Arduino Shield Tutorial

This tutorial will walk you through:

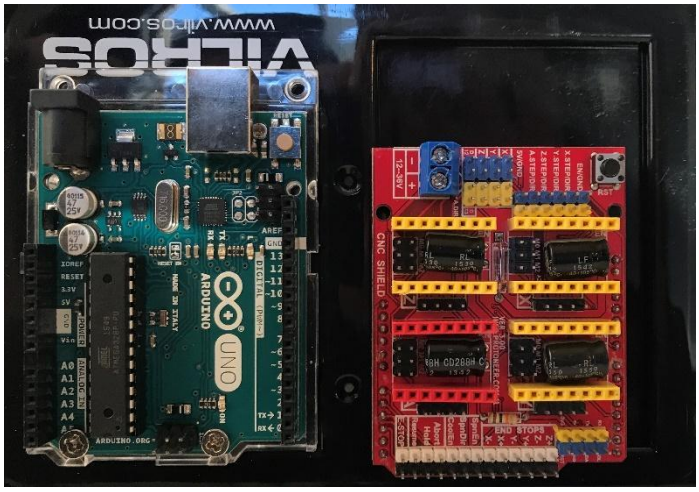
- Connecting the Arduino CNC Shield to an Arduino Uno and connecting servos to the Arduino.
- Downloading and installing the GRBL software.
- Loading the GRBL software onto an Arduino and configuring the GRBL software.
- Downloading and using the Universal G-Code Sender software, and
- Running a program on Universal G-Code Sender.

Materials:

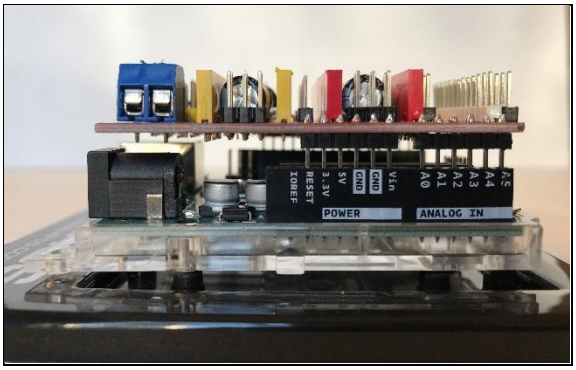
- Arduino Uno (1)
- Arduino Uno CNC Shield (1)
- NEMA Servo Drivers (2, up to 4)
- NEMA 14 Servos (2, up to 4)
- 12V power supply
- Computer with Arduino IDE software

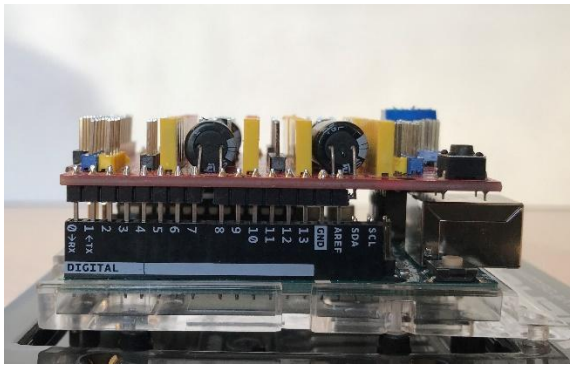
Hardware Installation

Begin by connecting the Arduino CNC Shield board to the Arduino Uno

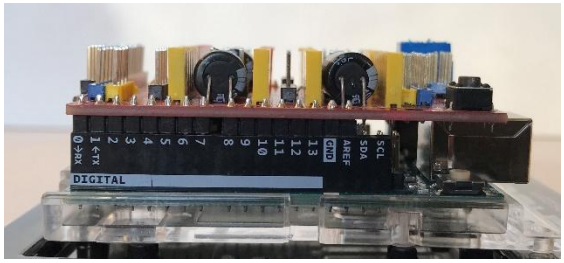


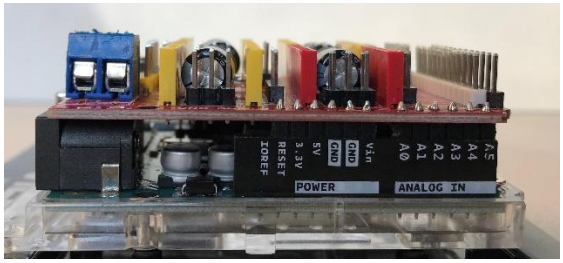
Line up the pins of the Arduino CNC Shield with the Arduino



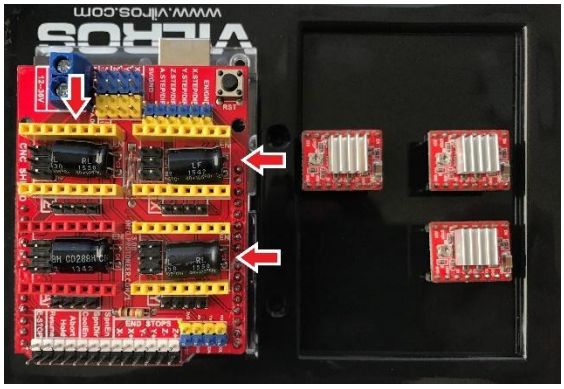


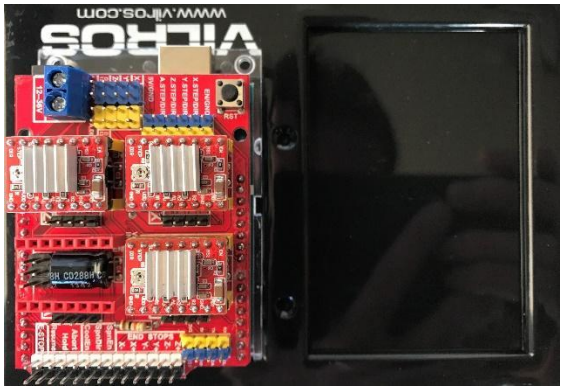
Carefully grasp the top and bottom or left and right sides of the CNC Shield board and press down until the pins are fully seated



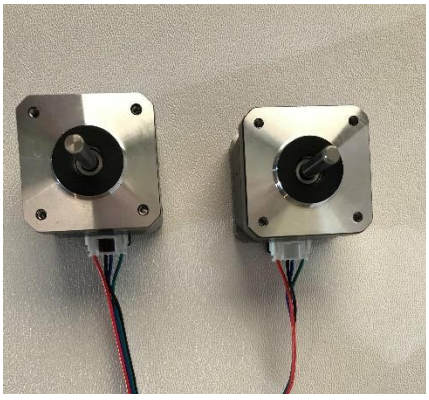


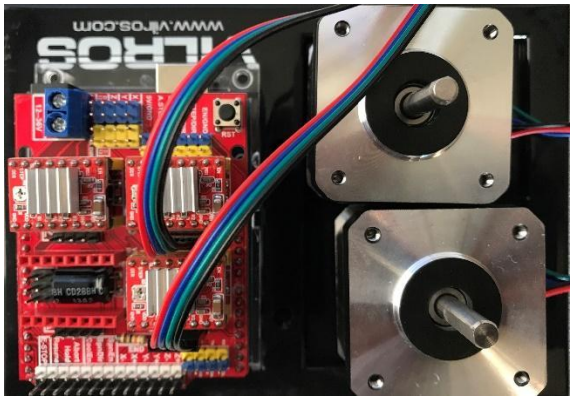
Place NEMA Servo drivers on CNC Shield Board (Red and white arrows identify location on CNC Shield board – orient the drivers all in the same direction, this way all your servos will rotate the same direction when first powered up. Apply uniform pressure to the top of each driver to seat each driver.



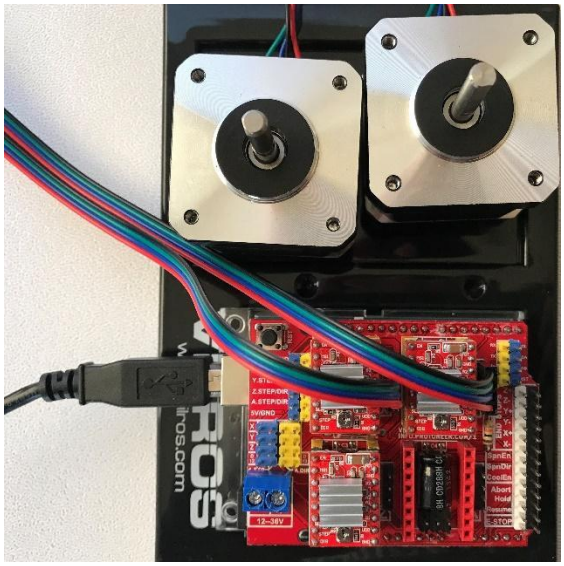


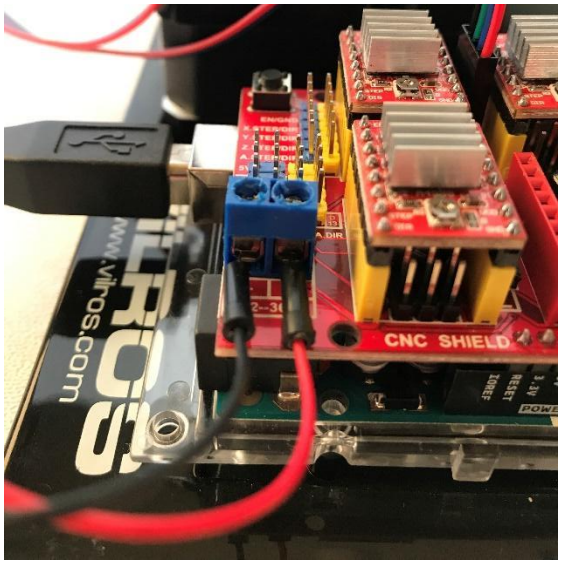
Connect the white wire connectors to the NEMA 14 Servos. Then connect the other end of the wires to the CNC Shield Board. When connecting wires to CNC board, connect each wire so that the red cable is closest to the **X**, **Y**, **Z**, and **A**.



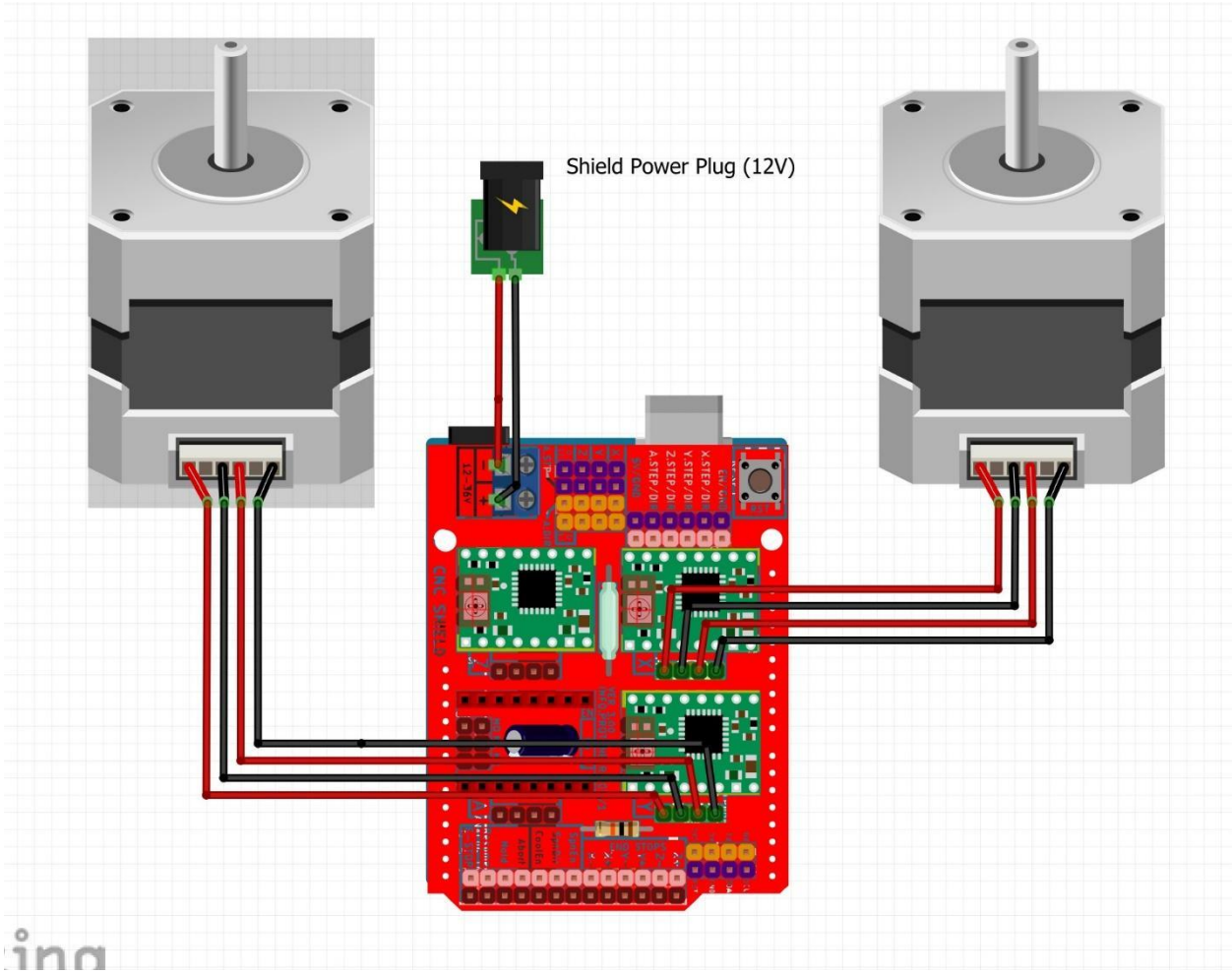


Connect USB 2.0 cable to the Arduino. Connect the 12V power supply to the CNC Shield and tighten contact screws.





Arduino CNC Shield Wiring Diagram

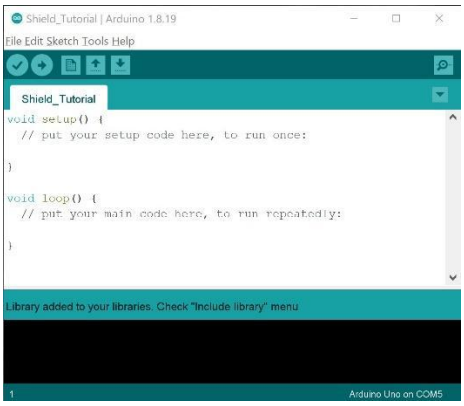


Download and Extract GRBL Software

Download GRBL software from github.com. (https://github.com/gnea/grbl/archive/refs/tags/v1.1h.20190825.zip)

Extract files from **grbl- 1.1h.20190825**

Load GRBL library into Arduino IDE



Open Arduino IDE software

Select **Sketch** -> **Include Library** -> **Add .ZIP Library**

Navigate to and open the **grbl- 1.1h.20190825** downloaded and extracted earlier

Select the folder **grbl** (left click once) and click **Open**

If successful, “Library added to your Libraries. Check “Include library” menu” should be displayed at the bottom of the screen

Upload GRBL software to Arduino

Select **File** -> **Examples** -> **grbl** -> **grblUpload**

*Note: **grbl** will be at the bottom of the **Examples** list

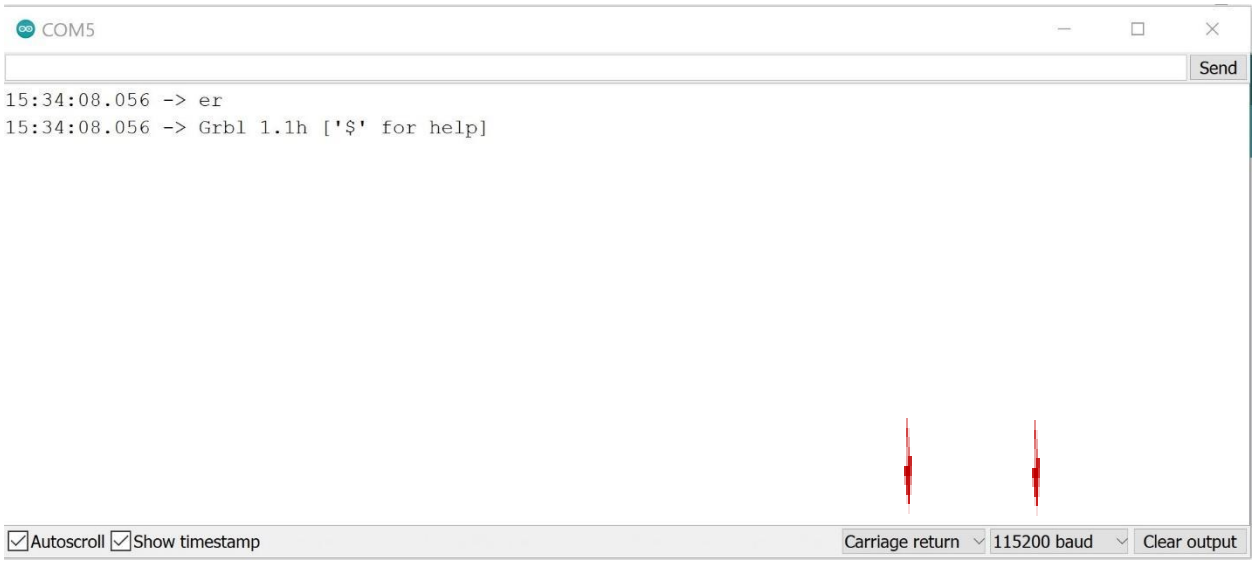
Connect your Arduino to your computer. In **Tools** ensure the correct board you are using is selected under **Board** (**Arduino Uno** is selected in our case), and that the correct Serial Port is selected under **Port** (**COM 5** is selected in our case).

Configure Arduino IDE software

After uploading the **grblUpload** program open the Serial Monitor

At the bottom of the Serial Monitor window make sure **No line ending** is changed to **Carriage return**

Also at the bottom of the Serial Monitor, make sure the baud rate is changed from **9600** to **115200**



Close the serial monitor before moving on to **Setting up Universal G-Code Sender (UGS)**

Downloading and opening Universal G-Code Sender (UGS)

Download Universal G-Code Sender from github.com (https://ugs.jfrog.io/ui/native/UGS/v2.0.9/ugs-platform-app-win.zip)

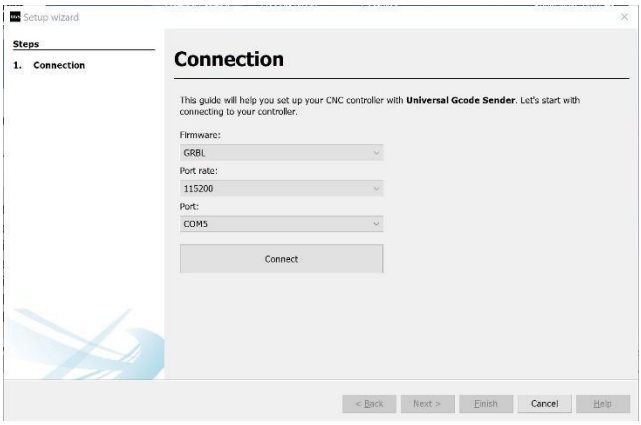
Extract files from **ugs-platform-app-win**

Open folder **ugs-platform-app-win**, then the folder **ugsplatform-win**, then the folder **bin**.

To open the UGS software select **ugsplatform.exe**

Setting up Universal G-Code Sender (UGS)

At the top of the window select **Machine** -> **Setup wizard**



Under the **Firmware:** dropdown menu make sure **GRBL** is selected

Under the **Port rate:** dropdown menu, select **115200**.

Under the **Port:** dropdown menu, select the same port you selected in the Arduino IDE software (**COM 5** is selected in our case).

Press **Connect**

If UGS connected the Setup wizard window will display the message, **Connected to Grbl 1.1h**

Press **Next**.

Press **Next** again until you are on the **Motor wiring** screen of the Setup Wizard

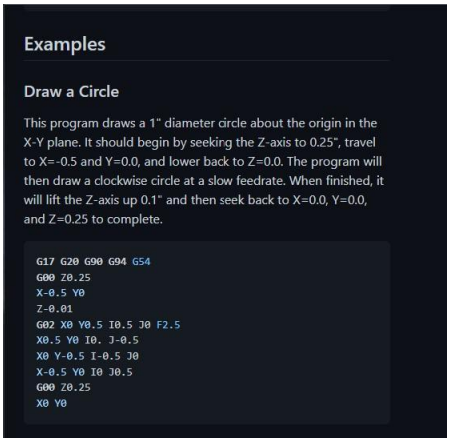
Test your servo motors by pressing **X-**, **X+**, **Y-**, and **Y+**.

If your servos respond, GRBL and UGS are successfully connected and responding.

Press **Next** until you arrive at the **Soft limits** window of the Setup wizard, at which point press **Finish**.

Running your first program

Travel to the **G Code Examples** portion of the GRBL github here. (https://github.com/grbl/grbl/wiki/G-Code-Examples)



Scroll down to the **Examples** portion of the page.

Copy the example code **Draw a Circle.**

Open a text file using **Notepad** or any text file software.

Paste the copied example code into a new text file.

At the top of the window select **File** and **Save As**.

Enter a file name, **Draw a Circle** for example

Change the extension to .**gcode**

The entire file name should look something like **Draw a Circle.gcode**.

Press **Save** and close the text file software.

In the UGS software select **File** -> **Open** and select the **Draw a Circle.gcode file** we just made.

To run the program press the Play button near the top left of the window

Your servos should begin rotating

If you wish to stop the program press the square button to the right of the play button.

References:

https://all3dp.com/2/grbl-arduino-cnc-controller-simply-explained/

https://github.com/grbl/grbl

https://github.com/gnea/grbl/releases

https://github.com/grbl/grbl/wiki/Compiling-Grbl

https://github.com/grbl/grbl/wiki/G-Code-Examples

https://github.com/winder/Universal-G-Code-Sender