

PROTOTYPING FORM 3: FUSION 360

CSE 599 Prototyping Interactive Systems | Lecture 9 | Oct 24

Jon Froehlich • Liang He (TA)

Spring 2019

Home

Announcements

Assignments

Discussions

Grades

People

Pages

Files

Syllabus

Outcomes

Quizzes

Modules

Conferences

Collaborations

Chat

Attendance

UW Libraries

Add 4.0 Grade
Scale

A2: Fabrication: 3D-Printed Interactive Night Light

Published**Edit**

⋮



HOW IS A2 GOING?

Image caption: The Tangible Interactive Computing Top Maker Award from [CMSC838f, Spring 2015](#) designed by Jon Froehlich based on the [Holocron Nightlight](#) by CMSC838f student Philip Dasler.

Overview

This assignment will illustrate and fabricate 3D-printed interactive and light-based products.

Related Items[SpeedGrader™](#)

3D PRINTING + LIGHT

ADAFRUIT TIME TRACKING CUBE

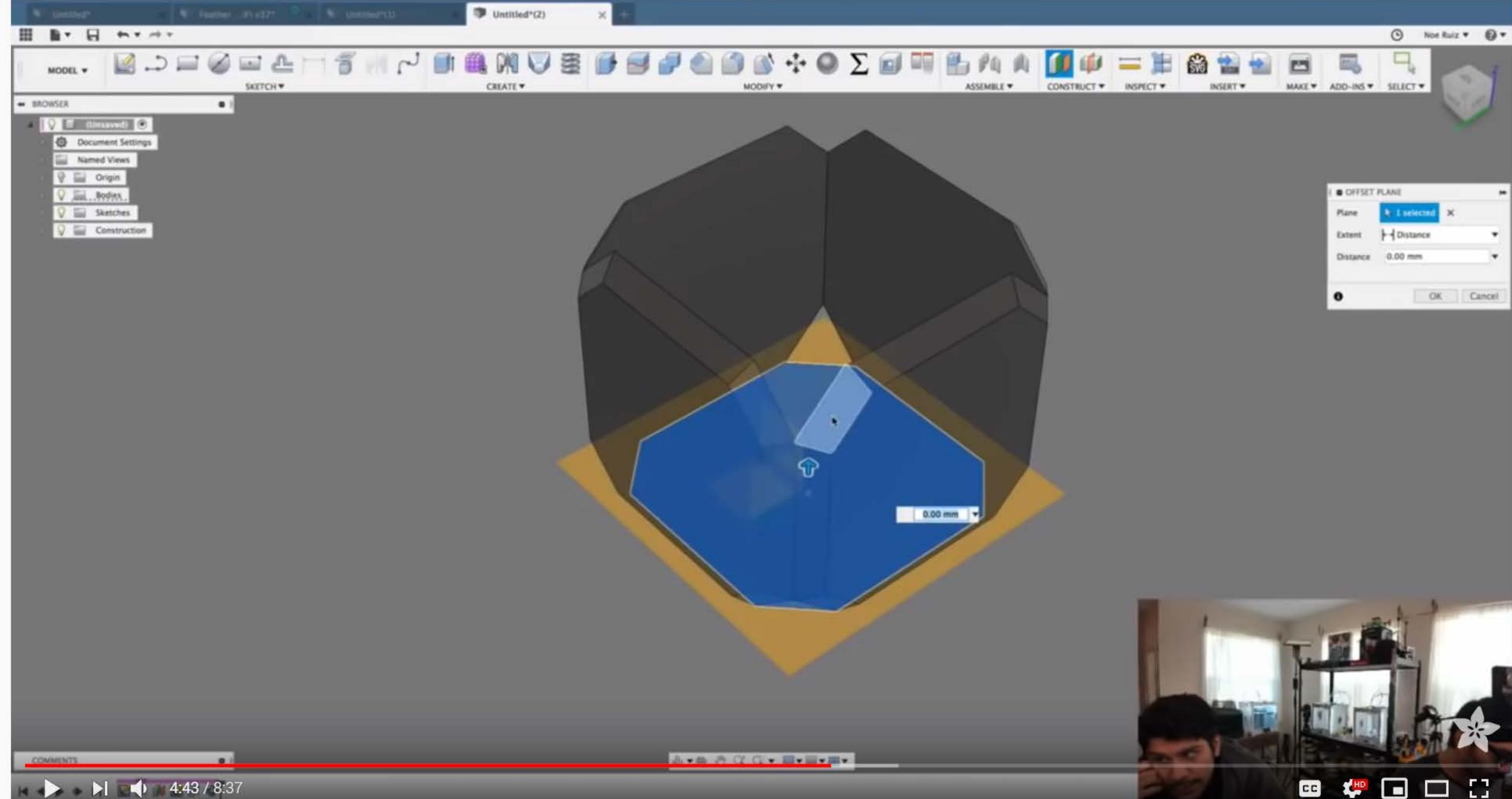


Source: <https://learn.adafruit.com/time-tracking-cube/> and <https://youtu.be/x2O-yca4eGw>



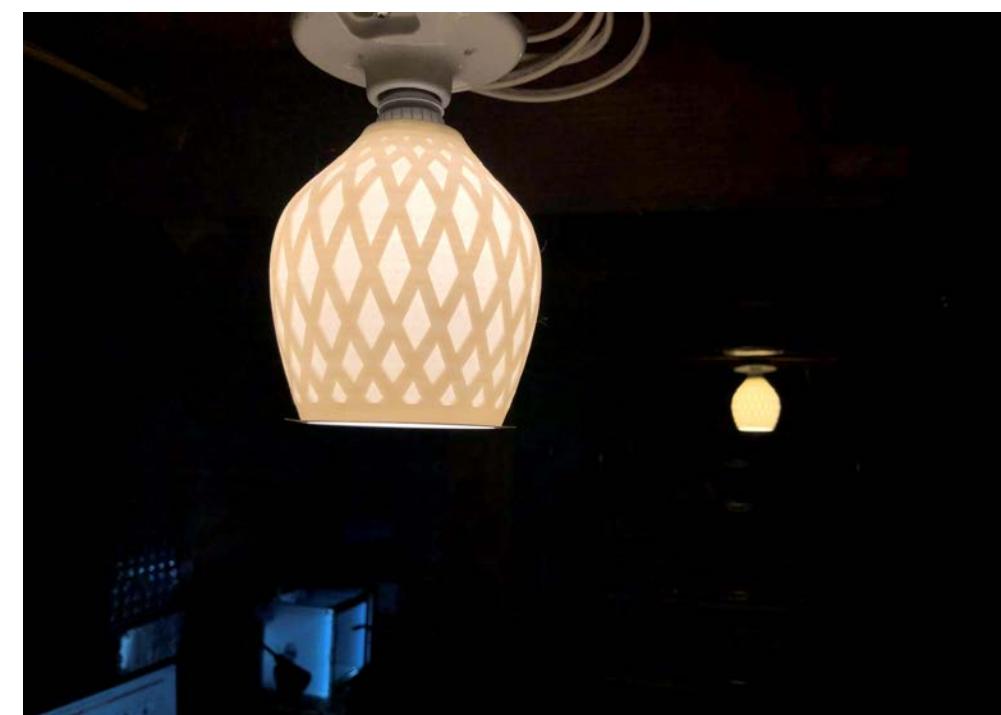








By Jon Froehlich based on design by Taylor Stein, <https://youtu.be/3PnKBSOulwo>



Lamp Shade (Without Holes) Try 2 v3

x + Ⓜ ⓘ ?



BROWSER

- ▶ Lamp Shade (Without Holes) ...
- ▶ Document Settings
- ▶ Named Views
- ▶ Origin
- ▶ Bodies
 - ▶ Lamp Shade Pattern 1 (20)
 - ▶ Lamp Shade Pattern 2 (20)
 - ▶ Top
 - ▶ Bottom
 - ▶ Inner Body
 - ▶ Inner Body Top
- ▶ Sketches
 - ▶ Sketch1
 - ▶ Sketch2
 - ▶ Sketch3
- ▶ Construction
 - ▶ Plane1
 - ▶ Plane2



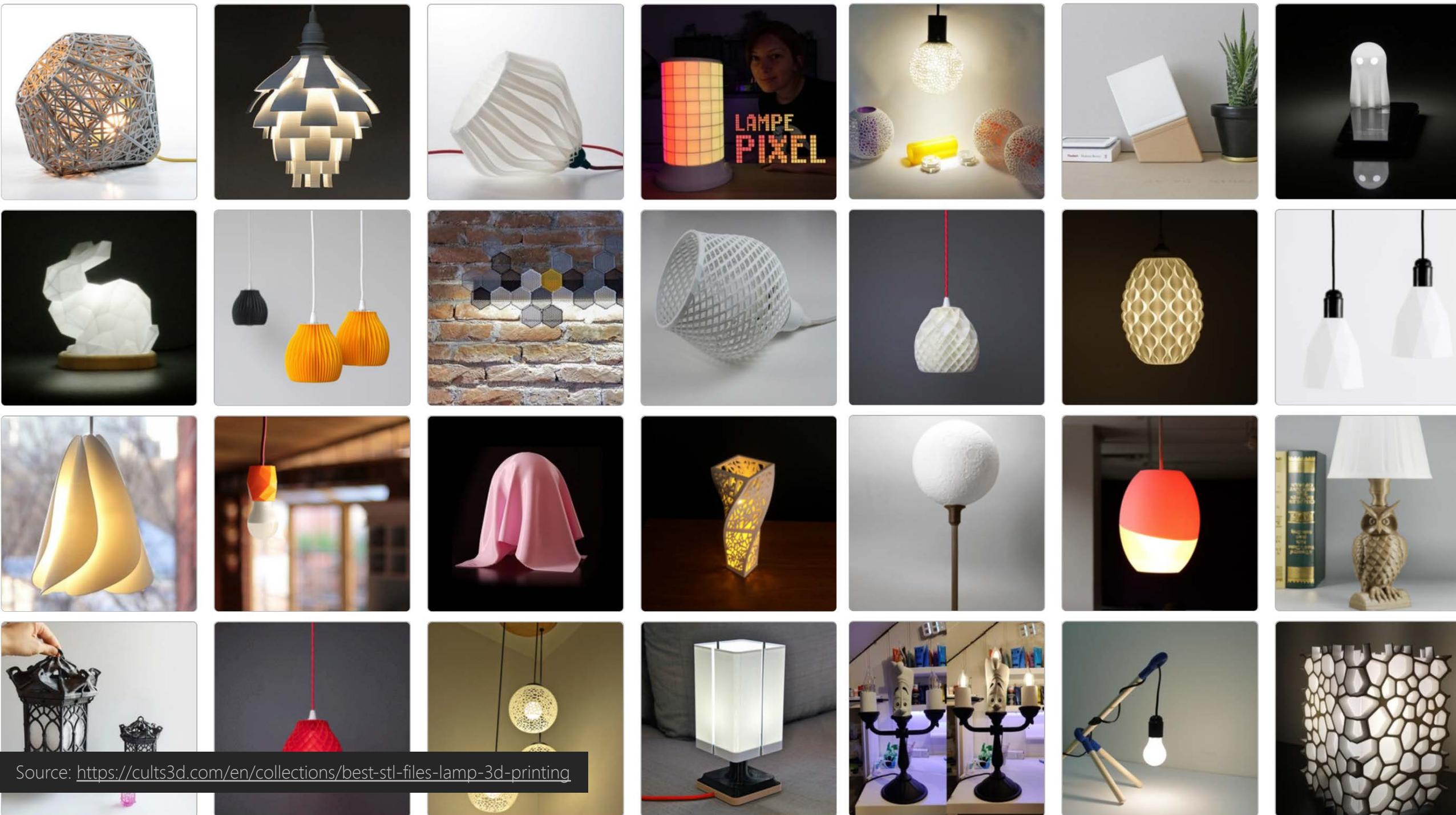




Source: <https://cults3d.com/en/3d-model/home/iceberg-shade>







Source: <https://cults3d.com/en/collections/best-stl-files-lamp-3d-printing>



NEOPIXELS / STRIPS / ADAFRUIT NEOPixel DIGITAL RGB LED STRIP - WHITE 30 LED



DESCRIPTION

You thought it couldn't get better than our world-famous 32-LED-per-meter Digital LED strip but we will prove you wrong! These NeoPixel strips have 30 digitally-addressable pixel LEDs per meter and are very affordable and are only 12.5 mm wide, 10 mm if you remove the strip from the casing. This is the strip with white flex PCB, its identical to the black 30 LED/meter except it has a different color mask on the flex strip.

Adafruit NeoPixel Digital RGB LED Strip - White 30 LED - WHITE

PRODUCT ID: 1376

Select Length

Learn about the benefits of ordering full reels.

1 meter
2 meters
3 meters
4 meters
5 meters (full reel)

\$16.95

IN STOCK

1

ADD TO CART

QTY DISCOUNT

1-9 \$16.95

10-99 \$15.26

100+ \$13.56

ADD TO WISHLIST

[DESCRIPTION](#)[TECHNICAL DETAILS](#)



RGB LED Strips

Glowy goodness!

[Overview](#)

[Schematic](#)

[Current Draw](#)

[Wiring](#)

[Usage](#)

[Arduino Code](#)

[CircuitPython Code](#)

[Featured Products](#)

[Single Page](#)

[Download PDF](#)

Contributors

[lady ada](#)

[Tyler Cooper](#)

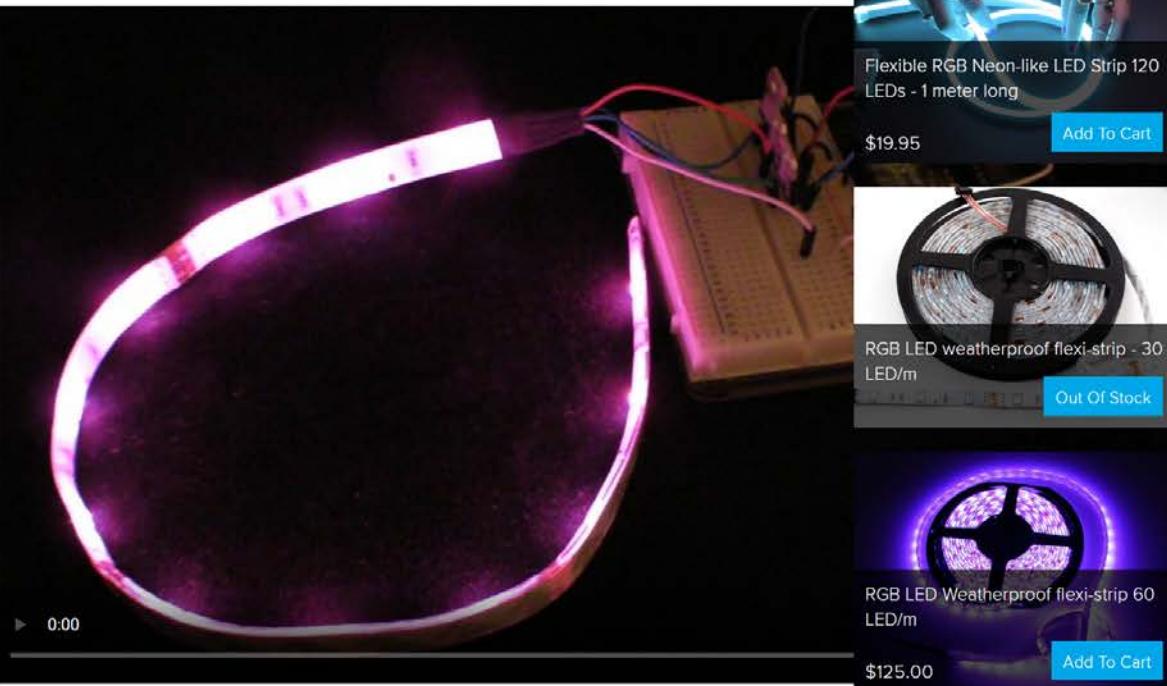
[Tony DiCola](#)

[Feedback? Corrections?](#)

LEDS / LED STRIPS 

Overview

by Tyler Cooper



We love some good LED blinking as much as the next person but after years of LED-soldering we need something cooler to get us excited. Sure there are RGB LEDs and those are fun too but what comes after that? Well, we have the answer: LED Strips! These are *flexible* circuit boards with full color LEDs soldered on. They take a lot of LED-wiring-drudgery out of decorating a room, car, bicycle, costume, etc. The ones we carry are also waterproof (although not all are).

There are two basic kinds of LED strips, the "analog" kind and "digital" kind. Analog-type strips have all the LEDs connected in parallel and so it acts like one huge tri-color LED; you can set the entire strip to any color you want, but you can't control the individual LED's colors. They are very easy to use and fairly inexpensive.

The Digital-type strips work in a different way. They have a chip for each LED, to use the strip you have to send digitally coded data to the chips. However, this means you can control each LED individually! Because of the extra complexity of the chip, they are more expensive.

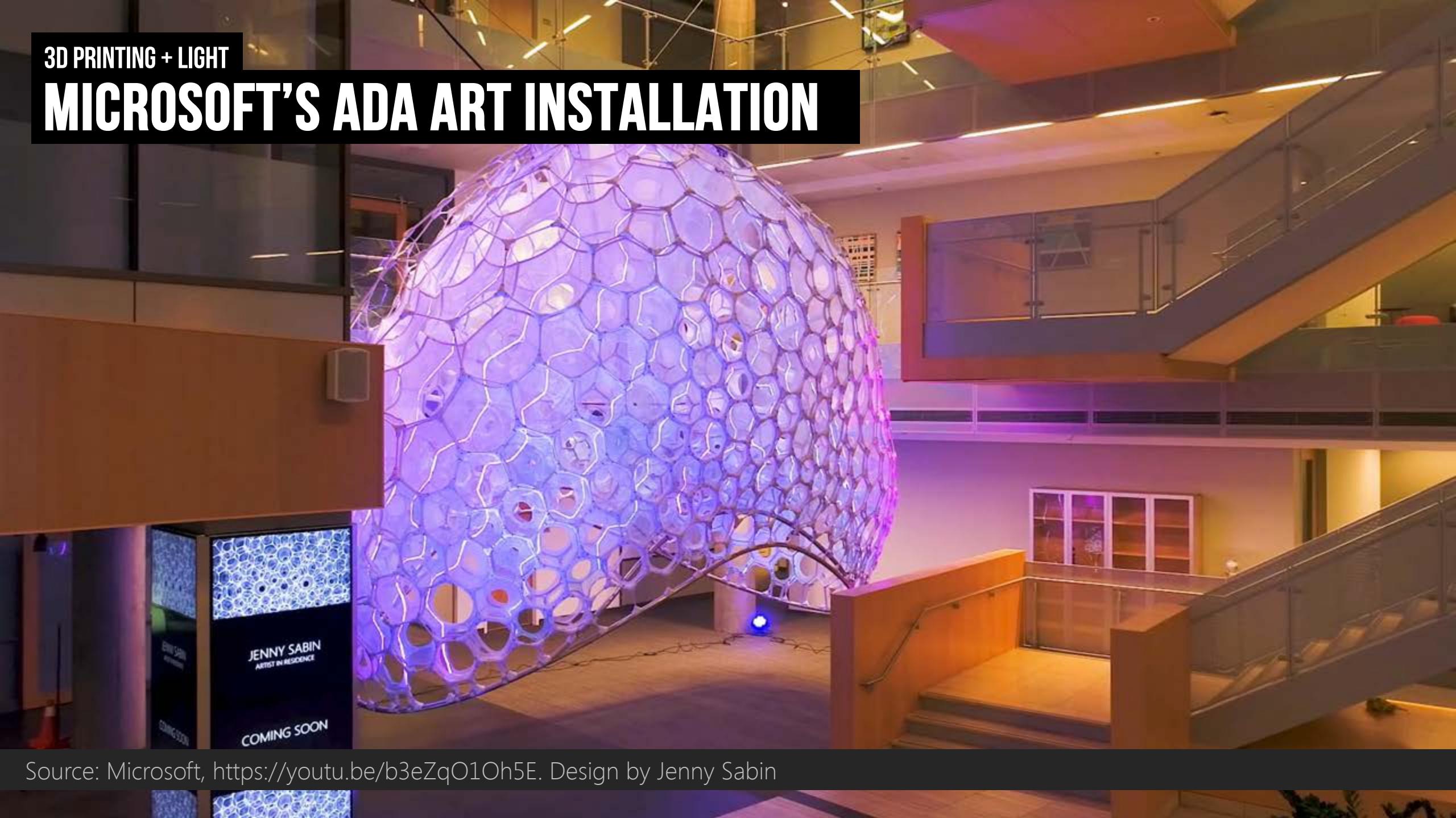
You can buy waterproof analog-type RGB LED strips by the meter at the Adafruit shop!



Source: UMD Sandbox Makerspace

3D PRINTING + LIGHT

MICROSOFT'S ADA ART INSTALLATION



Source: Microsoft, <https://youtu.be/b3eZqO1Oh5E>. Design by Jenny Sabin



JENNY SABIN

ARTIST IN RESIDENCE

COMING SOON

COMING SOON

3D PRINTING + LIGHT

LAMPE PIXEL ANIMÉE



Source: <https://youtu.be/94nbqv7Jhlo>



LA LAMPE PIXEL ANIMÉE

VUE 3D

J'AIME

★★★★★

TÉLÉCHARGER GRATUIT



MAKES RÉALISÉS PAR LA COMMUNAUTÉ



VOUS AVEZ IMPRIMÉ EN 3D CE MODÈLE ?

AJOUTEZ VOTRE MAKE

18 408 vues 190 j'aimes 1 626 téléchargements

Print-2-3D

Additive Manufacturing Service

3D Printing Service for your Projects!

print-2-3d.com

OPEN

DESCRIPTION DU MODÈLE 3D

Toutes les étapes de réalisation ici :
<https://youtu.be/94nbqv7Jhlo>

PARAMÈTRES D'IMPRESSION 3D

Les fichiers "OPTION" sont pour ceux qui ont une imprimante dual color, ignorez les si ce n'est pas le cas.
L'abat jour doit s'imprimer en mode vase en 0.2 avec 8 couches du dessous et rien au dessus.
Vous pouvez choisir d'imprimer les demi-cercles de pixel ou le cercle entier, je vous ai mis les deux à disposition.

Tout a été imprimé en 0.2mm dans la vidéo.

> Format du fichier 3D : STL

MOTS-CLEFS

[ART](#) [PROJECT](#) [ELECTRONIC](#) [ARDUINO](#) [DIY](#) [DECORATION](#)
[PIXELART](#) [PIXEL](#) [LAMPE](#)Source: <https://cults3d.com/fr/mod%C3%A8le-3d/maison/la-lampe-pixel-animee>4520
ABONNÉS 446Youtube : <https://www.youtube.com/c/HelioxLab>

LEARNING GOALS

FUSION 360

Sketching: How to **move** objects

Sketching: How to **resize** objects

Sketching: What are **construction** lines?

Sketching: How to use **constraints**

3D: How to **import** 3D objects

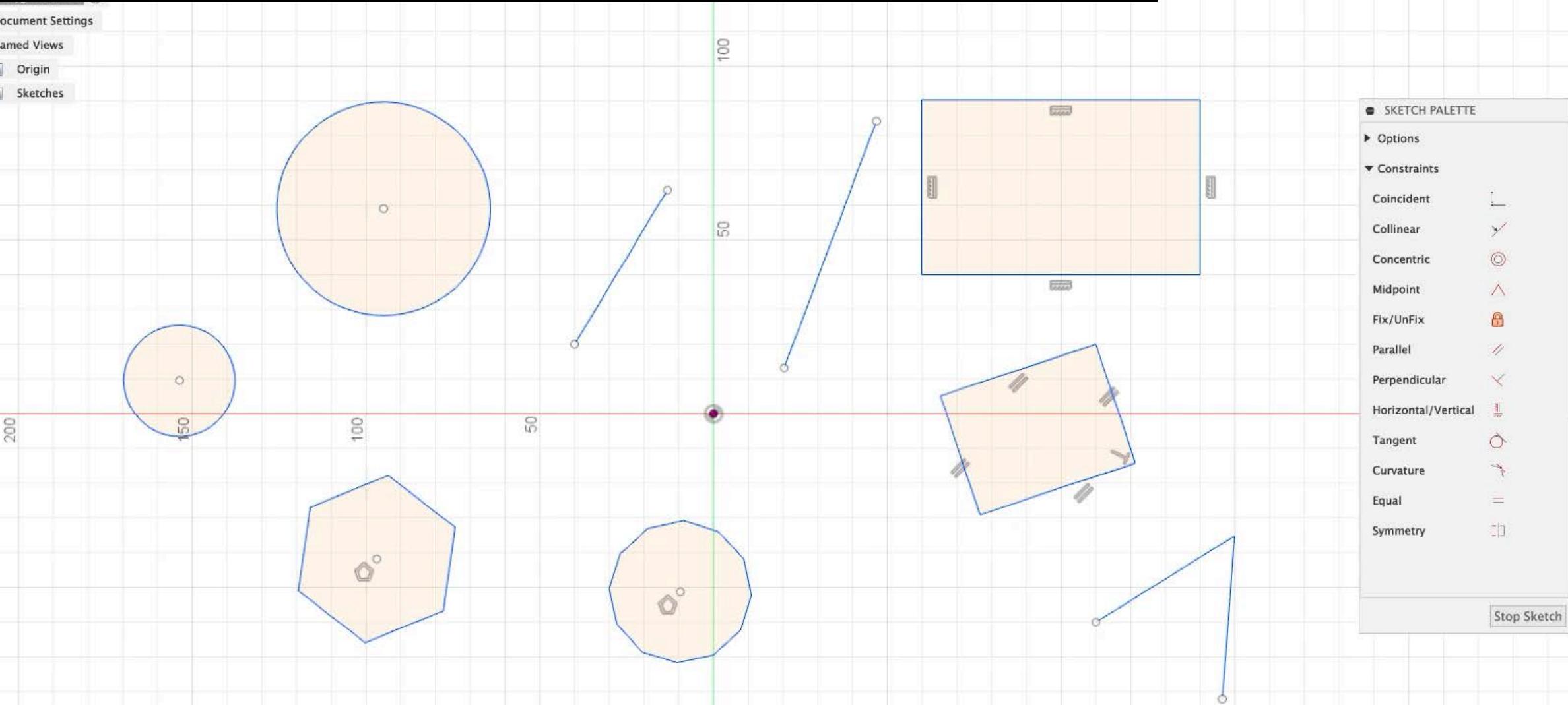
3D: How to **project** from 3D to 2D

3D: How to use **revolve** and **circular patterns**

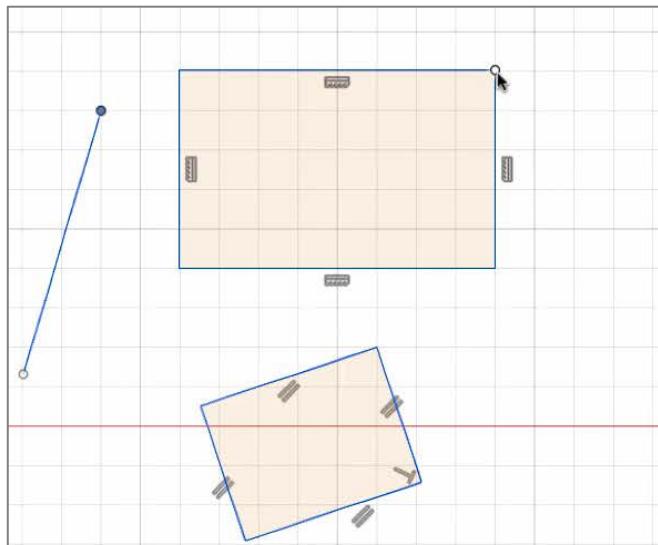
SKETCHING

ACTIVITY: MAKE SOME BASIC PRIMITIVE SHAPES

- D Document Settings
- D Named Views
- D Origin
- D Sketches



RESIZING SKETCH OBJECTS: THREE METHODS



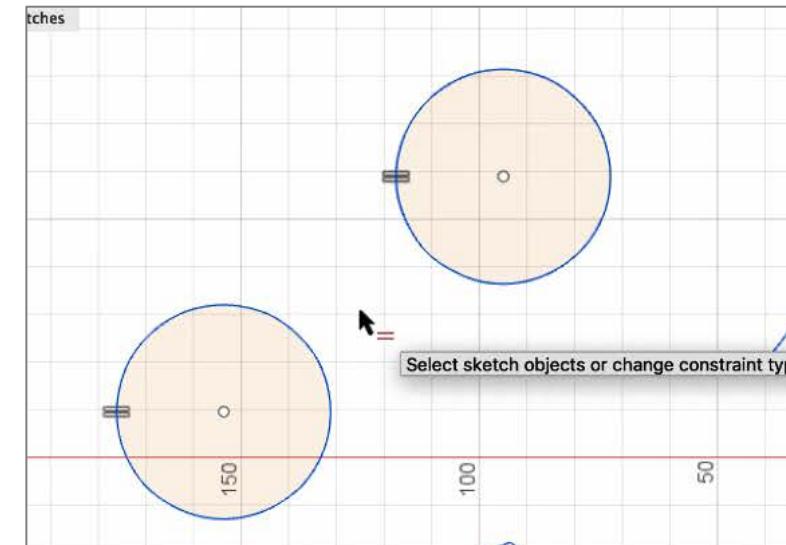
DIRECT MANIPULATION

Hover over object, grab and drag points



USING DIMENSIONS

Hit the 'd' key and select a geometry, then enter in the dimensions

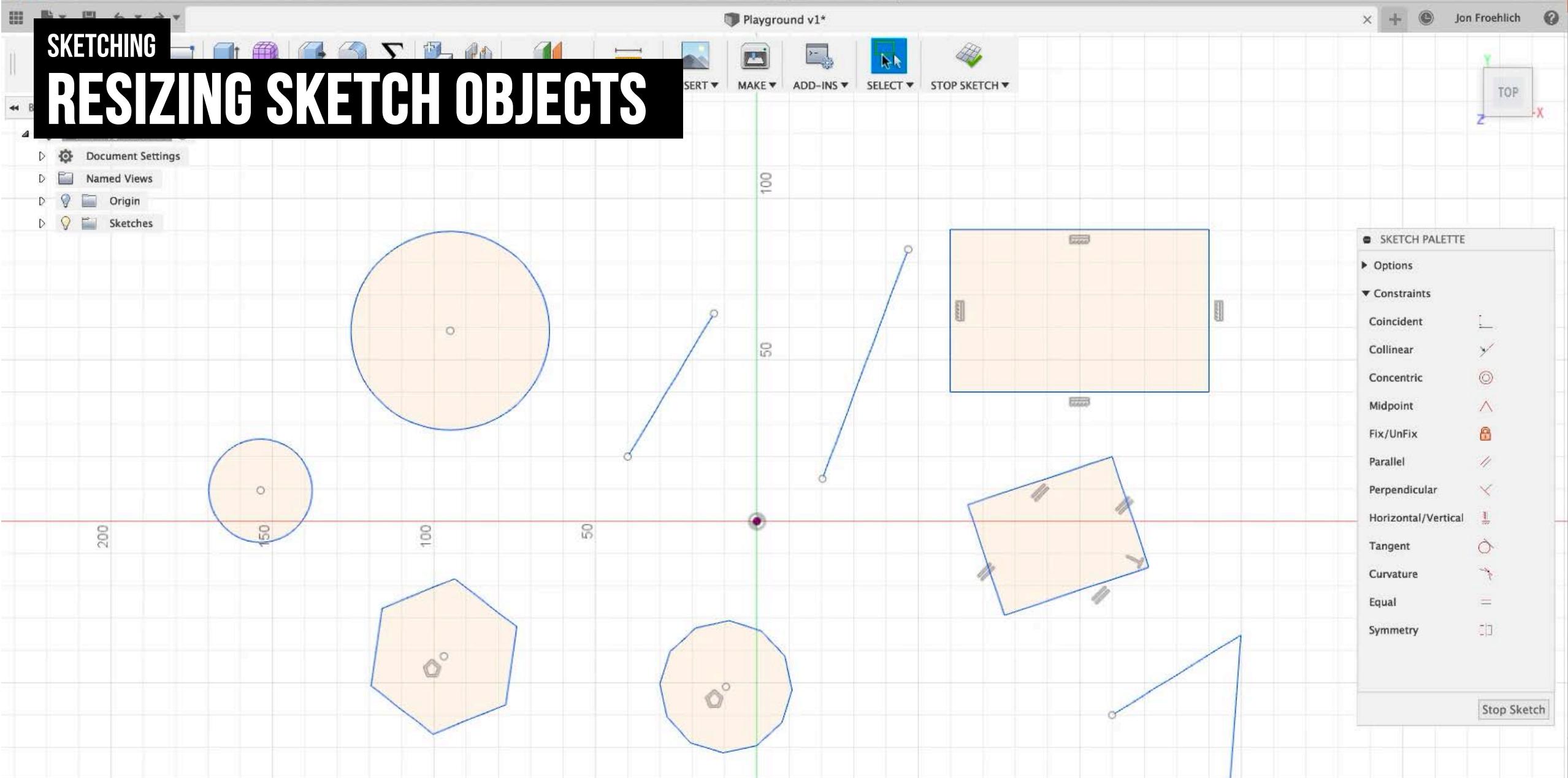


USING CONSTRAINTS

Go to the constraint panel, select the '**equals**' constraint and then select objects to constrain

SKETCHING

RESIZING SKETCH OBJECTS



Autodesk Fusion 360 (Education License) - Playground v1*

Model Sketch Create Modify Assemble Construct Inspect Insert Make Add-Ins Select Stop Sketch

BROWSER: Playground v1

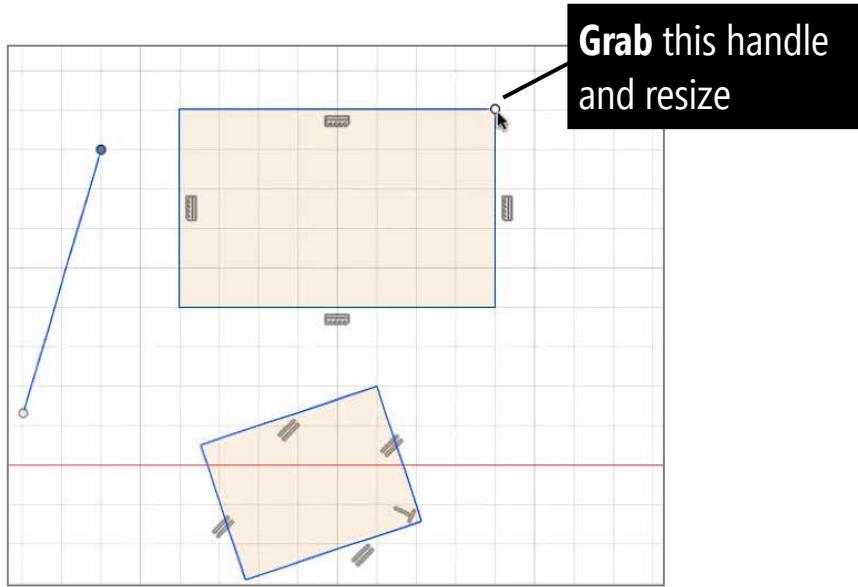
- Document Settings
- Named Views
- Origin
- Sketches

Sketch Palette:

- Options
- Constraints
 - Coincident
 - Collinear
 - Concentric
 - Midpoint
 - Fix/UnFix
 - Parallel
 - Perpendicular
 - Horizontal/Vertical
 - Tangent
 - Curvature
 - Equal
 - Symmetry
- Stop Sketch

SKETCHING

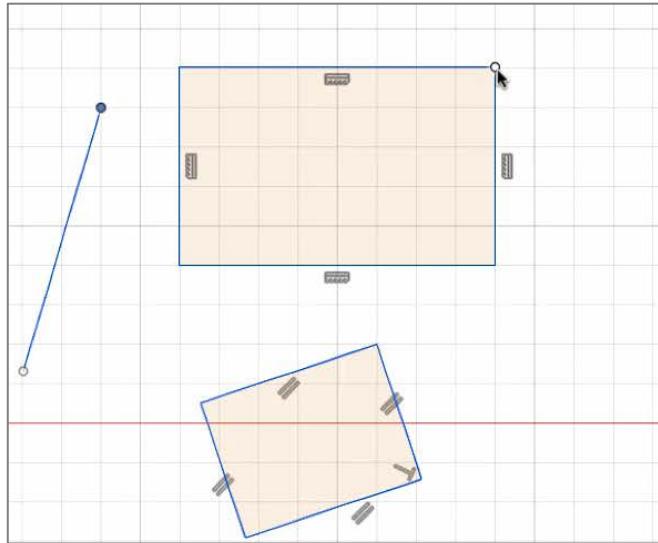
RESIZING SKETCH OBJECTS: THREE METHODS



DIRECT MANIPULATION

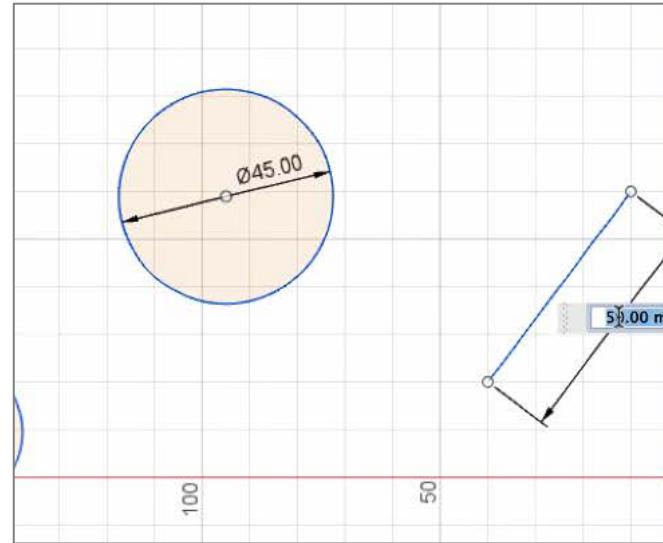
Hover over object, grab and drag points

RESIZING SKETCH OBJECTS: THREE METHODS



DIRECT MANIPULATION

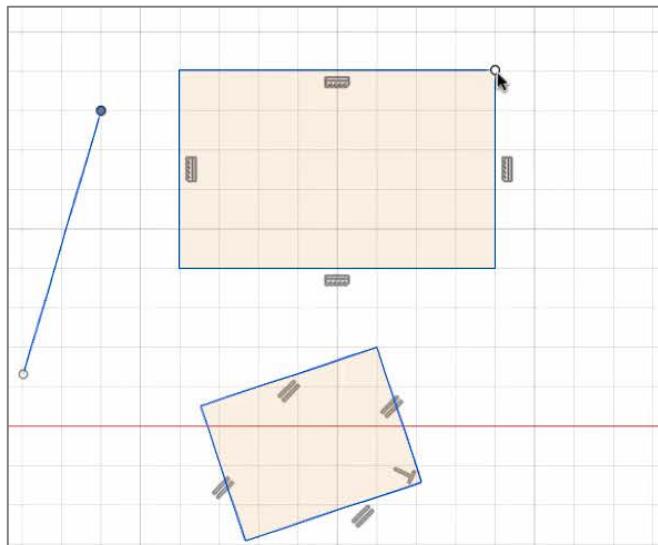
Hover over object, grab and drag points



USING DIMENSIONS

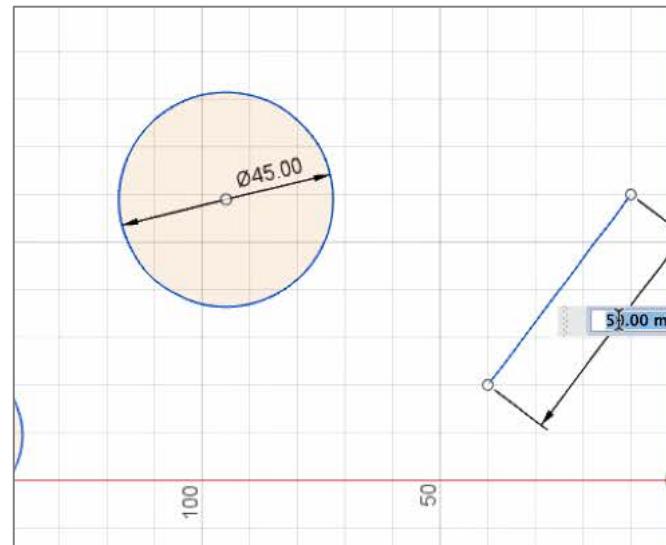
Hit the 'd' key and select a geometry, then enter in the dimensions

RESIZING SKETCH OBJECTS: THREE METHODS



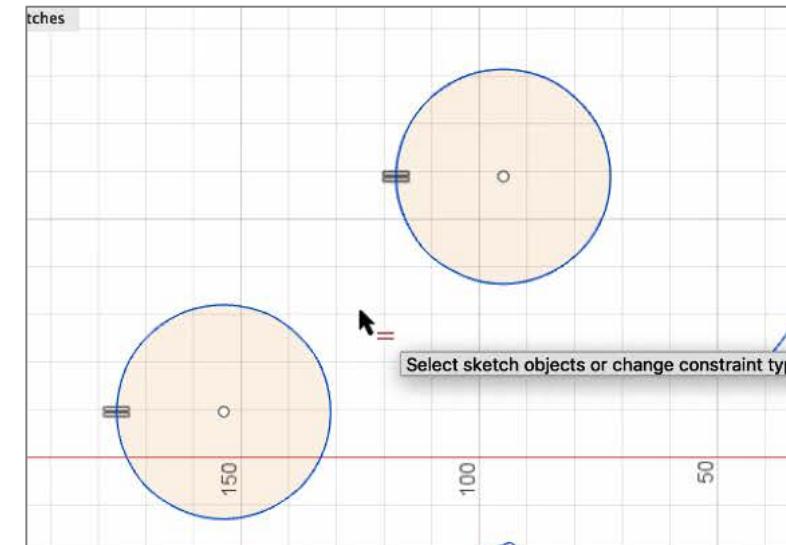
DIRECT MANIPULATION

Hover over object, grab and drag points



USING DIMENSIONS

Hit the 'd' key and select a geometry, then enter in the dimensions



USING CONSTRAINTS

Go to the constraint panel, select the '**equals**' constraint and then select objects to constrain

SKETCHING

MOVING OBJECTS

Direct manipulation

Pop-up menu

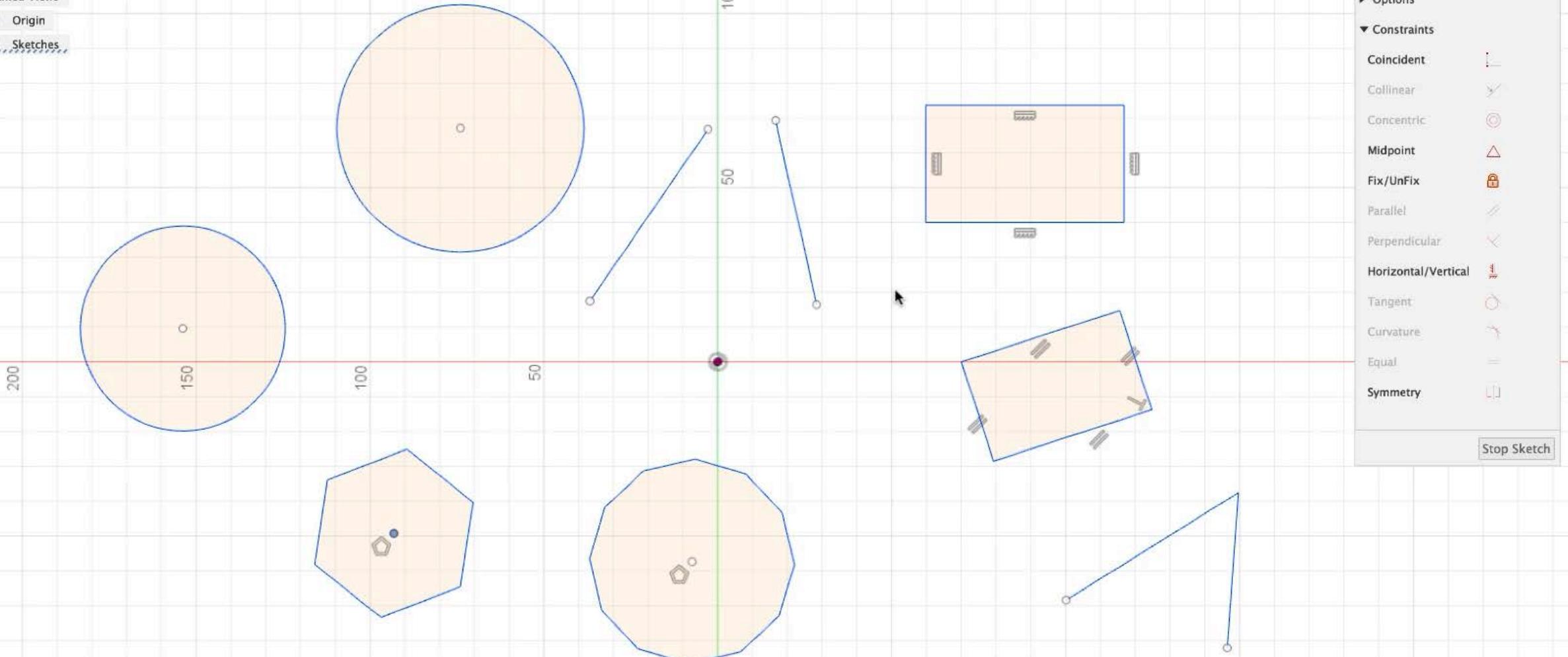
Many constraints (*e.g.*, midpoint, tangent, parallel)

Using dimensions

SKETCHING

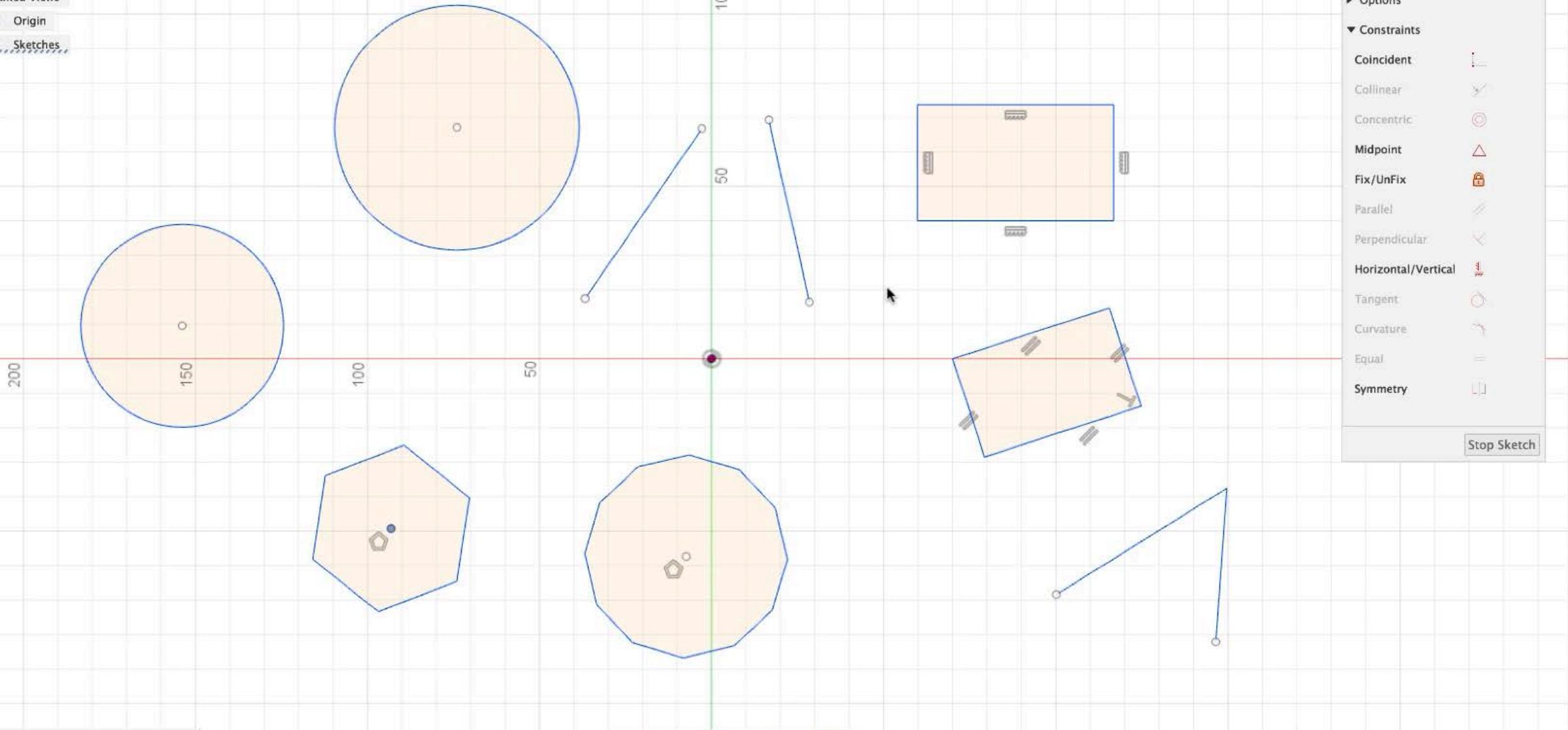
MOVING SKETCH OBJECTS

- Document Settings
- Named Views
- Origin
- Sketches



BROWSER

- Playground v1
- Document Settings
- Named Views
- Origin
- Sketches

TOP
Z
Y
X

SKETCHING

MOVING OBJECTS

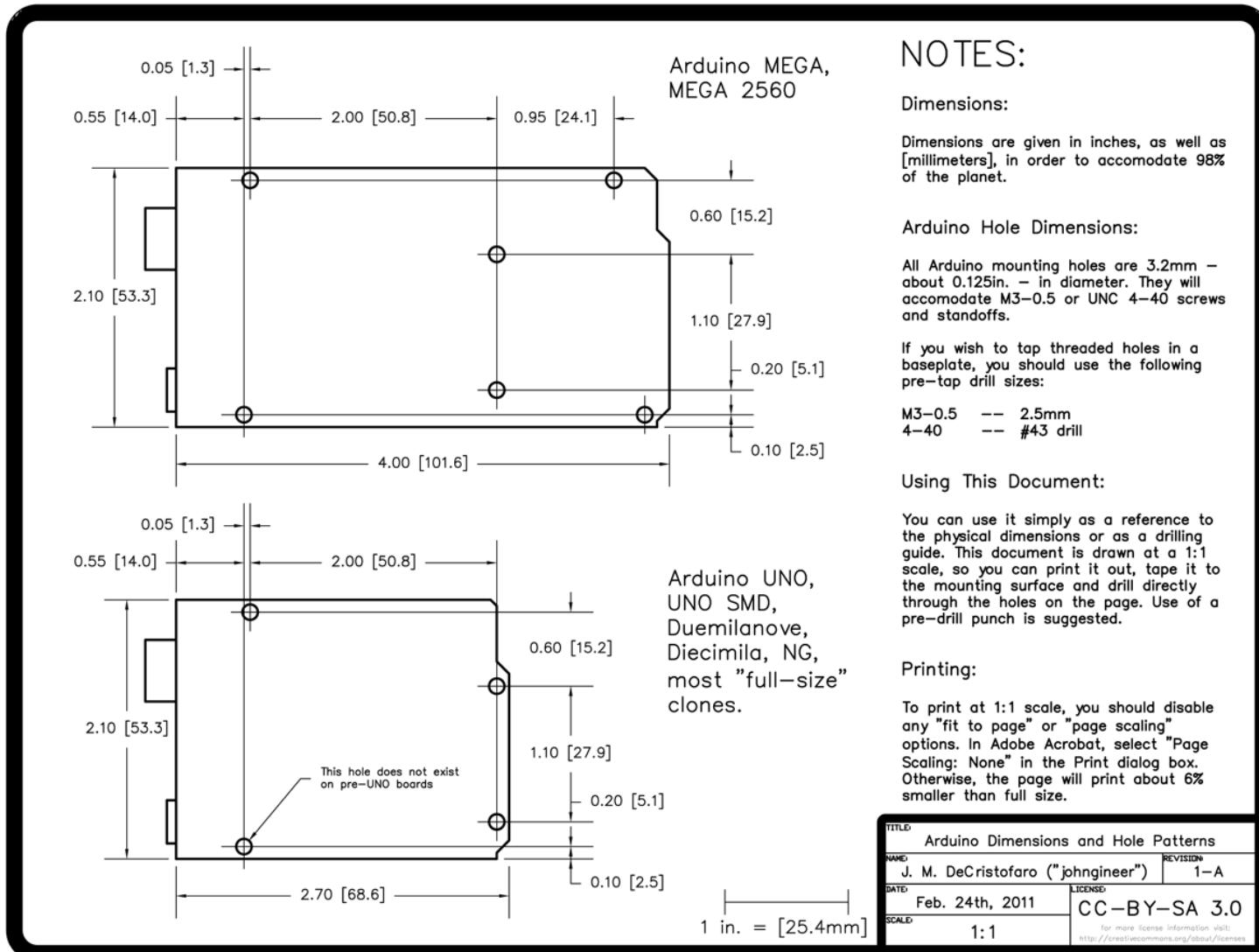
Direct manipulation

Pop-up menu

Many constraints (*e.g.*, midpoint, tangent, parallel)

Using dimensions

DATASHEETS FOR DIMENSIONS: EXAMPLE: UNO



ARDUINO UNO DIMENSIONS

NOTES:

Dimensions:

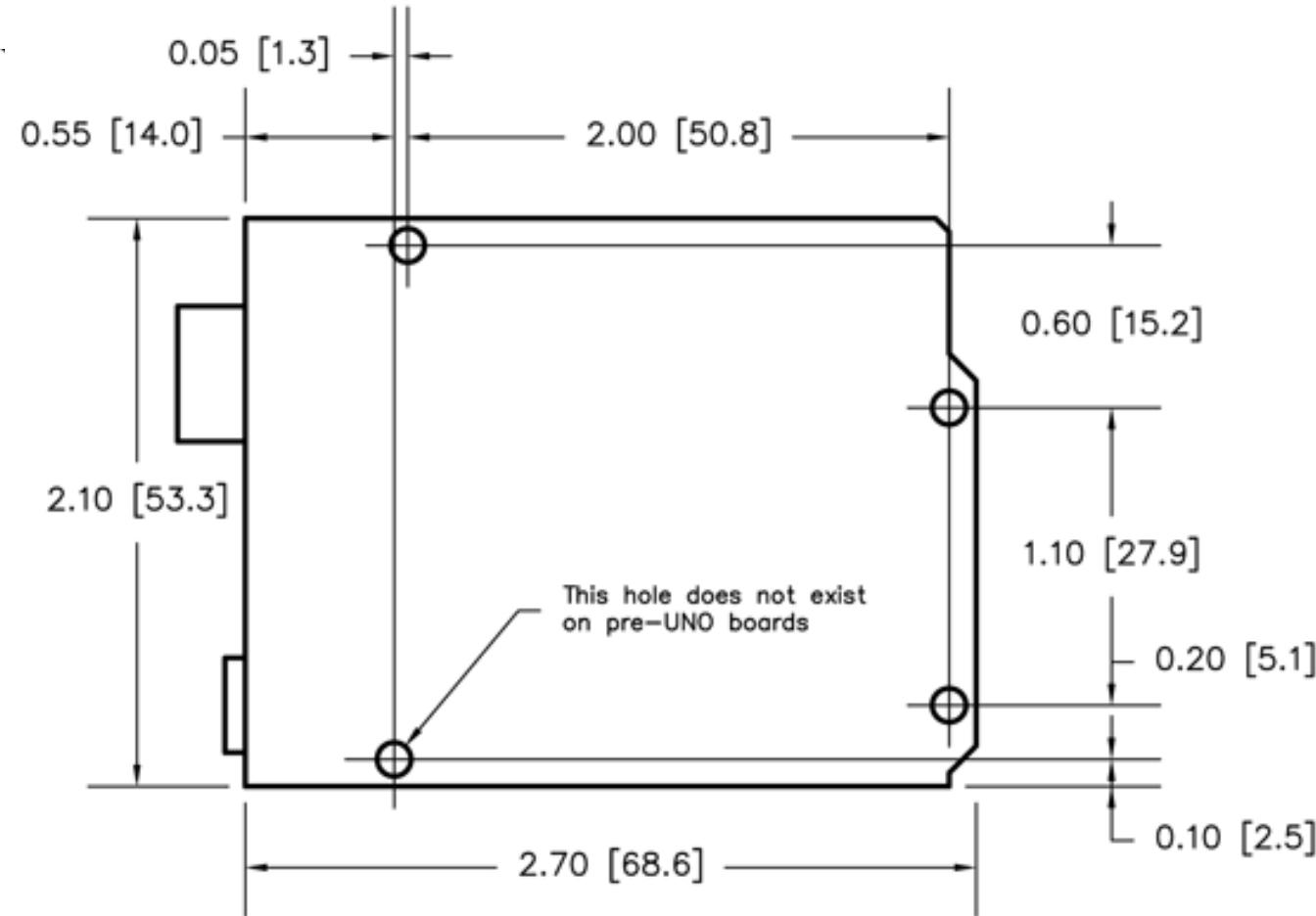
Dimensions are given in inches, as well as [millimeters], in order to accomodate 98% of the planet.

Arduino Hole Dimensions:

All Arduino mounting holes are 3.2mm – about 0.125in. – in diameter. They will accomodate M3-0.5 or UNC 4-40 screws and standoffs.

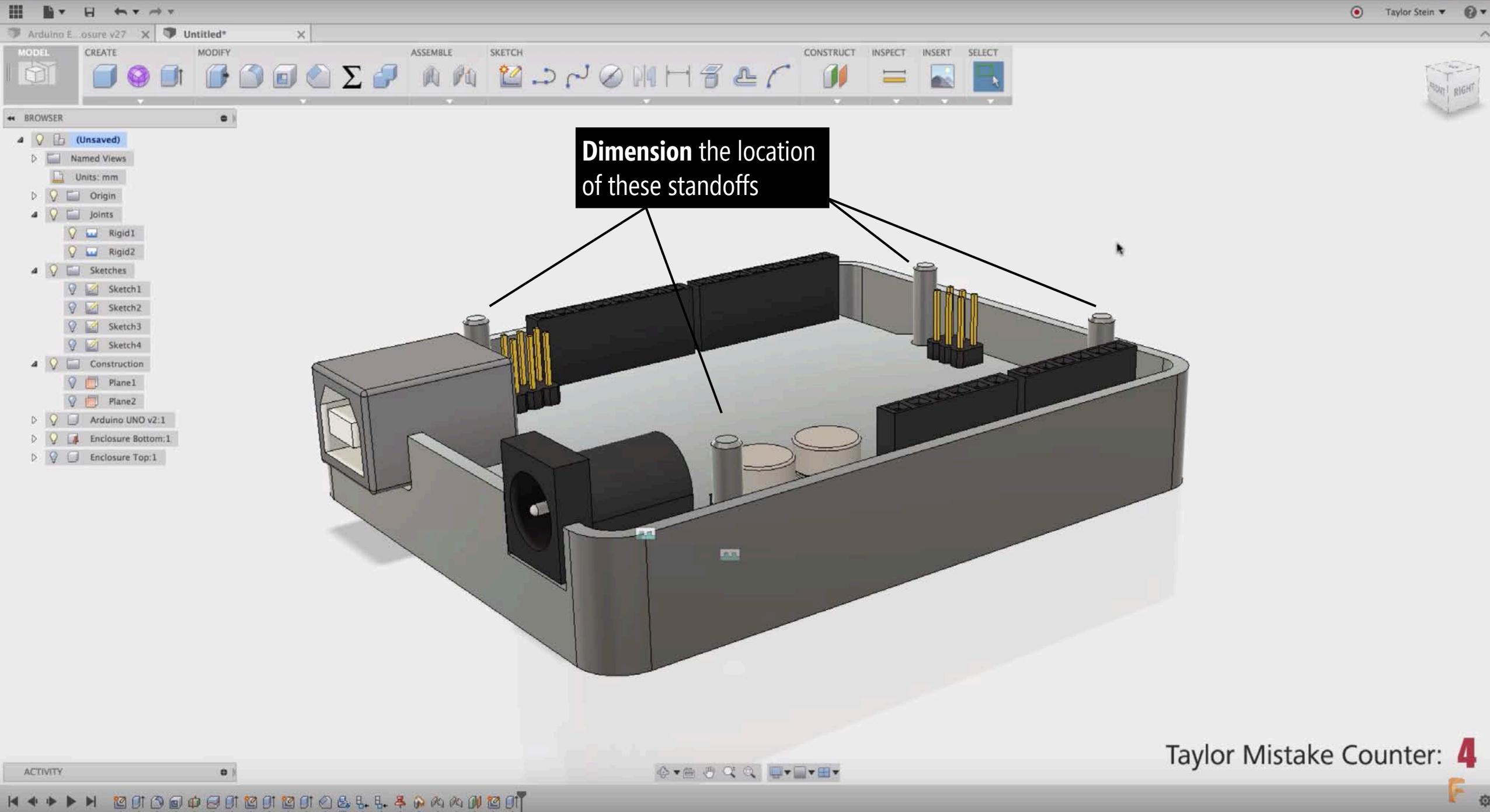
If you wish to tap threaded holes in a baseplate, you should use the following pre-tap drill sizes:

M3-0.5 -- 2.5mm
4-40 -- #43 drill



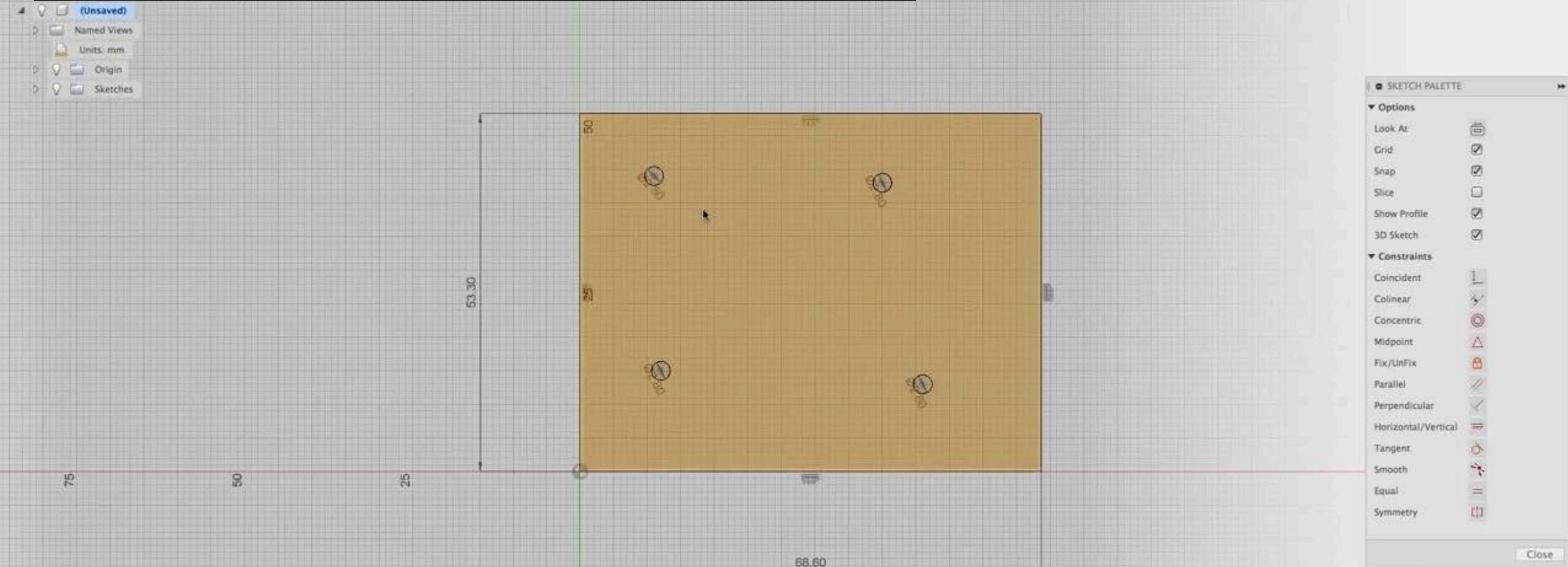
Arduino UNO,
UNO SMD,
Duemilanove,
Diecimila, NG,
most "full-size"
clones.

1 in. = [25.4mm]



SKETCHING

USING DIMENSIONS TO MOVE OBJECTS



Source: Autodesk Fusion 360 Tutorial Series, <https://youtu.be/E0bhdr84FNU>

Untitled*

MODEL CREATE MODIFY ASSEMBLE SKETCH CONSTRUCT INSPECT INSERT SELECT STOP SKETCH

BROWSER (Unsaved) Named Views Units: mm Origin Sketches

SKETCH PALETTE Options Look At Grid Snap Slice Show Profile 3D Sketch Constraints Coincident Colinear Concentric Midpoint Fix/UnFix Parallel Perpendicular Horizontal/Vertical Tangent Smooth Equal Symmetry

This hole does not exist on pre-UNO boards

0.05 [1.3] 0.55 [14.0] 2.00 [50.8] 0.60 [15.2] 1.10 [27.9] 0.20 [5.1] 0.10 [2.5] 2.10 [53.3] 2.70 [68.6] 53.30 68.60

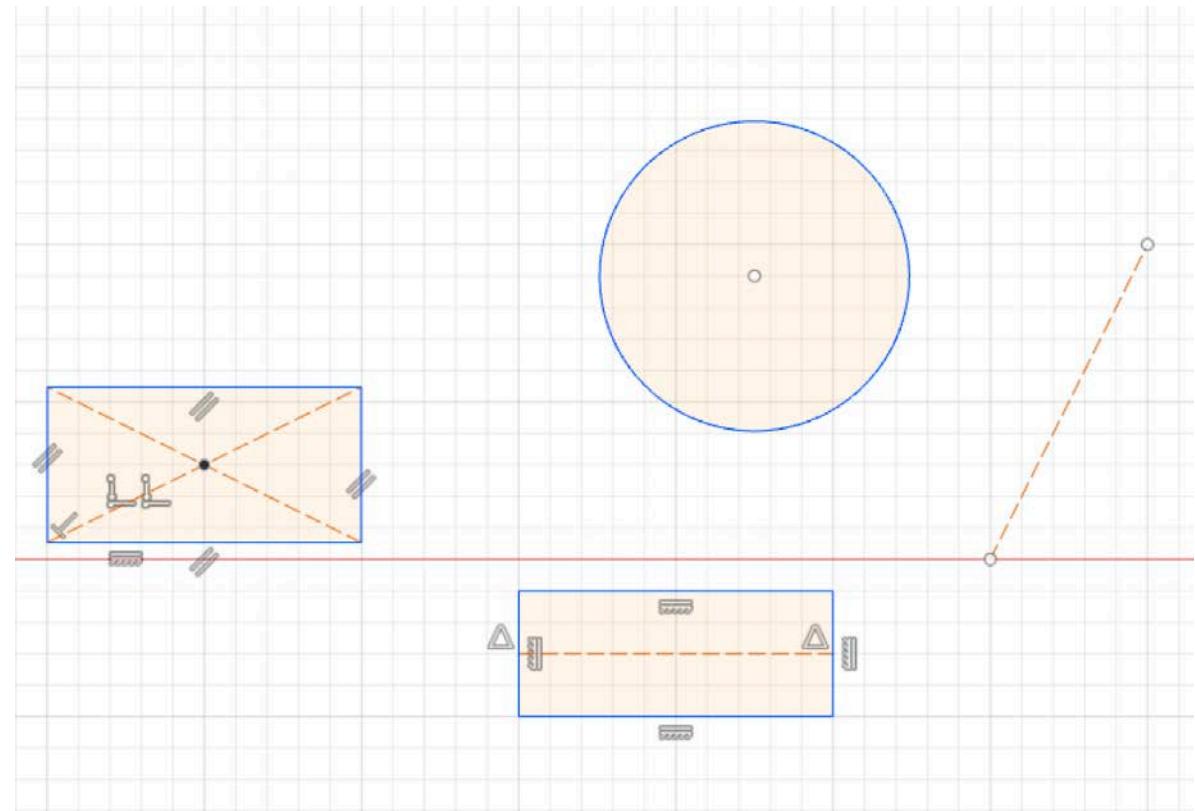
75 50 25

Taylor Mistake Counter: 1

CONSTRUCTION LINES

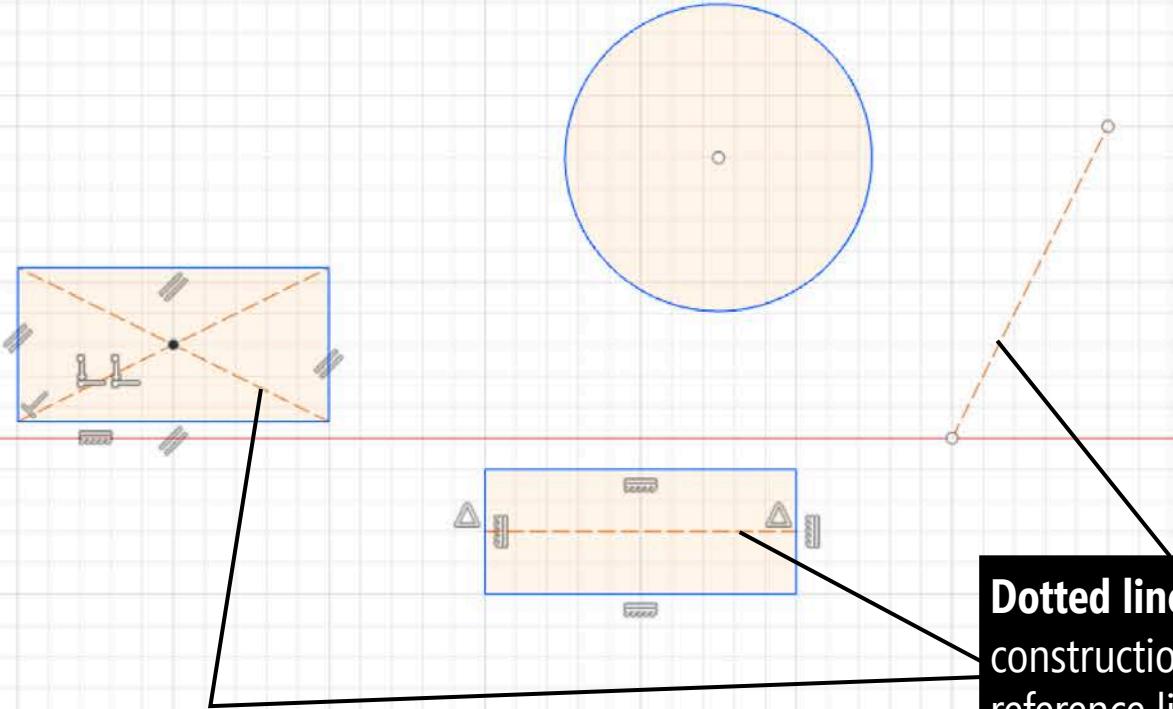
Construction entities are used as a reference and do not create solid geometry.

Use construction lines to help guide you in building and aligning objects



SKETCHING

CONSTRUCTION LINES



Dotted lines are
construction lines. These are
reference lines and not used
to create solid geometry

SKETCH PALETTE

Options

Construction

Look At

Sketch Grid

Snap

Slice

Show Profile

Show Points

Show Dimensions

Show Constraints

Show Projected Geometries

3D Sketch

Constraints

Coincident

Collinear

Concentric

Midpoint

Fix/UnFix

Parallel

Perpendicular

Horizontal/Vertical

Tangent

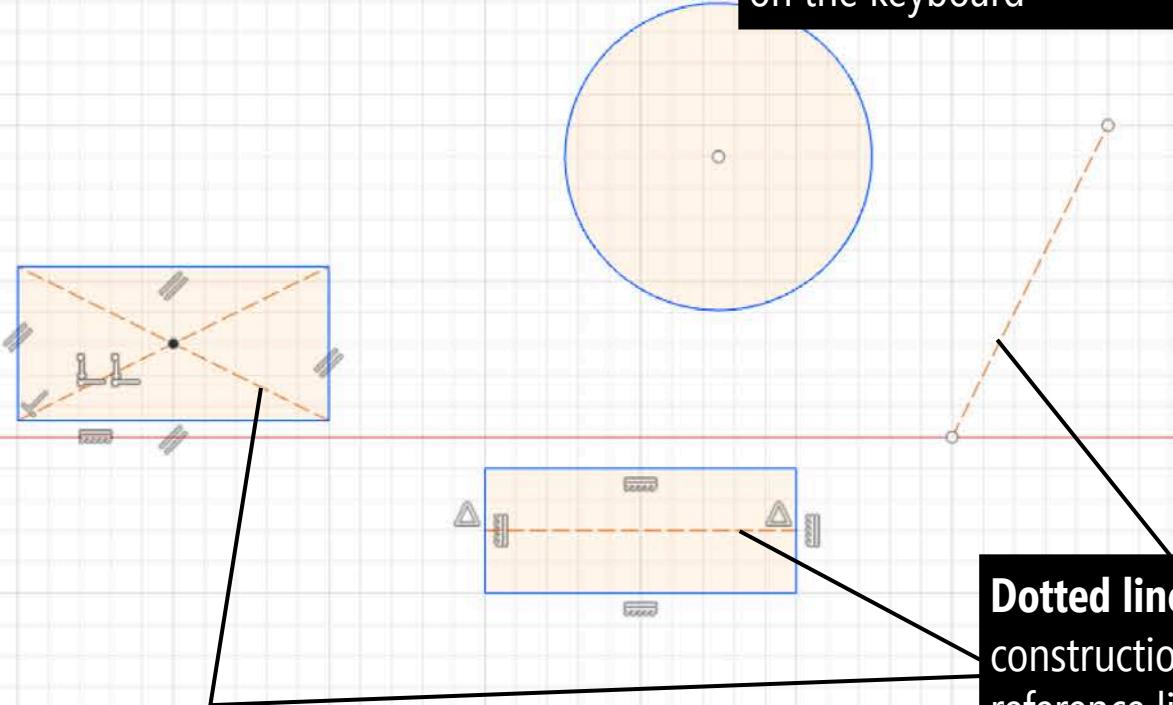
Curvature

Equal

Symmetry

SKETCHING

CONSTRUCTION LINES



To convert a geometry to a construction reference, select the line and then this 'Construction' icon. You can also hit 'x' on the keyboard

Dotted lines are construction lines. These are reference lines and not used to create solid geometry

SKETCH PALETTE

Options

Construction

Look At

Sketch Grid

Snap

Slice

Show Profile

Show Points

Show Dimensions

Show Constraints

Show Projected Geometries

3D Sketch

Constraints

Coincident

Collinear

Concentric

Midpoint

Fix/UnFix

Parallel

Perpendicular

Horizontal/Vertical

Tangent

Curvature

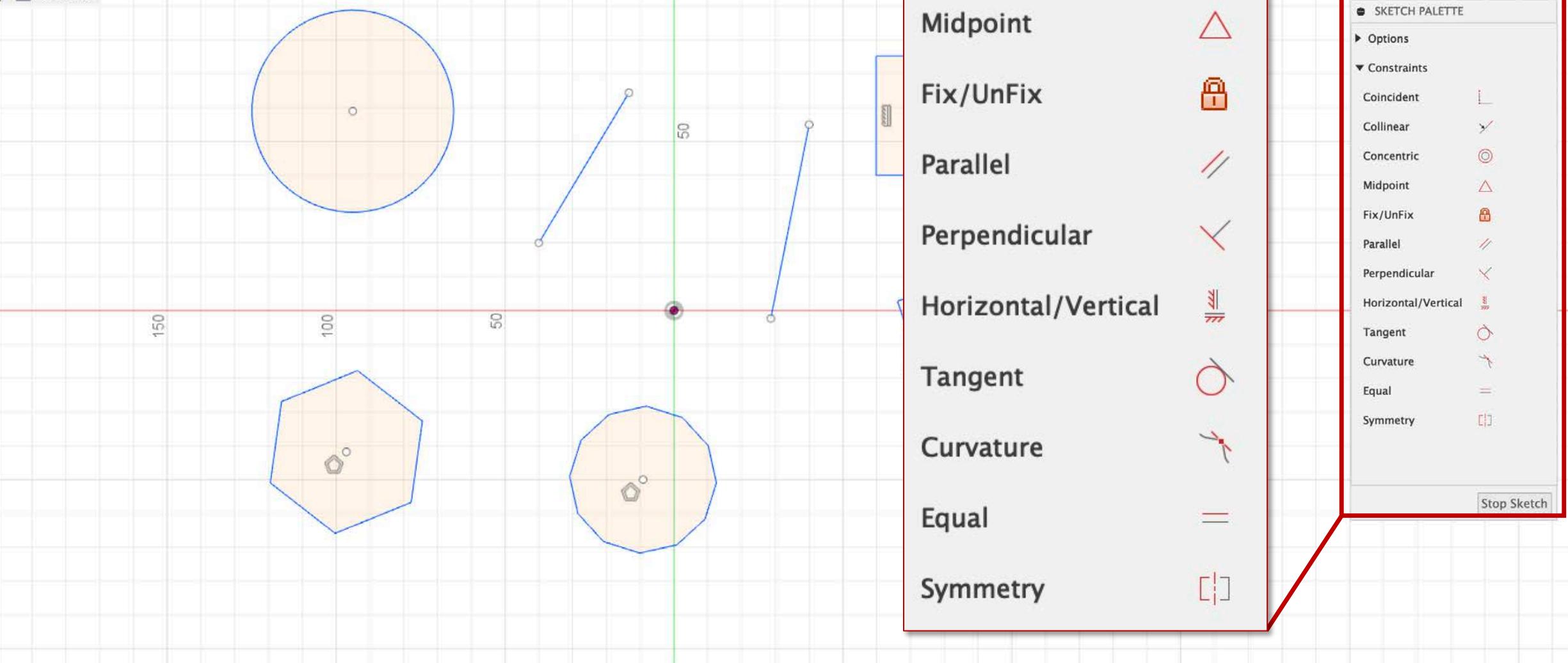
Equal

Symmetry

CONSTRAINTS

SKETCH CONSTRAINTS

- Document Settings
- Named Views
- Origin
- Sketches



Coincident		Fuses two points together (aka applies a 'position continuity')
Collinear		Makes two lines (objects) share a common line
Concentric		Aligns center points of circular objects (circles, arcs)
Midpoint		Aligns objects to center points of other objects
Fix/UnFix		Fixes the location of object (fixed sketches turn green!)
Parallel		Makes two objects (lines) parallel
Perpendicular		Makes two objects (lines) perpendicular
Horizontal/Vertical		Makes two objects that you select either horizontal or vertical
Tangent		Similar to coincidence but forces object (lines) to be tangent
Curvature		Enforces spline curvature between two objects
Equal		Makes all selected objects the same size
Symmetry		Makes two objects symmetrical to a third object

CONSTRAINTS

SKETCH CONSTRAINTS

- ▷ Document Settings
- ▷ Named Views
- ▷ Origin
- ▷ Sketches

100

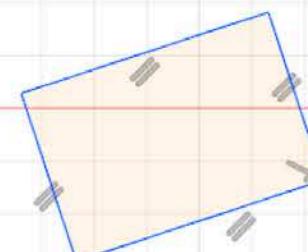
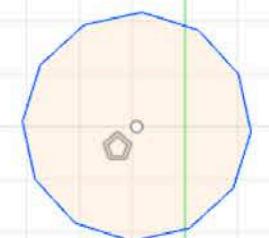
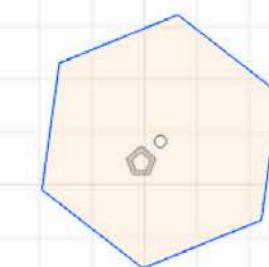
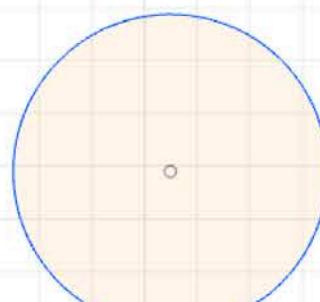
50

200

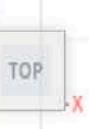
150

100

50



- INSPECT ▾
- INSERT ▾
- MAKE ▾
- ADD-INS ▾
- SELECT ▾
- STOP SKETCH ▾



SKETCH PALETTE

► Options

▼ Constraints

Coincident



Collinear



Concentric



Midpoint



Fix/UnFix



Parallel



Perpendicular



Horizontal/Vertical



Tangent



Curvature



Equal



Symmetry



Stop Sketch

CONSTRAINTS

SKETCH CONSTRAINTS

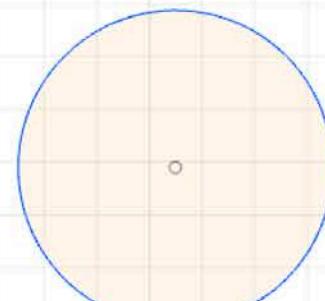
- Document Settings
- Named Views
- Origin
- Sketches

Playground v1*

INSPECT INSERT MAKE ADD-INS SELECT STOP SKETCH

X + ⏺

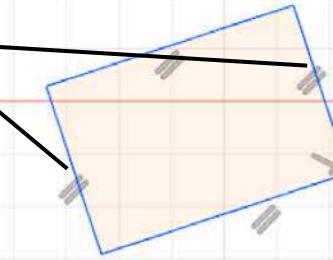
Jon Froehlich



Vertical constraint
geometry must be vertical

Parallel constraint
geometry must be parallel

Horizontal constraint
geometry must be horizontal



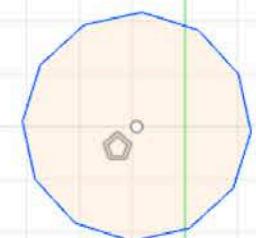
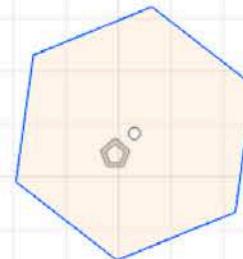
Perpendicular constraint
geometry must be perpendicular

150

100

50

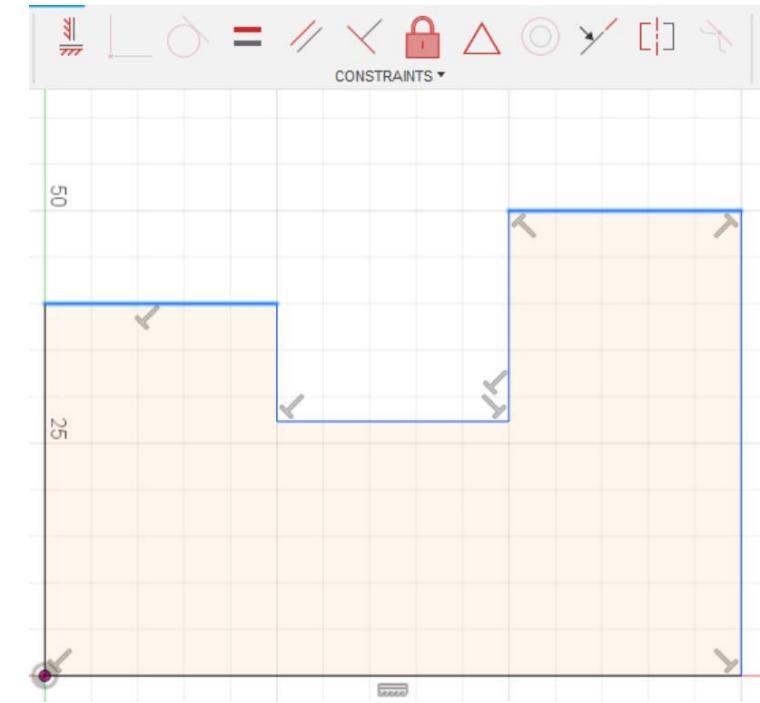
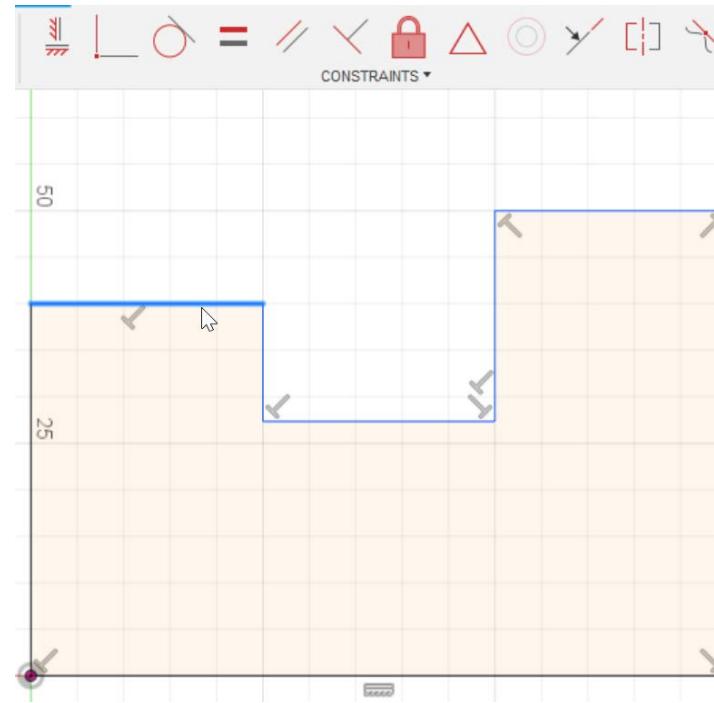
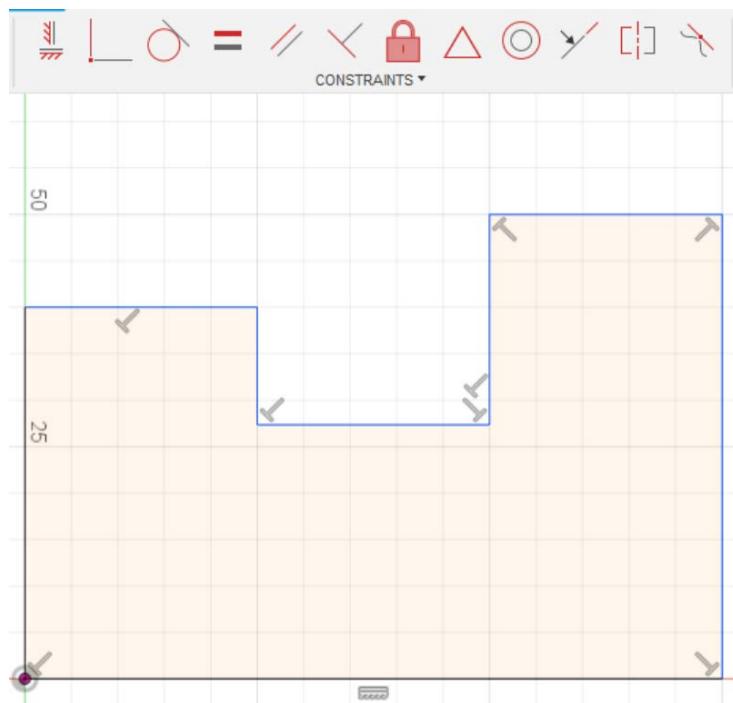
200



SKETCH PALETTE	
► Options	
▼ Constraints	
Coincident	
Collinear	
Concentric	
Midpoint	
Fix/UnFix	
Parallel	
Perpendicular	
Horizontal/Vertical	
Tangent	
Curvature	
Equal	
Symmetry	
Stop Sketch	

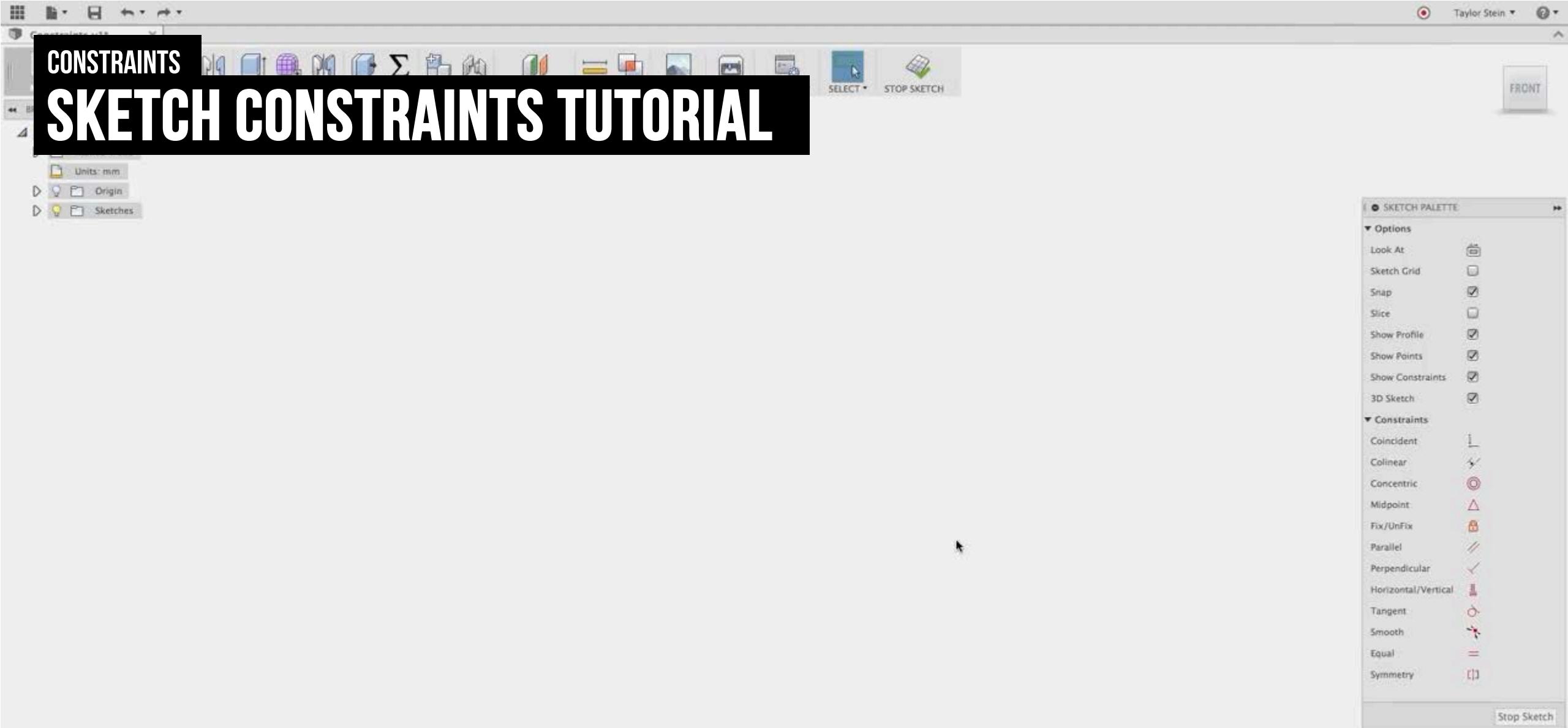
CONSTRAINTS

CONSTRAINT MENU IS ADAPTIVE

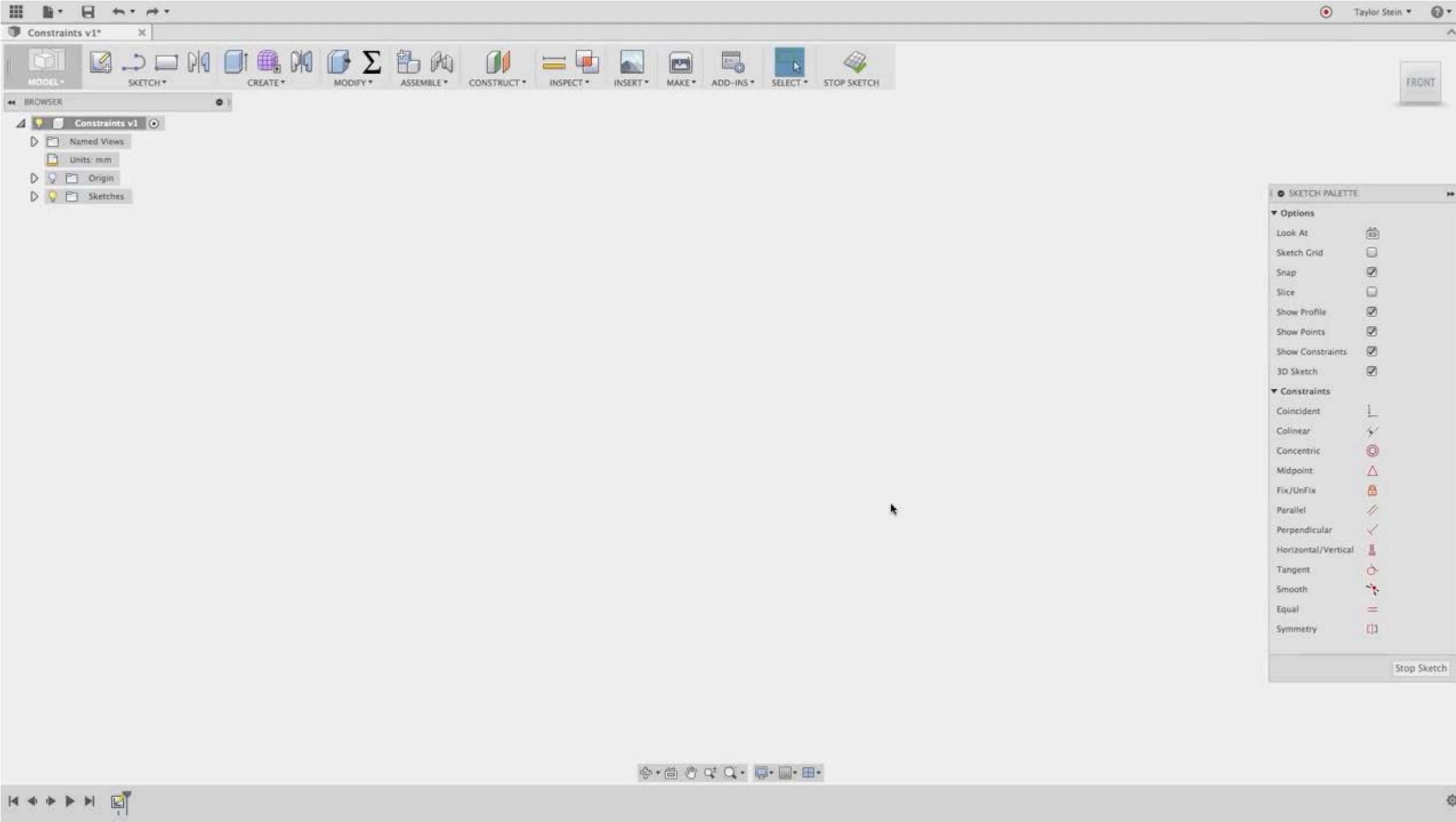


CONSTRAINTS

SKETCH CONSTRAINTS TUTORIAL



Source: Autodesk Fusion 360 YouTube Channel, https://youtu.be/J_2If5zVp84



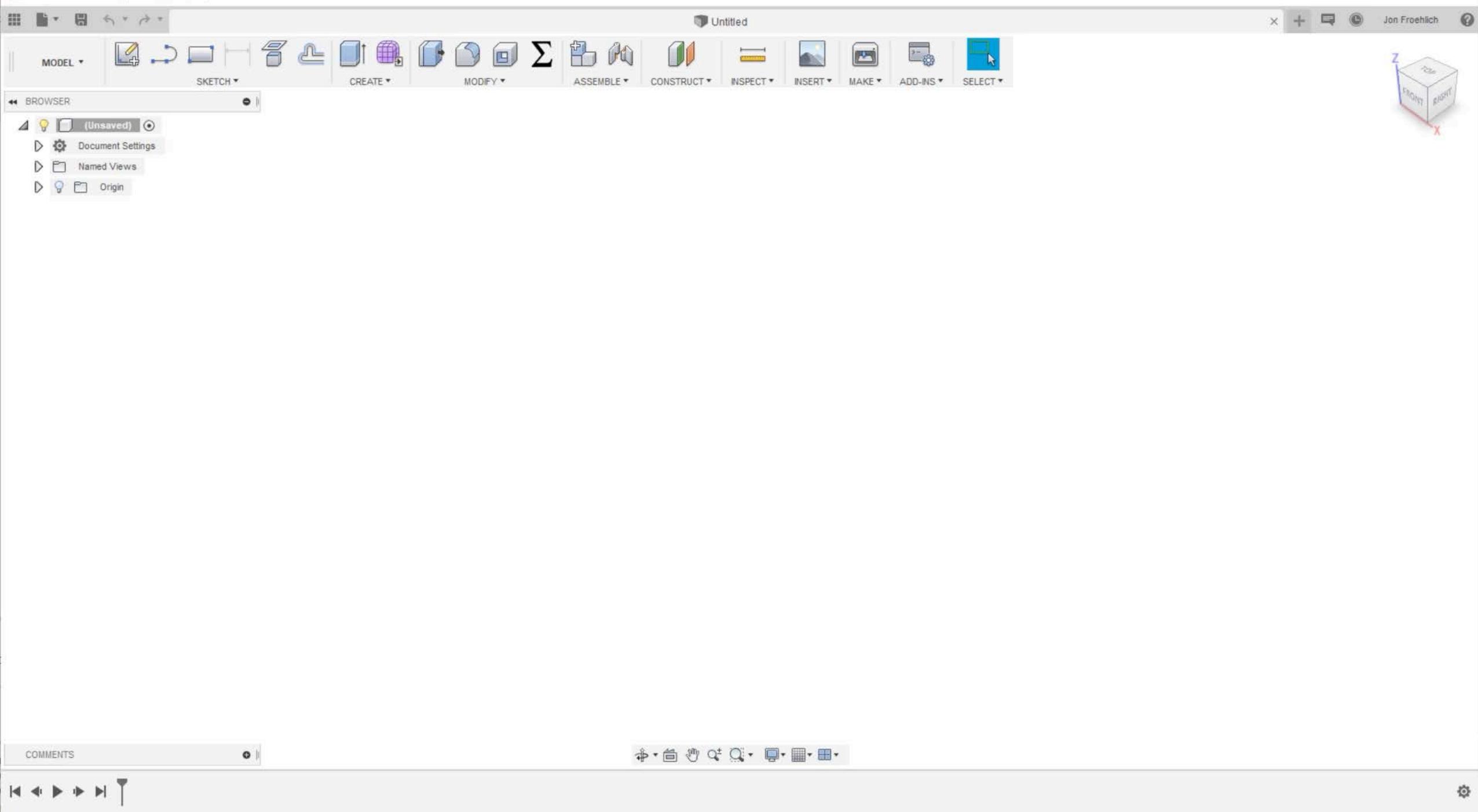
CONSTRAINTS

Untitled

x + ⓢ ⓘ ? Jon Froehlich

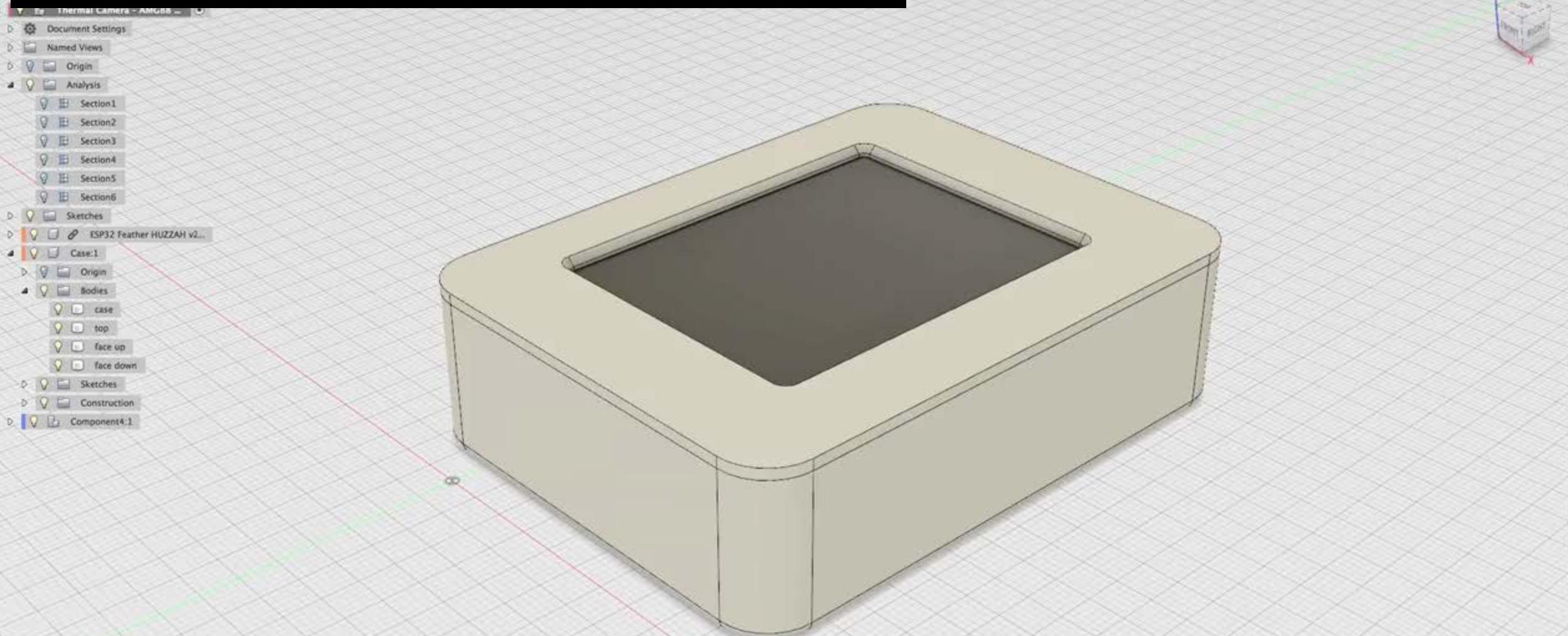
CONSTRAINTS CAN BE POWERFUL BUT CONFUSING





CONSTRAINTS

EXAMPLE: "EASY-SNAP" ENCLOSURE



Source: Adafruit Fusion 360 Tutorial Series, <https://youtu.be/VVmOtM60VWw>

Autodesk Fusion 360

Thermal...v16 X | CP Case...v2 X | Circuit Pl...v15 X | CP Case...v9 X | Thermal...FT v12 X | +

MODEL SKETCH CREATE MODIFY ASSEMBLE CONSTRUCT INSPECT INSERT MAKE ADD-INS SELECT

BROWSER

- Thermal Camera - AMG88
- Document Settings
- Named Views
- Origin
- Analysis
 - Section1
 - Section2
 - Section3
 - Section4
 - Section5
 - Section6
- Sketches
- ESP32 Feather HUZZAH v2...
- Case:1
 - Origin
 - Bodies
 - case
 - top
 - face up
 - face down
 - Sketches
 - Construction
- Component4:1

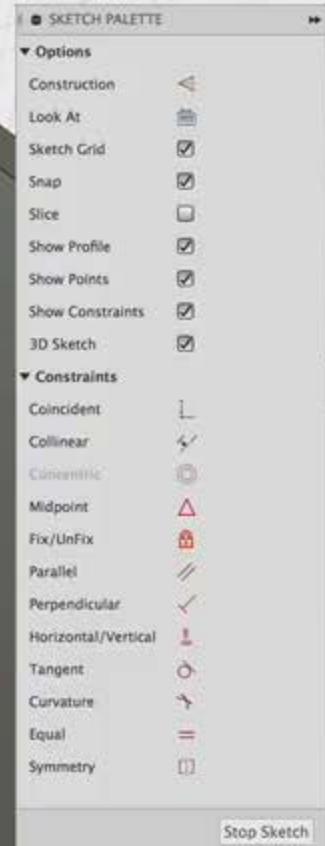
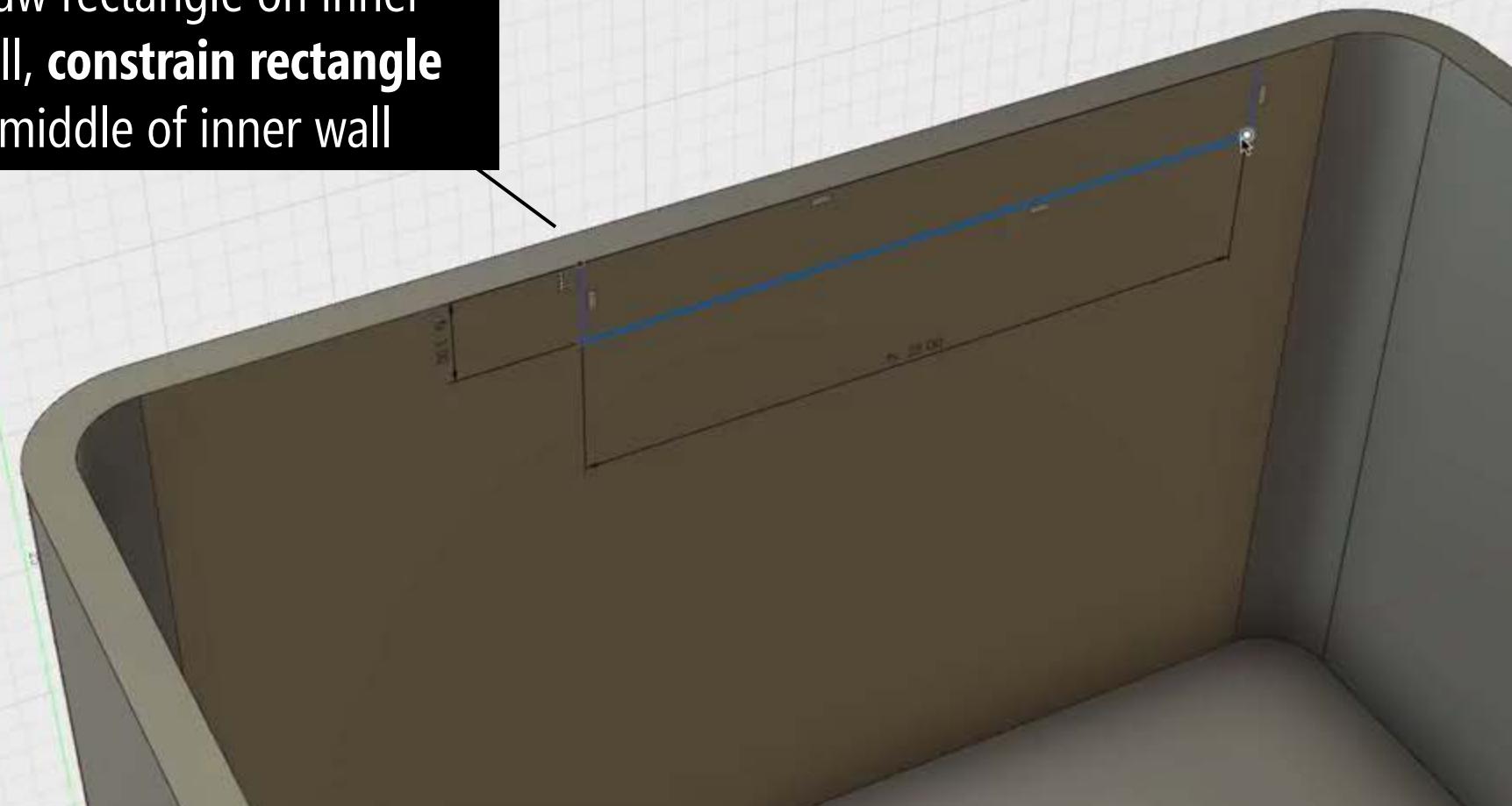
Comments

The image shows a 3D rendering of a rectangular case with rounded edges and a large rectangular cutout on the top surface. The case is colored in a light beige or cream shade. It is positioned on a 3D coordinate system grid with red, green, and blue axes. The software interface is Autodesk Fusion 360, with a toolbar at the top containing icons for Model, Sketch, Create, Modify, Assemble, Construct, Inspect, Insert, Make, Add-Ins, and Select. The left side of the screen displays the 'BROWSER' panel, which lists the project structure, including 'Thermal Camera - AMG88', 'Document Settings', 'Named Views', 'Origin', 'Analysis' (with sub-sections 1-6), 'Sketches', 'ESP32 Feather HUZZAH v2...', 'Case:1' (with sub-items like 'Origin', 'Bodies' containing 'case', 'top', 'face up', 'face down', 'Sketches', 'Construction'), and 'Component4:1'. The bottom of the screen has a 'COMMENTS' section and a ribbon of small tool icons.

CONSTRAINTS

EXAMPLE: "EASY-SNAP" ENCLOSURE

Draw rectangle on inner wall, **constrain rectangle** to middle of inner wall



The screenshot shows the Autodesk Fusion 360 interface with the following details:

- Top Bar:** Fusion 360, File, Edit, View, Window, Share, Help, Fri 3:26 PM.
- Toolbar:** MODEL, SKETCH, CREATE, MODIFY, ASSEMBLE, CONSTRUCT, INSPECT, INSERT, MAKE, ADD-INS, SELECT, STOP SKETCH.
- BROWSER:** (Unsaved), Document Settings, Named Views, Origin, Enclosure:1, Case:1, Top Cover:1.
- Sketch Palette:** Options (Construction, Look At, Sketch Grid, Snap, Slice, Show Profile, Show Points, Show Constraints, 3D Sketch), Constraints (Coincident, Collinear, Cosemic, Midpoint, Fix/UnFix, Parallel, Perpendicular, Horizontal/Vertical, Tangent, Curvature, Equal, Symmetry).
- 3D Model:** A brown-colored 3D model of a case with a blue sketch line drawn on its side face.
- Bottom Bar:** COMMENTS, various icons, and a status bar showing Search Lines: Length: 2500 mm.



Video by Jon Froehlich

Autodesk Fusion 360 (Education License) Jon Froehlich

Playground

Data People Upload New Folder

SOLID SURFACE SHEET METAL TOOLS

CREATE MODIFY fx ASSEMBLE CONSTRUCT INSPECT INSERT SELECT

BROWSER (Untitled*)

- 2000mAh Battery 10/16/19 V1
- Adafruit FONA Feather 32u4 10/16/19 V1
- Arduino_uno.6df525b0-a0fc-4683-8e1... 4/24/19 V1
- Arduino Playground 4/24/19 V1
- Feather BLE with Headers 10/16/19 V1
- Feather Box V2 10/16/19 V1
- Feather OLED Wing 10/16/19 V1
- Huzzah32 Simple 10/21/19 V1
- Huzzah32 Simple 10/21/19 V1
- Huzzah32 Simple 3 10/21/19 V1
- Huzzah32 Simple IGES 10/21/19 V1
- Just Arduino 4/25/19 V2
- Pizero Large 10/16/19 V1
- Playground 4/25/19 V3
- Projection 4/24/19 V1
- SketchingPlayground 7:01:41 AM V1

RIGHT W

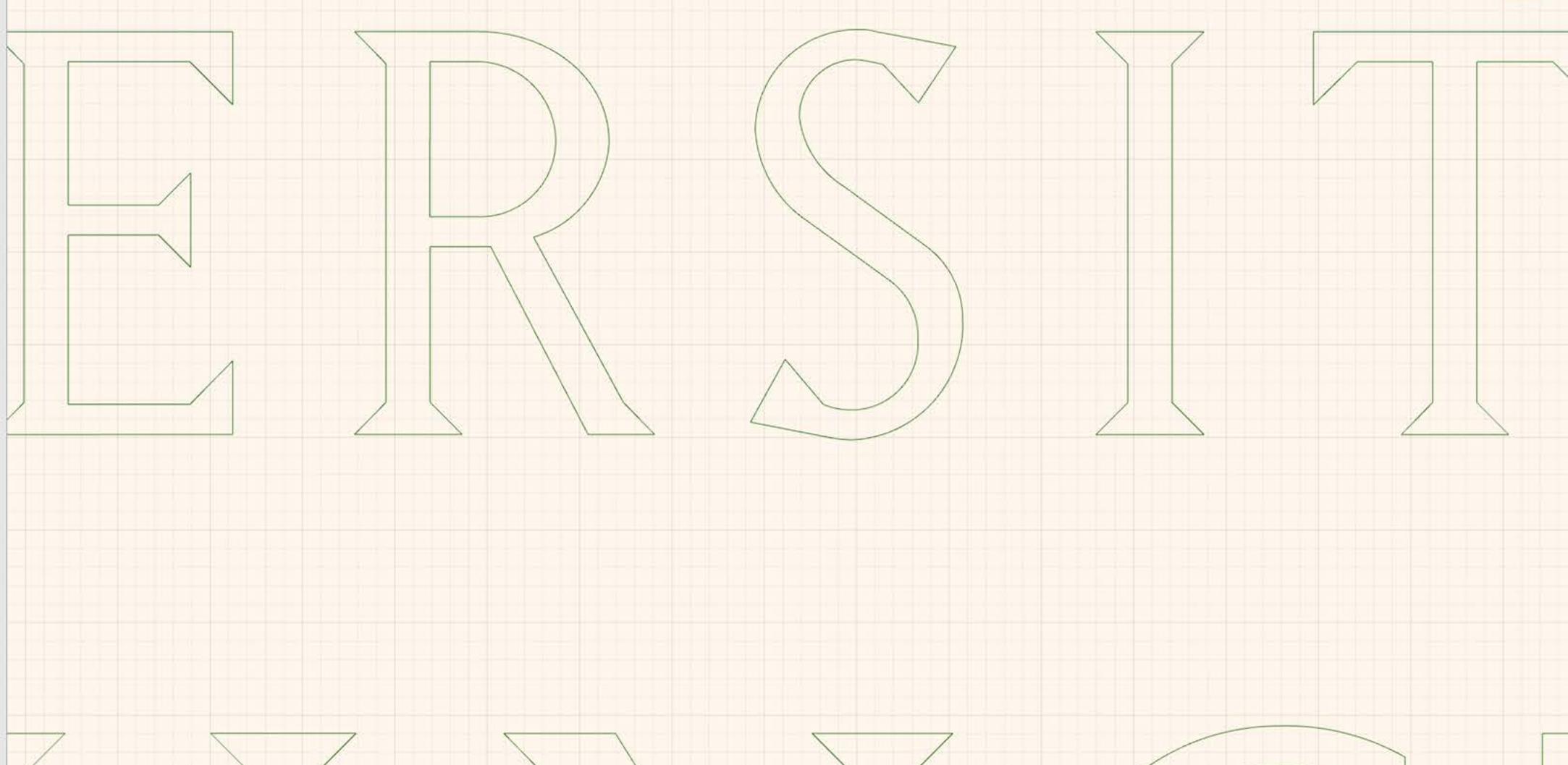
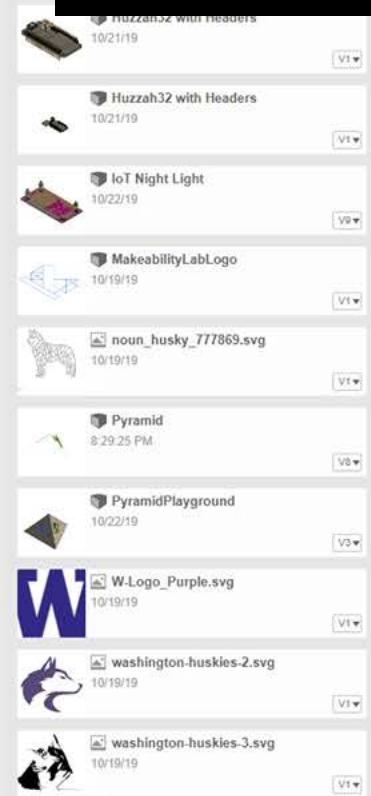
COMMENTS

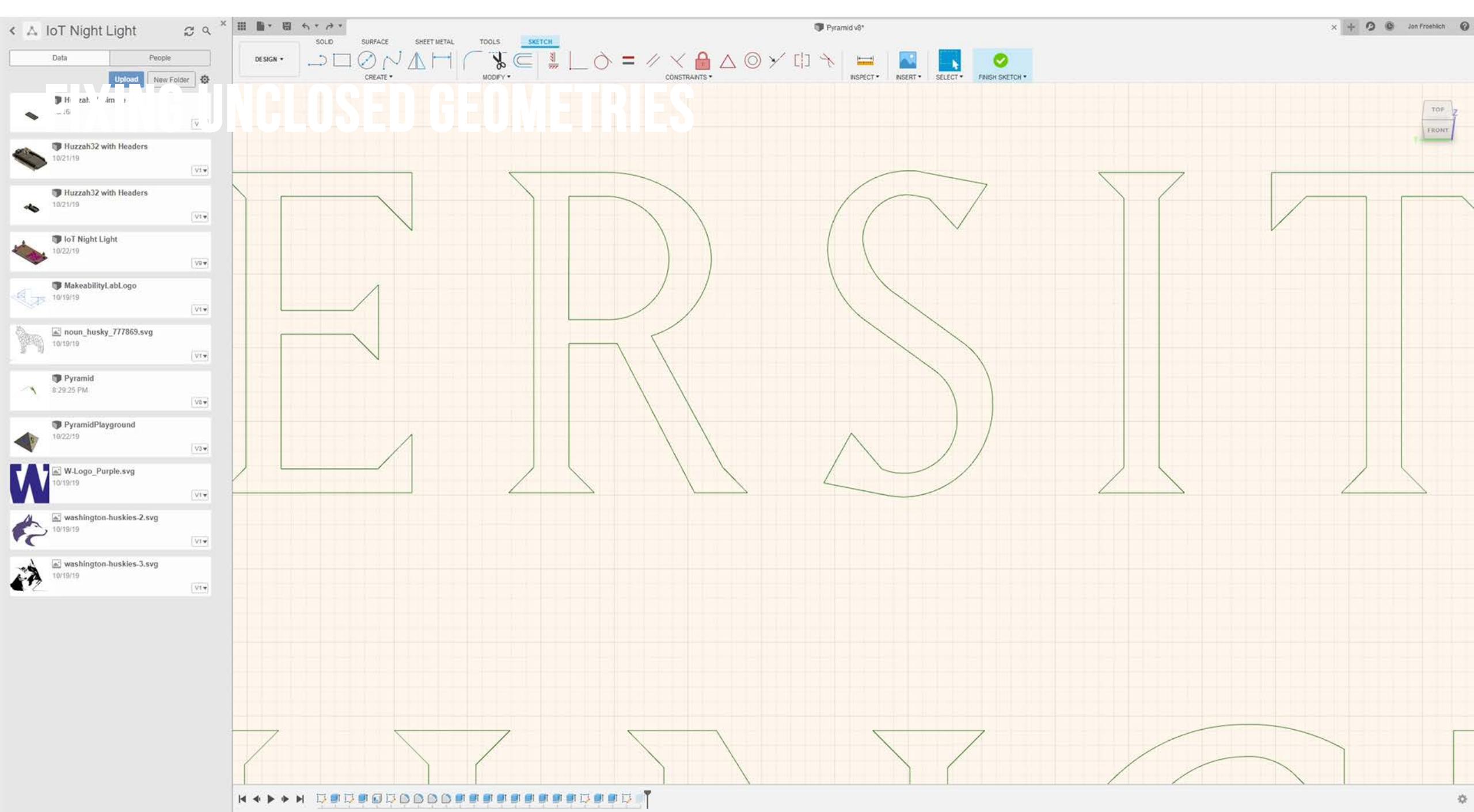
Untitled*

Windows Taskbar: Search, Start, File Explorer, Internet Explorer, Edge, Mail, Photos, OneDrive, OneNote, Powerpoint, Word, Excel, File, Settings, Control Panel, Task View, Task Manager, System, Help & Support, 10:46 AM

IMPORTING SVGS

FIXING UNCLOSED GEOMETRIES





Autodesk Fusion 360 [Education License] Jon Froehlich

IoT Night Light

Data People Upload New Folder

Huzzah32 Simple 10/18/19 V1

Huzzah32 with Headers 10/21/19 V1

Huzzah32 with Headers 10/21/19 V1

IoT Night Light 10/22/19 V8

MakesabilityLabLogo 10/19/19 V1

noun_husky_777869.svg 10/19/19 V1

Pyramid 8:29:25 PM V8

PyramidPlayground 10/22/19 V3

W W-Logo_Purple.svg 10/19/19 V1

washington-huskies-2.svg 10/19/19 V1

washington-huskies-3.svg 10/19/19 V1

Pyramid v8* DESIGN SKETCH

SOLID SURFACE SHEET METAL TOOLS SKETCH

CREATE MODIFY CONSTRAINTS INSPECT INSERT SELECT FINISH SKETCH

BROWSER

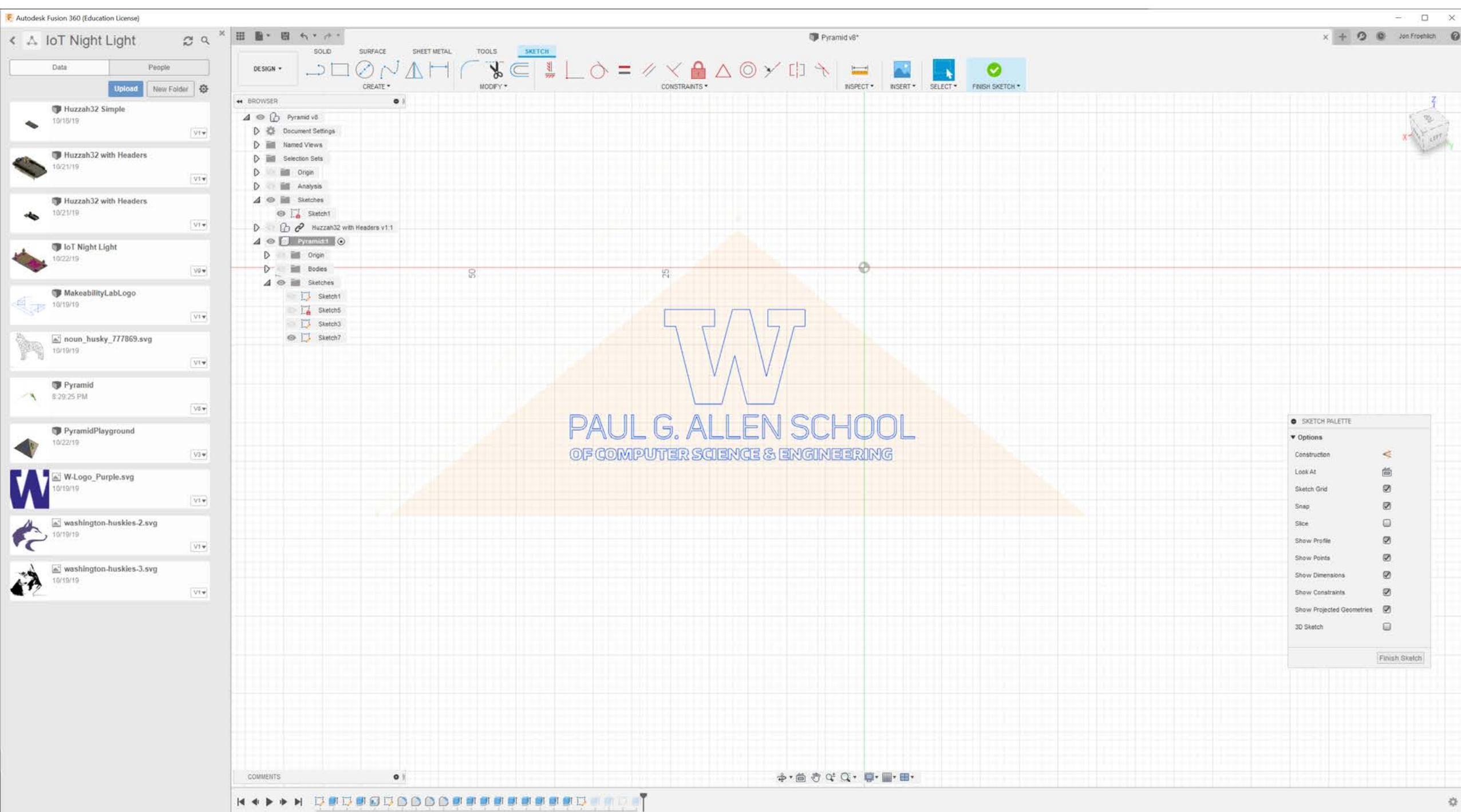
- Pyramid v8
 - Document Settings
 - Named Views
 - Selection Sets
 - Origin
 - Analysis
 - Sketches
 - Sketch1
 - Huzzah32 with Headers v1:1
 - Pyramid1
 - Origin
 - Bodies
 - Sketches
 - Sketch1
 - Sketch5
 - Sketch3
 - Sketch7

SKETCH PALETTE

- Options
- Construction
- Look At
- Sketch Grid
- Snap
- Slice
- Show Profile
- Show Points
- Show Dimensions
- Show Constraints
- Show Projected Geometries
- 3D Sketch

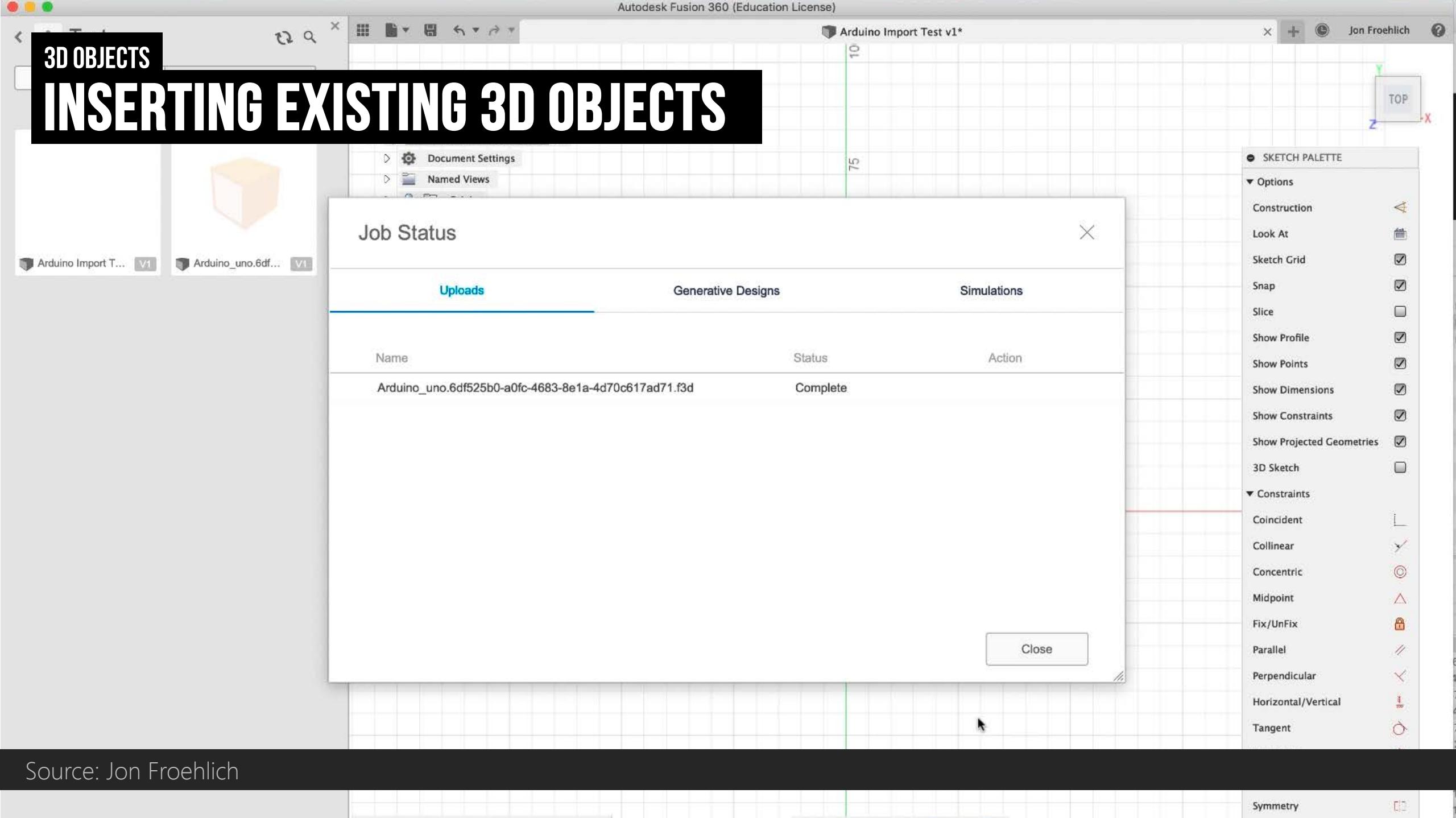
Finish Sketch

PAUL G. ALLEN SCHOOL
OF COMPUTER SCIENCE & ENGINEERING

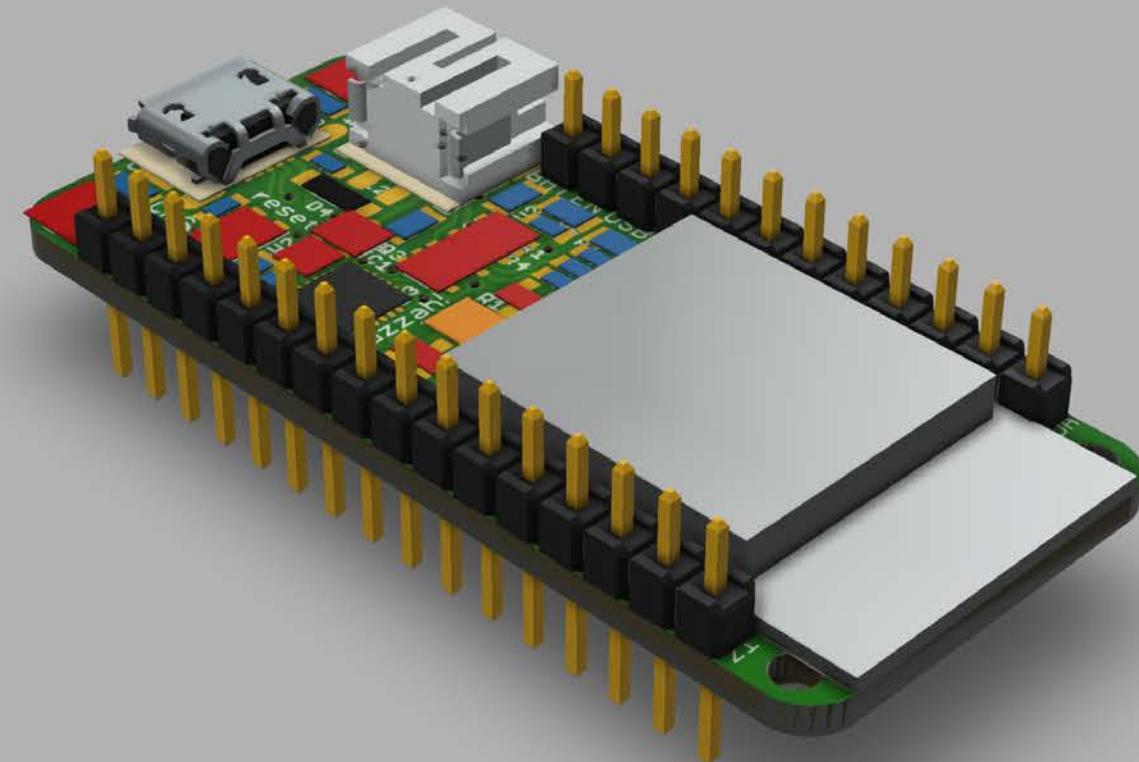


3D OBJECTS

INSERTING EXISTING 3D OBJECTS



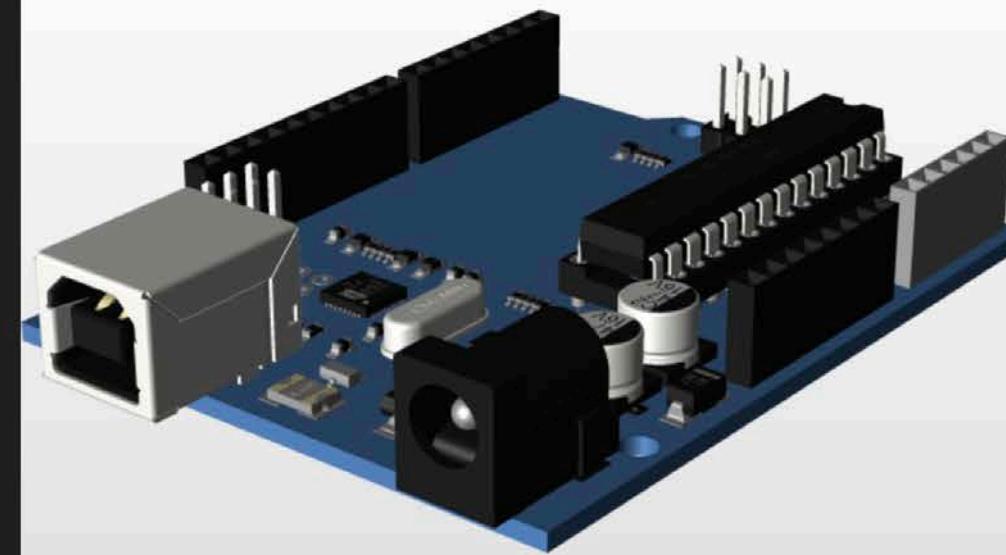
Source: Jon Froehlich



Source: Jon Froehlich, <https://a360.co/2JaYhVX>

3D

Load in 3D viewer



The CAD files and renderings posted to this website are created, uploaded and managed by third-party community members. This content and associated text is in no way sponsored by or affiliated with any company, organization, or real-world good that it may purport to portray. X

Arduino Uno



Eon Ang

February 20th, 2019

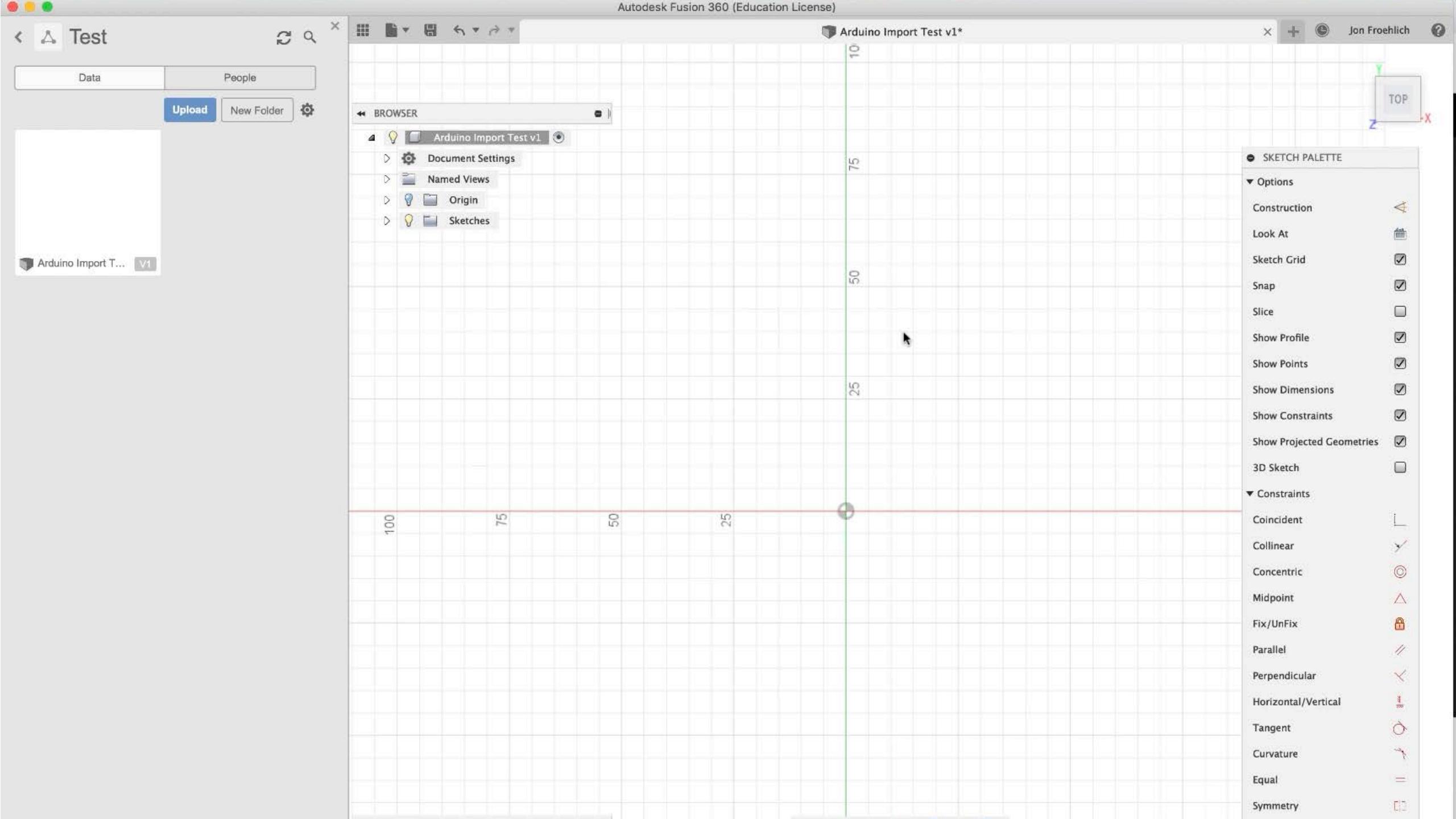
[Download files](#)

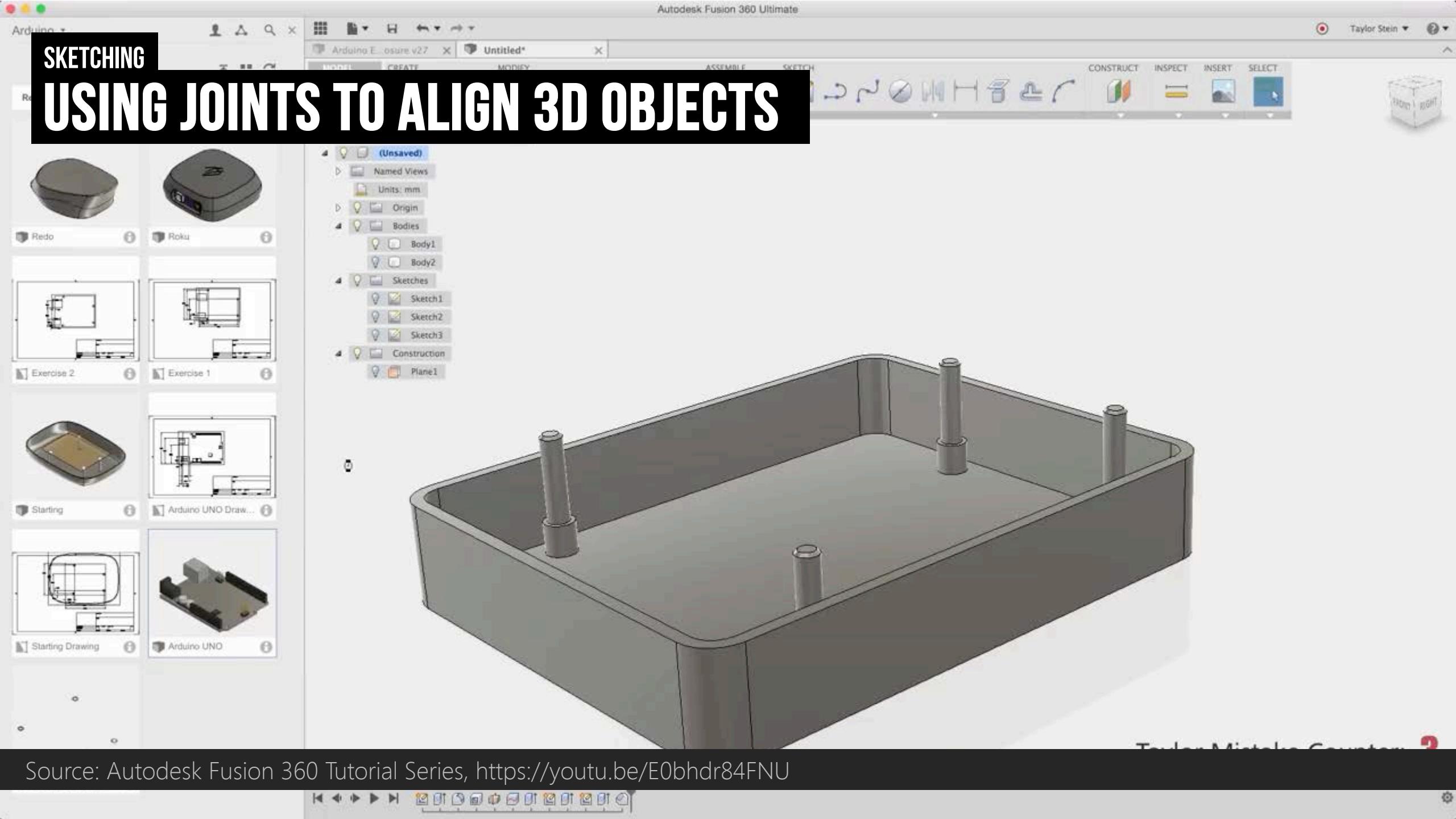
Like



Share



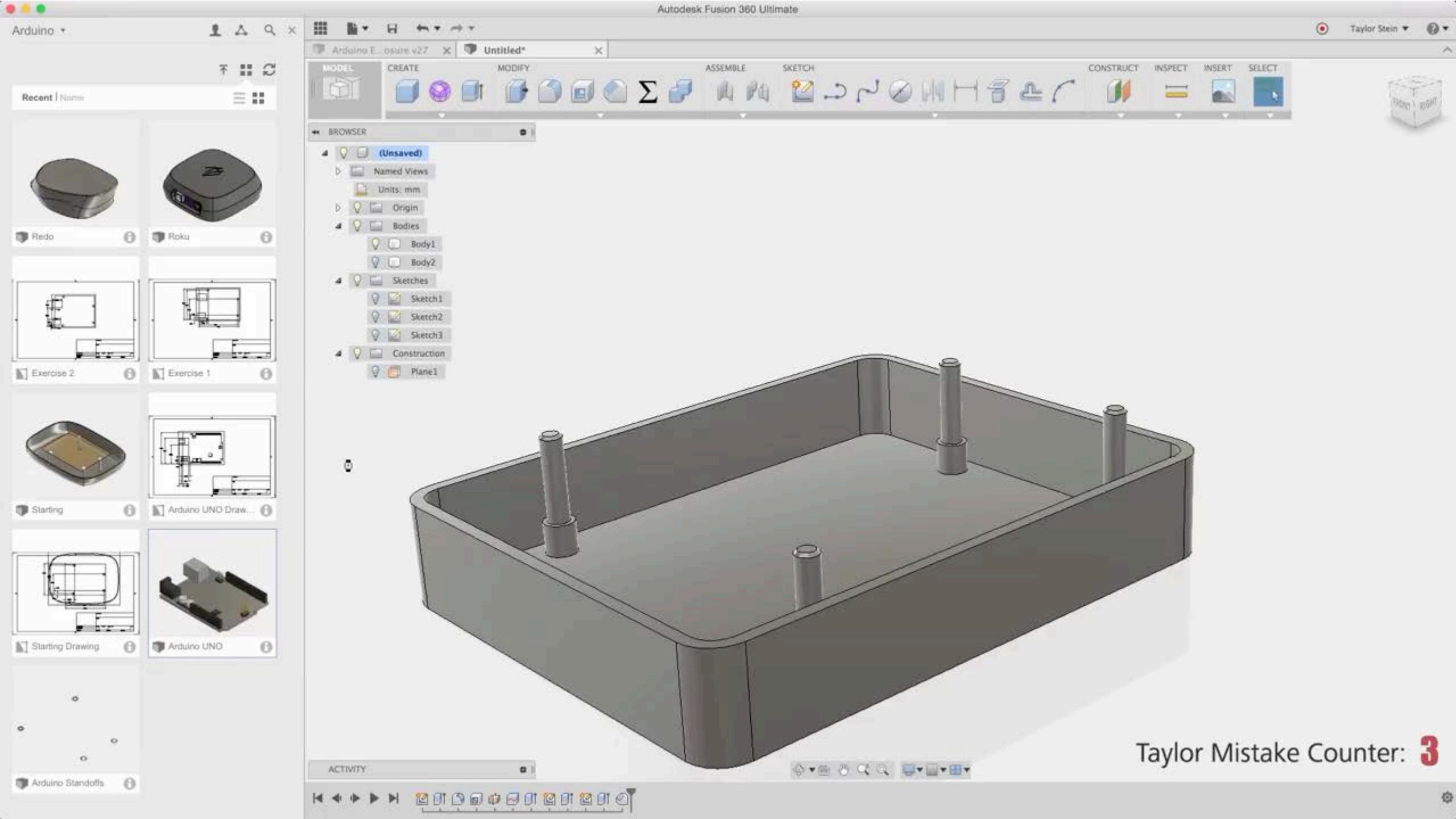




SKETCHING

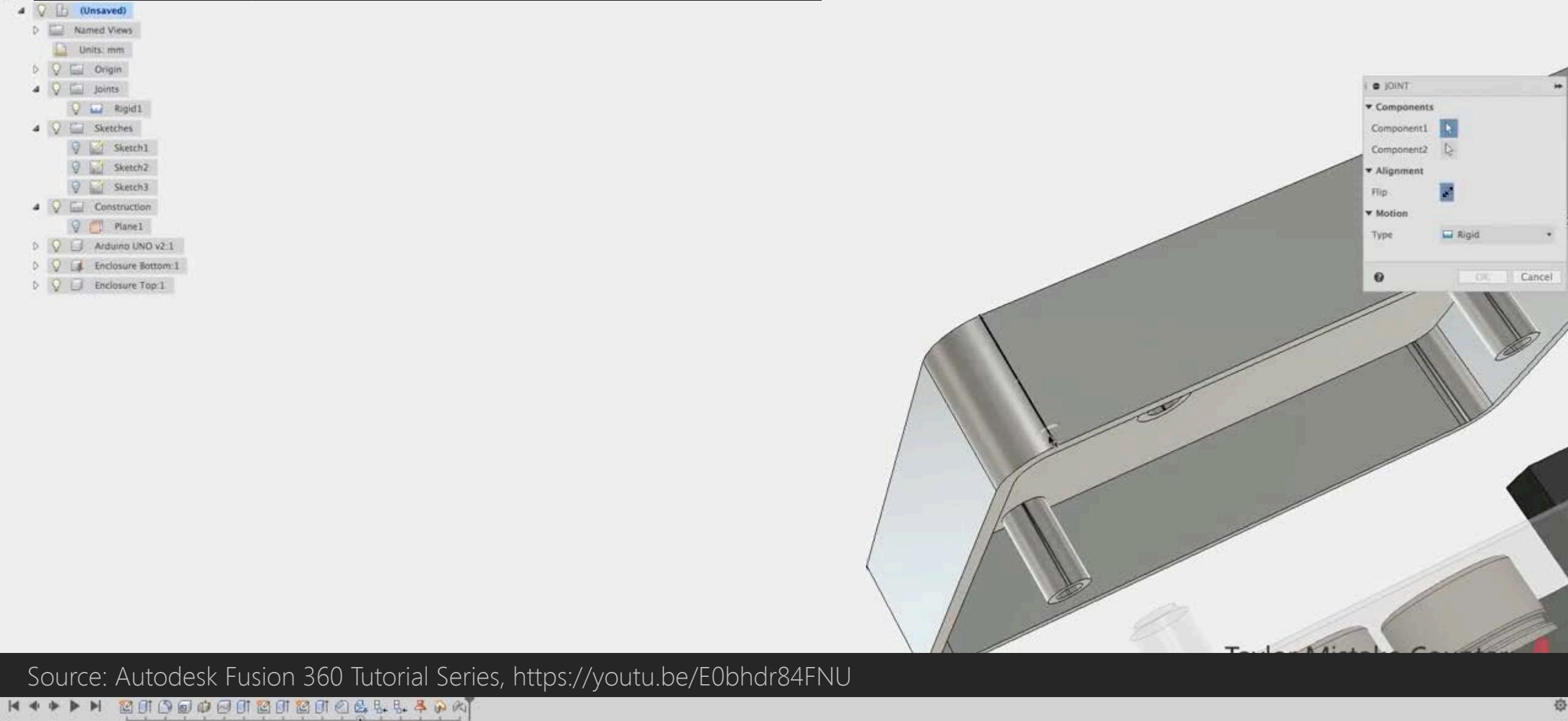
USING JOINTS TO ALIGN 3D OBJECTS

Source: Autodesk Fusion 360 Tutorial Series, <https://youtu.be/E0bhdr84FNU>

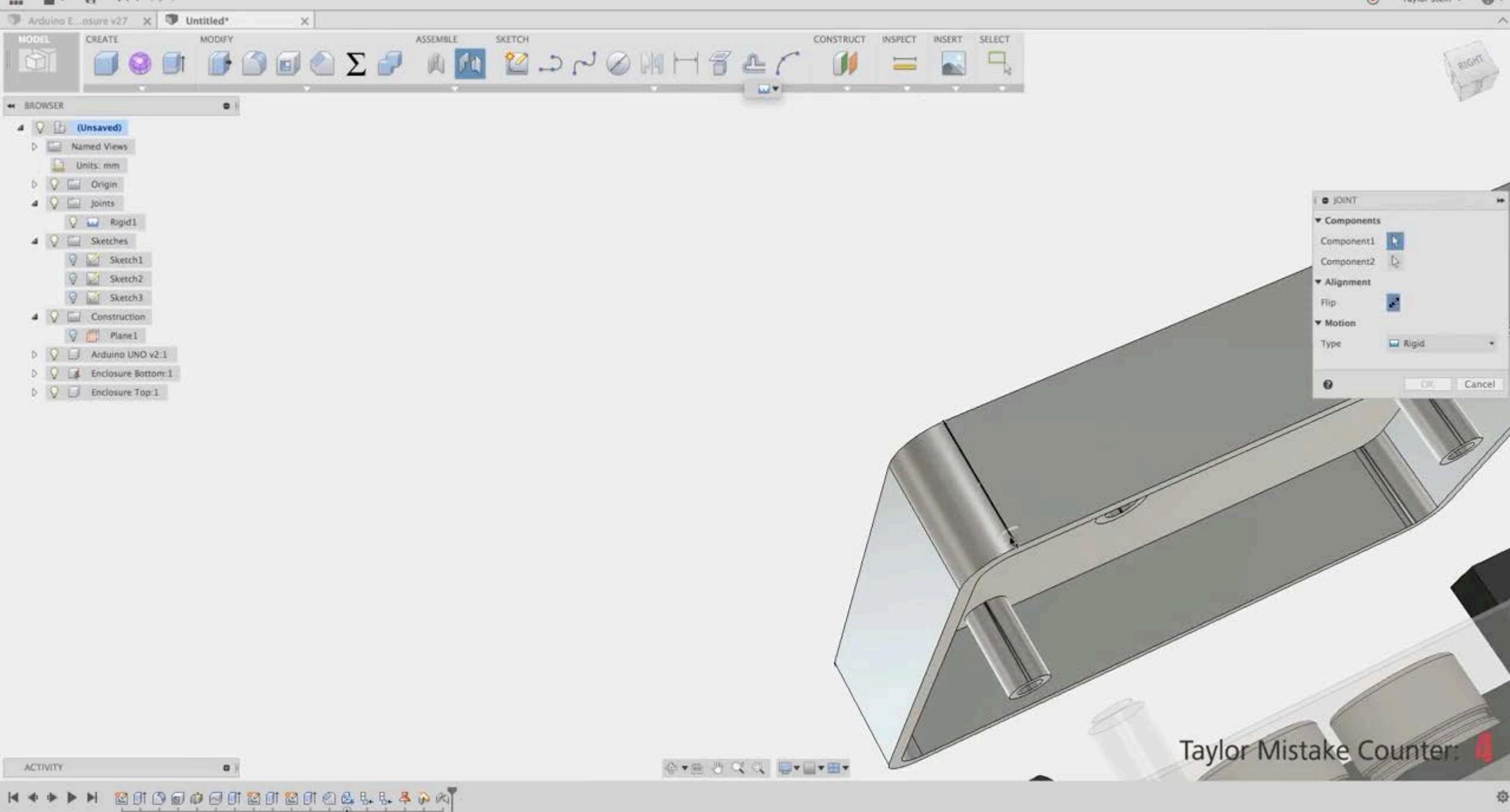


SKETCHING

PROJECTING FROM 3D TO SKETCH



Source: Autodesk Fusion 360 Tutorial Series, <https://youtu.be/E0bhdr84FNU>



ACTIVITY

MEASURE AND MAKE TRIMPOT KNOBS



Trimpot Knob

MODEL SKETCH CREATE MODIFY ASSEMBLE CONSTRUCT INSPECT INSERT MAKE ADD-INS SELECT

BROWSER

- InClassExercise v1
 - Document Settings
 - Named Views
 - Origin
 - Bodies
 - Sketches

10 KILO-OHM B... V1 Building Around ... V2

CSE599Playgro... V2 InClassExercise V1

InClassExercise V1 Initial Design V3

Revolved Star K... V1 Star Knob V1

Star Knob v1

InClassExercise v1

FRONT TOP RIGHT



Star Knobs M8 Thread Thru...
[amazon.com](#)



10Pcs Female Thread Star Kn...
[amazon.com](#)



2pcs Star Knob M6/M8/M10/...
[aliexpress.com](#)



Axminster Star Knobs - Handl...
[axminster.co.uk](#)



Amazon.com: Star Knobs - K...
[amazon.com](#)



5pcs M10 x 40mm Female Th...
[aliexpress.com](#)



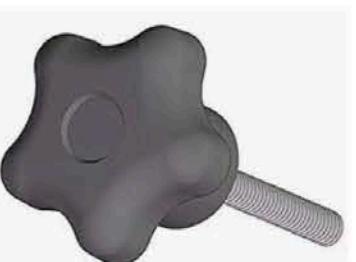
DCT® Star Knobs 5/16"-18 Cl...
[ebay.com](#)



20 Pcs Star Knobs Grips M6x1...
[walmart.com](#)



6336.5 Technopolymer Plas...
[jwwinco.com](#)



Star Knob, 2, 1 3/4 In, 5/16-18 ...
[amazon.com](#)



Star Knobs at Rs 8 /piece | ...
[indiamart.com](#)



Solid Five-Lobed Knobs ...
[jwwinco.com](#)



SK7404/7405
sankq.en.alibaba.com
SANKO



Navy Star Knobs | Pottery Barn...
[potterybarnkids.com](#)



Grips M12x60mm Male Thre...
[walmart.com](#)



Long Bolt; With Star Knob
[infinitytools.com](#)



DIN 6335 | Star knobs
[elesa.com](#)



Grip Handle M6 Diameter Br...
[overstock.com](#)



Knobs M8 Star Shaped Head ...
[amazon.com](#)



Item # PHK-4820, Metric Sta...
[workholdingcomponents.mort...](#)



Black Rosette Thumb Screw...
[ebay.com](#)



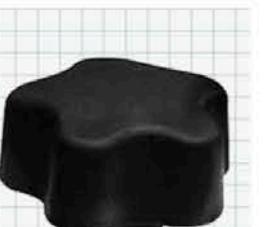
Grip Handle M10 Diameter B...
[overstock.com](#)



5pcs M8 x 50mm Thread 40...
[aliexpress.com](#)



Thread Dia Black Star Knobs Handl...
[newegg.com](#)

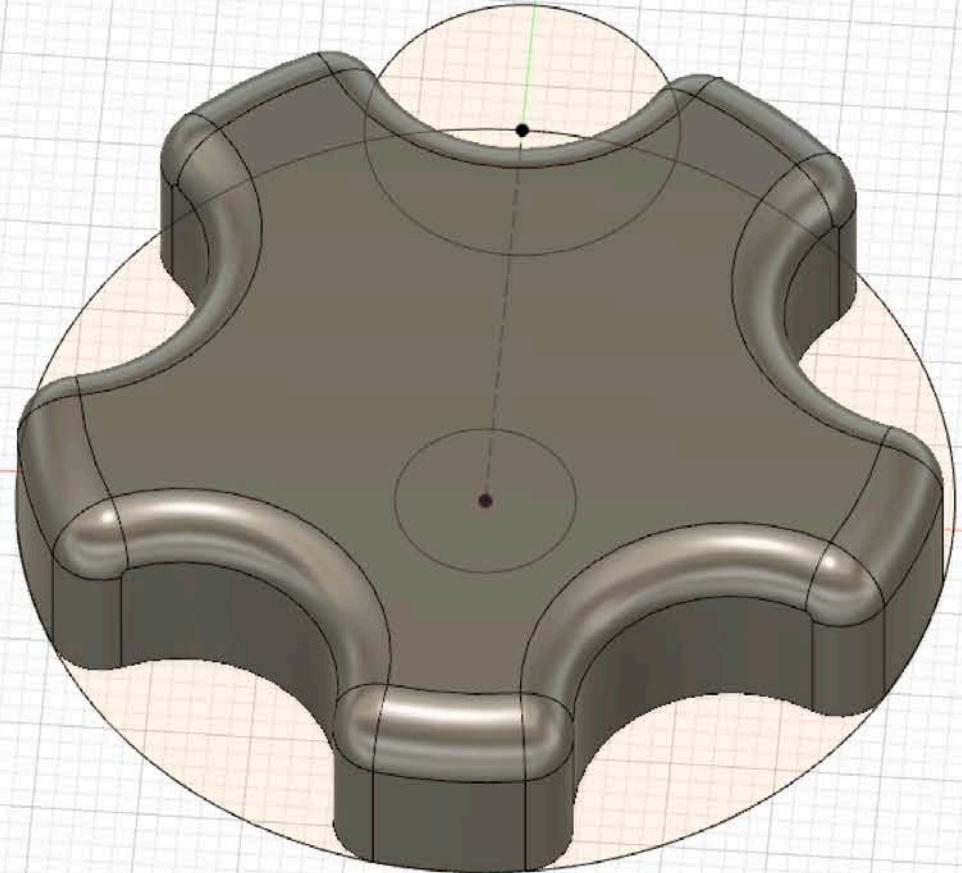


ACTIVITY

USING REPEATING PATTERNS TO CREATE A STAR KNOB

- Document Settings
- Named Views
- Origin
- Bodies
 - Body1
- Sketches
 - Sketch1

COMMENTS



ACTIVITY

USING SKETCH + REVOLVE TO MAKE A COMPLEX KNOB

BROWSER

- Revolved Star Knob v1
- Document Settings
- Named Views
- Origin
- Bodies
 - Body1
- Sketches
 - Sketch1
 - Sketch2
 - Sketch3
 - Sketch4
- Construction

COMMENTS

Jon Froehlich

ACTIVITY

USING SKETCH + REVOLVE TO MAKE A COMPLEX KNOB



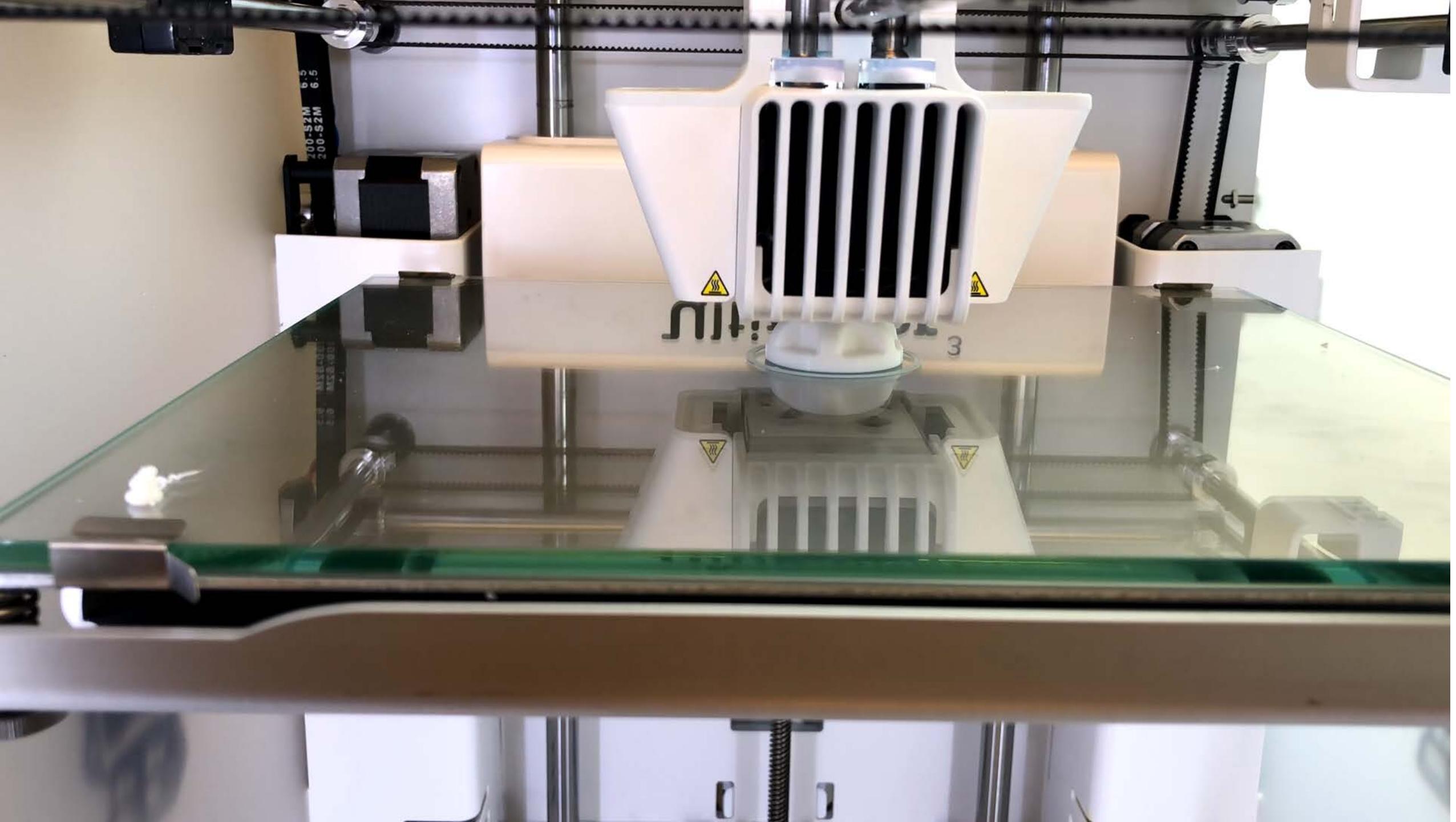
BROWSER

- (Unsaved)
- Document Settings
- Named Views
- Origin
- Bodies
 - Body1
- Sketches
 - Sketch1
 - Sketch2
 - Sketch3
- Construction



COMMENTS





ultimaker³



FUSION 360

Sketching: How to **move** objects

Sketching: How to **resize** objects

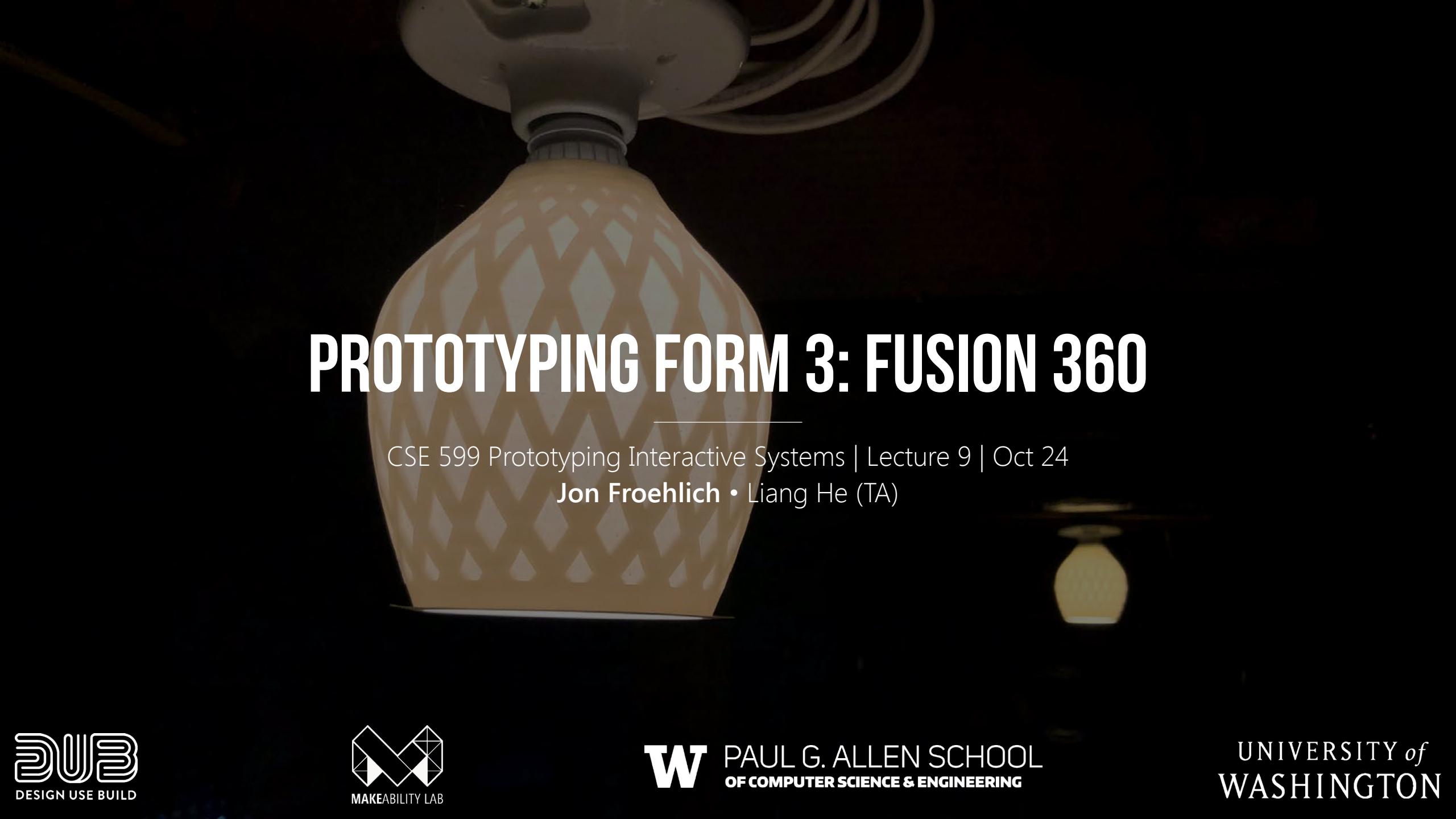
Sketching: What are **construction** lines?

Sketching: How to use **constraints**

3D: How to **import** 3D objects

3D: How to **project** from 3D to 2D

3D: How to use **revolve** and **circular patterns**



PROTOTYPING FORM 3: FUSION 360

CSE 599 Prototyping Interactive Systems | Lecture 9 | Oct 24

Jon Froehlich • Liang He (TA)