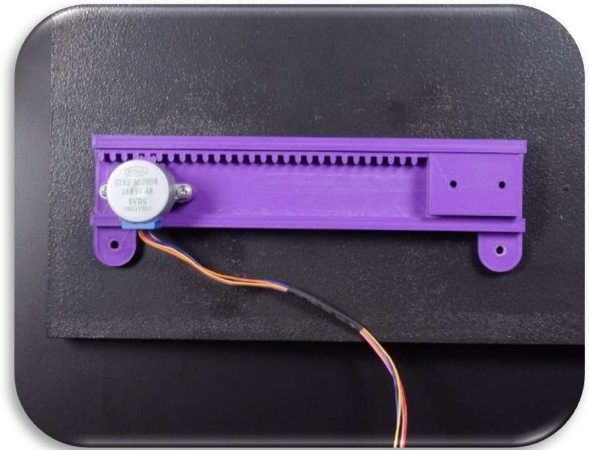# ARDUINO MINI: CNC PLOTTER

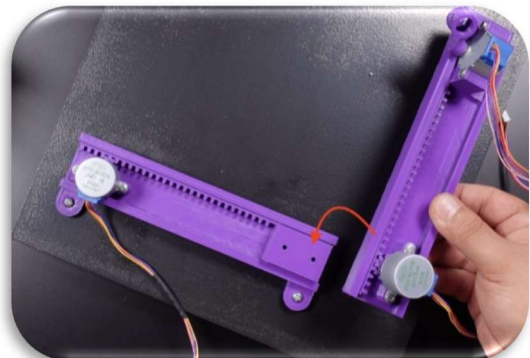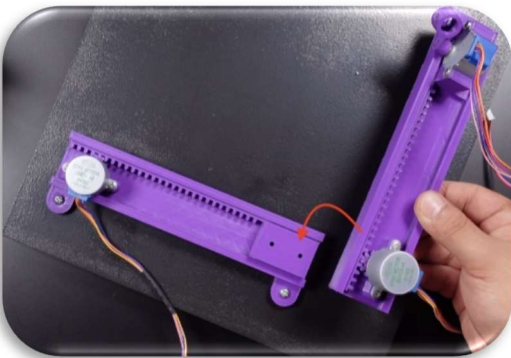ENG. Mahmoud Essam

SMART TECHNOLOGY

What's CNC plotter machine?

CNC plotter machine is used to create 2-D, and 3-D images on a plain surface using a 2-D printing mechanism and microcontroller

Step 1: 3D Parts of Plotter

## Components and connection of Plotter

Steppers are of type **28BYJ-48 Stepper Motor** which kinda works like our

3d-printer stepper motors.

And it comes with **ULN2003 Board**

All those can be bought from ELEEGO 5 SETS ELEGOO 5 Sets 28BYJ-48 ULN2003 5V Stepper Motor + ULN2003 Driver Board Compatible with Arduino

Amazon.com: ELEGOO 5 Sets 28BYJ-48 ULN2003 5V Stepper Motor + ULN2003 Driver Board Compatible with Arduino : Industrial & Scientific
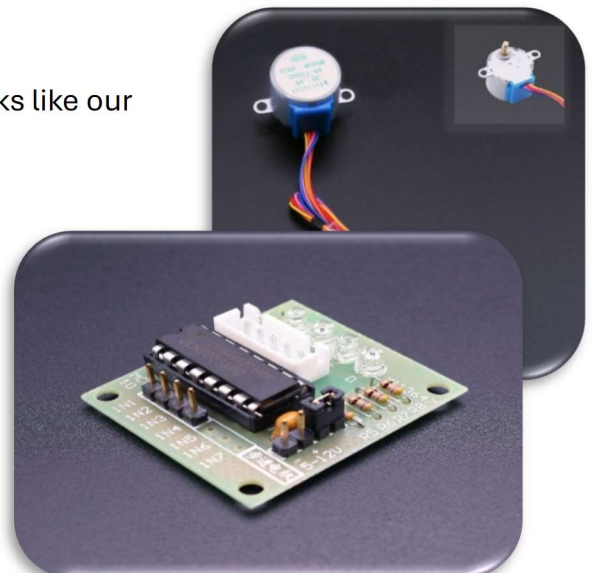
It exists in Makers anyway: [Stepper Motor Driver Board ULN2003 | Makers Electronics](#)

And for Stepper motor also: [Stepper Motor 5V | Makers Electronics](#)

So, in this project, we need 3 steppers with drivers, which approximates to be $(65 + 35) * 3 = 300 EGP$

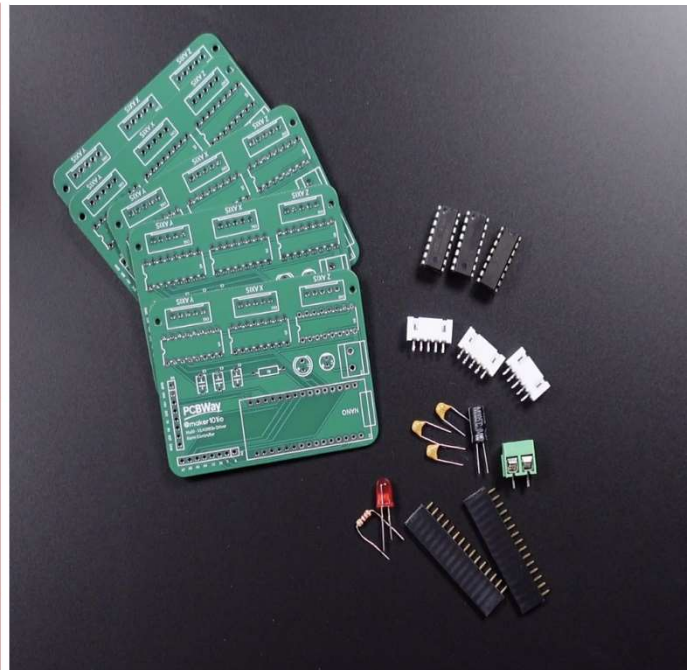Design is in the same Memory for this report, and for access :
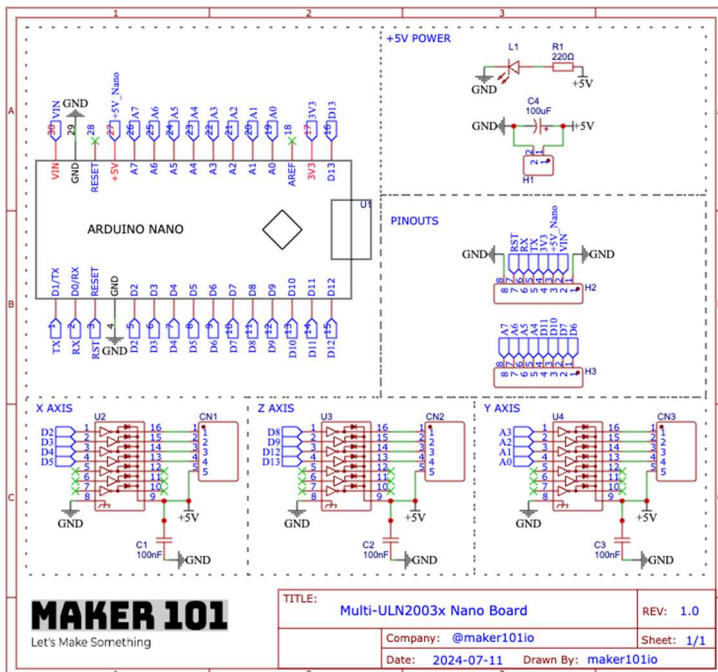"https://www.thingiverse.com/thing:4607077"

Step 2: Applying it as Circuit

The Following image, will show in general if we didn't made PCB for the components will be like this way
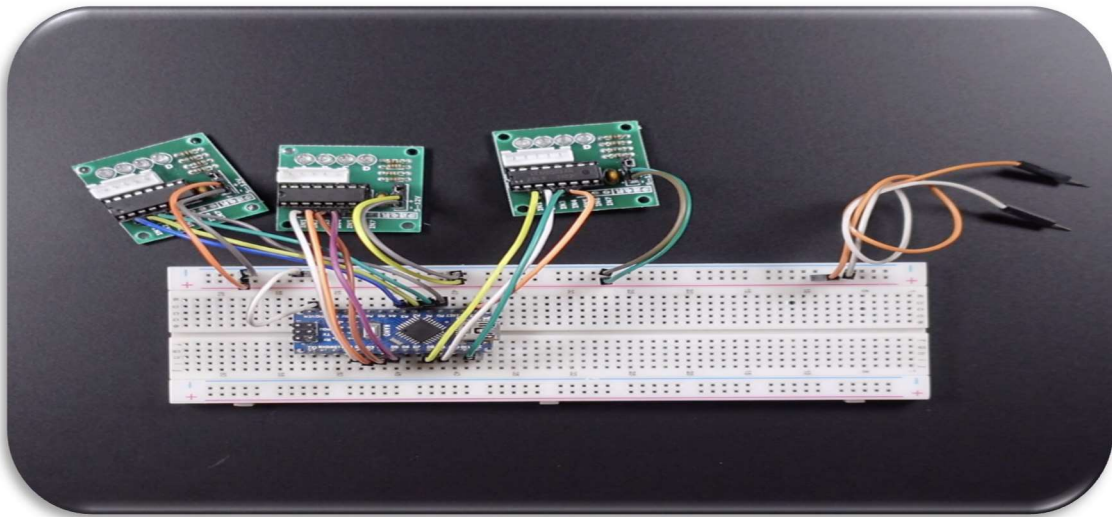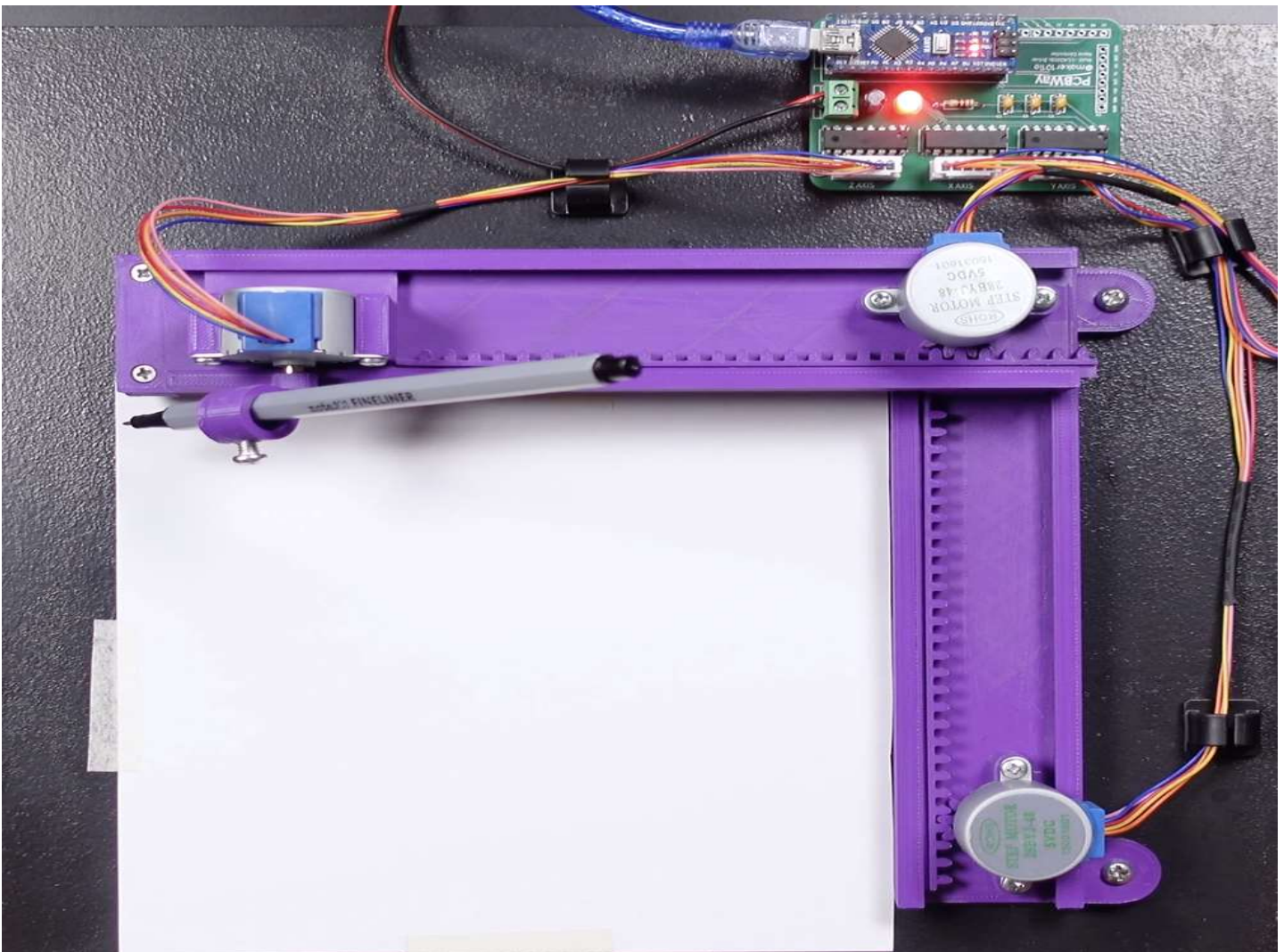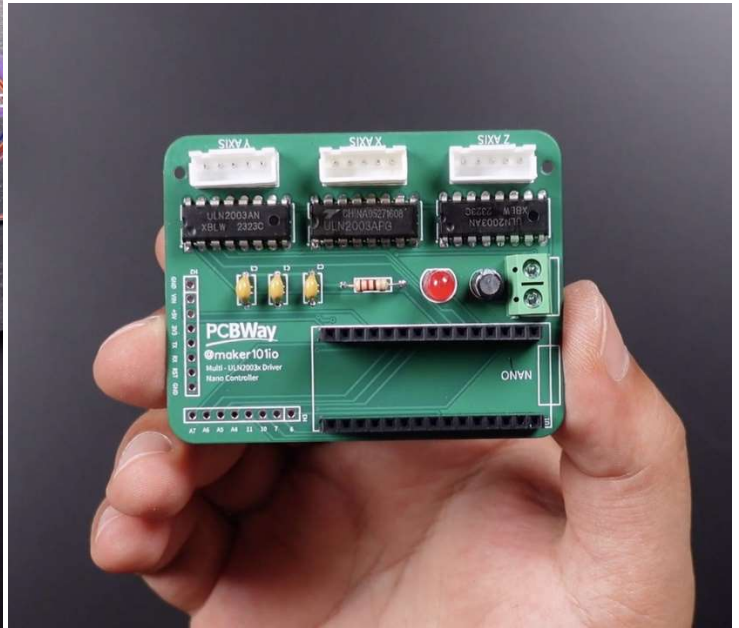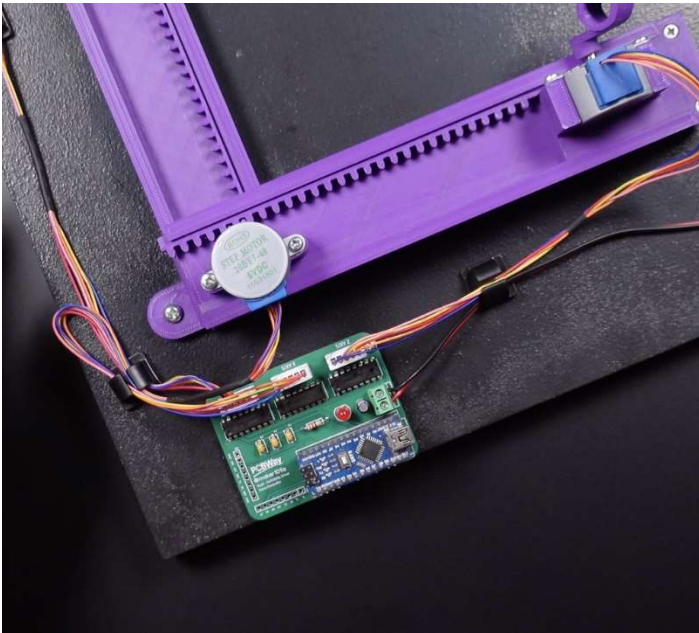

And if we have the chance to setup OUR PCB, maybe looks like the creator of t

For the Pins and Connections, we have 3 Steppers connected "With his PCB"

**https://www.pcbway.com/project/shareproject/Build_a_simple_3D_Arduino_Mini_CNC_Plotter_e2c3f905.html**

Step 3: Coding

Sure for specific Action of X,Y and Z need for library that focus in handling the 3 direction, from thw following Repo "TGit-Tech/**GRBL-28byj-48**" which This modification implements all 3-axises XYZ to a 28BYJ-48 stepper motor, and sure it will easiness the process of coding

Step 4: Vector Image

Will need to download "INKSPACE" "Download Inkscape 1.0.1 | Inkscape" to make it easier in drawing process, just upload the image you need to the app, and adjust the image size accordingly and place it on the page, then convert it to vector and no need for the inserted image, now Vector Image is ready to the work.
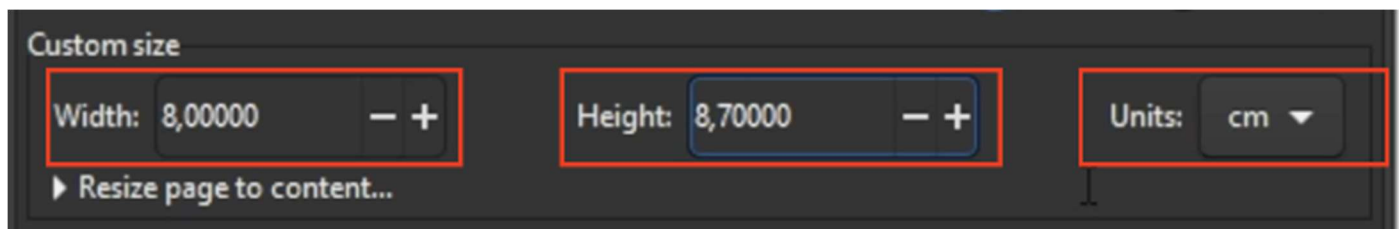
Step 5: Vector File to G-code

We will use the JSCut web tool to convert the vector file to G-code, Then, mark it to **return to the zero point at the end**, and adjust the **pen tip width**. Load the vector file, select it, and choose to create operation, there are several types of conversion options, choose the one that works for you, and click generate. Finally, save and download the g-code.

Step 6: UGS Platform (G-code Sender)

Now will download the main software that allows you to configure and control the plotter. First, **open the setup wizard**, select GRBL as firmware, select the connected port and serial communication, and click connect. The plotter will connect without any problems. In the **motor wiring section**, you can check if the motors are moving in the opposite direction and make changes. In this plotter, the **Y axis will move in reverse**. The **calibration section** allows you to set the initial position of all axes by moving them precisely. **Update the calibration** section **millimeter values** for this plotter with the values on the screen (**100, 100, 50**). You can then move the plotter axes and complete the update with the **'Reset to Zero' button** when you reach the optimal positioning. Then press the Finish button and the plotter start position will now be defined.

Import the generated g-code and **update the values in the bottom left corner** by entering the values on the screen (**0,991 - 0,991 - 15,113**). These values are the default values that are compatible with the stepper motors used in the plotter. If everything is ready, you can start the printing process by simply pressing the Send command