LASER-CUT AWARDS

design custom awards using:

TinkerCAD

+

TTU Makerspace's Glowforge Plus

+

Glowforge draftboard

2025

Sean W Scully

Lead Administrator – TTU Libraries Emerging Technology

Rhino3D, TinkerCAD, AutoCAD Inventor, Fusion360, Blender, Solidworks

MakeCode, Python, Scratch, C++, C, MATLAB, Arduino, JavaScript, Assembly, Verilog, Xilinx

GSB, General Studies – Math/Engineering/Renewable Energy, TTU
MFA, Studio Art – Metals/Jewelry/Enameling, Kent State Univ
BFA, Studio Art – Metalsmithing/Jewelry Design, TTU
AA, Fine Arts, South Plains College

linkedin.com/in/seanwscully

Find me on the First Friday Art Trail, ffat.org, CASP Work Studio H

Jake Syma

Who am I?

Associate Librarian – Technology Services
TTU Library Emerging Technology

VR/AR/XR, Data Visualization, TinkerCAD

jake.syma@ttu.edu

https://guides.library.ttu.edu/prf.php?id=5a31bf4b-7cdb-11ed-9922-0ad758b798c3
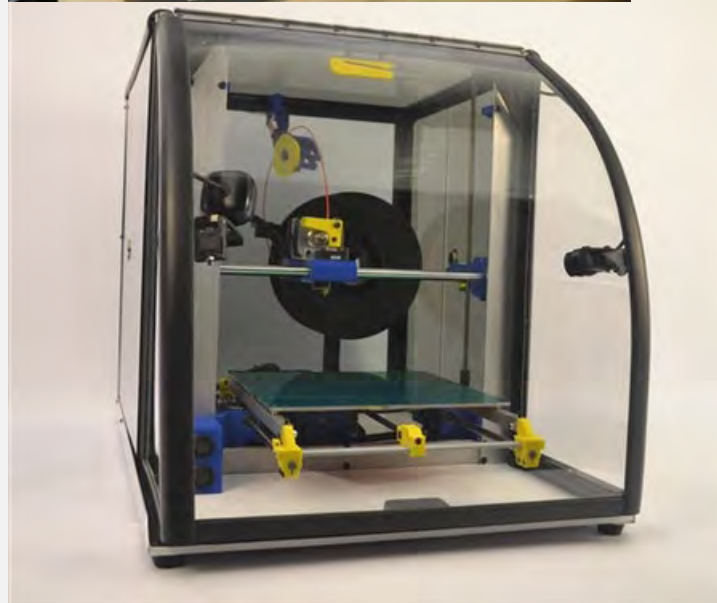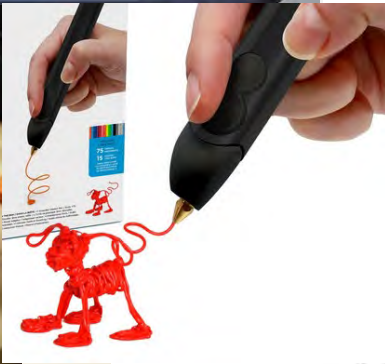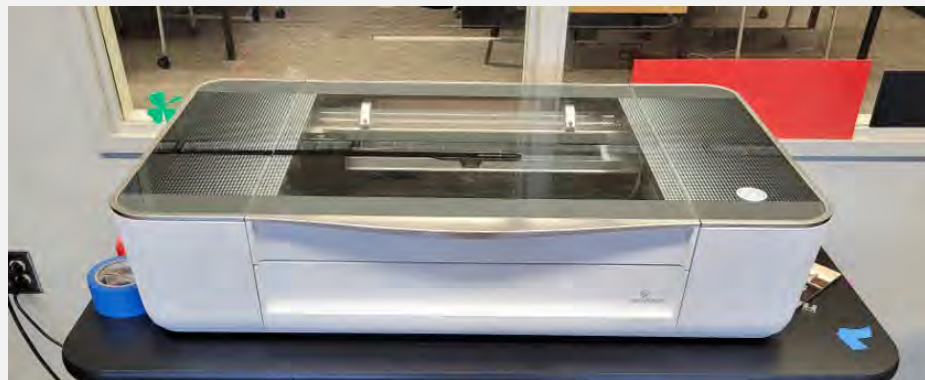
Emerging Technology Department

- Makerspace: Main Library, 2nd floor, room 210

- VR Lab: Main Library, 2nd floor, room 201A

make@ttu.edu

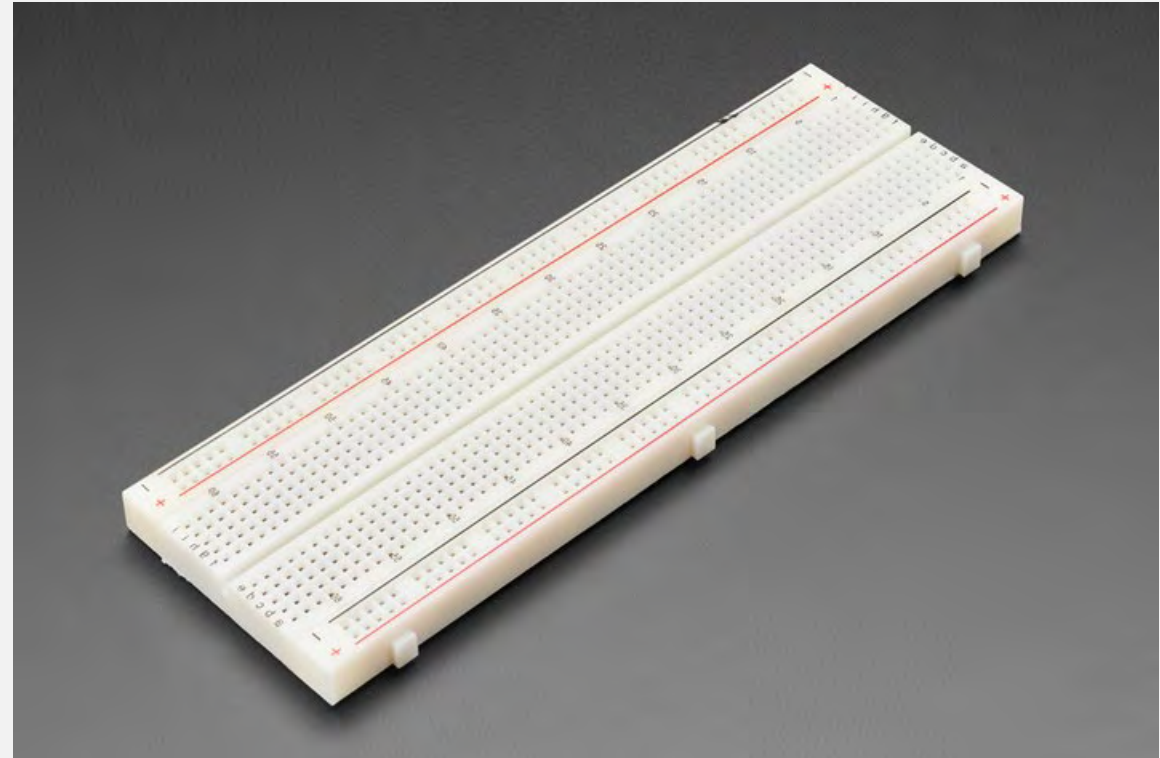https://www.depts.ttu.edu/library/make/

- Cricut Maker/Venture
- Glowforge Lasercutter
- Makyu Formbox
- Matter&Form 3D Scanner
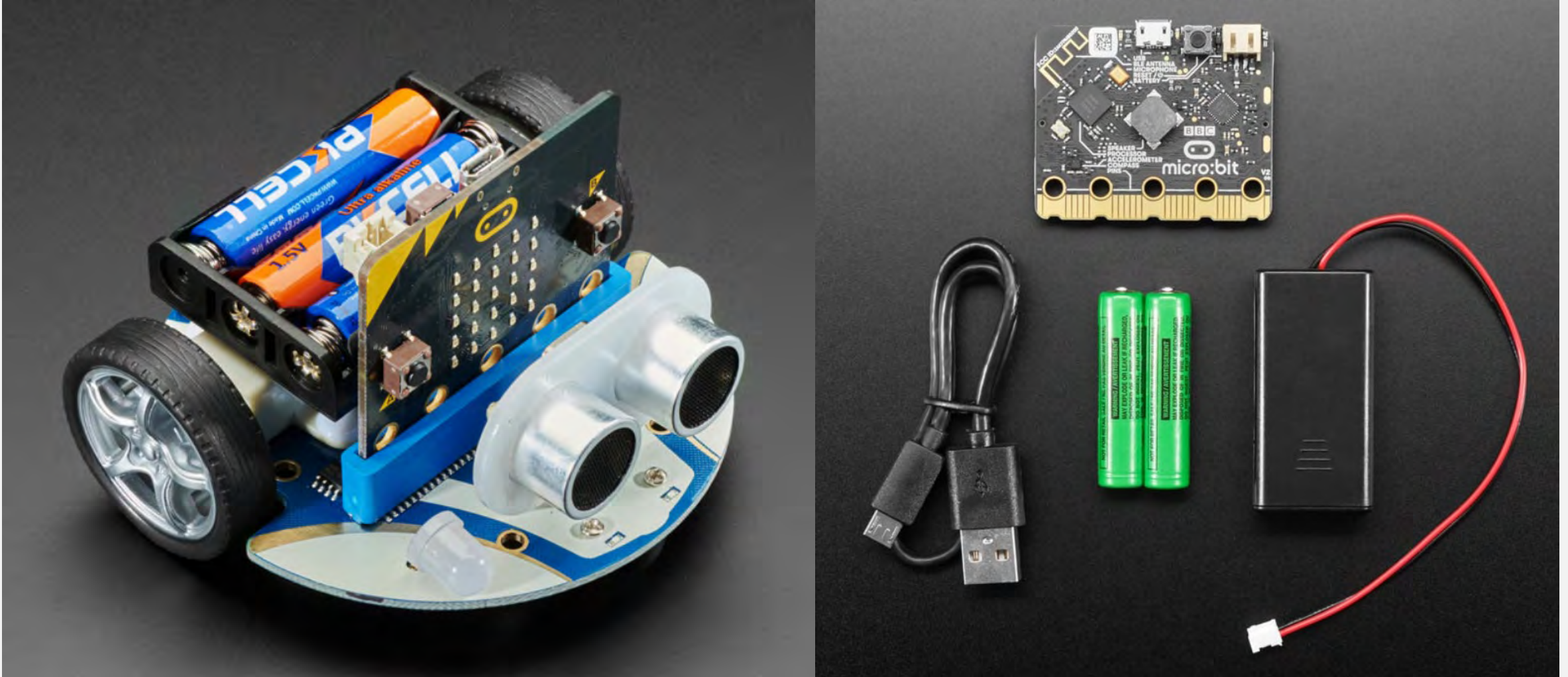- PolyPrinters 229 & 508
- Ultimaker 3, S7
- Sewing machines

TTU Library's Makerspace *Pi-400* and *Pi-Zero W* Kits

6 kits of each is available: recommend supplying your own microSD card (minimum size: 8Gb)

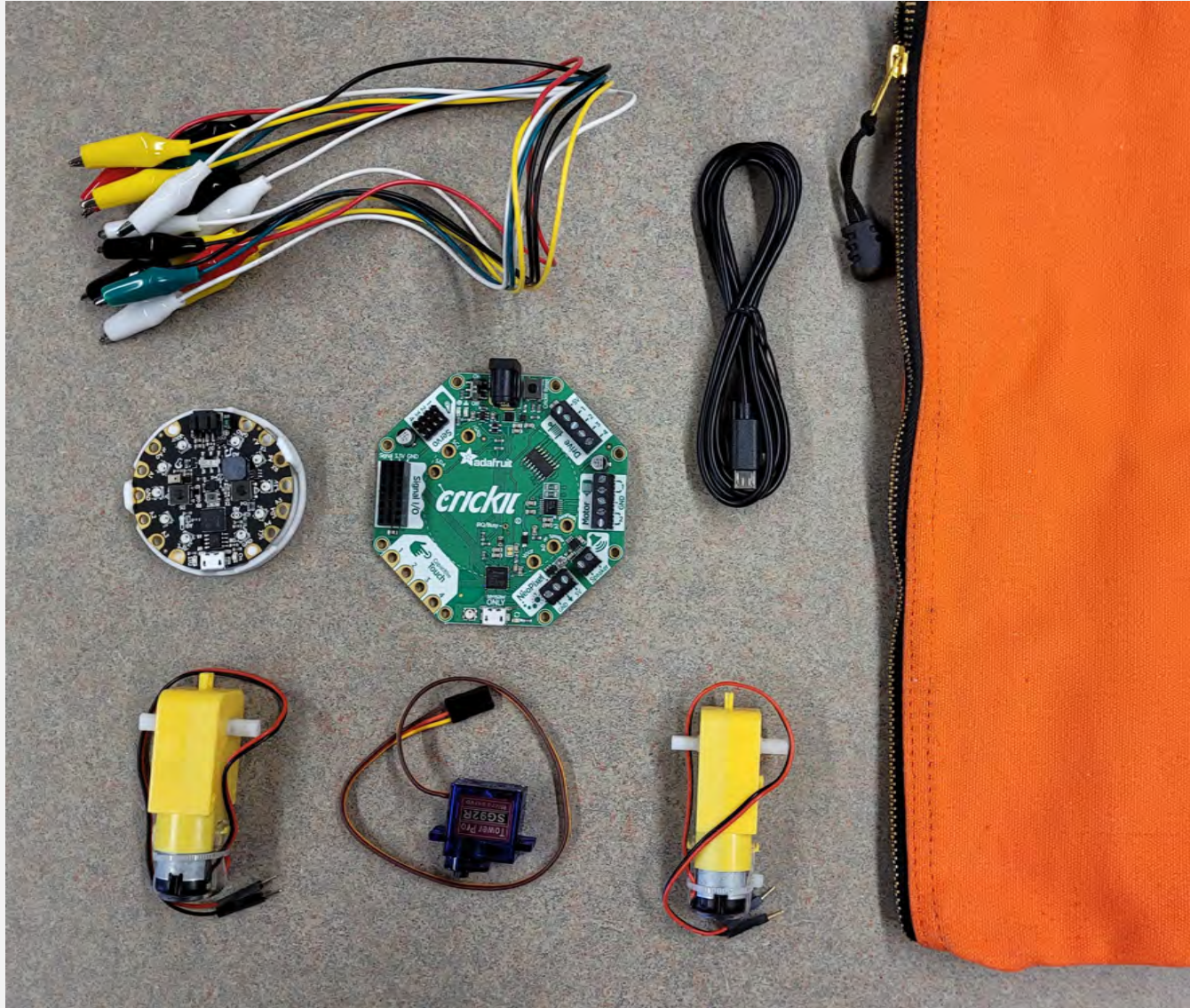# TTU Library's Makerspace *Pi – Interface* Kits

6 kits of each is available, one for every Pi–400

- Pi T-Cobbler Plus
  - GPIO Breakout – Pi A+, B+, Pi 2/3/4, Zero
- Full Sized Premium Breadboard
  - 830 Tie Points

TTU Library's Makerspace *CuteBot* and *Micro:Bit v2* Kits
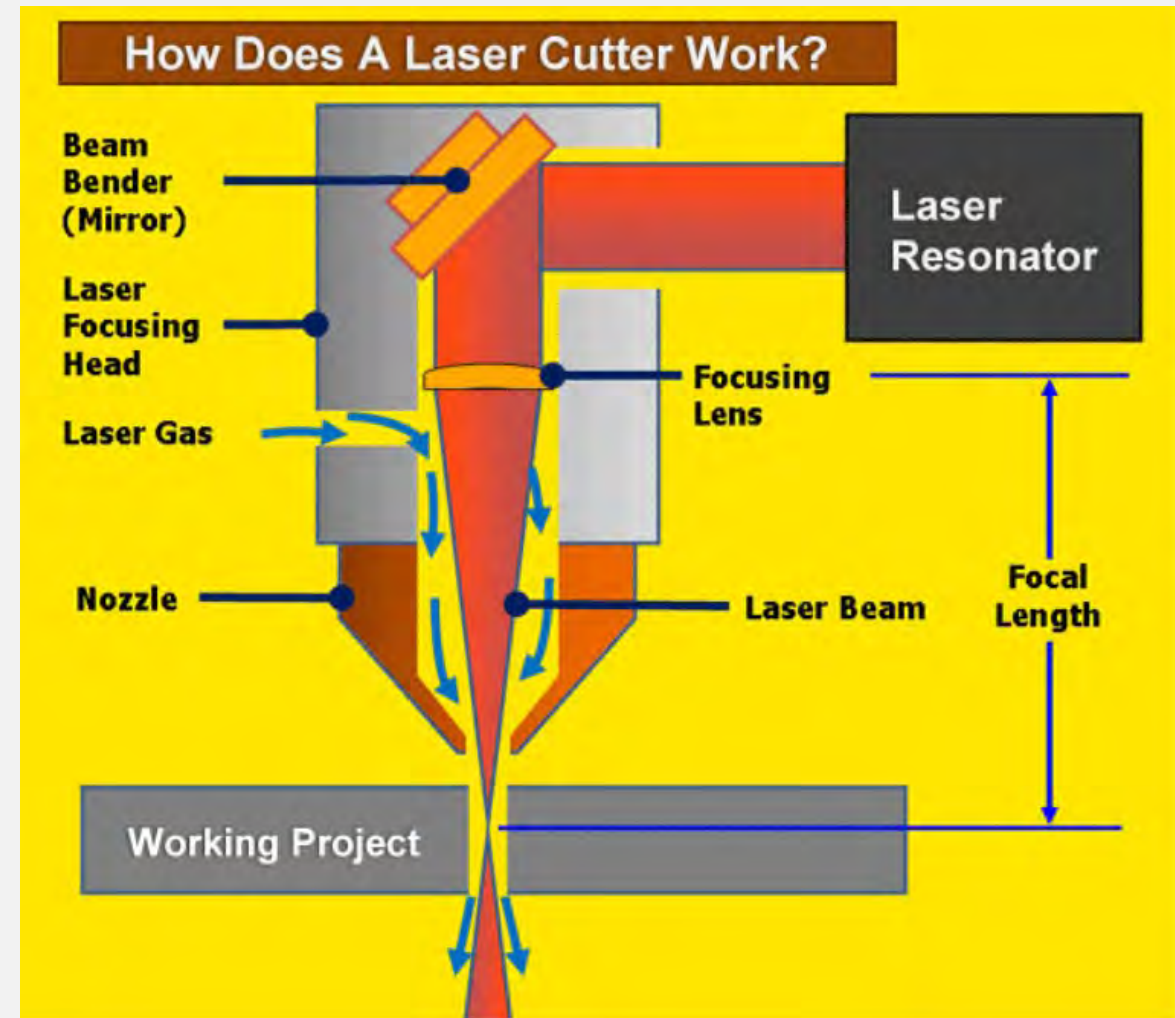

Images of our CuteBot kit and Micro:Bit v2 kit

- **Robo Kits (15)**
    - *Adafruit's Circuit Playground Express (CPX)*
    - *Adafruit's Crickit robotic control board*
    - *geared motors (2), micro servo*
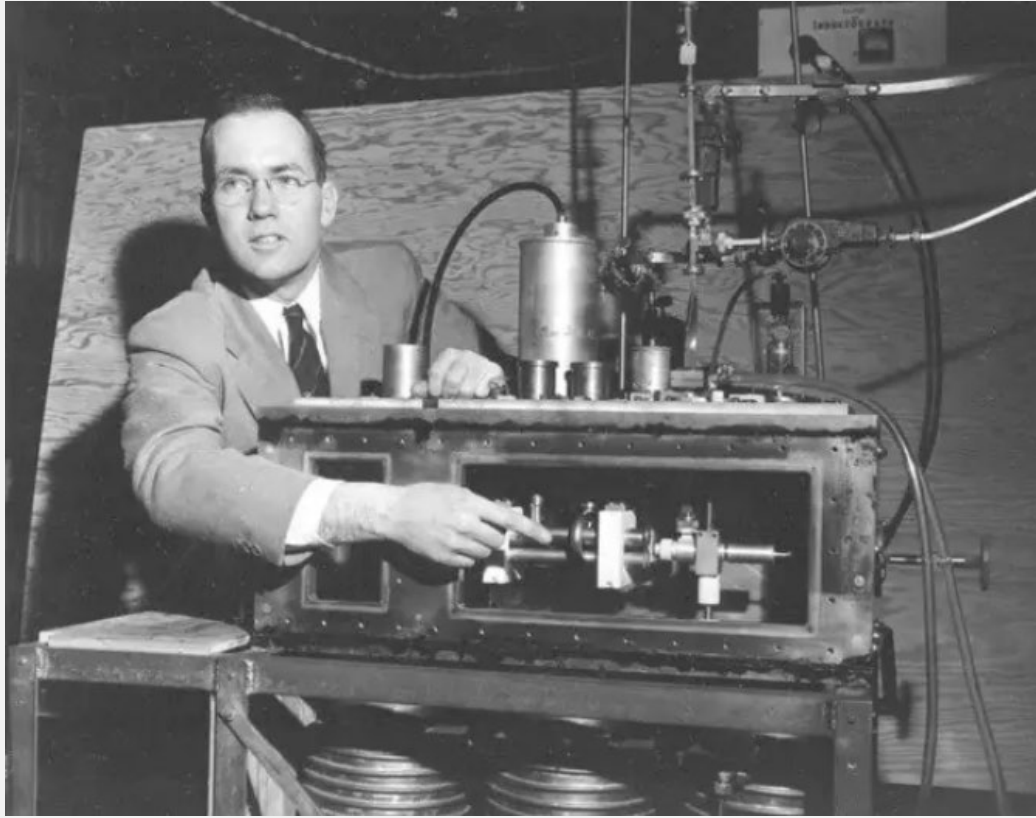- **ElectroSoldering Kits (5)**

what is a lasercutter?

- CNC – computer numerical control
  - motors control x,y axis movements
  - beam is variably powered
  - cooling and exhaust system

- subtractive vs. additive
  - burns away material – engraver/cutter
  - fuses ink onto a material – laser printer

- laser beam types/categories/sources
  - CO2
  - fibre
  - UV – ultraviolet
  - plasma beam
  - diode – highpower LED

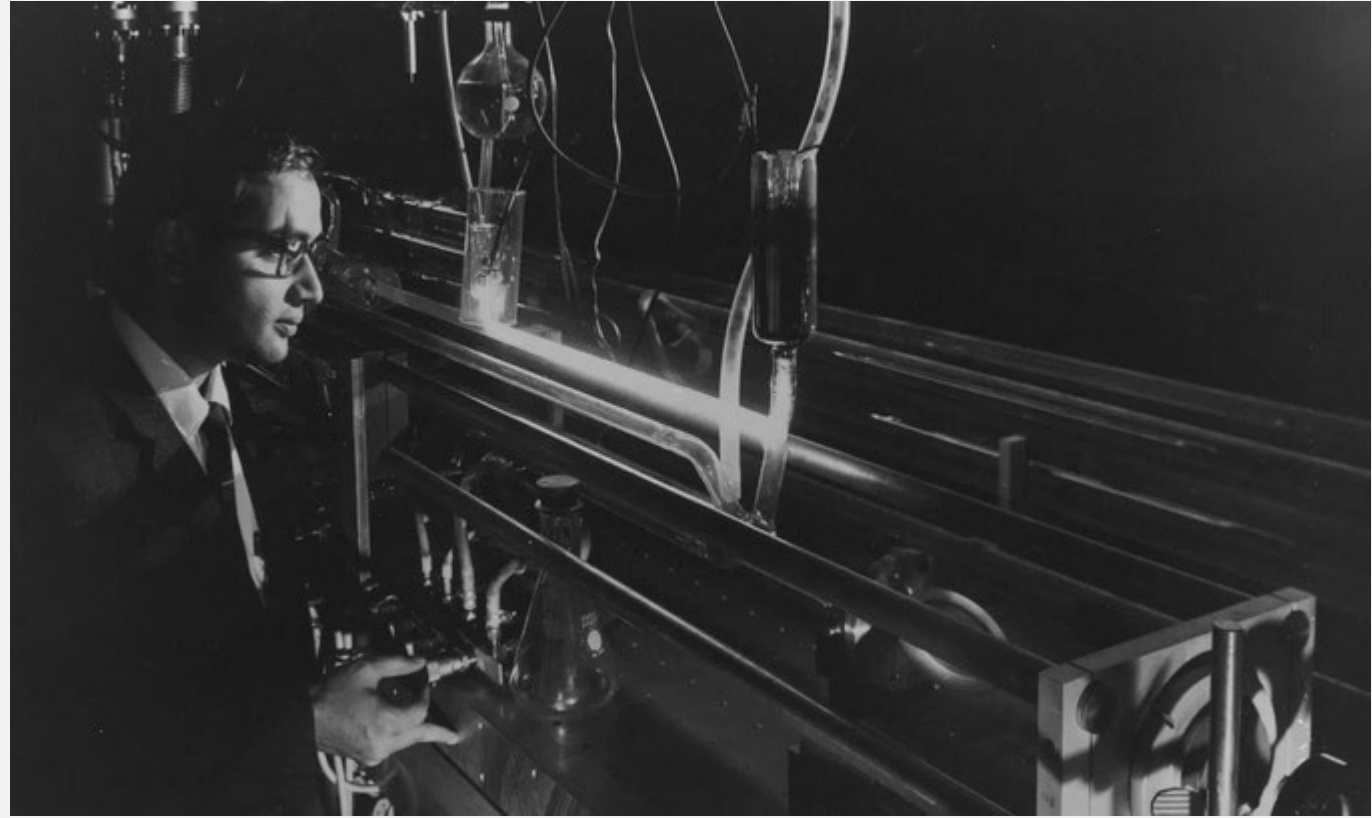- uses adjustable mirrors and lenses to focus the beam

How Does A Laser Cutter Work?

lasercutting history

- ## MASERs (1950s) vs LASERs (1960s)

Charles Townes
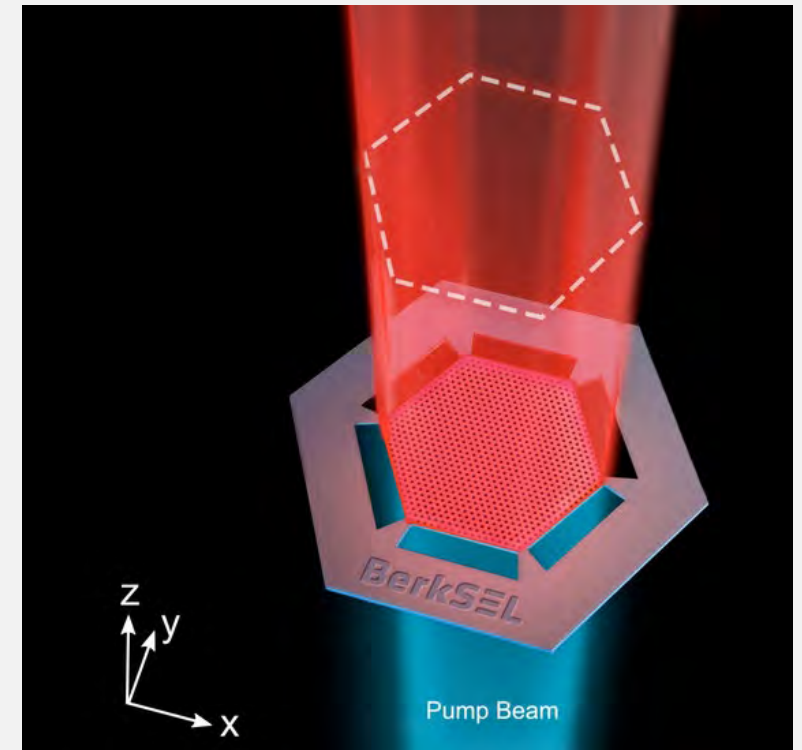*MASER – Microwaves Amplification by Stimulated Emission of Radiation*

Kumar Patel
LASER – Light Amplification by Stimulated Emission of Radiation

lasercutting into the future

- Einstein, *On the Quantum Theory of Radiation* (1917)
- synthetic ruby (1950s)
- CO2 & gas-based (1960s)
  - *titanium, diamond, ceramics*
- Fibre (1980s-2007)
  - *super thick steel*
- BerkSEL (2022)
  - *Berkeley Surface Emitting Lasers*
  - *semiconductor membrane-based*

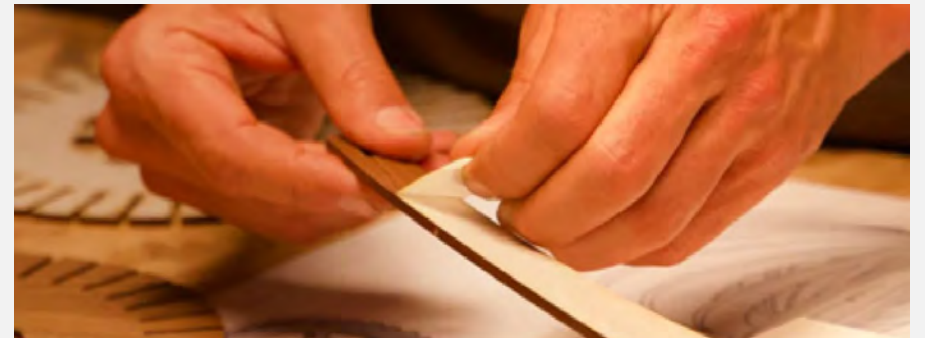# what materials can the Glowforge Plus cut/engrave?

- paper
- wood
  - plywood
  - veneer
  - draftboard
- acrylic
- leather
- fabric
- metal
- stone (shale)

where to find materials for the Glowforge Plus?
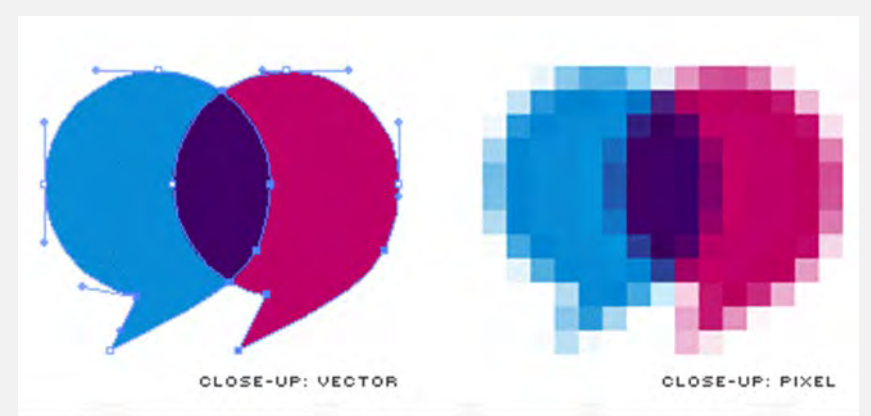
- Glowforge Website – recommended
  - https://shop.glowforge.com/

- local hobby shops
  - Michaels/HobbyLobby
  - Walmart/DollarTree/DollarStore
  - Joann's Fabrics

- local consumer/prosumer wood suppliers
  - Acacia Hardwoods – recommended (https://www.acaciahardwoods.net/)
  - Lowes/Home Depot

- online suppliers
  - Amazon.com
  - DickBlick.com

file types

Vectors   Pixels

- why is a JPG not an SVG?
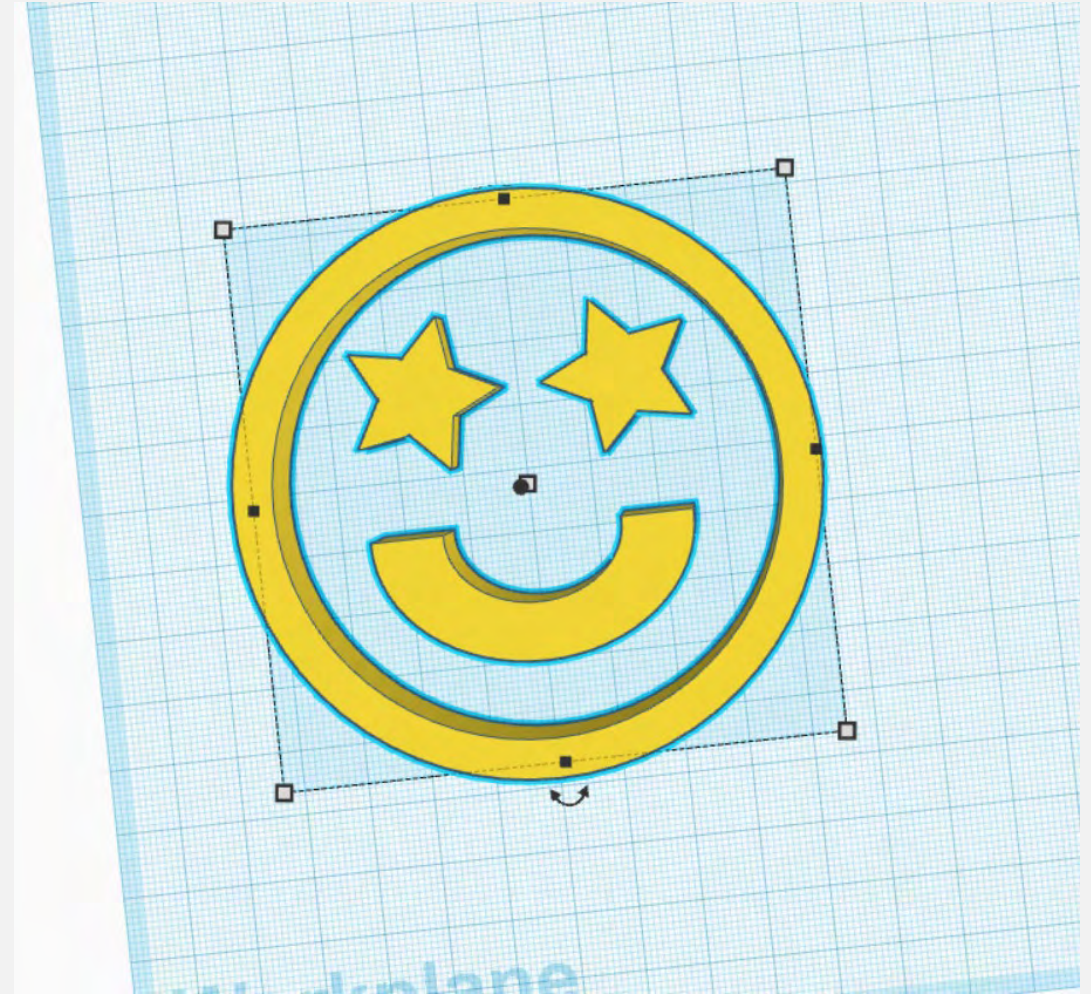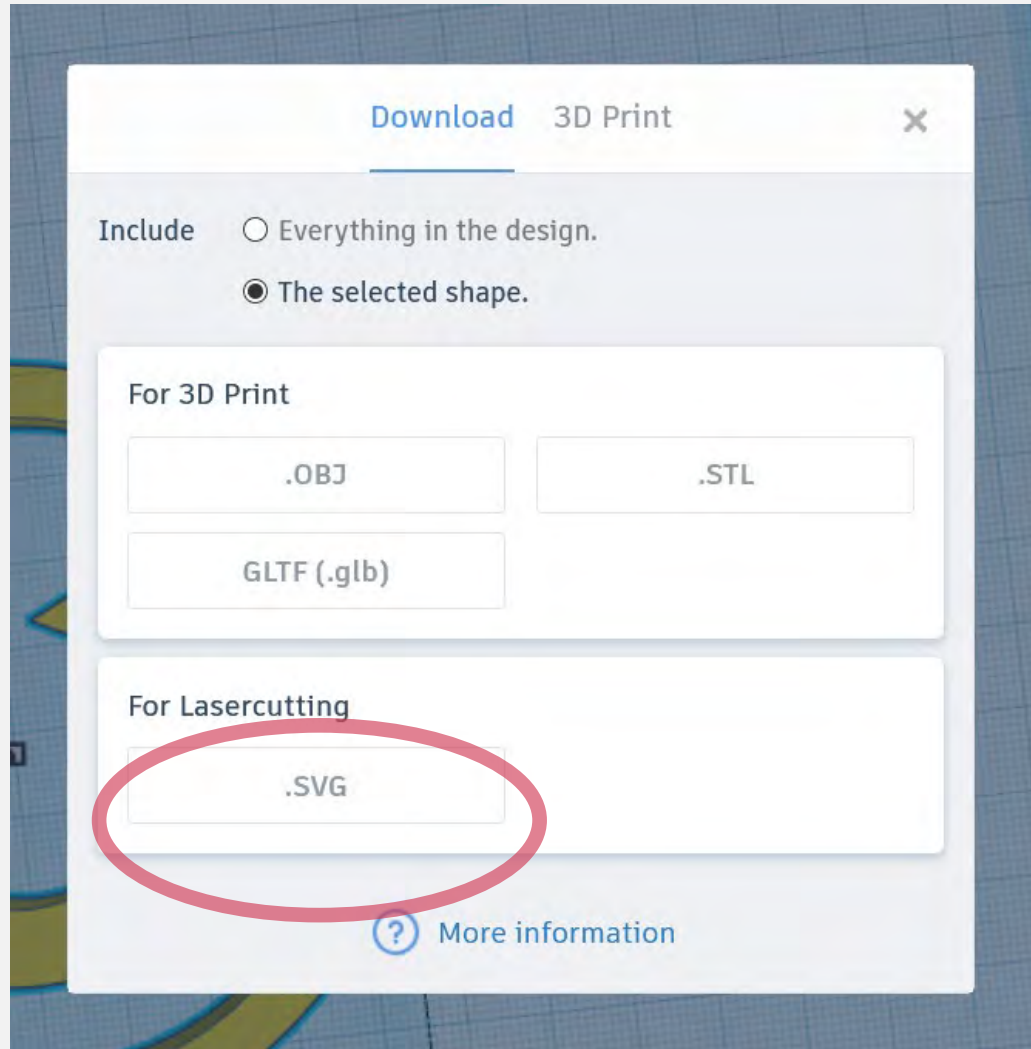
    Bitmap/Raster/Pixels vs. Vector Graphics

- Bitmap (JPG, GIF, PNG):
    - made of dots/pixels that distort when the image is scaled

- Vector (SVG, AI, PDF):
    - calculation of points connected with lines that will not lose clarity when scaled up or down (math path)

software – freeware: TinkerCAD

- free online Autodesk CAD software, simplified for kids
- runs in your browser – Chrome/Firefox
  - *https://www.tinkercad.com/*
- complex and simple shapes available for remixing
- export file options
  - **_SVG – lasercut or Cricut Maker it_**
  - *STL – 3D print it*
  - *glb/glbTF– 3D model optimized for web design*
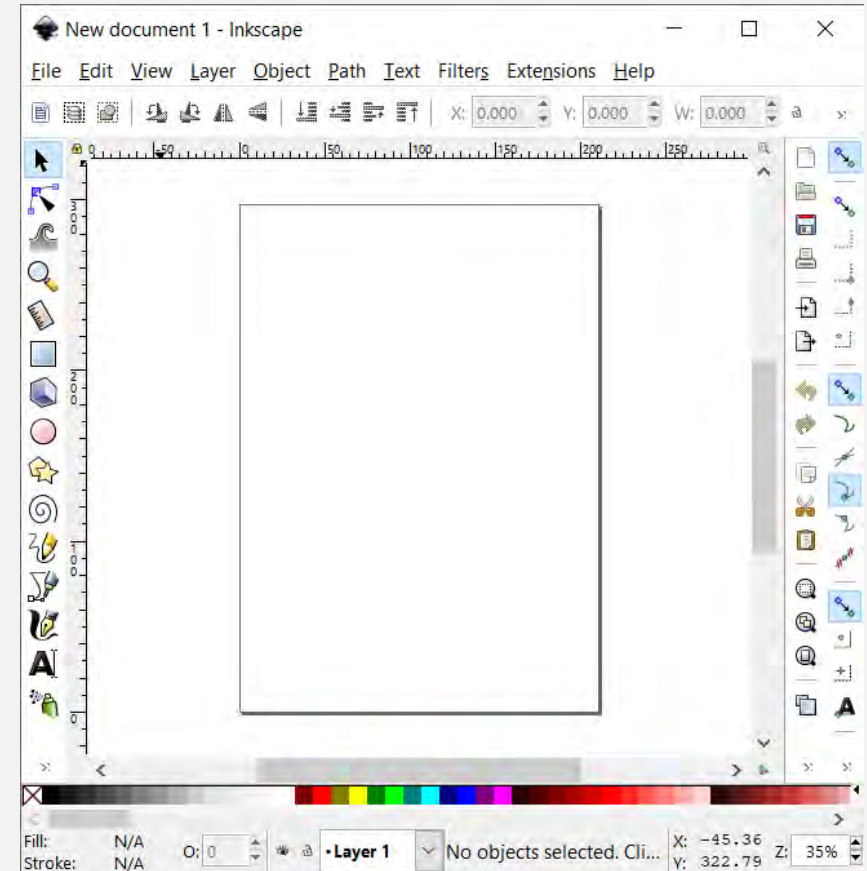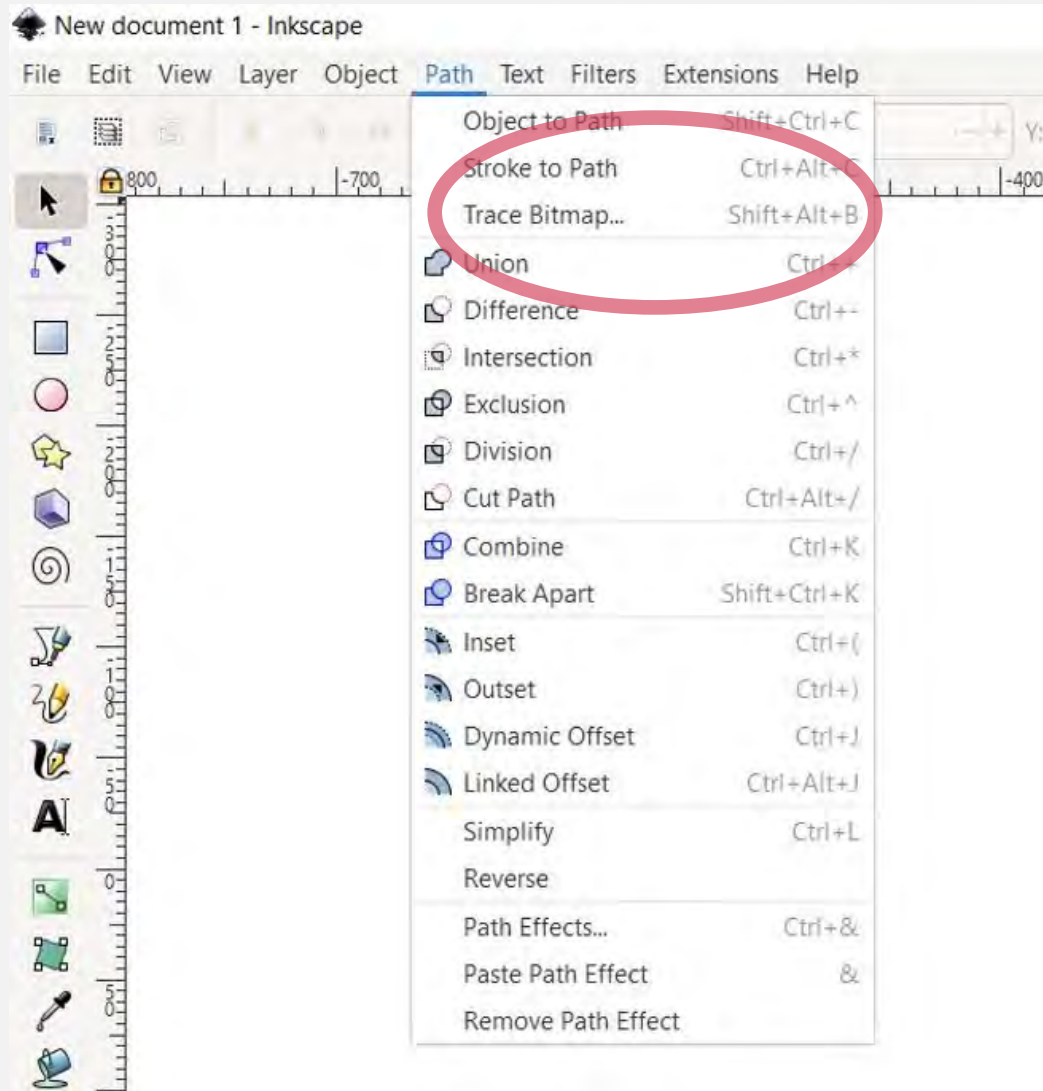
software – freeware: TinkerCAD

- all objects the same height (5-10mm)

software – freeware: Inkscape

- free offline vector graphic software
- Illustrator-style program
- install software from
  - https://inkscape.org/
- importing images to make custom SVG files
- trace your vector design over an existing image
- start a vector drawing from scratch

software – freeware: Inkscape
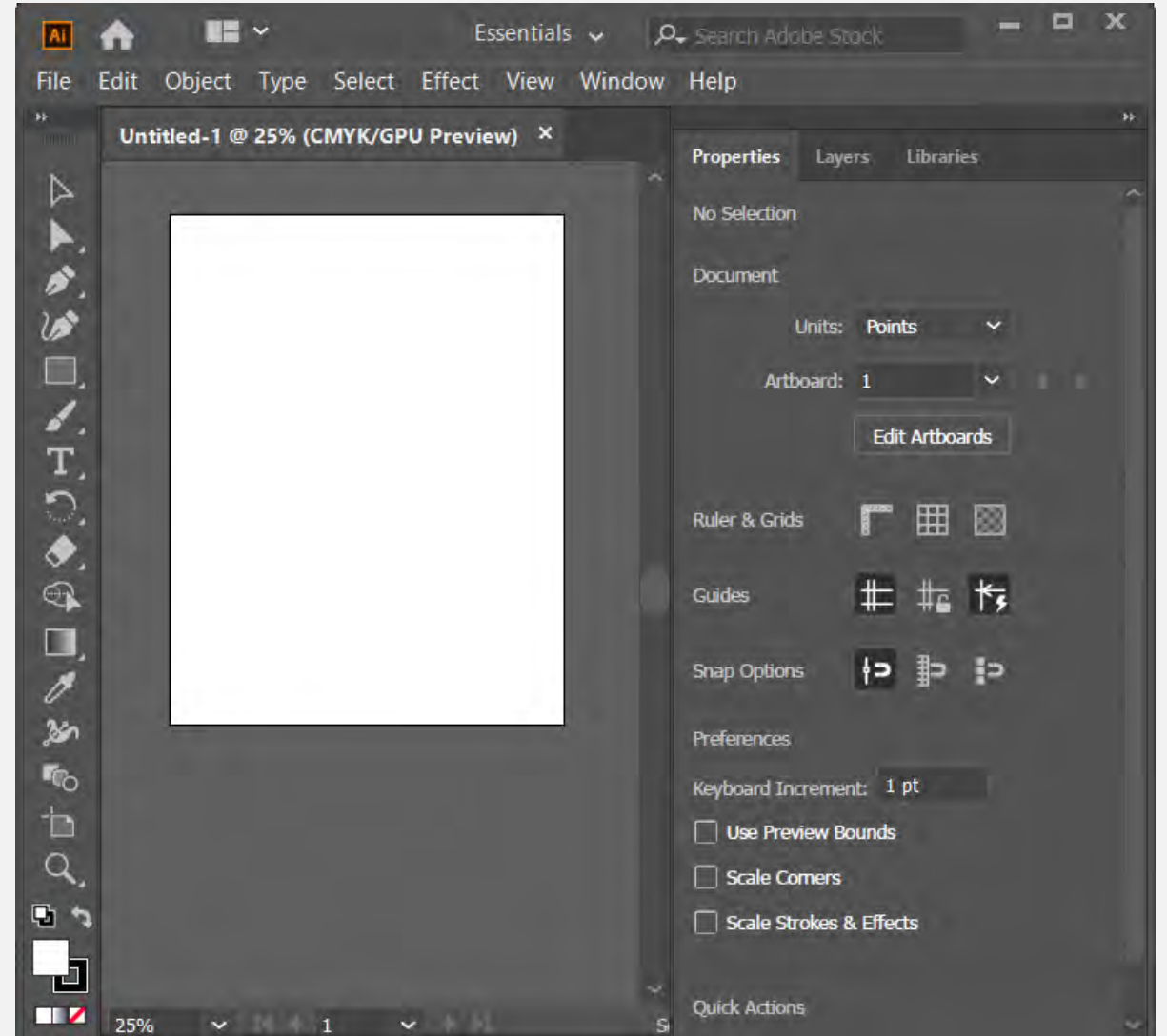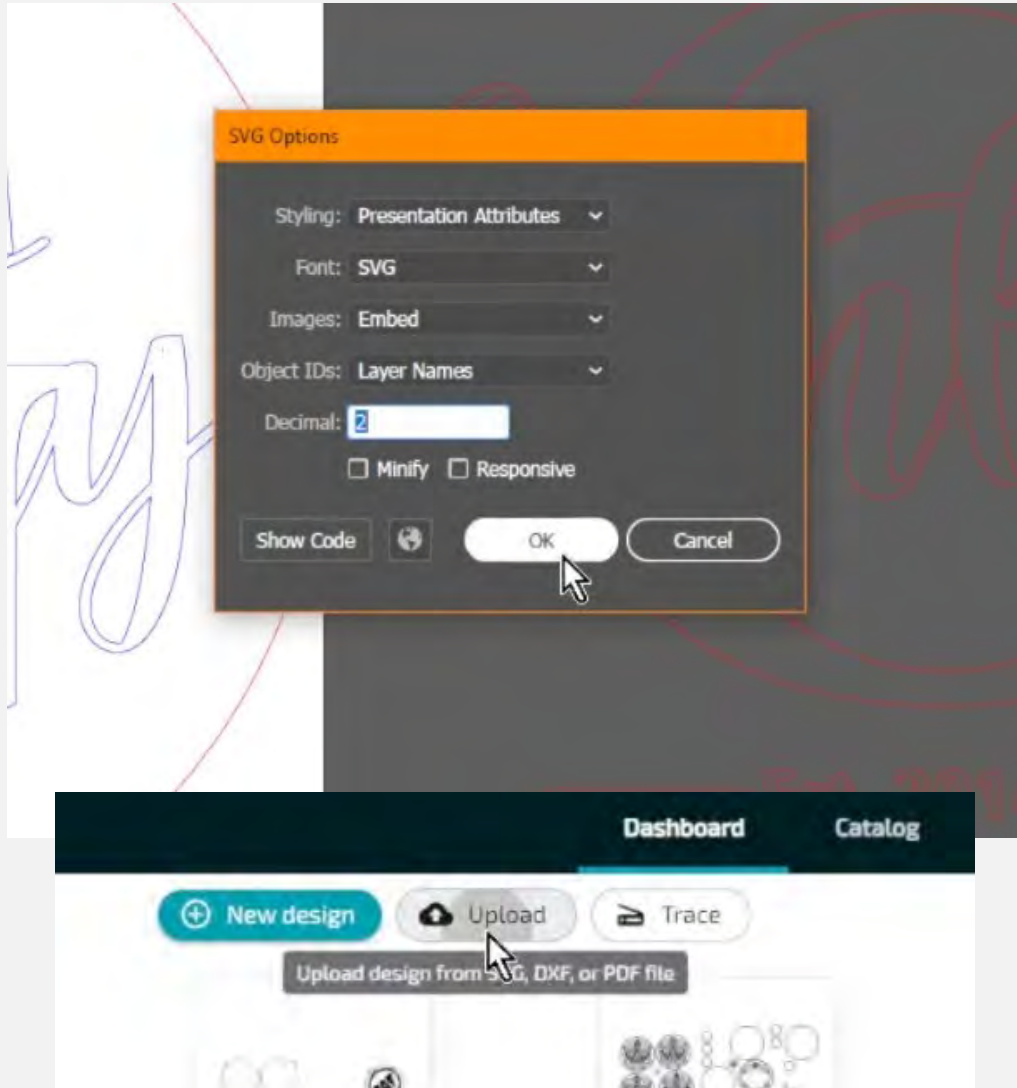
software – Adobe Illustrator

- offline vector graphic design software
- wide array of tools available
  - *fonts/Lettering*
  - *graphic effects/textures*
  - *starting a vector drawing from scratch*
- export as
  - *bmp, png, or jpg file*
  - *SVG is possible, but can be complicated*
- install software from your Adobe account (free/low cost for students)

software – Adobe Illustrator

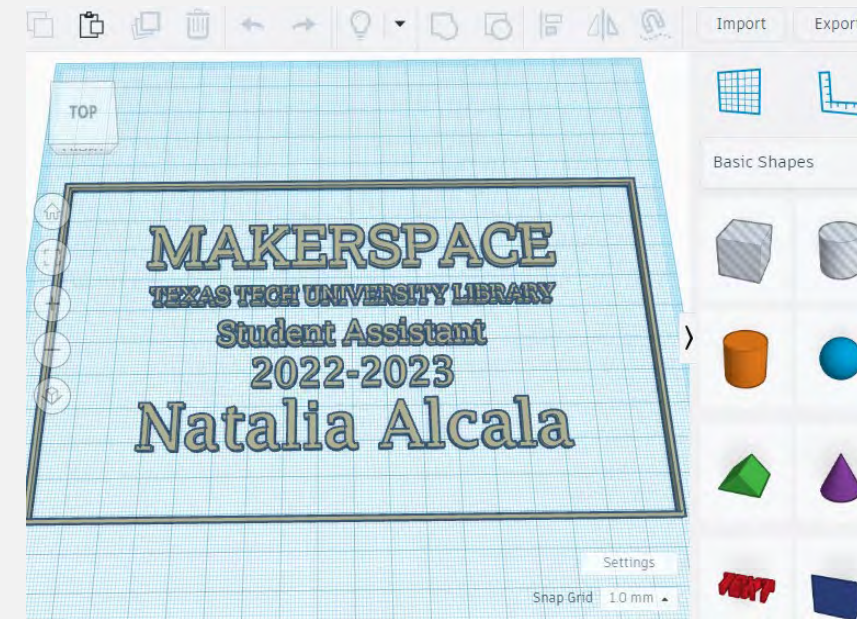# let's get started – TinkerCAD!!

- setup TinkerCAD account

- design your award image (draw on paper first)

- build your design in TinkerCAD

  - *outline* *(outside edge for reference)*

  - *text/design/logo* *(engraved design/image)*

- export your design (.SVG files)

  - *text/design/logo* *(engraved design/image)*

- email your design files to make@ttu.edu

  - *subject: "LaserCut Workshop"*

let's get started – Awards!!
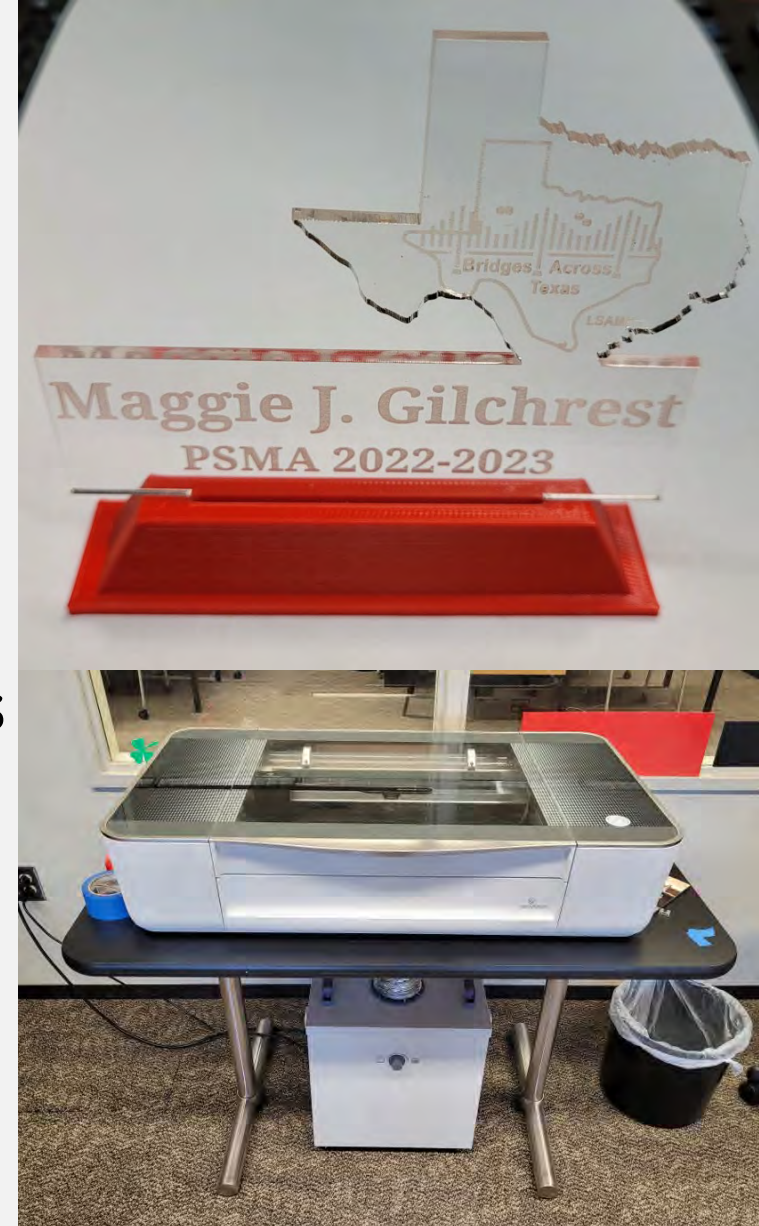
- Inspiration:
  - *plaques*
  - *medals*
  - *monuments*

- Dimensions (we will keep them simple, small, and fast today)
  - *50mm x 100mm*
  - *keep text large enough that you can see it (10-20mm tall)*

- let's cut some awards!

MAKERSPACE
TEXAS TECH UNIVERSITY LIBRARY
Student Assistant
2022
Rishabh Tewari

MAKERSPACE
TEXAS TECH UNIVERSITY LIBRARY
Student Assistant
2020-2023
Brian Atwood

using Makerspace's *Glowforge Plus*

- arrange a $2.00/hr appointment time to work
- send us your files to ensure they work

- grab your materials

- have fun!

- brainstorm by exploring Glowforge's project guides
  - https://glowforge.com/discover/
  - https://community.glowforge.com/

- explore Glowforge's professional-grade materials
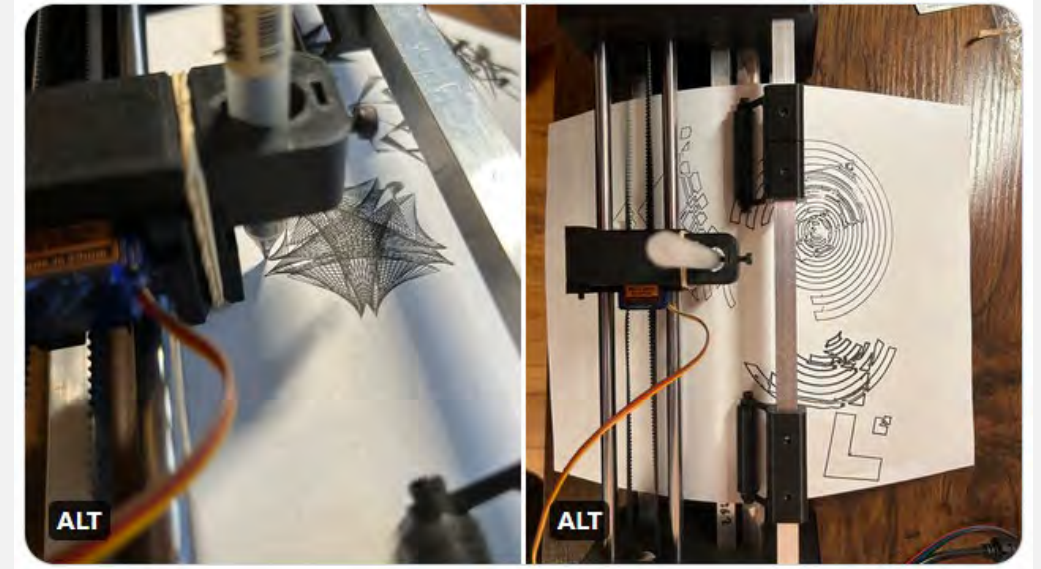 - https://shop.glowforge.com/

moving forward

- The Staff and Student Assistants in the Makerspace are here to help!

- There are O'Reilly video and text tutorials available to help learn the more advanced software (TinkerCAD, Inkscape, etc.) through Library Databases:
  - *Search for "oreilly" @*
  - *http://texastech-ml.hosted.exlibrisgroup.com/V/?func=find-db-1*

- https://inkscape.org/learn/tutorials/

- Makerspace's Inkscape Workshop: https://guides.library.ttu.edu/inkscape

- trace bitmap image in Inkscape for Glowforge
  - *https://www.youtube.com/watch?v=UY6diLQl4cY*

- Glowforge and lasercut
  - *https://www.youtube.com/watch?v=dP5Qnp_2igk*

lasercutting – *onward*

- explore
    - *"plottertwitter"*
    - *Op Art*
    - *"generative design"*

- as springboards to the next level consider
    - *line quality*
    - *composition*
    - *other design elements*

- make mistakes, learning is messy

lasercutting – *inspiration*

hobby electronic projects

- https://learn.adafruit.com/search?q=lasercut

make boxes, looms, and cases!

- https://www.instructables.com/The-Ultimate-Guide-to-Laser-cut-Box-Generators/
- https://festi.info/boxes.py/
- https://www.makercase.com/
- https://makeabox.io/
- https://talk.vanhack.ca/t/laser-cut-inkle-loom-project/5503

other project generators – even puzzles

- https://makerdesignlab.com/tutorials-tips/online-file-generators-for-laser-cutting/
- https://www.instructables.com/howto/lasercut/
- https://tinyurl.com/laserpuzzlegen
- https://box.laserbiz.ru/JigsawPuzzle?language=en
- https://gists.rawgit.com/Draradech/35d36347312ca6d0887aa7d55f366e30/raw/b04cf9cd63a59571910cb226226ce2b3ed46af46/jigsaw.html
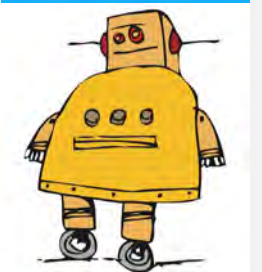- https://zvikabenhaim.appspot.com/software/jigsaw-svg/?#

projects galore

project-sharing websites (some require membership)

- https://learn.adafruit.com/
- https://www.hackster.io/
- https://www.instructables.com/
- https://hackaday.io/
- https://make.co/

Support/Forums/Discord

- **Glowforge** (create a free log-in first – https://glowforge.com/create-account)
  - *https://community.glowforge.com/*
- **Adafruit**
  - *http://adafru.it/discord*

thank you!

please share your projects and progress!

'Laser-cut Awards' with Instructor Sean Scully
review this workshop here:

https://ttu.libwizard.com/f/workshop-eval-24-25_emerging_tech

Lead Administrator – sean.scully@ttu.edu
Makerspace – make@ttu.edu
Director/Librarian – ryan.cassidy@ttu.edu
Assoc. Librarian – jake.syma@ttu.edu
Staff Member – briamood@ttu.edu
Workshop Guides– https://guides.library.ttu.edu/make