3D PUZZLE DESIGN PROJECT

TEAM 17

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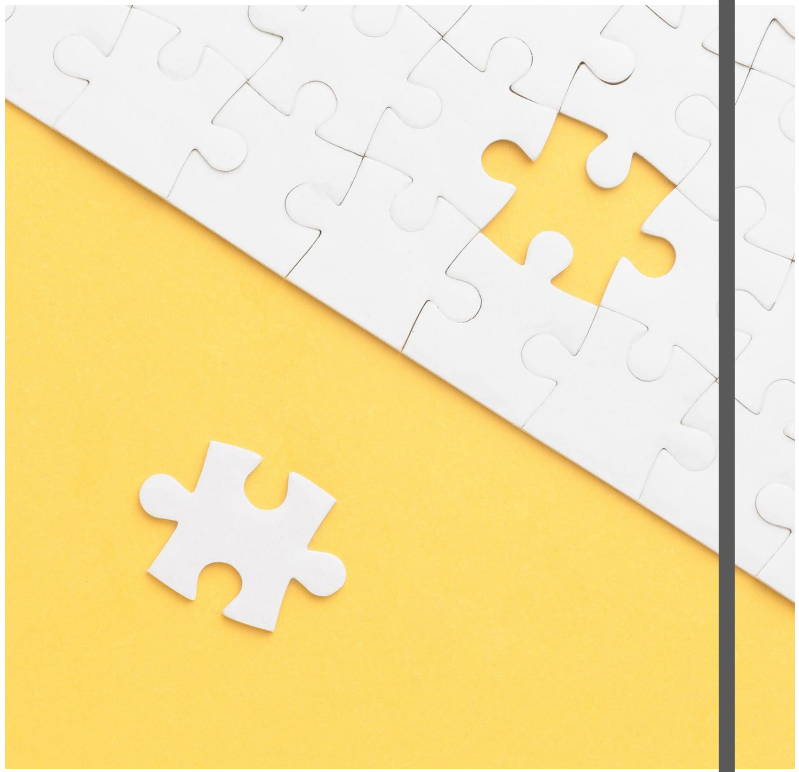
INTRODUCTION & BACKGROUND



INTRODUCTION AND BACKGROUND

WILD ROSE

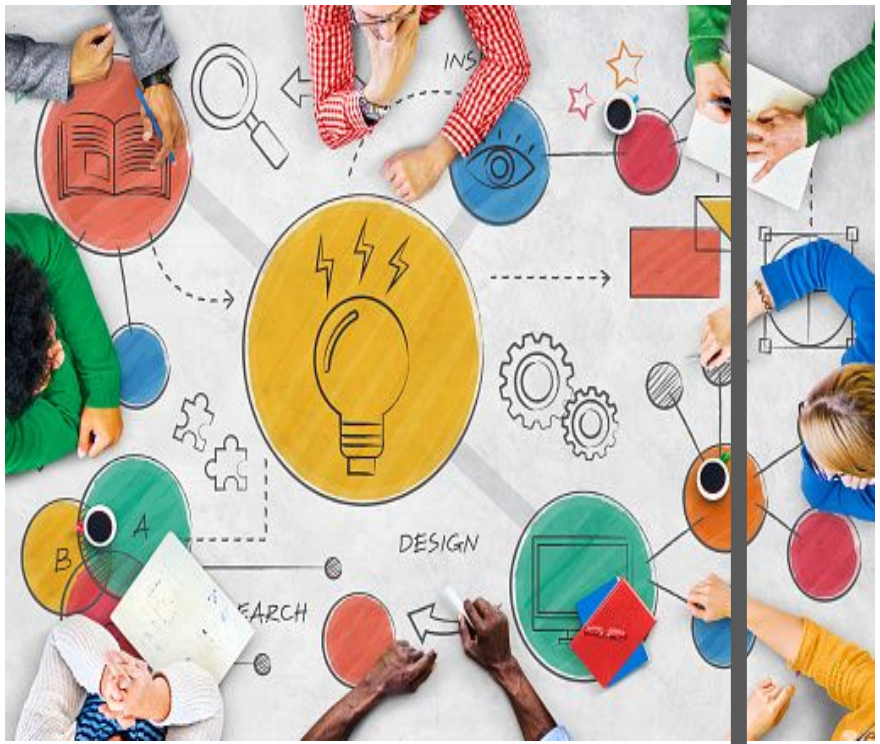
Our inspiration from native Canadian flora

Provincial Flower of Alberta [2]

[1]

02

DESIGN PROCESS



OUR PROCESS

FIRST STEPS

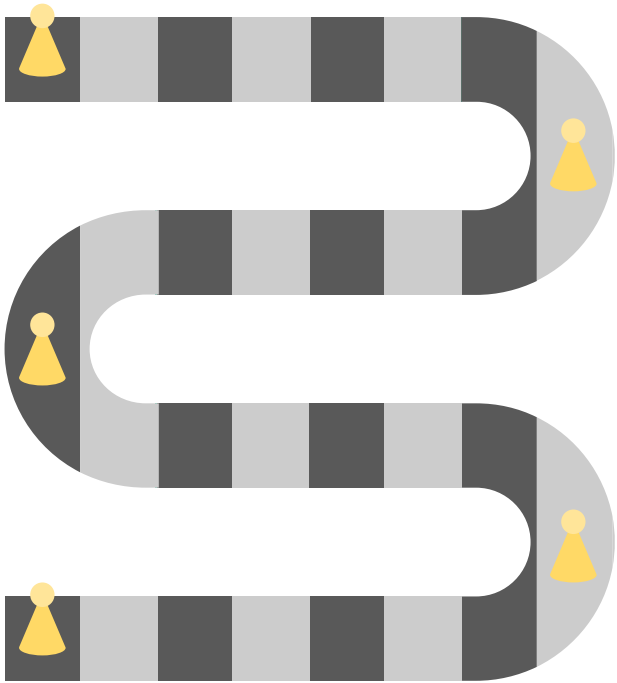
Brainstormed the abstraction approach to designing individual parts.

JOINT IDEATION

Brainstormed different ways to join the individual parts of the flower together

FINALIZATION

Dimensioned the final design with tolerancing and representing it using CAD to test the joints and parts



ABSTRACTION

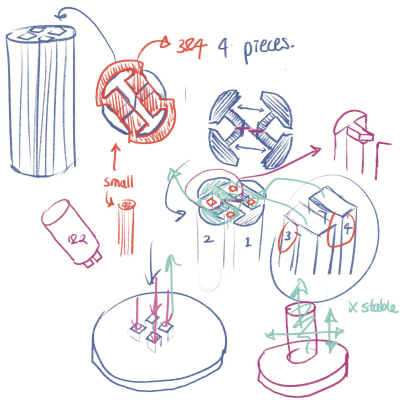
Observed the features of the wildrose and compared it to simple shapes

RAPID PROTOTYPING

Created multiple low fidelity sketches to describe the different parts and joints

JOINT AND ASSEMBLY CONCEPT SKETCHES

1



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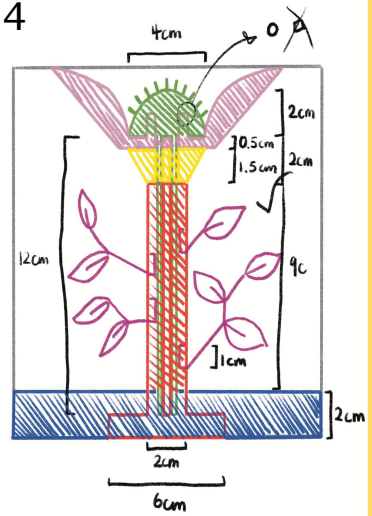


ABSTRACTION- HOW TO MAKE THE PARTS?

Petal - loft style curve which had a less accurate profile
- Improved by using 2D curves bent into 3D

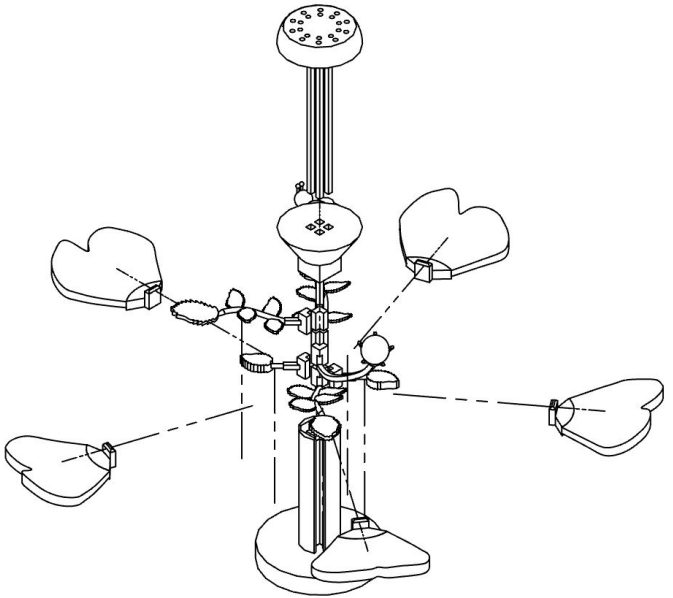
Pistil- initially a hexagonal shape
- Refined by switching to a more accurate circular profile with a flat top
- Smaller poles from the top were eliminated for simplicity

Bee
- Broken down into simpler ovoid representation

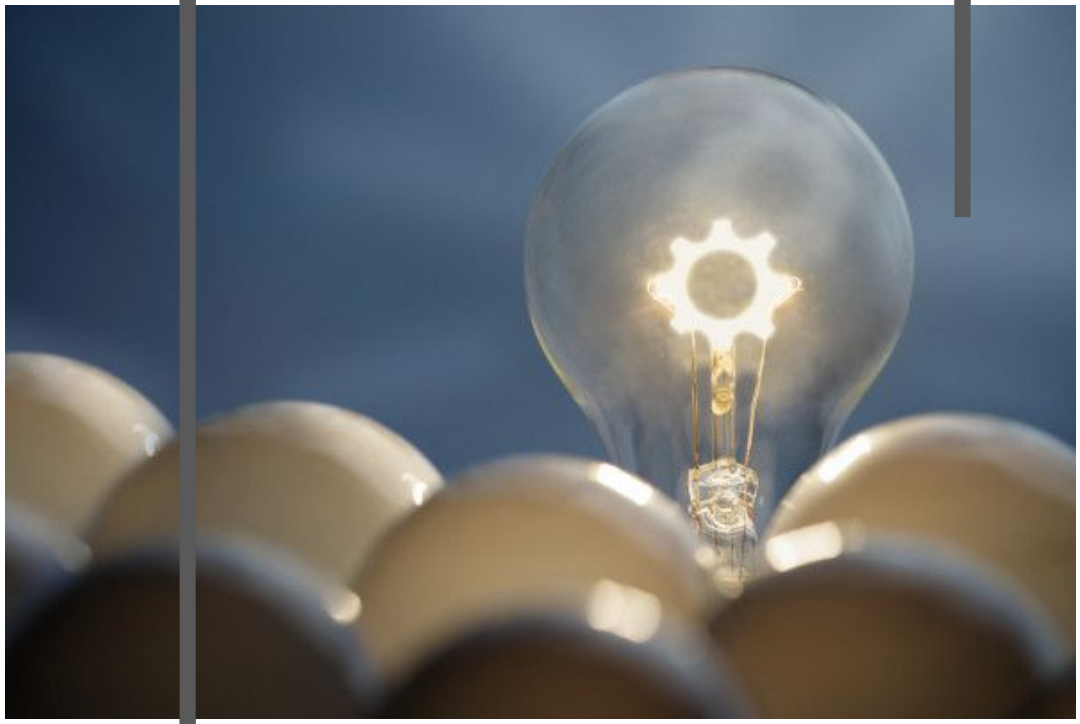
Leaves
- Planar representation

Stem
- Cylinder

INITIAL DESIGN & EXPLODED VIEW



SCALE 1:2



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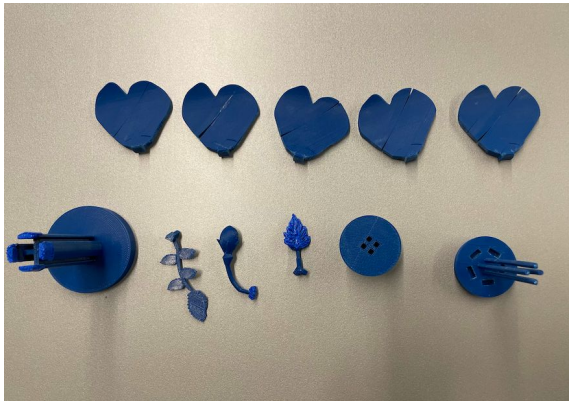
FINAL CONCEPT

DESIGN OBJECTIVES

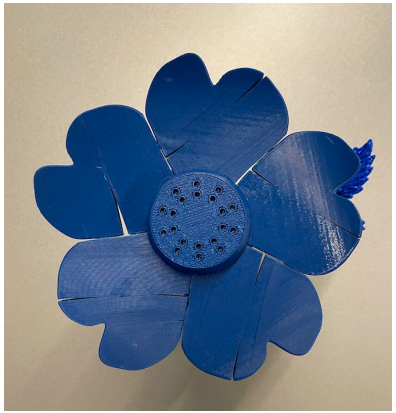
1. Prioritize essential pieces that help represent a wild rose
2. Simplify the pieces so the print time is under 12 hours
3. Correct the tolerance accordingly

PRINTED PUZZLE

Unassembled

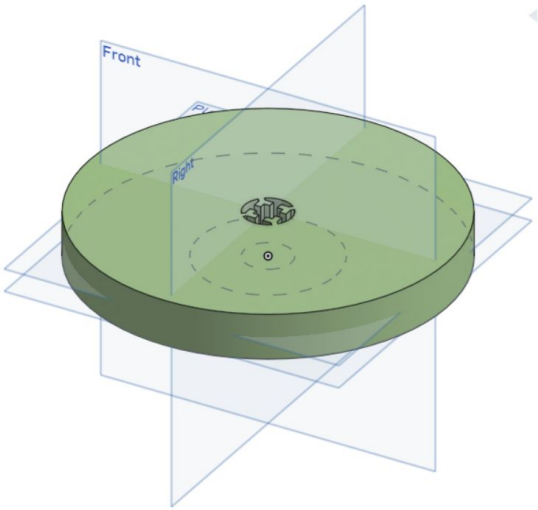


Assembled

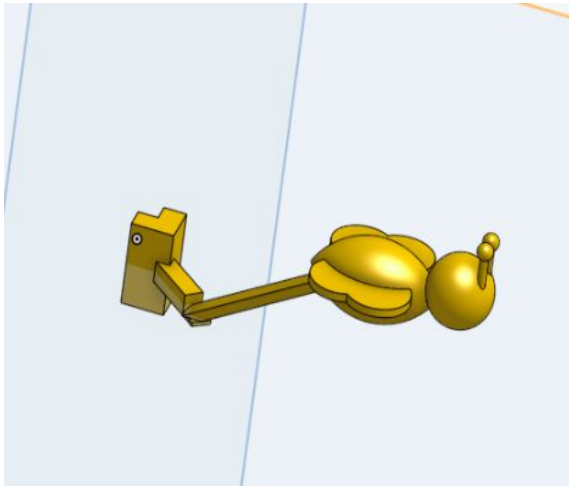


UNPRINTED PARTS

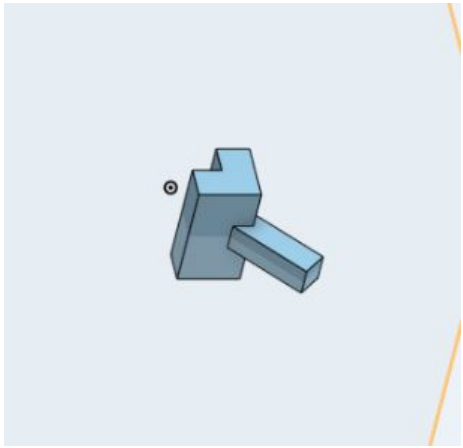
Base



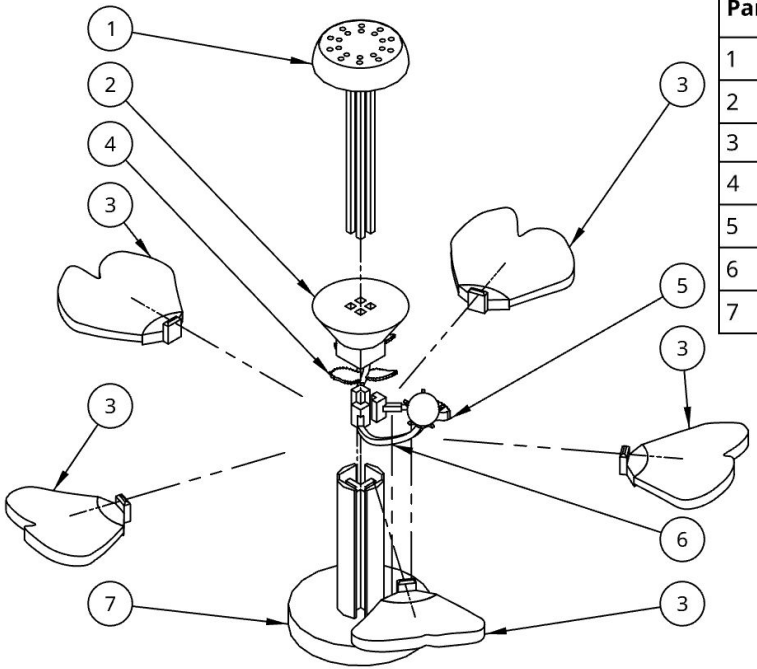
Bee



Elevation pieces



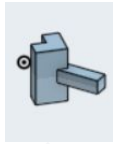
DESIGN FOR PRINTING & EXPLODED VIEW



SCALE 1:2

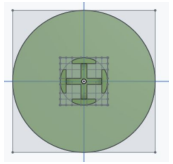
Part Number	Quantity	Name
1	1	pistil
2	1	pistil base
3	5	petal
4	1	vine-like leaf
5	1	thron-like leaf
6	1	bud
7	1	stem

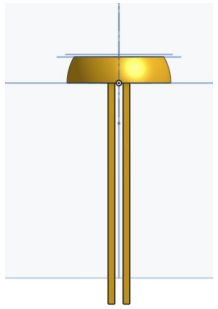
DESIGN FEATURES

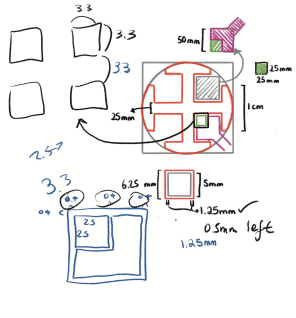


Design for Manufacturing and Assembly

- Pistil piece
- Stem
- Petals
- Tolerancing

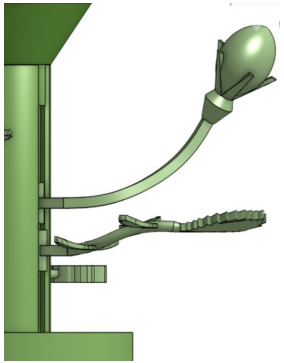






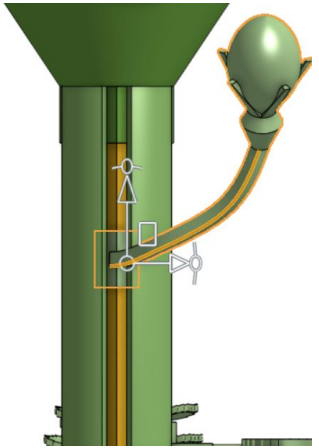
Multiple Spatial Arrangements

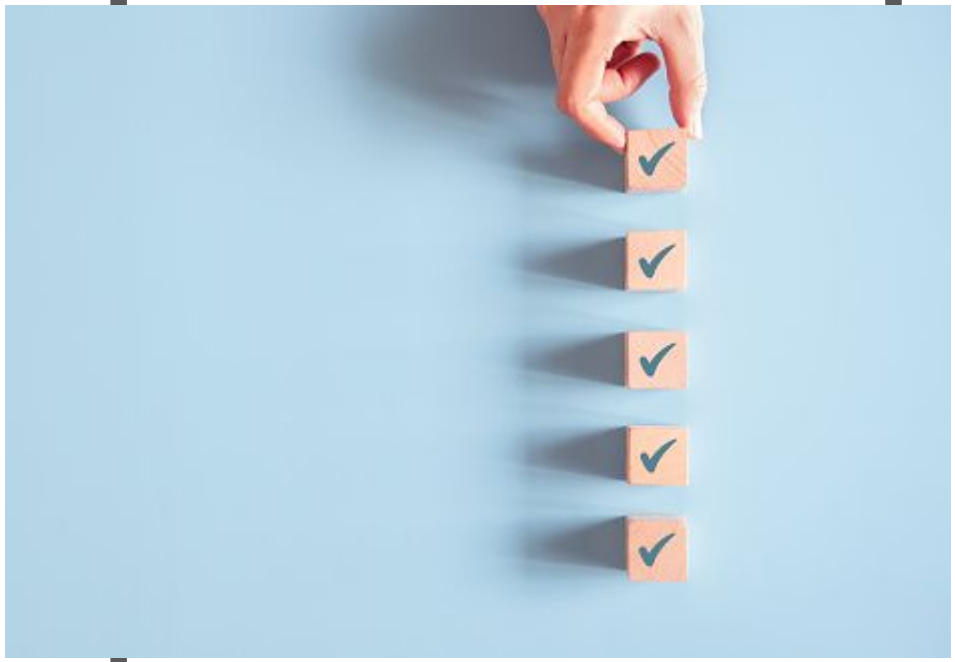
- Leaf attachments can be placed in 4 different slots of the stem
- Multiple leaves can be placed in one slot



Moving Elements

- Leaves can move up and down the stem body





04 CONCLUSION AND TAKEAWAYS

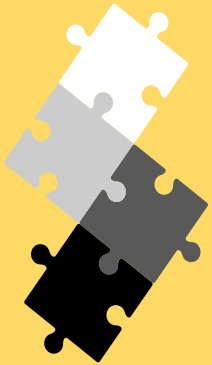
CONCLUSION & TAKEAWAYS

CONCLUSION

- Each team member contributed to the puzzle
- Minor issues present
- Puzzle pieces fit together

LEARNED ONSHAPE FEATURES

- Projected curves
- Making surfaces
- Offset planes
- Booleans



POTENTIAL FUTURE ITERATIONS

- Tolerancing
- Petal Adjustments
- Adjust Thorn Like Leaf for printing
- Elongate and minimize the stem
- Overall, more consideration into 3D printing capabilities

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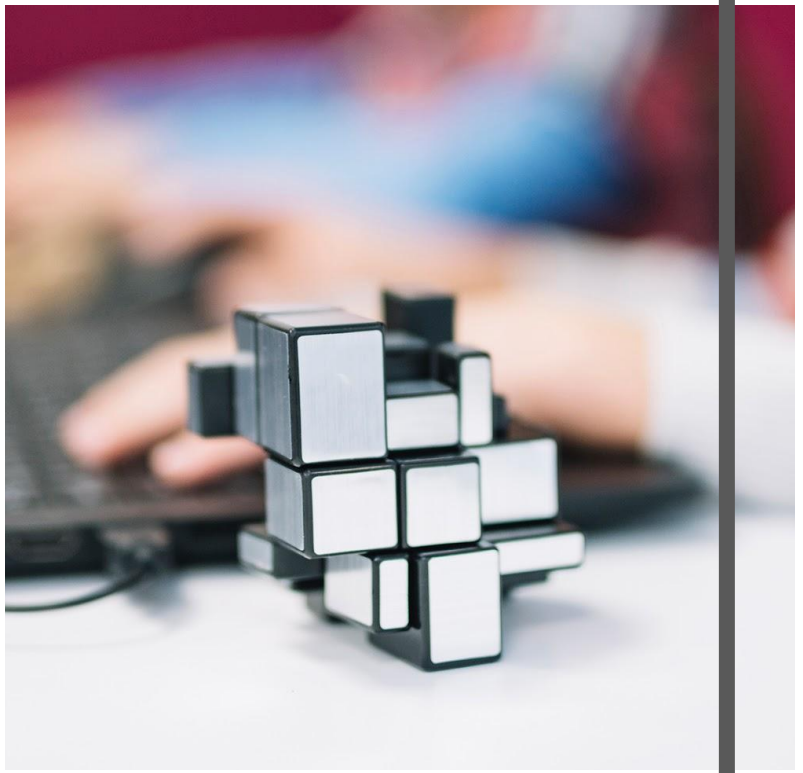
REFERENCES



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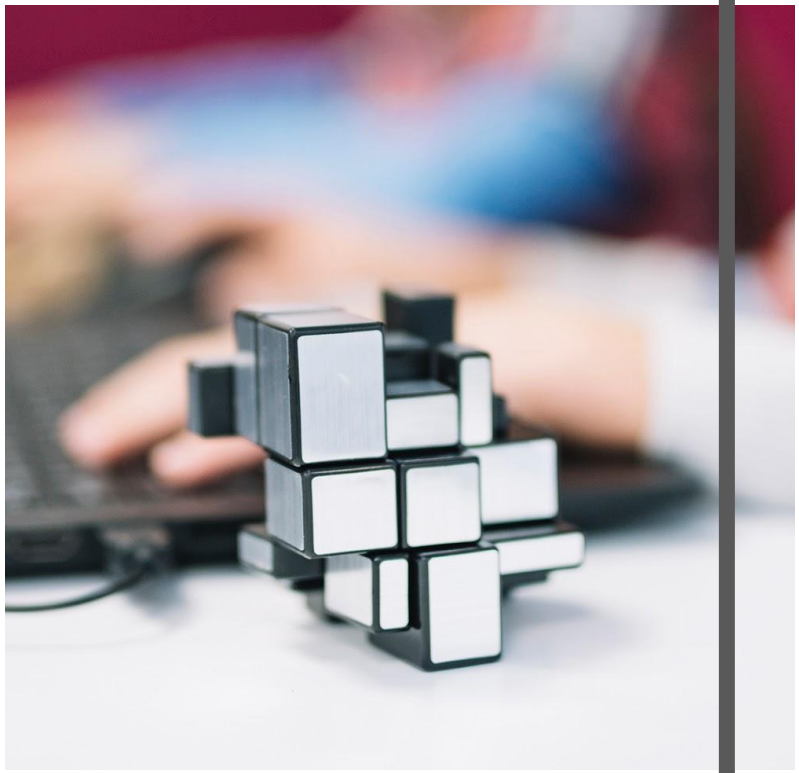
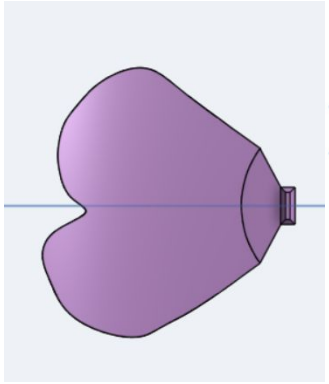
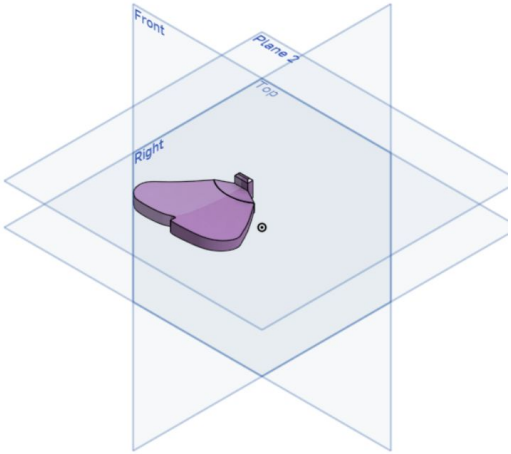
APPENDIX

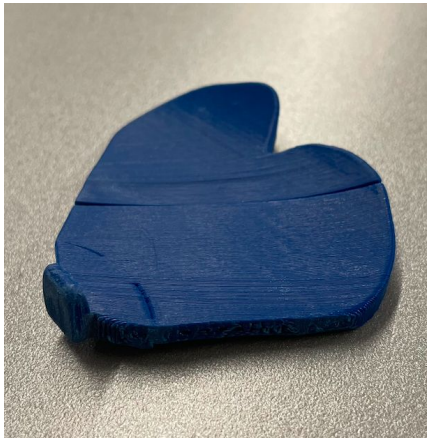


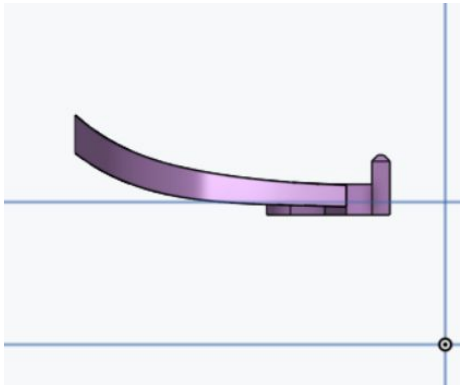
PETALS

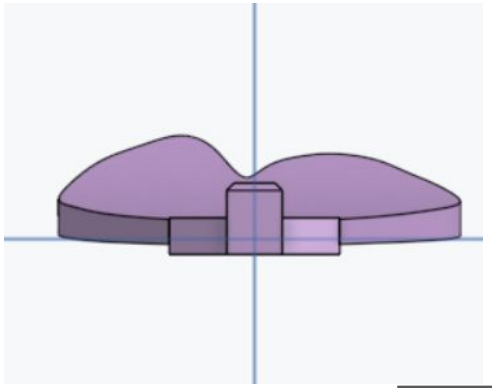
- 3D projected curves based off a 2D sketch
- Closed curve profile to match a petal shape
- Chamfered peg at the end to fit into the pistil





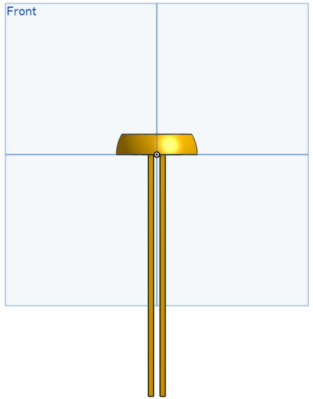


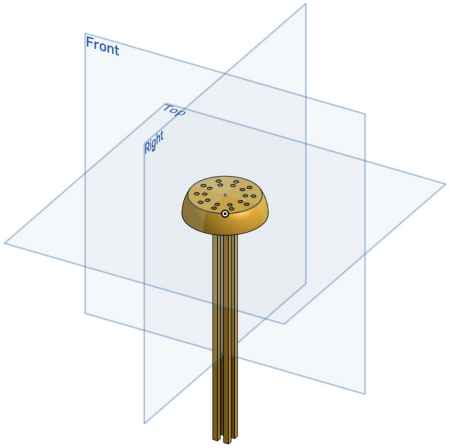


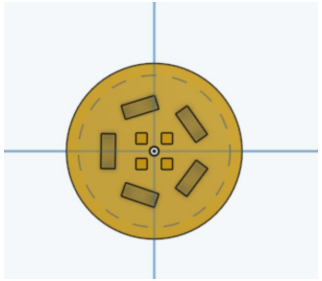


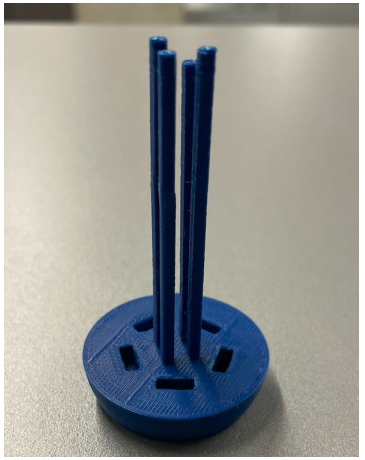
PISTIL

- Flat top surface
- Top circular stamen pattern
- Bottom rectangular holes
- Bottom fork for connection
- Revolve, Circular Pattern, Extrusion



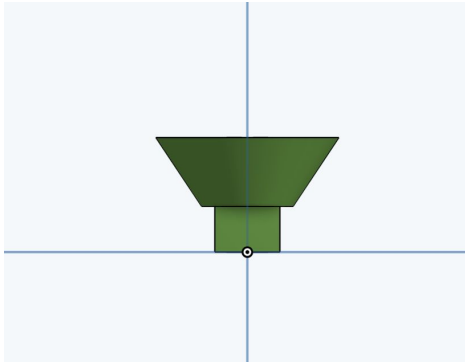


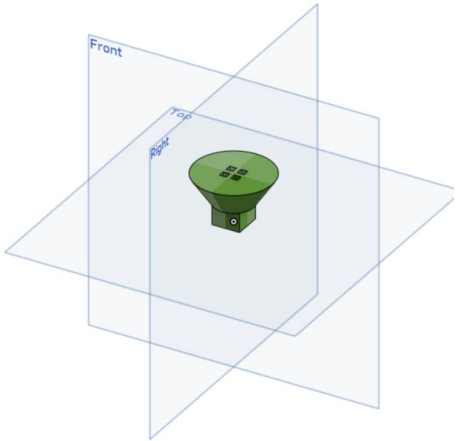


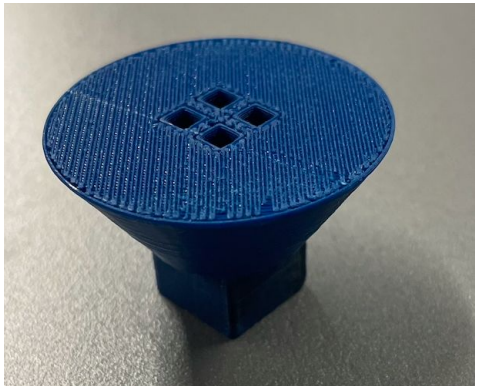


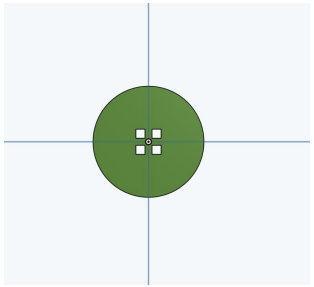
PISTIL BASE

- Helps hold together the pistil and petals by providing support at the bottom
- Loft features
- Tolerancing between the pistil and the holes of the pistil base



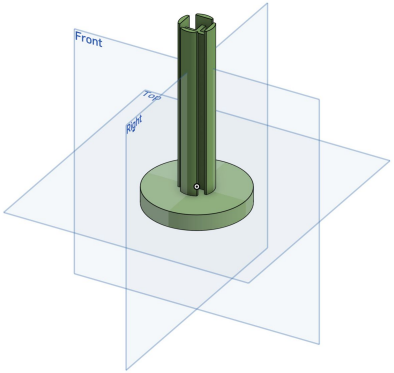


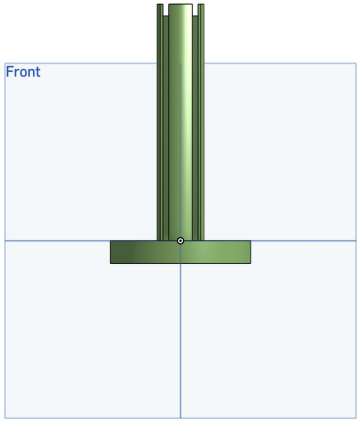


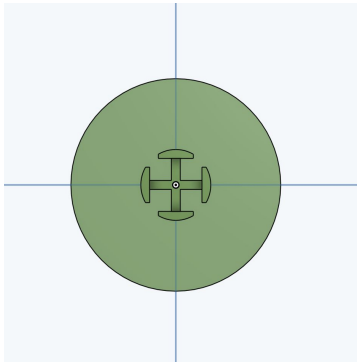


STEM

- Circular, cylindrical, cross shaped
- Largest piece of the puzzle
- Sketch, Extrude, Mirroring

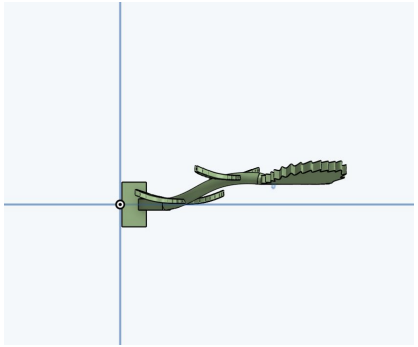


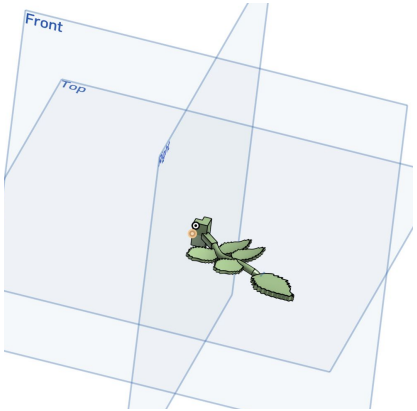


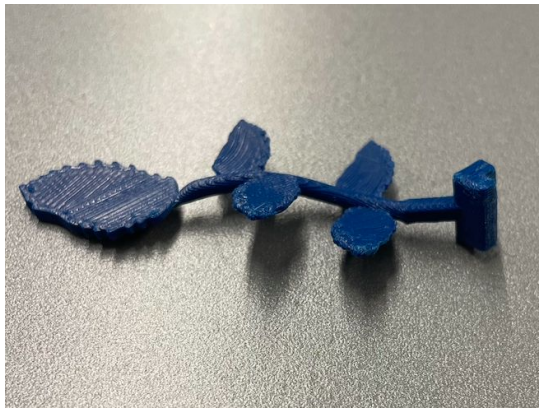


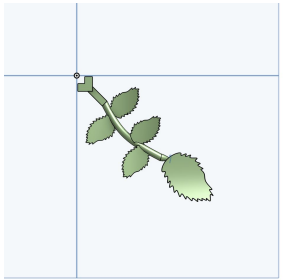
VINE-LIKE LEAF

- 3D projected curves for the leaves
- 3D projected curves for a unique vine shape
- Booleans to connect multiple leaves into one part
- Attached to a standard joint that slides into the stem
- Represents the distinctive vines of a wildrose



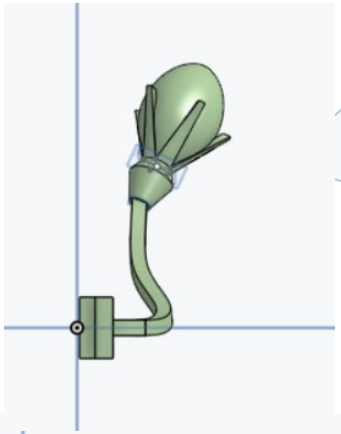


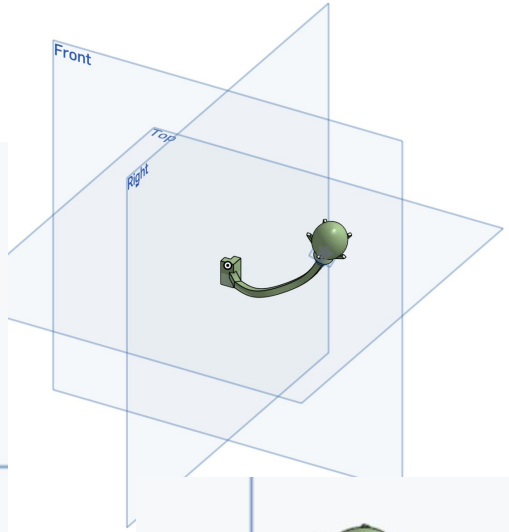


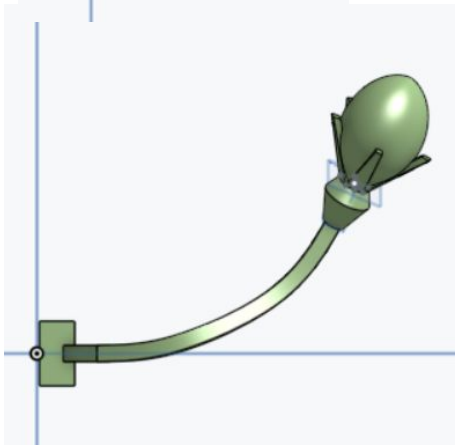


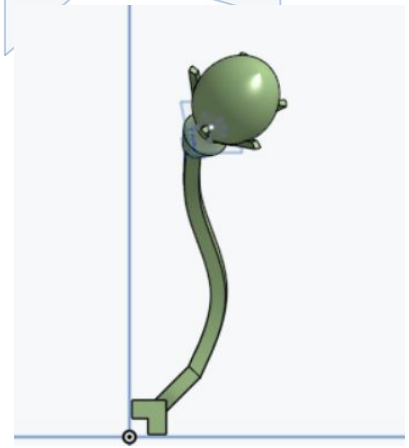
FLOWER BUD

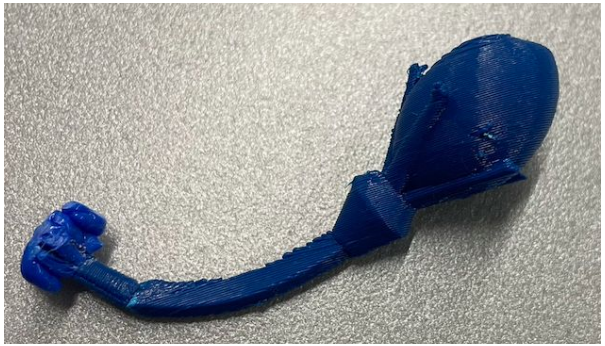
- Similar 3D projected curves for the vine shape
- Revolve oval to create the bud
- Attached to a standard joint point that slides into the stem











THORN-LIKE LEAF

- Elevation piece so that the piece slides into the stem
- Sketching, importing image, extruding