



GATOR CHAPTER
NATIONAL SOCIETY OF BLACK ENGINEERS




INNOVATORS

3D Printing 101





Agenda

- Icebreaker
 - What is it?
 - How does it work?
 - Applications
 - On Campus Options
 - Make your own Keychain
- 



Dear NSBae

A Light “Heart”ed Icebreaker

The Rules

1. Divide into groups of 2-3 people.
2. Your group has 5 minutes to write a love letter to your NSBae using the conversation hearts on the next slide.
3. Your letter must begin “Dear NSBae” and end “Yours truly” (signed by everyone in that group).
4. You must use the words on the hearts in a sentence.
5. You can use more than one heart in a sentence.
6. The words on the heart can be at the beginning, middle or end of the sentence.
7. The group who uses the most conversation hearts will win. (If there is a tie, we will vote on our favorite love letter.)




Example

Dear NSBae,

My **“heart beat”**s fast when I think of you. **“Call me”** if you want to go to the next Innogators meeting together. I’m sure if we’re together everything will **“be good”**. **“I wonder”** if I shoot my shot, will it go in? **“It’s true,”** I want to be your NSBae **“forever”** because we have such a **“good time”**!

Yours Truly,

Cam and TJ





BE MINE	XOXO	CUTIE PIE	SWEET HEART	REAL LOVE	SWEET PEA	UDA BOMB
DREAM ON	NUTS 4U	LET IT SHINE	BE TRUE	STAY COOL	BFF	BEST DAY
KISS ME	LUV U	MARRY ME	TRUE LOVE	LET'S KISS	DREAM BIG	LOVE WINS
TE AMO	STAY SWEET	FIRST KISS	YES	BE HAPPY	I DO	SWEET TALK
SMILE	CUTIE	STAY TRUE	I DIG YOU	WINK WINK	MISS YOU	CALL ME
LOVE BUG	SWEET STUFF	GOOD TIMES	CRAZY 4U	HUG ME	I MELT	LOL
SOUL MATE	NOPE	HOT STUFF	ALL MINE	YOU ROCK	EMAIL ME	IM YOURS



A teal background with a large white circle in the center containing the text "3D Printing". The white circle is surrounded by several smaller, overlapping circles in various colors including yellow, orange, red, pink, and blue. The overall design is modern and abstract.

3D Printing

What is It?

- Method of **additive manufacturing**
- Used in almost every industry
- “The action or process of making a physical object from a three-dimensional digital model, typically by laying down many thin layers of a material in succession.”

Workflow



Design

Slicer

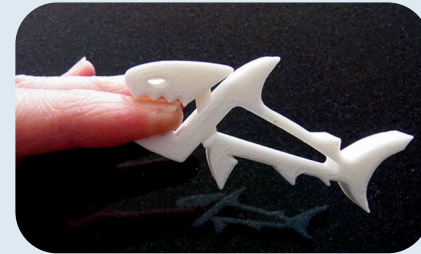
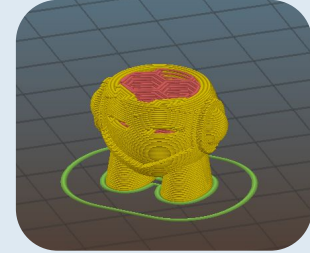
G-Code

3D Printer

Product

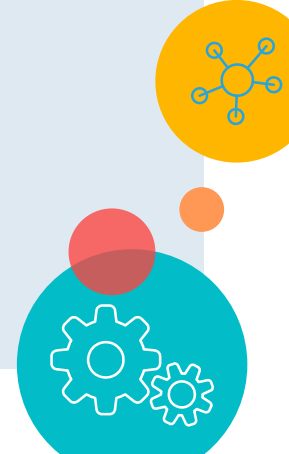
Finishing

```
27 ;Layer count: 336
27 ;LAYER:0
28 M107
29 G0 F9000 X91.800 Y93.520 Z0.300
30 ;TYPE:SKIRT
31 G1 F1200 X92.617 Y92.870 E0.01964
32 G1 X93.518 Y92.412 E0.03865
33 G1 X94.458 Y92.141 E0.05705
34 G1 X95.218 Y92.072 E0.07141
35 G1 X95.998 Y92.064 E0.08608
36 G1 X96.894 Y92.071 E0.10294
37 G1 X98.900 Y92.070 E0.14067
38 G1 X100.514 Y92.071 E0.17103
39 G1 X101.565 Y92.065 E0.19080
40 G1 X102.277 Y92.081 E0.20420
41 G1 X102.421 Y92.091 E0.20691
42 G1 X103.374 Y92.066 E0.22484
43 G1 X103.774 Y92.065 E0.23237
44 G1 X104.490 Y92.070 E0.24584
G1 X106.878 Y92.069 E0.29076
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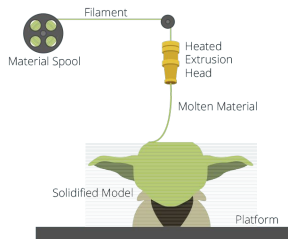
Types

- **FDM** - Fused Deposition Modeling
 - **SLA** - Stereolithography
 - **SLS** - Selective Laser Sintering
- 



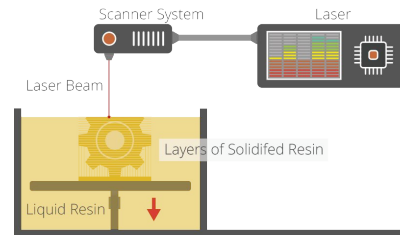
FDM

- “Robotic hot glue gun”
- Uses cartesian coordinates (XYZ)
- Most common and cost effective type
- PLA and ABS



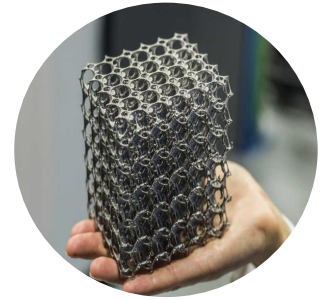
SLA

- Uses a laser and liquid resin to create really smooth parts
- Expensive



SLS

- Melts powdered material to create complex structures with even finer lines than SLA
- \$\$\$\$\$\$
- Common materials
 - Nylon
 - Metals





Applications

Applications: College/Small Scale



- **Personal Projects**
 - DIY
 - Repairs
 - Inventions
 - Cosplay



- **Design Teams**



- **Making Community**
 - Community of tech DIYers
 - Youtube/Forums/Conventions (Makerfaire)



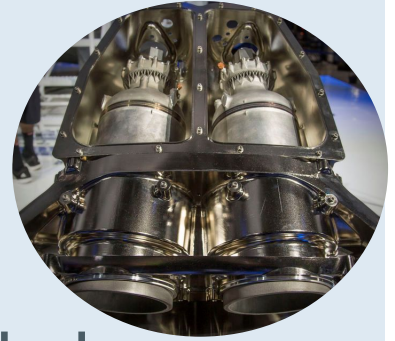
On Campus Options

- **College of Engineering Students**
 - Take EML 2023 (Solidworks ((Take with Crane)))
 - Part of Curriculum for MAE department
 - Gives access to 3D printers in MAE-B
- **Marston Science Library**
 - Rent a 3D printer for 7 days (free)
 - Or submit part online (not free)
- **InnoGators**
- **Take Engineering Design and Society (EGN 2020C)**
- **Infinity Hall Fab Lab**

Applications: Industry/Large Scale



- Prototyping
- **Complex designs that can't be manufactured by traditional methods**
 - SpaceX Draco Engine
 - Custom jigs and fixtures
 - Tissue
- **Marketing strategy to increase prices** 🙄
- **Education**



The image features a teal background with a large white circle in the center. The text "3D Modeling" is written in a teal, sans-serif font within this circle. Surrounding the white circle are several smaller, semi-transparent circles in various colors: yellow, red, orange, pink, and light blue. Some of these smaller circles overlap each other or the central white circle.

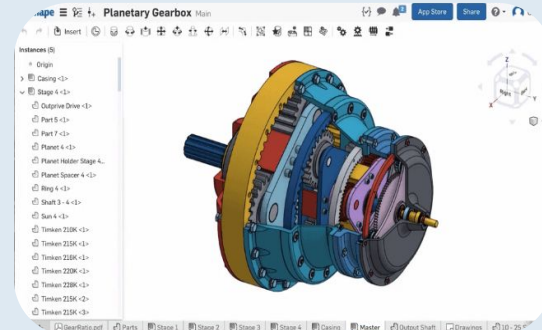
3D Modeling

What is It?



- AKA
 - CAD - Computer Aided Drawings
 - Solid Modeling
 - 3D Graphics
- A way to graphically represent something in 3D using specialized software
- Drawing in 3D

Like this, but with a keyboard and mouse



Common
Software



AUTODESK[®]
FUSION 360

Onshape



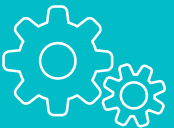
MAYA



AUTODESK[®]
INVENTOR[®]

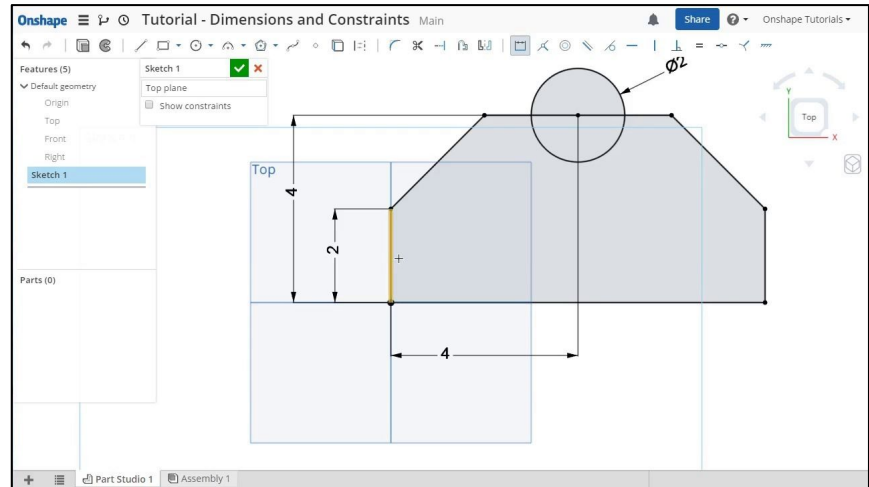
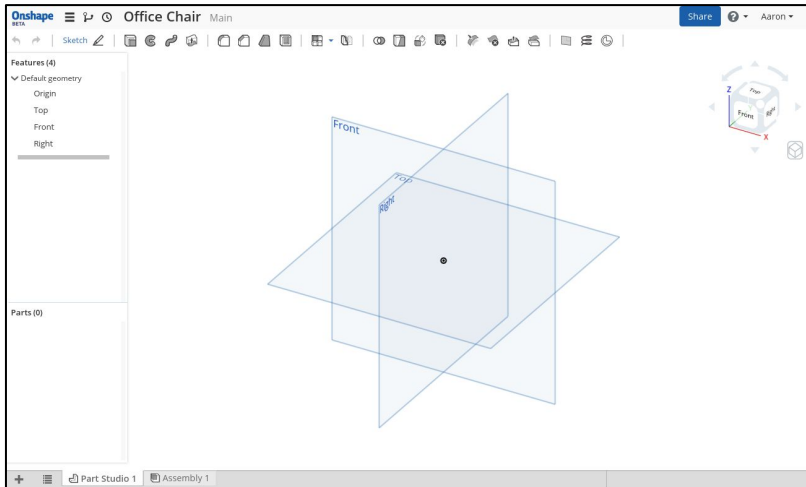


creo[®]



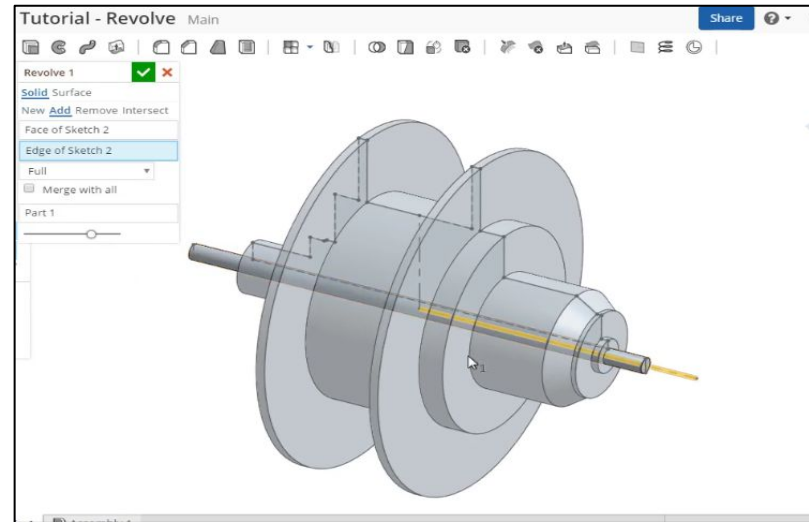
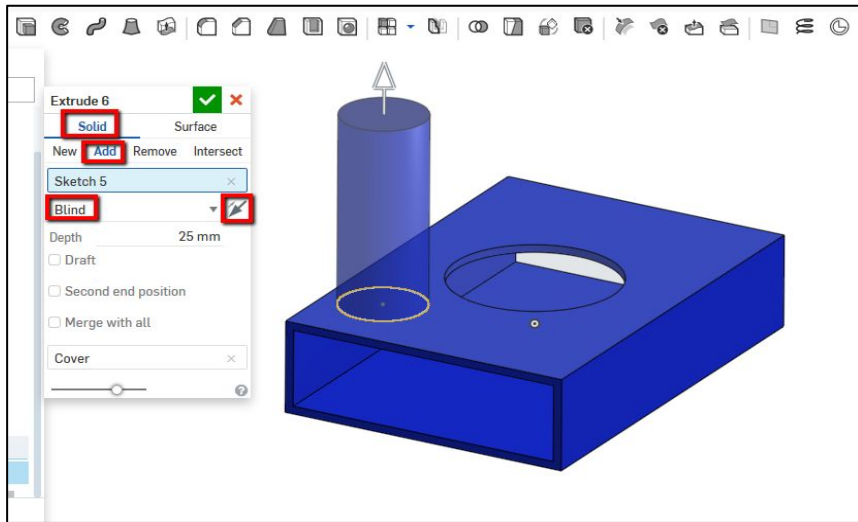


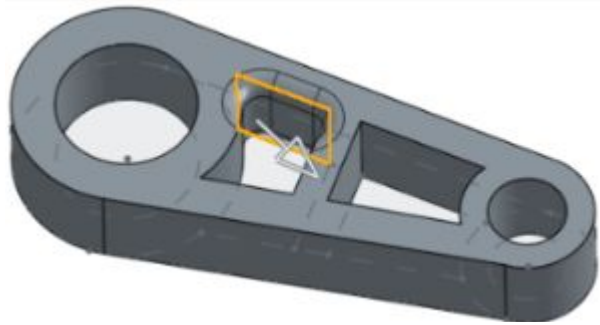
Common sketch shapes: Line, Circle, Rectangle, Arc, Spline



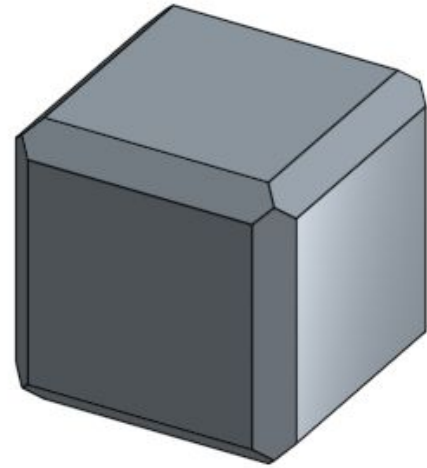


Common extrude methods: Extrude, Revolve, Loft, Shell





Fillet



Chamfer






Success/Advice for CAD

- Practice
- Make things that you see everyday or are interested in
- Learn to think in 3D





Make Your Own Keychain



Make Your Own Keychain

Onshape

- Sketch - based platform
- Everything saves in the cloud
- Free

