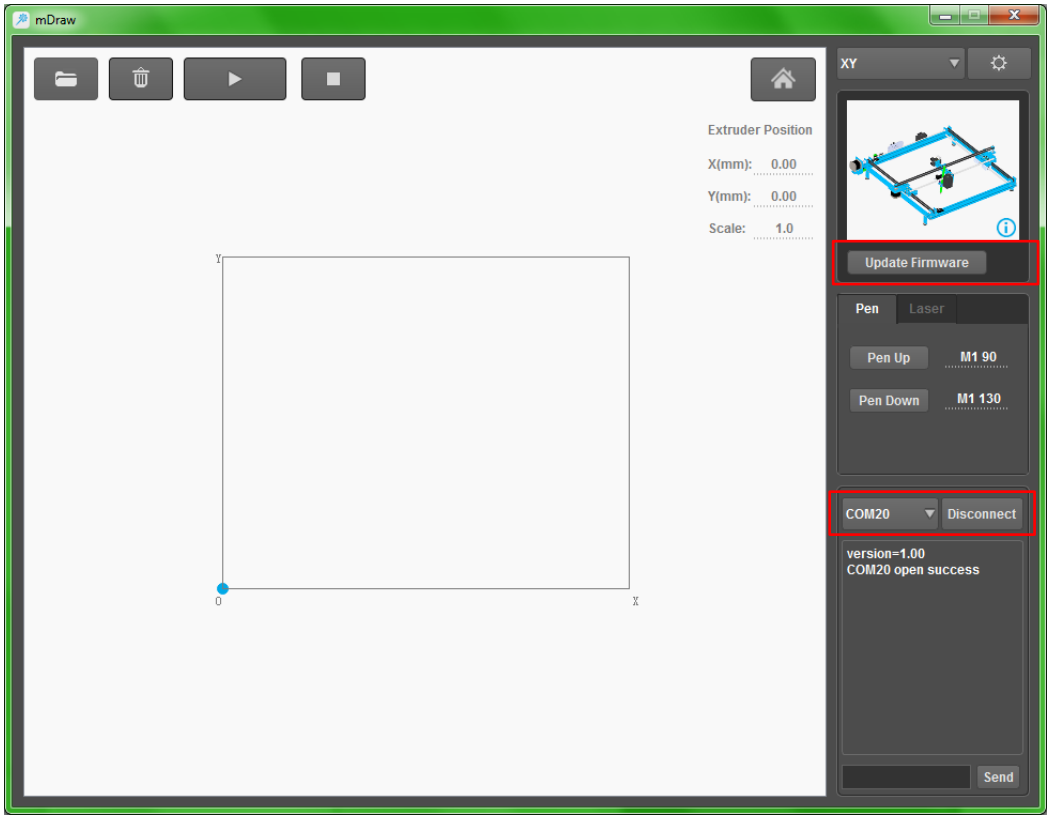
（1） XY Plotter V2.0

a. Check and make sure all wiring is correct. Connect robot to computer via USB cable.[3]

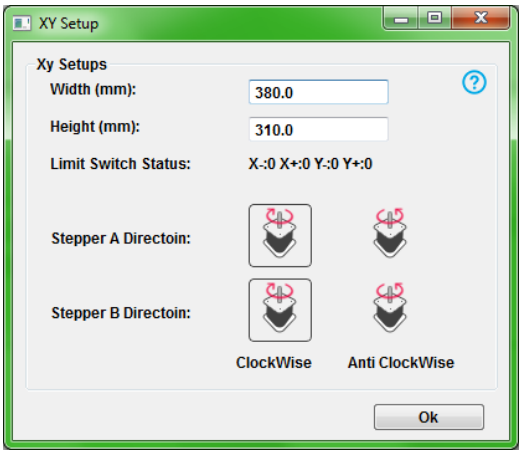
b. Choose XY as robot configuration, select the correct COM port, click “connect”, and then click “Update Firmware”).[4]

[3] For Bluetooth connection, please be sure that you’ve installed the Bluetooth driver software in computer.

[4] You need to click “update firmware” for the first time you use a new configuration, and each time you switched robot configuration.



c. Click button to entry the setup window. Generally default value is fine, you can revise parameters per your own necessary.

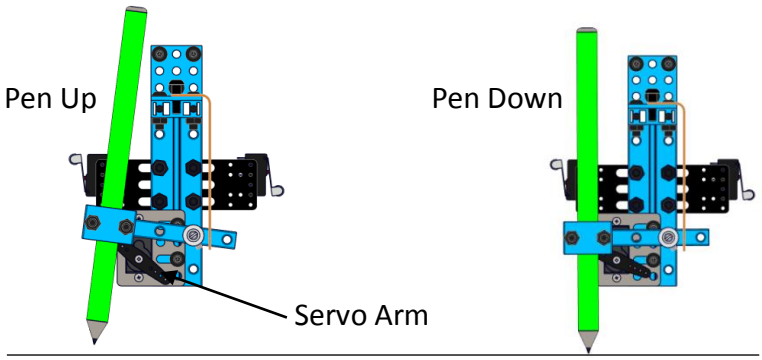


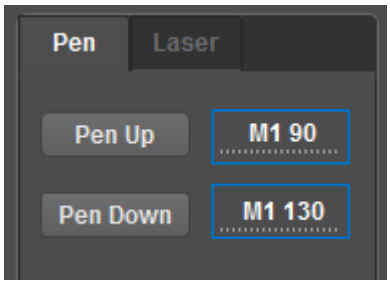
d. Please keep graphics stay in the rectangle zone, or it will cause abnormal drawing.

e. Make XY Plotter back to origin point before starting.

（2） Configurations of Pen Up and Pen Down

Input value of Pen Up and Pen Down in mDraw, and observe the movement of mDrawBot. If the feedback is correct as below, that means your settings are correct.[5]。



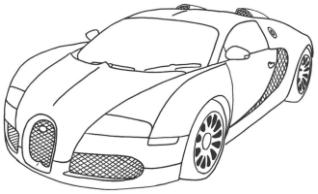


Note: the default value here is only for reference. In actual use please apply the

6. Samples for Software mDraw and Inkscape

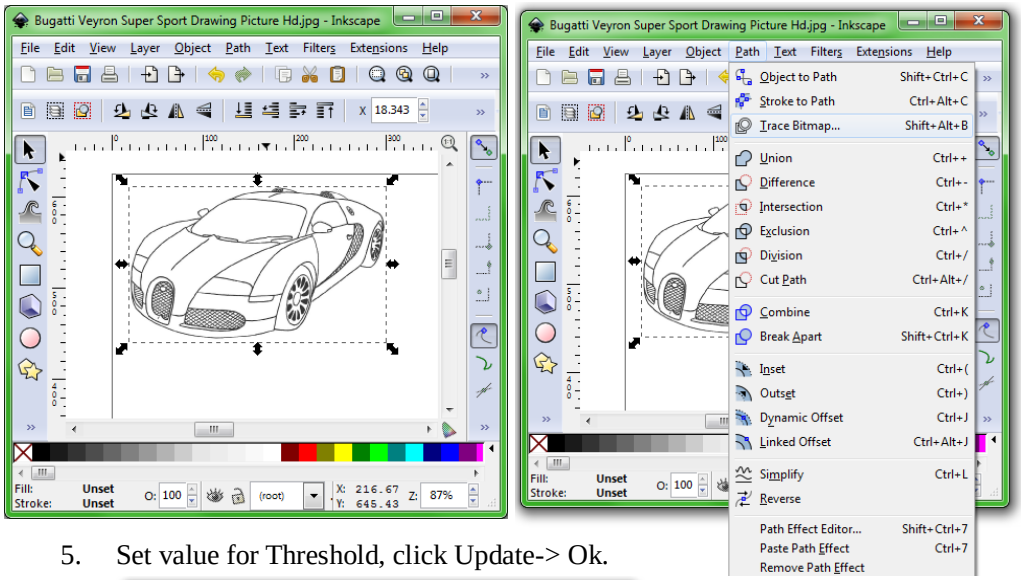
mDraw supports SVG file which is based on open-source software Inkscape. For better experience of mDraw, please learn the basic operation of Inkscape.

1. Install Inkscape.
2. Create a new vector graphic or open a vector graphic in Inkscape. Inkscape supports to convert other vector types into SVG file, like *.dxf, *.cdr (please save as an earlier version) files. Here you go a simple sample.
3. We suggest to choose sketch for BMP as below sample.

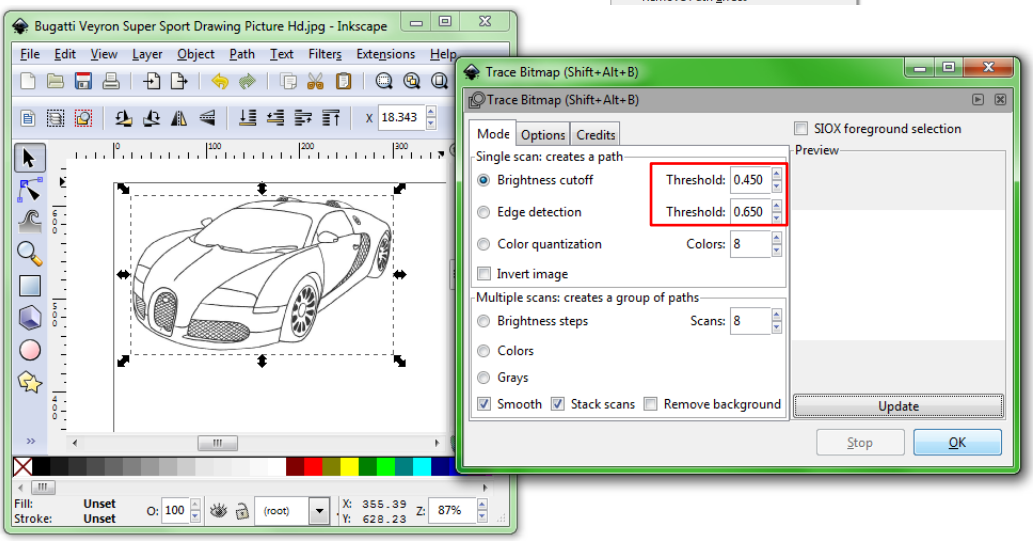


[5] If the servo arm cannot reach to below angle, please uninstall the servo arm to re-adjust the installation angle. Please adjust the tightness of rubber band if necessary.

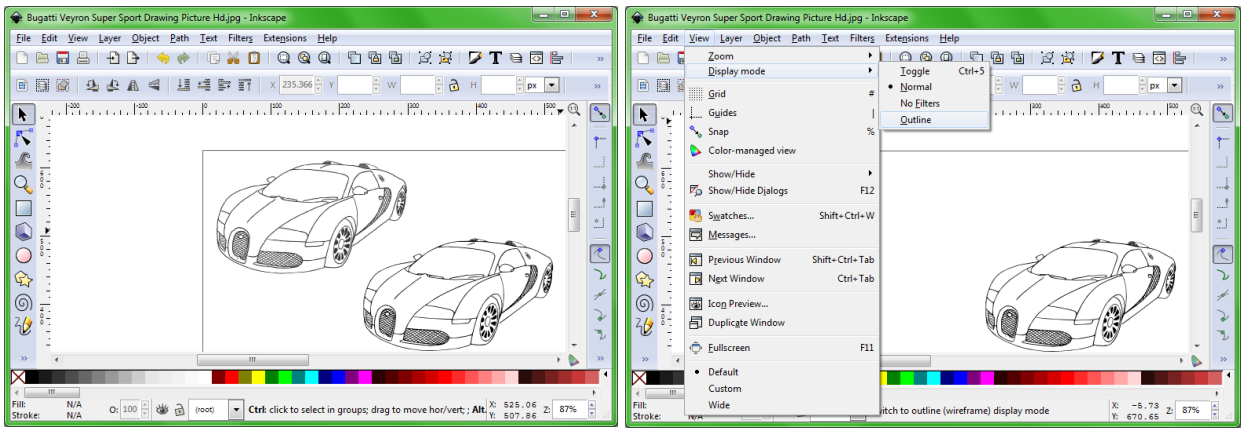
4. Open a BMP file with Inkscape, select the picture, and then click Path->Trace Bitmap.



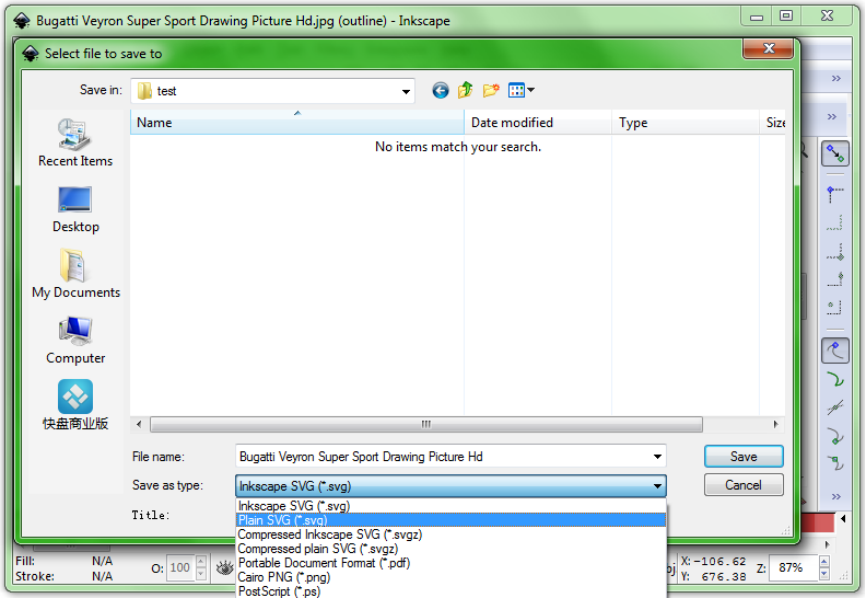
5. Set value for Threshold, click Update-> Ok.



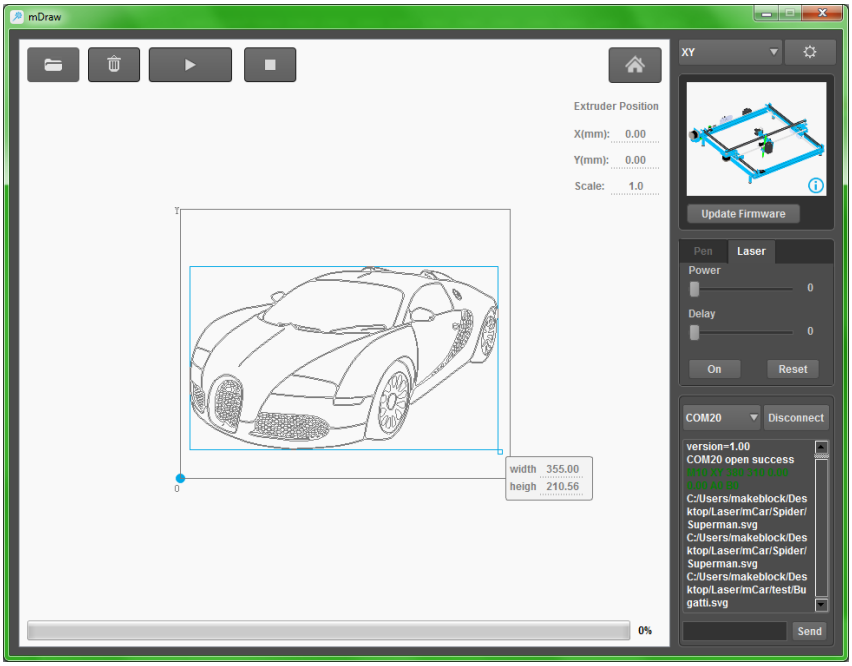
6. Drag out the generated vector graphic, select View -> Display mode -> Outline. Delete the original BMP picture.



7. Save file as type Plain SVG (*svg)[6].



8. Open the SVG file you just saved as below, adjust the position and size, and then click button to start drawing.[7]



7. FAQs

Q1. Why cannot install driver software for Makeblock Orion?

A: If your computer cannot install driver software for Makeblock Orion successfully, please download the driver installation here and install it manually.

Makeblock Orion driver download link:

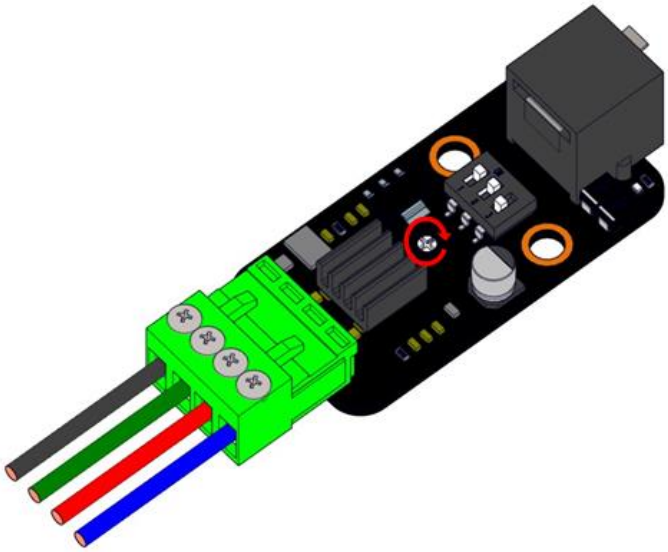
http://learn.makeblock.cc/driver_installation/

[6] Please be sure to choose the correct file type, or it will be unsupported.

[7] Before you start drawing anything, please check the manual and be sure that the mDrawBot is located at the same position in software.

Q2. How to adjust the torque and electric current of stepper motor?

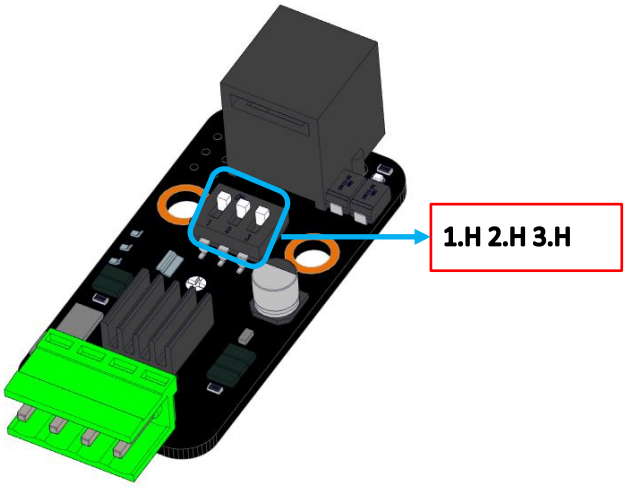
A: You can swirl the tiny knob of stepper motor driver module in "+" direction to increase the torque output if it's not enough.



Q3. Why the speed and ratio are incorrect?

A： The microstep presets of mDraw is HHH 1/16. If the speed and ratio are incorrect, please check the setting. Here you go the setting chart and default

	1	2	3
Full speed	L	L	L
1/2	H	L	L
1/4	L	H	L
1/8	H	H	L
1/16	H	H	H

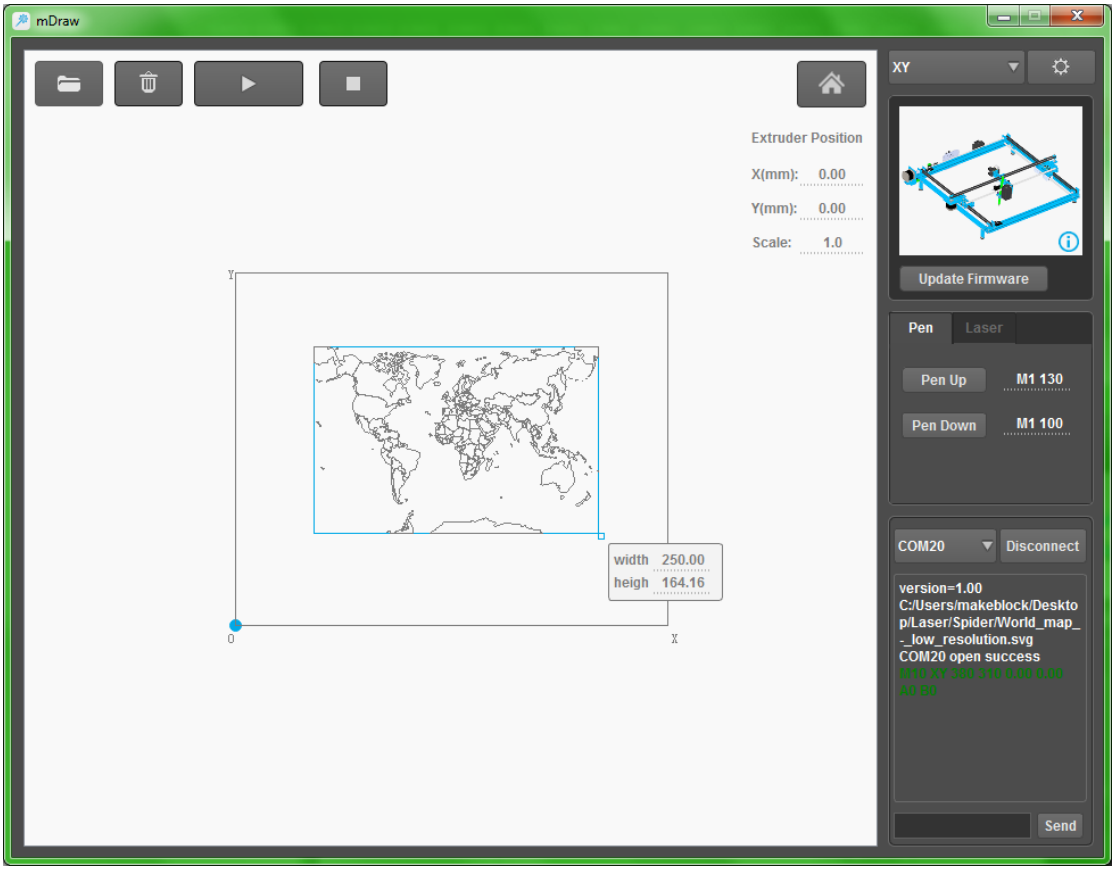


Q4. How to fix the height difference of pen lift mechanism?

A: Check the levelness of your desktop, change a better desktop if it's not good enough.

Q5. How to know the corresponding physical position of the graphic in soft UI?

A: Move the machine back to origin position, drag graphic to change its size and position. Lift the pen, click the 4 corners of graphic as below figure, and then observe the movement of machine to identify the graphic's physical size and position.



Q6. How to download the related sources and 3D models?

A: Please download related sources at our official Grabcad website.

Q7. How to convert BMP into SVG?

A： Please refer to below teaching videos.

https://www.youtube.com/watch?v=W0V-4O9x9Uk

https://www.youtube.com/watch?v=-yBMB5KtZj4

Q8. How to share your work?

A: Welcome to upload and share you work at http://forum.makeblock.cc/category/showcase.

Q9. How to contact us?

A: Welcome to email us at support@makeblock.cc. Or you can contact us at below.

https://www.facebook.com/Makeblock?ref=br_tf
https://plus.google.com/102486511775733872783/posts
https://twitter.com/Makeblock

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