# Weekly Documentation

The assignment for this week is to design and build a machine that includes mechanism, actuation, automation, and application. As a group, we decided to build a CNC machine that makes sawdust carpets.

A sawdust carpet is a tradition from Mexico and Central America. It consists of making a decoration carpet out of colorful sawdust and other materials.



Image taken from: https://www.pinterest.ca/pin/472948398361059816/

**Design Process** 

Machine Building

# Software

We are going to use an Arduino and CNC driver to control the machine, but the instructions will be given in g code, so there are a few things we must install to make it work.

#### Installing Java

Step 1: Go to your favorite browser and search for "java download" and open the link from the official java website.

Google java download	× 🌷	<b>0</b>
Q Todo 🗈 Imágenes 🕞 Vídeos 🗉 Noticias 🏽 Libros 🗄 Más	Не	rramientas
Cerca de 761,000,000 resultados (0.27 segundos)		
java.com https://www.java.com > download > ie_manual		
Descargar Java para Windows		
17 ene 2023 — Descargar <b>Java</b> para Windows. Version 8 Update 361 (filesize:	62.11 MB) Por	
qué se recomienda Java 8? Fecha de publicación: 17 de enero de		
Centro de ayuda de Java · Instrucciones de Instalacion · Eliminar versiones anti Visitaste esta nágina el 04-10-23	guas	
java.com https://www.java.com > ie_manual · Traducir esta página		
Download Java for Windows		
<b>Download Java</b> for Windows. Version 8 Update 361 (filesize: 62.11 MB) Why is recommended? Release date: January 17, 2023	Java 8	

Step 2: Press the Download Java option.



#### Step 3: Execute the downloaded file and install Java.

Configuración de Java - Bienvenido – 🗆 🗙					
Bienvenido a Java - Condiciones de licencia acto	ualizadas				
Condiciones que han cambiado en la licencia de esta versión d <u>Acuerdo de licencia actualizado</u> Esta versión de Java Runtime únicamente otorga permisos para el uso de sobremesa (no comerciales). El uso comercial de este software requiere una licencia independiente de Ora software. Haga clic en Instalar para aceptar el acuerdo de licencia e instalar Java ahora desinstalarlo del sistema.	lel software. equipos port acle o de su p o haga clic er	tátiles provee n Elimi	yde dorde narpara		
En este proceso de instalación no se registra ningún dato personal. <u>Detalle</u> <u>recopilamos</u>	<u>es de la infor</u> r	maciór	<u>n que</u>		
Cambiar la Carpeta de Destino	Instalar		Eliminar	r I	

Step 4: Wait a few seconds and Java will be installed.



e le comunicará cuando haya alguna actualización de Java disponible. Instale siempre las actualizaciones para aprovechar las mejoras de rendimiento y seguridad. <u>Más información sobre configuración de actualización</u>



#### Installing Universal Gcode Sender

Step 1: Go to your favorite browser and search for "universal gcode sender" and open the link from the Github site.

Google	universal gcode	e sender			×	•	٩
Q Todo 🖾 Imáge	enes 🕨 Vídeos	🗉 Noticias	⊘ Maps	: Más		Herram	iientas
Cerca de 374,000 resultados (0.37 segundos)							
Sugerencia: Buscar solo resultados en <b>español</b> . Puedes especificar el idioma de búsqueda en Preferencias.							
Universal Gcod	Universal Gcode Sender						
Universal Gcod	le Sender is <mark>a</mark> s	self-contair	ned Java	applicat	ion wł	nich	
includes all external dependencies and can be used on most							
computers running Windows, MacOSX or Linux.							
github.io       https://winder.github.io > ugs_website       Universal Gcode Sender - GitHub Pages							

Step 2: Go to Download Page found on the upper menu bar.

#### UGS Home Download User Guide 🔻 Developer Guide - Contributing **Universal Gcode Sender** Firmware: GRBL 0 Port: () /dev/tty Common Actions Jog Controller 📀 Visualizer 💿 **Features** XY Step size: 0.7 🗘 **Screenshots** Z+ Z Step size: mm Platform 11 0 Feed rate: Classic Y+Z+ Х-X+ **Sponsors** mm Y-Z-**Donations** 6 -Controller State (DRO) 📀 Macros

Step 3: Previously, we downloaded Java so we could run UGS, but there is a platform-based interface that has Java already integrated. I tried installing UGS Platform, following the user instructions found in the page, but could not running, so I decided to go old school and install the classic version. So, just click on the "All platforms" link under UGS Classic.

# UGS Platform

The next generation platform-based interface.

Version 2.0.14	Version 2.0.13	Description
O Windows x64	O Windows x64	Windows 64-bit version with bundled Java
Windows	Windows	Windows version with bundled Java
💰 MacOSX	🔹 MacOSX	MacOSX version with bundled Java
∆ Linux	∆ Linux	Linux version with bundled Java
Linux ARM	Linux ARM	Linux ARM version with bundled Java. Can be used with RaspberryPi
All platforms	All platforms	A generic package without Java which needs to be installed separately

# UGS Classic

The classic UGS interface with slightly less features but with the same robust backend as the Platform edition.

Version 2.0.14	Version 2.0.13	Description
All platforms	All platforms	A generic package without Java which needs to be installed separately

Step 4: Unzip the file and go to the UniversialGodeSender.jar and execute it.

<b>`</b>	Descargas > UniversalGcodeSender >	UniversalGcodeSender		
	Nombre	Fecha de modificaci	Тіро	Tamaño
nal	$^{\vee}$ al principio de este año			
	UniversalGcodeSender.jar	26/1/2023 17:09	Executable Jar F	26,531 KB
*	README.txt	26/1/2023 17:05	Documento de	1 KB
*	start.sh	26/1/2023 17:05	sh_auto_file	1 KB
*	start-cli.sh	26/1/2023 17:05	sh_auto_file	1 KB
*	🐁 start-windows.bat	26/1/2023 17:05	Archivo por lot	1 KB



🛓 Universal Gcode Sender (Ver	sion 2.0.14)			-		×
Settings Pendant						
Connection						
Port	Machine Control Macros					
	Reset Zero	Reset X Axis	Enable Keyboa	rd Movement		
Baud: 115200 C2 Open	Return to Zero	Reset Y Axis	XY St	ep size:		1
Firmware: GRBL	Soft Reset	Reset Z Axis	mm Z Ste	p size:		1
Machine status	SH SX SC		Feed	rate:	1	100
Active State:	\$G Help		Y	+	Z	2+
Work Position: Machine Position:			X-	X+		
X: 0 X: 0			Y	-		Z-
Y: 0 Y: 0						
Z: 0 Z: 0	Scroll output window SI	how verbose output	Enable command table			
File	Console Command Tab	le				
Rows In File: 0						
Remaining Rows: 0						
Estimated Time Remaining: -::						
Duration: 00:00:00						
Send Pause Cancel						
Visualize Browse Save						
	Command:					

#### **GRBL** Library

We need to provide the GRBL library to the Arduino so it can understand the commands send from the Universal Gcode Sender, so here are the steps to install it.

Step 1: Step 1: Go to your favorite browser and search for "grbl arduino library" and open the link from the Github site.



Cerca de 152,000 resultados (0.38 segundos)



# GitHub - Protoneer/GRBL-Arduino-Library

Arduino Library for GRBL - With this Library you can use the Arduino IDE to upload GRBL to your Arduino Board. (More details at the bottom of this page).

https://github.com > blob > READ... · Traducir esta página

# GRBL-Arduino-Library/README.md at master - GitHub

Arduino Library for GRBL - With this Library you can use the Arduino IDE to ...

Step 2: Click on the green dropdown button "Code" and click on "Download ZIP".

Product ~ Solutions ~ Open Source ~ Pricing Search					
Protoneer / GRBL-Arduino-Library Public					🗘 Notif
<> Code 🔿 Issues 5 👬 Pull req	uests 1 🕑 Actions 🗄	Projects 🖽 Wi	iki 🕛 Secu	rity 🗠 Insights	
🐉 master 🗸 🐉 1 branch 🔊 0 tags				Go to file	Code 🝷
Protoneer Update README.md		Local		Codespaces	
examples/GRBLtoArduino	Include the testing boards	▶ Clone			?
🖺 README.md	Update README.md	HTTPS GitHu	ıb CLI		
🖺 config.h	Inial Commit	https://github.	.com/Protoneer,	/GRBL-Arduino-Lib	Q
Coolant_control.cpp	Inial Commit				
Coolant_control.h	Inial Commit	🖞 Open with Gi	tHub Desktop		
🖺 defaults.h	Inial Commit				
Peeprom.cpp	Updated the EEPROM and S	Download ZI	P		

Step 3: Open the Arduino IDE.



Step 4: Go to Sketch > Include Library > Add .ZIP Library...

🔤 sk	etch_a	pr11a   Ard	luino IDE 2.0.3				
File	Edit	Sketch 1	Tools Help				
	24	Verify,	/Compile	Ctrl + R		-	
		Uploa	d	Ctrl + U			
P	•	Config	gure and Upload				
		Uploa	d Using Programmer	Ctrl + Mayús + U			
۶,		Export	t Compiled Binary	Alt + Ctrl + S		e, to run once:	
	-	Optim	ize for Debugging				
m	n	Show	Sketch Folder	Alt + Ctrl + K			
	u	Includ	le Library		►	Manage Libraries	Ctrl + Mayús + I
1	>	Add F	ile			Add .ZIP Library	
Đ.		9	}				
$\sim$		10				Contributed libraries	
C	ξ					ESP32Servo	

Step 5: Select the GRBL-Arduino-Library-master.zip file we have just downloaded, and it will get installed.

🔤 Select a zip file co	ntaining the library you'd like to add	×
$\leftarrow \rightarrow ~ \checkmark ~ \uparrow$	↓ > Descargas > ∨ C Be	ıscar en Descargas 🛛 🔎
Organizar 👻 Nuev	a carpeta	<b>=</b> • <b>•</b> ?
> 🌰 Fávell - Persoi	Nombre V hoy	Fecha de modificaci
📒 Escritorio 🔺	🧮 GRBL-Arduino-Library-master.zip	11/4/2023 10:37
🛓 Descargas 🖈	🔚 UniversalGcodeSender.zip	11/4/2023 10:08
📔 Documentc 🖈	∨ ayer	
🔀 Imágenes 🖈	🔚 grbl-master.zip	10/4/2023 12:25
🗖 Unitec 🛛 🖈	UniversalGcodeSender	10/4/2023 16:59
🚞 Mis clases 🖈		
🖿 Fablab 🛛 🖈		_
No	nbre: GRBL-Arduino-Library-master.zip	brary (*.zip) ~ Abrir Cancelar

Step 6: Close the IDE and open it again. Go to File > Examples. You will see that there will be a new example for the library recently installed, so select GRBLtoArduino.

Sketch_apr11a   Arduino IDE 2.0.3						
File Edit Sketch Tools Help						
New Sketch Ctrl + N		-				
New Remote Sketch Alt + Ctrl + N						
Open Ctrl + O						
Open Recent	►					
Sketchbook	►	tup code here, to run on	ice	:		
Examples	►	Built-in examples				
Close Ctrl + W		01.Basics	۲			
Save Ctrl + S		02.Digital	۲			
Save As Ctrl + Mayús + S		03.Analog	۲	edly:		
Proferences (trl + Coma		04.Communication	۲			
		05.Control	۲			
Advanced	►	06.Sensors	►			
Ouit Ctrl + O		07.Display	►			
		08.Strings	۲			
		09.USB	►			
		10.StarterKit_BasicKit	►			
		11.ArduinoISP	►			
		Examples from Custom Libraries				
		FSP32Servo	•			
		GRBL-Arduino-Library-master	▶	GRBLtoArduino		
		Child And the Elotary Huster				

Step 7: Upload the example to your Arduino and verify that there are no errors. If everything has been done correctly, now you are ready to send the Gcode from UGS to your Arduino.

🥯 GRBLtoArduino   Arduino IDE 2.0.3				
File Ed	it Sketch	Tools Help		
$\checkmark$	⇒ ₽	🜵 Arduino Uno 👻		
P	GRBLtoA	rduino.ino		
	18	*/		
	19			
የ	20	/*		
	21	Supported hardware:		
	22	Arduino Duemilanove		
ШŊ	23	Arduino Uno		
	24	Arduino Mega 2560 (Limited Testing)		
	25			
÷.	26	*/		
	27			
	28	<pre>#include <grblmain.h></grblmain.h></pre>		
$\sim$	29			
	30	<pre>void setup(){</pre>		
	31	<pre>startGrbl();</pre>		
	32	}		
	33			
	34	<pre>void loop(){}</pre>		

#### Setting up

🛓 Universal Gcode Sender (Vers	sion 2.0.14)	- 🗆 X
Settings Pendant		
Connection		
Port: COM6	Machine Control Macros	
Baud: 9600 🔻 🔇 Open	ResetZero	Enable Keyboard Movement
Firmware: CPRI	Return to Zero Reset Y Axis	XY Step size: 1
Filliwale. GRBL	Soft Reset Reset Z Axis	mm Z Step size: 1
Machine status	SH SX SC	Feed rate: 100
Active State:	\$G Help	Y+ Z+
Latest Comment:		X- X+
X: 0 X: 0		Y- Z-
Y: 0 Y: 0		
Z: 0 Z: 0	Scroll output window Show verbose output	Enable command table
File		
Rows In File: 0	Console Command Table	
Sent Rows: 0		
Remaining Rows: 0		
Duration: 00:00:00		
Send Pause Cancel		
Visualize Browse Save		
	Command:	

Step 1: Open UGS and select the port connected to the Arduino. Then click on Open.

Step 2: You will be connected and see the commands and an ok message in the Console.

🛓 Universal Gcode Sender (Vers	sion 2.0.14) —	×
Settings Pendant		
Connection	Machine Control Macros	
Port: COM6 Baud: 9600 V Close Firmware: GRBL Vachine status Active State: Idle Latest Comment: Work Position: Machine Position: X: 0mm X: 0mm	Reset Zero       Reset X Axis       Enable Keyboard Movement         Return to Zero       Reset Y Axis       XY Step size:         Soft Reset       Reset Z Axis       mm         SH       SC       Feed rate:       10         SG       Help       Y+       Z+         X-       Y-       Z+       Z+	
Y: 0mm Y: 0mm		
Z: 0mm Z: 0mm	🗹 Scroll output window 🗌 Show verbose output 📄 Enable command table	
File Rows In File: 0 Sent Rows: 0 Remaining Rows: 0 Estimated Time Remaining: Duration: 00:00:00 Send Pause Cancel Visualize Browse Save	Console         Command Table           912 - 3         (IF-BELTINERS, INI)           \$13 = 0         (report inches, bool)           \$14 = 1         (auto start, bool)           \$15 = 0         (invert step enable, bool)           \$16 = 0         (hard limits, bool)           \$17 = 0         (homing cycle, bool)           \$18 = 0.5000         (homing feed, mm/min)           \$20 = 250.000         (homing feed, mm/min)           \$21 = 100         (homing pull-off, mm)           ok         >>> \$G           [Go 54 G17 G21 G90 G94 M0 M5 M9 T0 F250.000]         ok	
	Command:	