



CNC from recycled PC parts

by [AndyL47](#) on March 1, 2016

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Intro: CNC from recycled PC parts

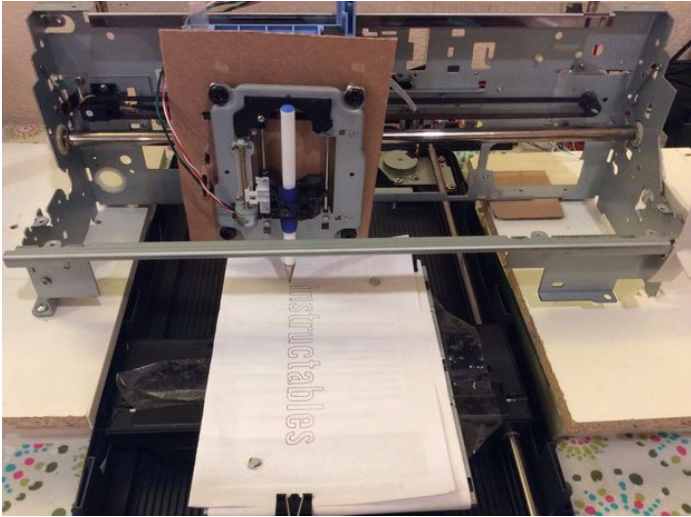
In this instructable I will show you how to make a very low cost CNC from recycled computer parts. This machine can do a lot of stuff depending on what you attach to it.

1. It can be used as a Plotter. (Attach a Pen as tool)
2. It can be a Laser Engraver. (Attach a Laser module as tool).
3. It can be used as a Router. (Attach a Drill Machine as tool).
4. It can be used as a PCB Plotter. (Attach a Permanent Marker as tool).
5. It can be used as a 3D Printer. (Attach extruder and hot end)
6. Possibilities are many.

This CNC is made up of recycled PC parts: old Printer, Scanner and CD/DVD drive.

It's based on [Arduino](#) and [GRBL](#).

*** If you like this instructable, please vote and comment [FULL SPECTRUM LASER CONTEST 2016!](#) It encourages me to upgrading it to something interesting ***



Step 1: Parts and Tools

1.1 Recycled PC Parts:

- CD/DVD-ROM x 1
- Printer x 1 (Canon S530D)
- Scanner x1 (HP Scanjet 3970)

Hints:

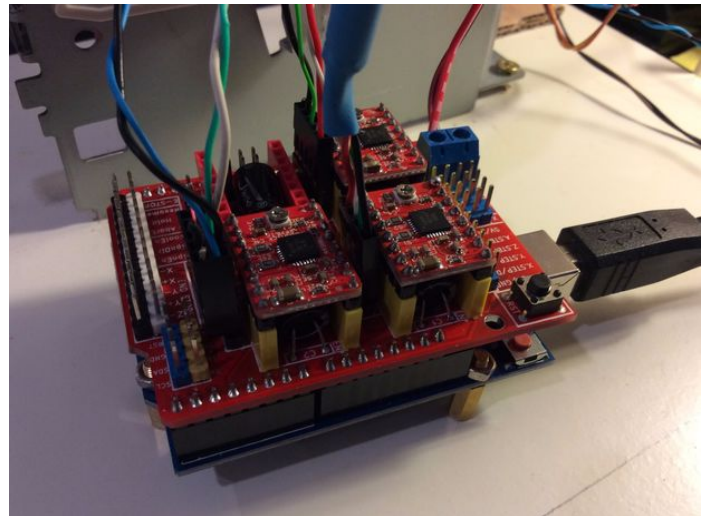
- The older the printer the better.
- The newer the scanners the better.

1.2 Parts I bought:

- Arduino UNO R3 x1
- Arduino CNC Shield V3 x1
- A4988 stepper motor driver x 3

1.3 Tools:

- Soldering Iron and Solder
- Computer with Arduino IDE



Step 2: Get useful parts

CD/DVD Drive:

2.1 Get stepper mechanism from a CD/DVD drive

The CD/DVD stepper mechanism will be using as Z-axis here for a Plotter.

Getting the stepper mechanism from a CD/DVD drive has been documented in other instructables very well already:

<http://www.instructables.com/id/Mini-CNC-Foam-Cutter/>

Printer:

2.2 Get carriage movement mechanism from a printer.

The printer stepper mechanism will be using as Y-axis.

2.2.1 carriage movement mechanism w/ DC motor

2.2.2 Stepper from paper feeder

<http://www.instructables.com/id/CNC-From-Recycled-PC-Parts/>

Scanner

2.3 Get carriage movement mechanism from a scanner

The scanner stepper mechanism will be using as X-axis.



Image Notes

1. paper feed stepper motor
2. DC motor
3. carriage movement mechanism



Step 3: Build X-axis

1. The X-axis is the easiest step here. We don't have to do much about it. Just need to disassemble the scanner and solder wires to the stepper motor.
2. Put the metal board from CD/DVD on the carriage of the scanner.



Step 4: Build Y-axis

Remove the gears from paper feed stepper motor, and then put the pulley from the main DC motor on it. To match the size, I am using plastic food wrap, totally works.



Image Notes

1. paper feed stepper motor
2. DC motor
3. carriage movement mechanism

Step 5: Build Z-axis

Make a pen holder and attach it to the CD/DVD stepper mechanism.

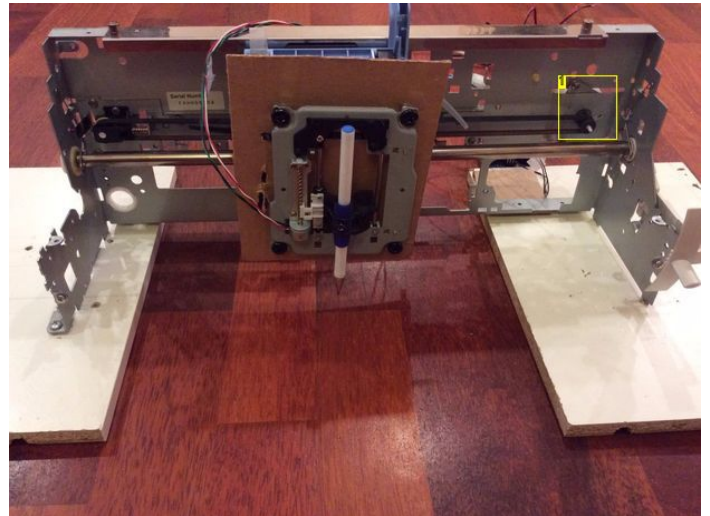


Image Notes

1. Replace the DC motor with paper feed stepper motor

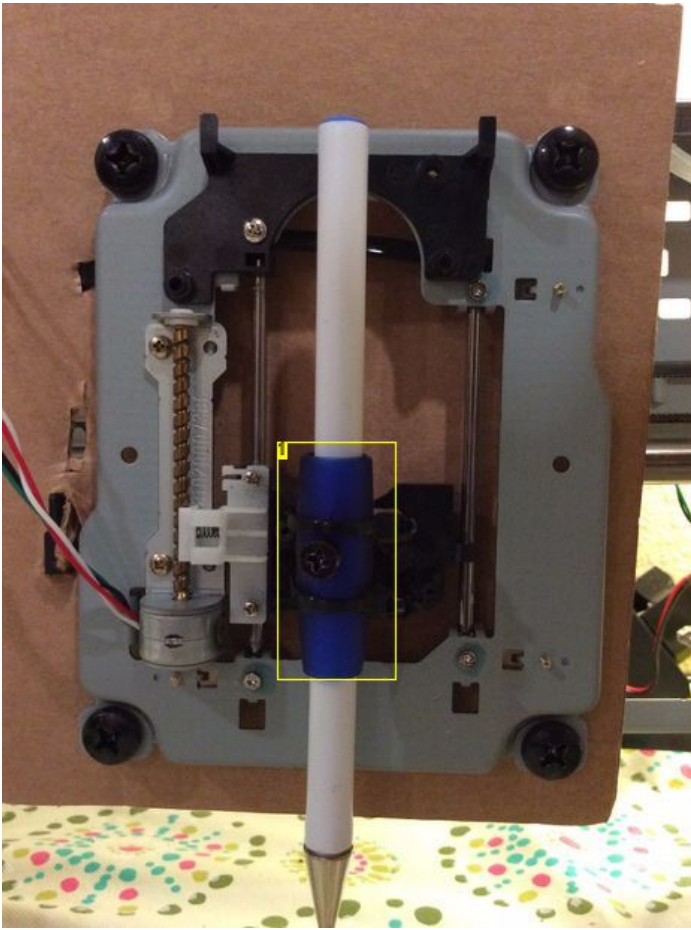


Image Notes

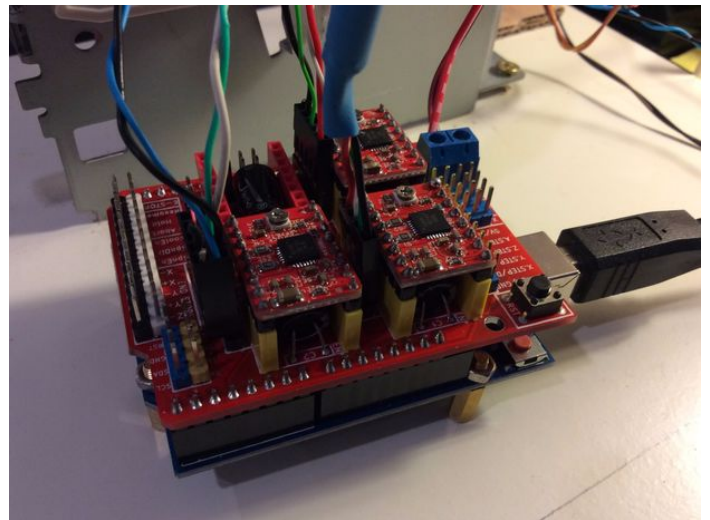
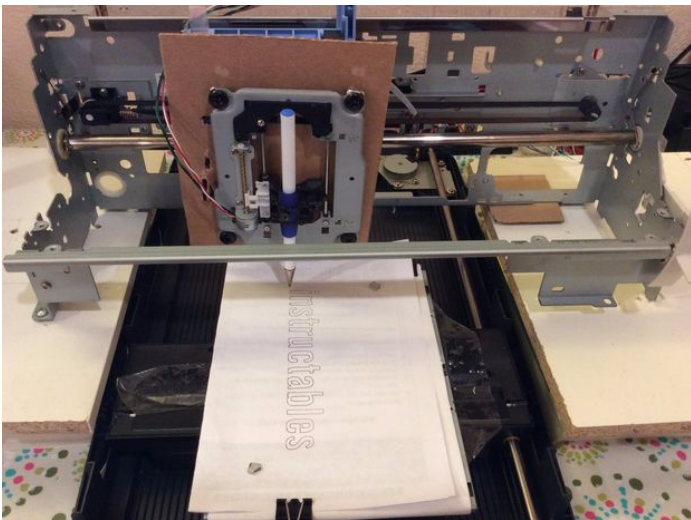
1. pen holder

Step 6: Axis assembly and Motors to Arduino CNC Shield Wiring

The assembly is very simple, please refer to the pictures.

The wirings are simple too. The point is to use multimeter to determine correct A+ A- / B+ B- for each motor.

For more information about Arduino CNC Shield, please visit <http://blog.protoneer.co.nz/arduino-cnc-shield-v3-00-assembly-guide/>



Step 7: Compile and upload GRBL to Arduino

7.1 Download GRBL source code

Download source code (v0.9i) from <https://github.com/grbl/grbl/archive/master.zip> Once downloaded, unzip it and you'll have a folder called grblmaster

7.2 Compile GRBL source code

7.2.1 Load GRBL to Arduino IDE (Version>1.6.1) as a library

<http://www.instructables.com/files/deriv/FZ0/2NHF/ILFI4C0P/FZ02NHFILFI4C0P.LARGE.jpg>

<http://www.instructables.com/files/deriv/F6T/ZKUU/ILFI4C0R/F6TZKUUILFI4C0R.LARGE.jpg>

7.2.2 Open the GrblUpload Arduino example.

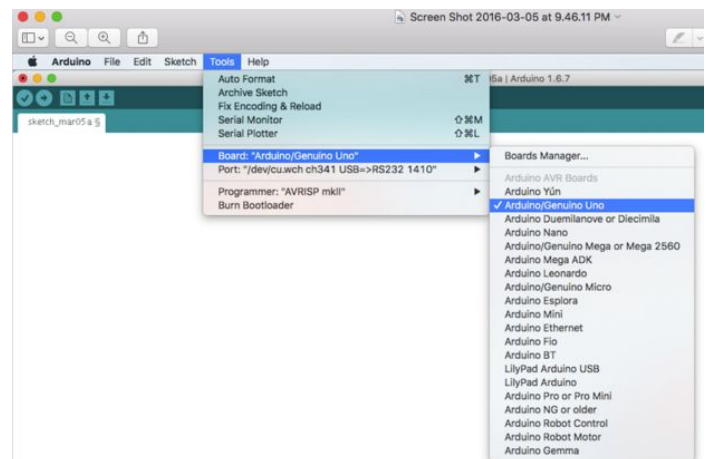
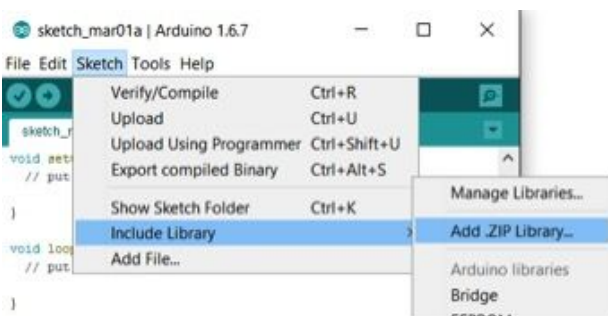
Click the File down-down menu, navigate to Examples->Grbl, and select GrblUpload.

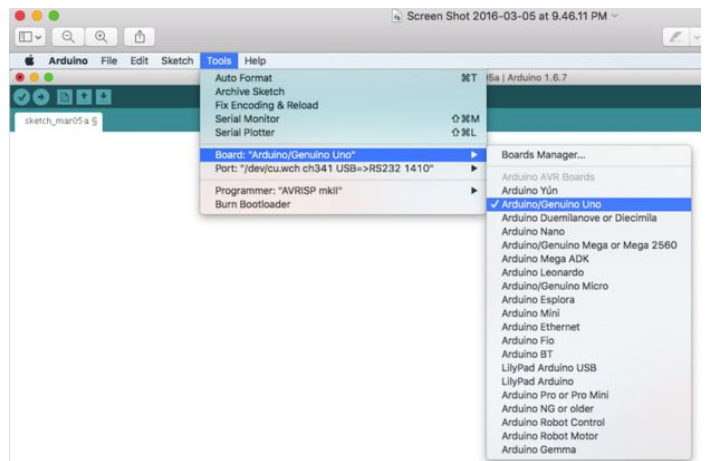
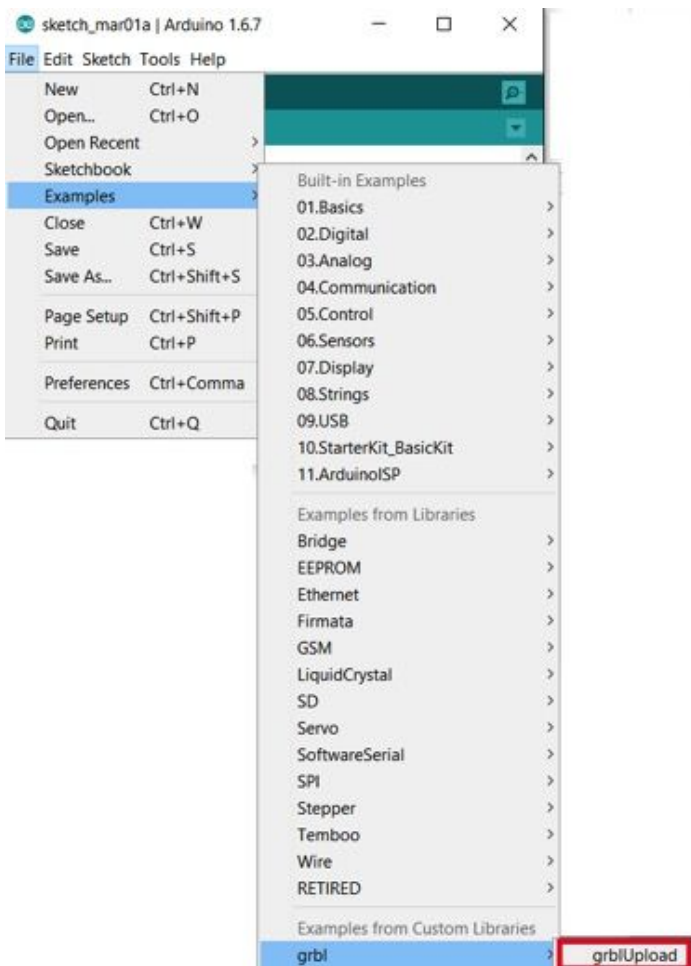
<http://www.instructables.com/files/deriv/FAT/KSLD/ILFI4C0S/FATKSLDILFI4C0S.LARGE.jpg>

7.2.3 Compile and upload Grbl to Arduino

Connect your Arduino Uno to your computer. Make sure your board is set to the Arduino Uno in the Tool->Board menu and the serial port is selected correctly in Tool->Serial Port. Click the Upload, and Grbl should compile and flash to your Arduino!

<http://www.instructables.com/files/deriv/FLW/M513/ILFI4CBN/FLWM513ILFI4CBN.LARGE.jpg>





Step 8: Settings for GRBL

8.1 X-axis

Stepper motor from xxx Scanner is 96 steps per revolution, and the timing belt pitch is 2.032mm. A4988 stepper drive is set to 8x micro step resolution. So it takes $96 \times 8 = 768$ steps per revolution now.

$768 / 2.032 = 377.953$ steps to make X-axis travel 1mm without gears, but it turns out it's a 1:2 gear ratio, so it takes $377.953 \times 2 = 755.906$ steps now.

Command $\$100=755.906$ makes the correct X-axis settings for GRBL

8.2 Y-axis

Stepper motor from xxx Printer is 48 steps per revolution, the pulley is 25 teeth, and the timing belt pitch is 1.5 mm. A4988 stepper drive is set to 16x micro step resolution. So it takes $48 \times 16 = 768$ steps per revolution now.

It travels $25 \times 1.5 \text{mm} = 37.5 \text{mm}$ per revolution.

$768 / 37.5 = 20.48$ steps to make Y-axis travel 1mm

Command $\$101=20.48$ makes the correct X-axis settings for GRBL

8.3 Z-axis

Stepper motors from DVD drive are 20 steps per revolution, and the screw is 3mm per turn. A4988 stepper drive is set to 8x micro step resolution. So it takes $20 \times 8 = 160$ steps per revolution now.

$160 / 3 = 53.333$ steps to make Z-axis travel 1mm

Command $\$102=53.333$ makes the correct Z-axis settings for GRBL


```

Grbl 0.9j ['$' for help]
$0=175 (step pulse, usec)
$1=25 (step idle delay, msec)
$2=0 (step port invert mask:00000000)
$3=0 (dir port invert mask:00000000)
$4=0 (step enable invert, bool)
$5=0 (limit pins invert, bool)
$6=0 (probe pin invert, bool)
$10=3 (status report mask:00000011)
$11=0.010 (junction deviation, mm)
$12=0.002 (arc tolerance, mm)
$13=0 (report inches, bool)
$20=0 (soft limits, bool)
$21=0 (hard limits, bool)
$22=0 (homing cycle, bool)
$23=0 (homing dir invert mask:00000000)
$24=25.000 (homing feed, mm/min)
$25=500.000 (homing seek, mm/min)
$26=250 (homing debounce, msec)
$27=1.000 (homing pull-off, mm)
$100=755.906 (x, step/mm)
$101=20.480 (y, step/mm)
$102=53.333 (z, step/mm)
$110=500.000 (x max rate, mm/min)
$111=500.000 (y max rate, mm/min)
$112=500.000 (z max rate, mm/min)
$120=20.000 (x accel, mm/sec^2)
$121=20.000 (y accel, mm/sec^2)
$122=20.000 (z accel, mm/sec^2)
$130=200.000 (x max travel, mm)
$131=200.000 (y max travel, mm)
$132=200.000 (z max travel, mm)
ok

```

Step 9: Power Supply

A 3-4A 12V laptop power supply works very well.



Step 10: Finish

This is the final result and I hope you like it.

Thanks so much for watching this instructable and enjoy!



Related Instructables



Arduino CNC by JohnnieT



3020 CNC + Arduino + GRBL + CNC SHIELD V3 by EricAusome



cnc Grbl with Adafruit Motot Shield v2 by vasiliuc



Small Arduino CNC by Make it BIG



CNC out of a scanner (cheap) by marwinrobot



Using a Single-Axis Stepper Driver with GRBL/RAMPS by dapiguy

Comments

1 comments [Add Comment](#)



DIY Hacks and How Tos says:
Awesome build!

Mar 6, 2016. 6:55 AM [REPLY](#)