COLGATE UNIVERSITY



Introduction To

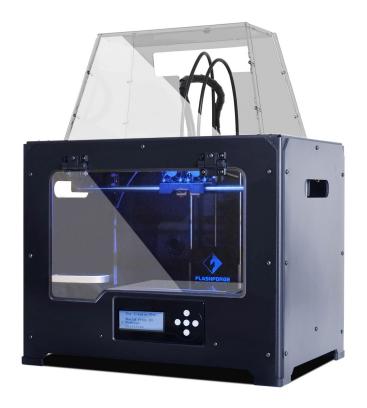
3D Printing

What is 3D Printing?

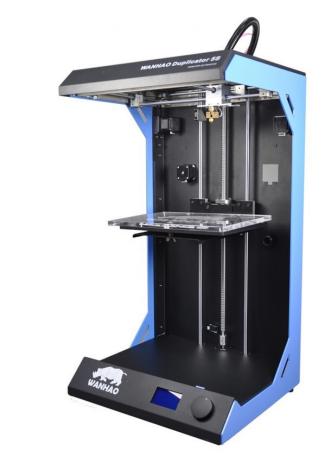
- An additive process where materials are joined, layered, or solidified with the assistance of computer hardware and software to create a three-dimensional object
- The first additive manufacturing equipment and materials were developed in the early 1980s
- Today there are a number of processes and materials to create 3D prints including:
 - Powder
 - Plastics
 - Resins
 - Metals

Types of Printers at Colgate

- Fused Filament Fabrication
 - Plastic filament is melted and built up layer by layer to create the object
- Stereolithography
 - Light (lasers) causes chemical monomers (resin) to link together to form polymers (plastic)







Flashforge Creator Pro

Formlabs Form 2

Wanhao Duplicator 5S

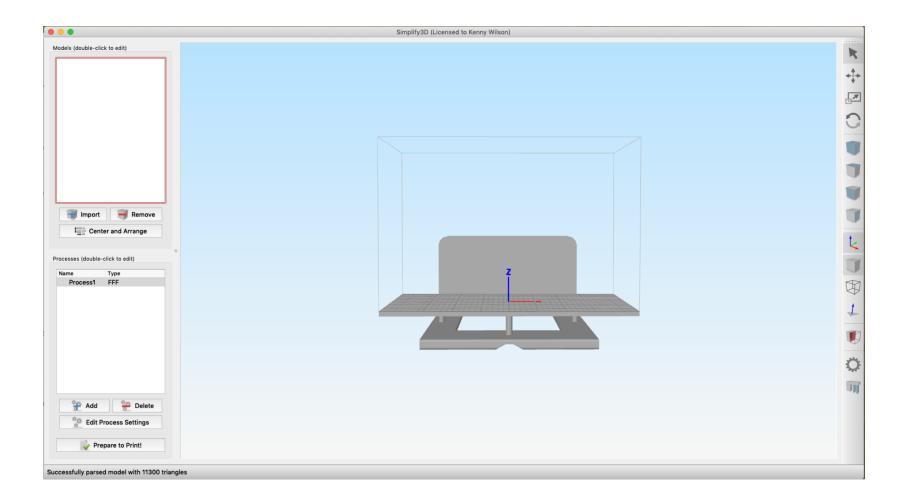
How Do You Create A 3D Print?

- Design A File
 - Tinkercad
 - Maya
 - AutoCAD
- Find A File
 - Thingiverse
 - www.thingiverse.com
 - Cults
 - https://cults3d.com/en
- Slice the model
 - Simplify3D
- Print

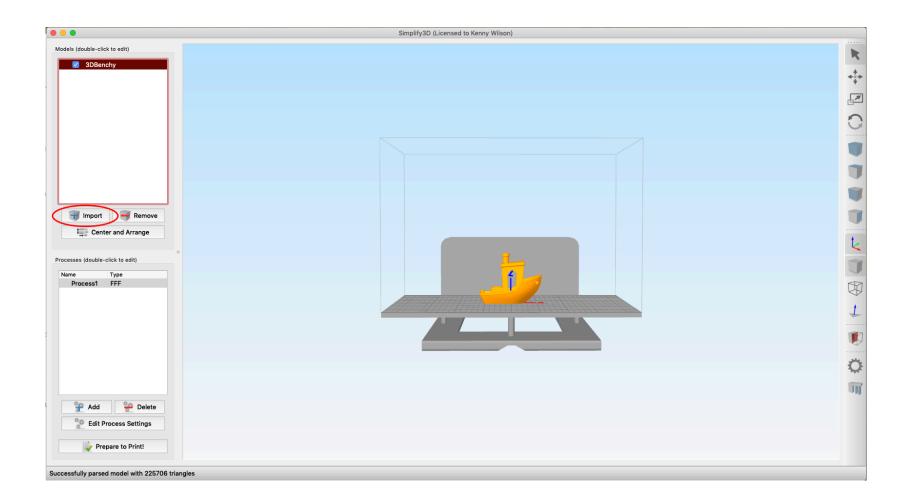
- Slicing software takes your CAD file and turns it into a set of instructions that the printer uses to construct your object
- gcode

- CAD = Computer Aided Design
- CAD software takes your design and turns it into a compatible file, most commonly a STL file

Opening Simplify3D



Import A STL File



Edit Process

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Models (double-click to edit)	Process Name: Process1	R
3DBenchy	Select Profile: FlashForge Creator Pro (modified)	++++
	2) Make sure PLA is selected Auto-Configure for Material Auto-Configure for Print Quality Auto-Configure Extruders	
	PLA 00 Medium 0 0 Right Extruder Only 0	E.
	General Settings 3) Choose left or right extruder	0
	Infill Percentage: 20% 🗹 Include Raft 🗹 Generate Support	
	Extruder Layer Additions Infill Support Temperature Cooling G-Code Scripts Speeds Other Advanced	7
	Extruder List (click item to edit settings) Left Extruder Toolhead	W
Temove Remove	Right Extruder Left Extruder Coolhead Index Tool 1	3
t ₌₌ Center and Arrange	Nozzle Diameter 0.40 0 mm	Ł
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Hame Type Process1 FFF	Extrusion Width 🔿 Auto 💿 Manual 0.40 🗘 mm	
	Ooze Control	
	Retraction Retraction Distance 1.00 🗘 mm	T
1) Double click above or	Extra Restart Distance 0.00 🗘 mm	
click below to edit process	Retraction Vertical Lift 0.00 🗘 mm	
	Retraction Speed 1200.0 🗘 mm/min	¢
	Add Extruder	Uj
🚰 Add 🔐 Delete	Remove Extruder Wipe Nozzle Wipe Distance 5.00 0 mm	
Set Edit Process Settings		
Prepare to Print!	Hide Advanced Select Models OK Cancel	
Successfully parsed model with 225706 triangles		

Select Additions

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✓ 3DBenchy	Select Profile: FlashForg	ge Creator Pro (modified)	CUpdate Profile Save as New Remove	***
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				0
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	Extruder Lay	er Additions Infill Support Temperature	Cooling G-Code Scripts Speeds Other Advanced	7
	(☑ Use Skirt/Brim	Use Prime Pillar	
Filmport Remove		Skirt Extruder Right Extruder ᅌ	Prime Pillar Extruder All Extruders	
tennor		Skirt Layers 1	Pillar Width 12.00 🗘 mm	_
	Make sure skirt/brim	Skirt Offset from Part 4.00 🗘 mm	Pillar Location North-West 🗘	k
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		Raft Extruder Right Extruder	Ooze Shield Extruder All Extruders ≎	
		Raft Top Layers 3 0	Offset from Part 2.00 0 mm	1
		Raft Base Layers 2	Ooze Shield Outlines 1	
		Raft Offset from Part 3.00 🗘 mm	Sidewall Shape Waterfall	
		Separation Distance 0.14 🗘 mm	Sidewall Angle Change 30 🗘 deg	0
		Raft Top Infill 100 🗘 %	Speed Multiplier 100 🗘 %	T
Se Add Se Delete		Above Raft Speed 30 🗘 %		~***
Edit Process Settings				
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Infill

- 15 to 20 percent infill is usually adequate
- Fast Honeycomb improves print time

000	FFF Settings	
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	General Infill Angle Offsets	U
Import Remove	Infill Extruder Right Extruder O C deg O	J
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	Minimum Infill Length 5.00 0 mm -45	1
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Support

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Add Delete Edit Process Settings	Der Hide Advanced	Select Models	0 %	0 0 deg Add Angle Remove Angle	0	OK Cancel

Bed Temperature

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	PLA O O Medium O O Right Extruder Only O	
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	Extruder Layer Additions Infill Support Temperature Cooling G-Code Scripts Speeds Other Advanced	7
	Temperature Controller List (click item to edit settings) Heated Build Platform Temperature	
Filmport Remove	Right Extruder Overview Left Extruder Temperature Identifier Heated Build Platform To	J
tige Center and Arrange	Temperature Controller Type: O Extruder O Heated build platform	k
Processes (double-click to edit)	Wait for temperature controller to stabilize before beginning build	3
Name Type Process1 FFF	Per-Layer Temperature Setpoints	
	Layer r Temperature Add Setpoint	1
	Remove Setpoint	×
c c c c c c c c c c c c c c c c c c c	Double click to change to 60 Layer Number 1 0	
	Add Temperature Controller 200 C °C	0
	Remove Temperature Controller	
		UI
Add 😤 Delete		
See Edit Process Settings		
🔯 Prepare to Print!	Hide Advanced Select Models OK Cancel	
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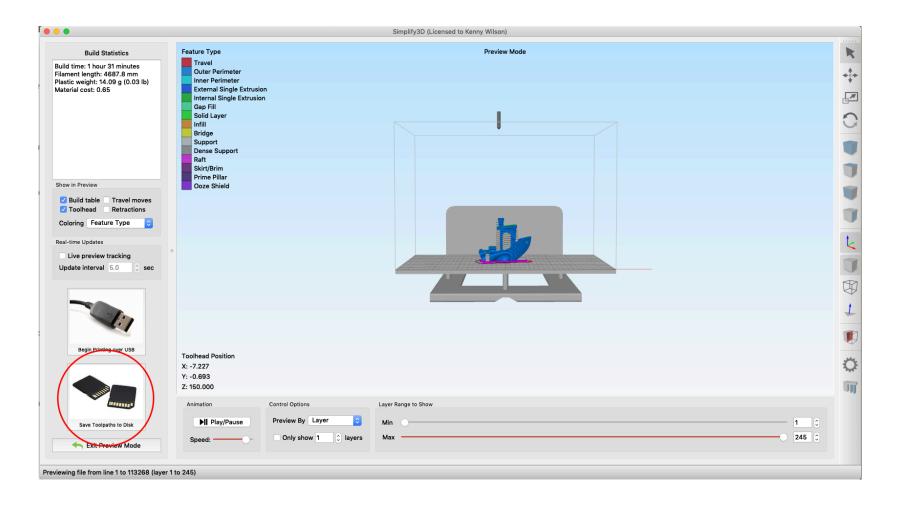
Extruder Temperature

000		
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☑ 3DBenchy	Select Profile: FlashForge Creator Pro (modified) O Update Profile Save as New Remove	***
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	PLA O O Medium O O O Right Extruder Only	
	General Settings	0
	Infill Percentage: 15% 🕑 Include Raft 🛛 Generate Support	
	Extruder Layer Additions Infill Support Temperature Cooling G-Code Scripts Speeds Other Advanced	7
	Temperature Controller List (click item to edit settings) Right Extruder Temperature	
Remove	Right Extruder Overview Left Extruder Temperature Identifier To Heated Build Platform Temperature Identifier To	1
t Center and Arrange	Make sure you have the extruder that matches your Temperature Controller Type: • Extruder	Ł
Processes (double-click to edit)	selection in the upper right selected Wait for temperature controller to stabilize before beginning build	
Name Type Process1 FFF		0
FIOLOSSI FIT	Per-Layer Temperature Setpoints	
	Layer V temperature Add Setpoint 1 220 Remove Setpoint	1
	Double click to change to 220 Layer Number 1 0	
	Add Temperature Controller Temperature 200 0 °C	
	Remove Temperature Controller	O
		T
Se Add		
2 Edit Process Settings		
Prepare to Print!	Hide Advanced Select Models OK Cancel	
Successfully parsed model with 225706 triangles		

Prepare To Print



Save To SD Card



Let's Make A Name Tag

- On your computer, open the MediaSAN folder on the desktop
 - Locate the student work folder
 - Locate 'Name Plate' folder
 - Locate 'Media Mentor Name Plate.stl'
 - Drag it to your desktop
- Create a Tinkercad account
 - Import the name plate file
 - Add a text object and edit it
 - Export a STL file
- Save your file to the desktop
 - Move it to the MediaSAN server
 - YourName.stl
 - MediaSAN -> Student Work -> Name Plate

Thank You

• Feel free to contact me at <u>kjwilson@colgate.edu</u>