Finger Fidget Balls

A Process Book

By Julie Xu

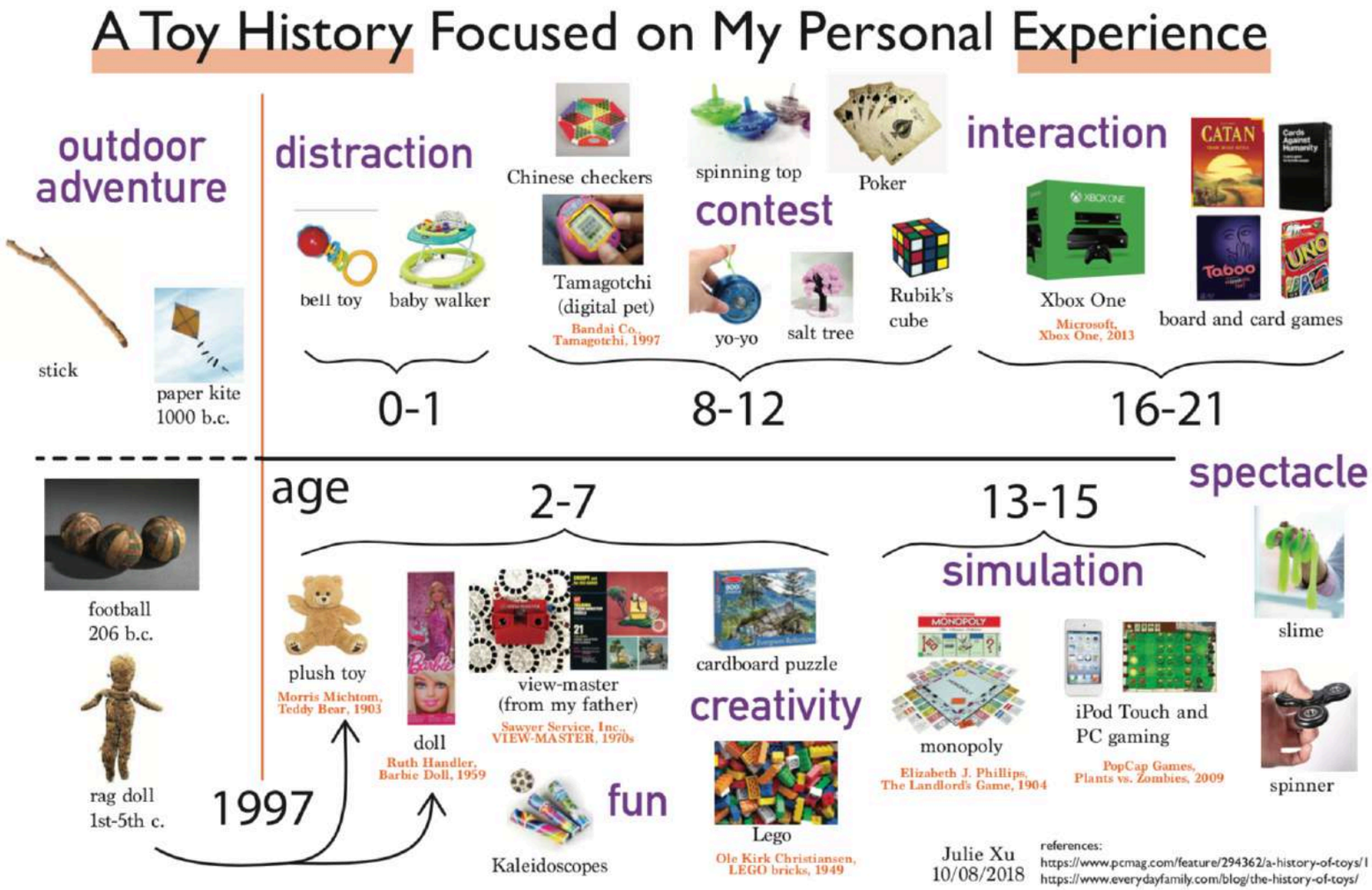
Project Brief

Inspired by yo-yo, I set out to find a “play” experience that gets users attracted to the simple and repeated motion of spinning, rolling, or throwing, at the same time has some space for creativity (tricks).

DUCAN Butterfly XT

Research

To get started, I analyzed all the toys I have played growing up, and found that toys I played during each stage of my life had their own emphasis on experience such as simulation and interaction.

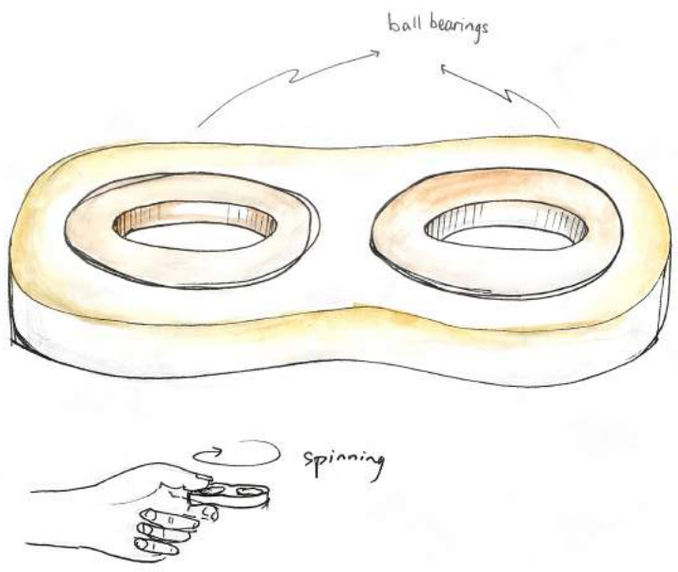


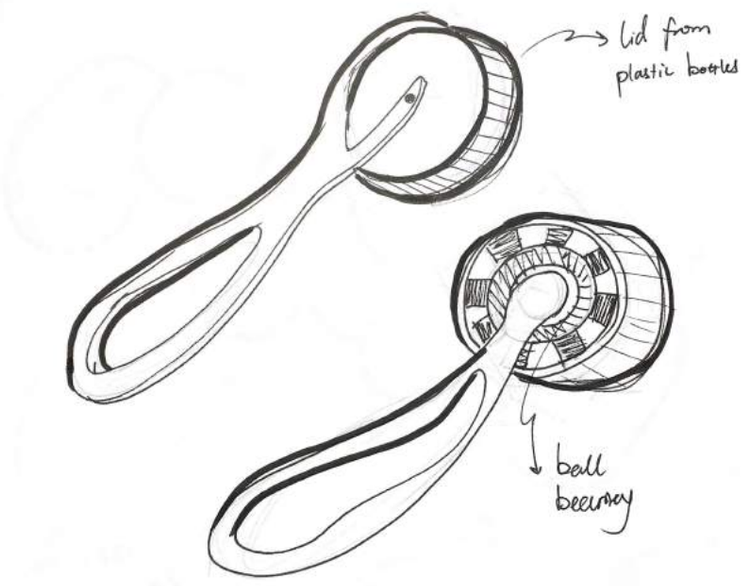
Synthesis

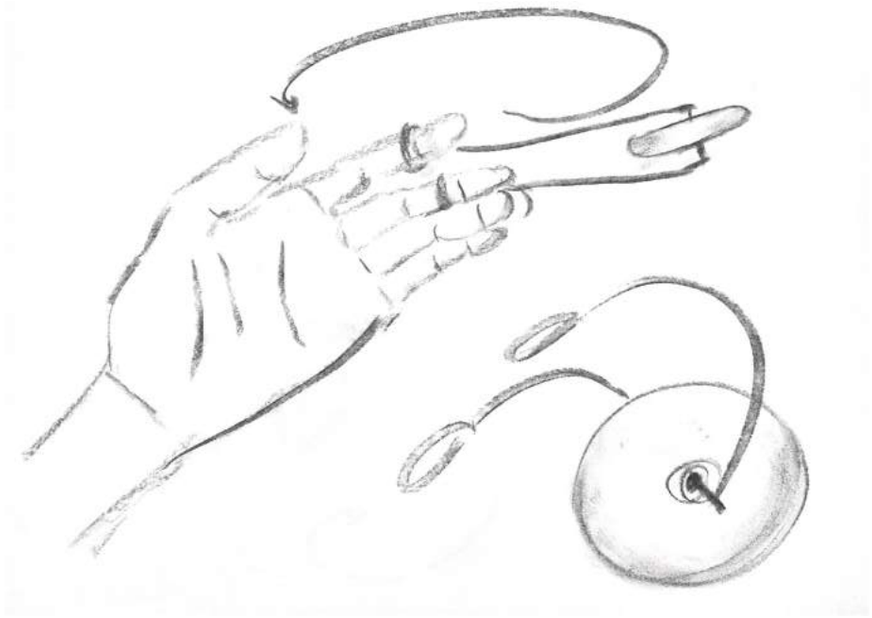
I narrowed my focus down to a few fidget toys: a spinner pen, a yo-yo, and a butterfly knife. They are all toys for teenagers or adults that require a certain amount of practice. The joy of the experience comes from the “ah-ha” moment when the user successfully learns a trick.

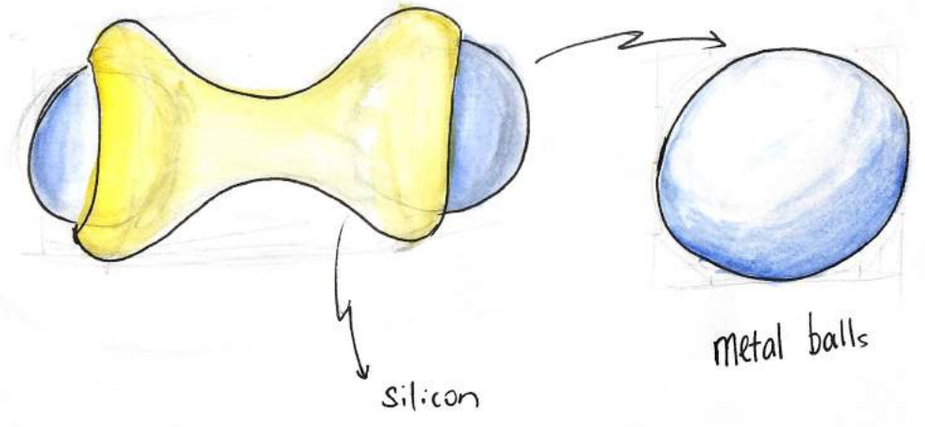
Sketches

I thought of the simple and repeated motion of spinning, rolling, or throwing when I made sketches.



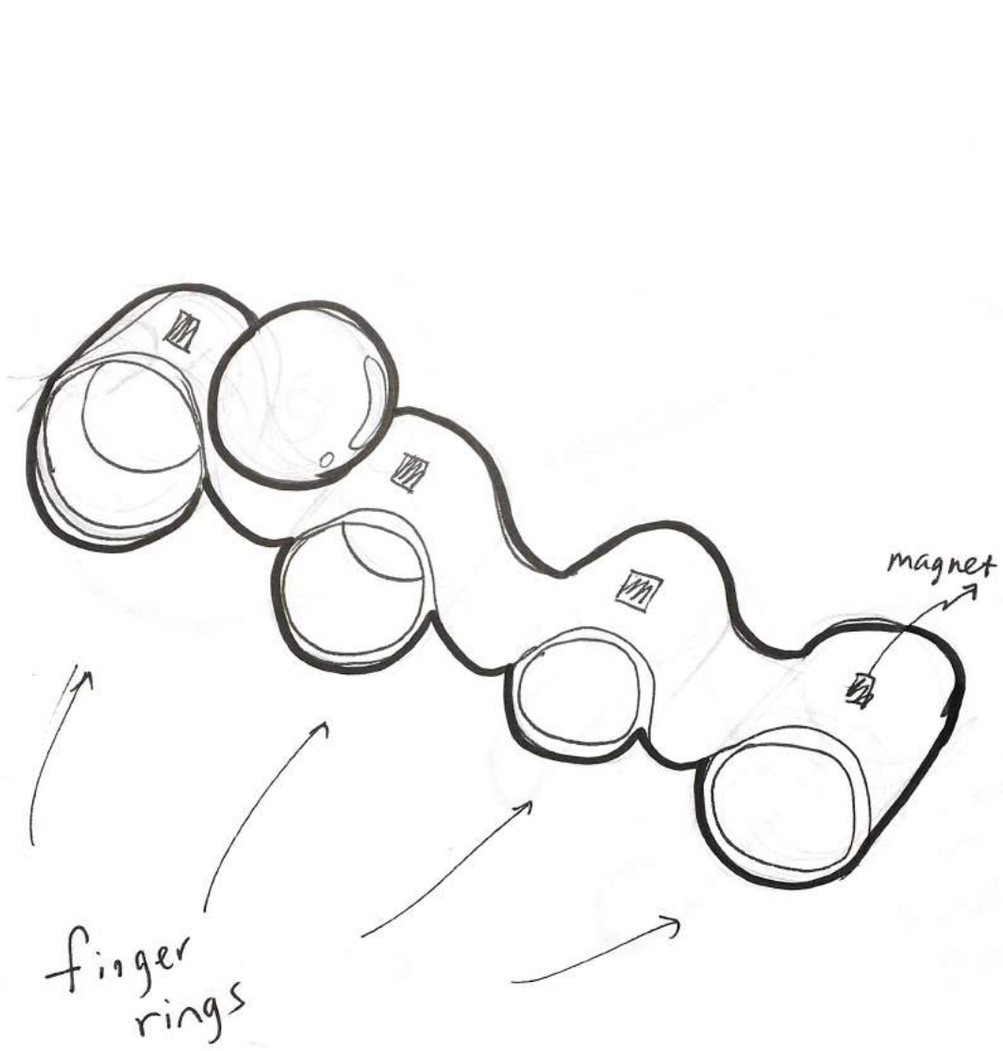


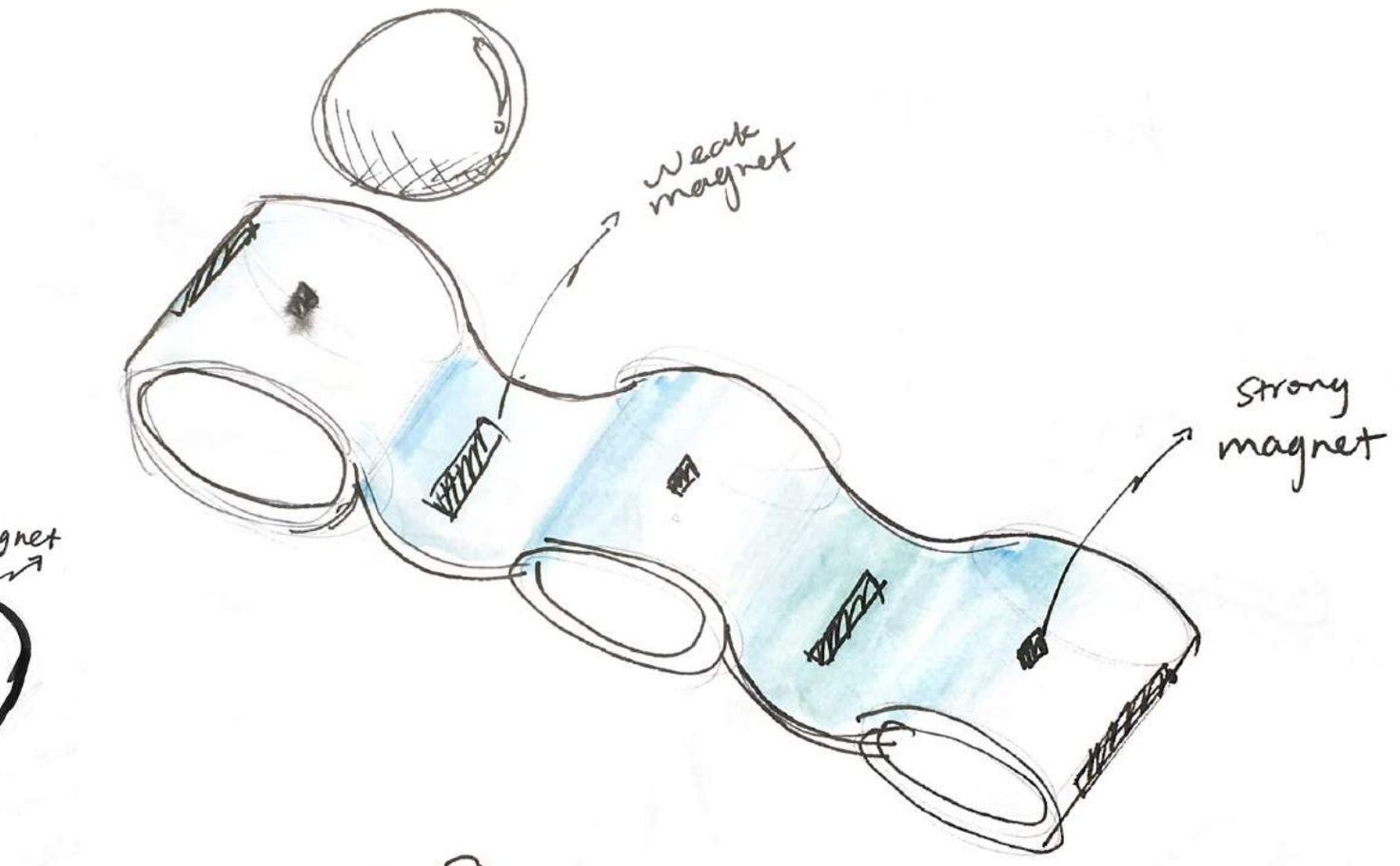


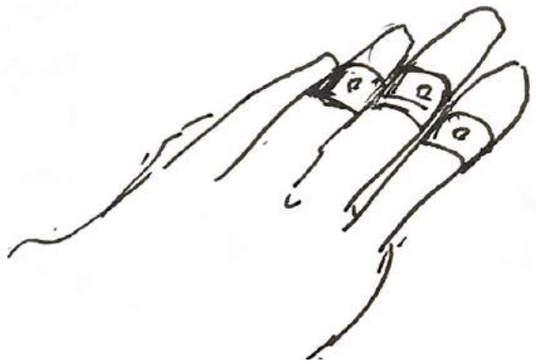


Sketches

At last, I decided to explore the design that enables users to move a metal ball from one finger to another.

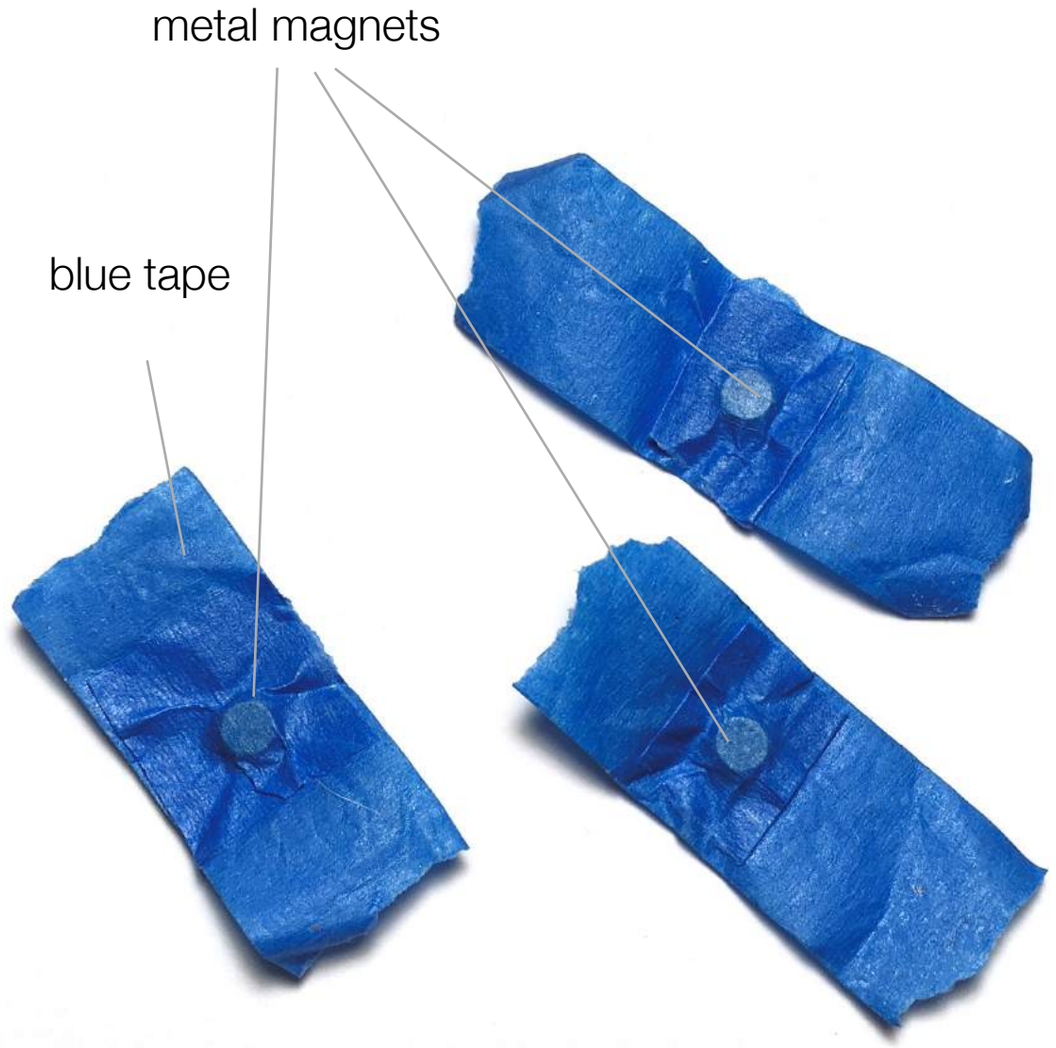






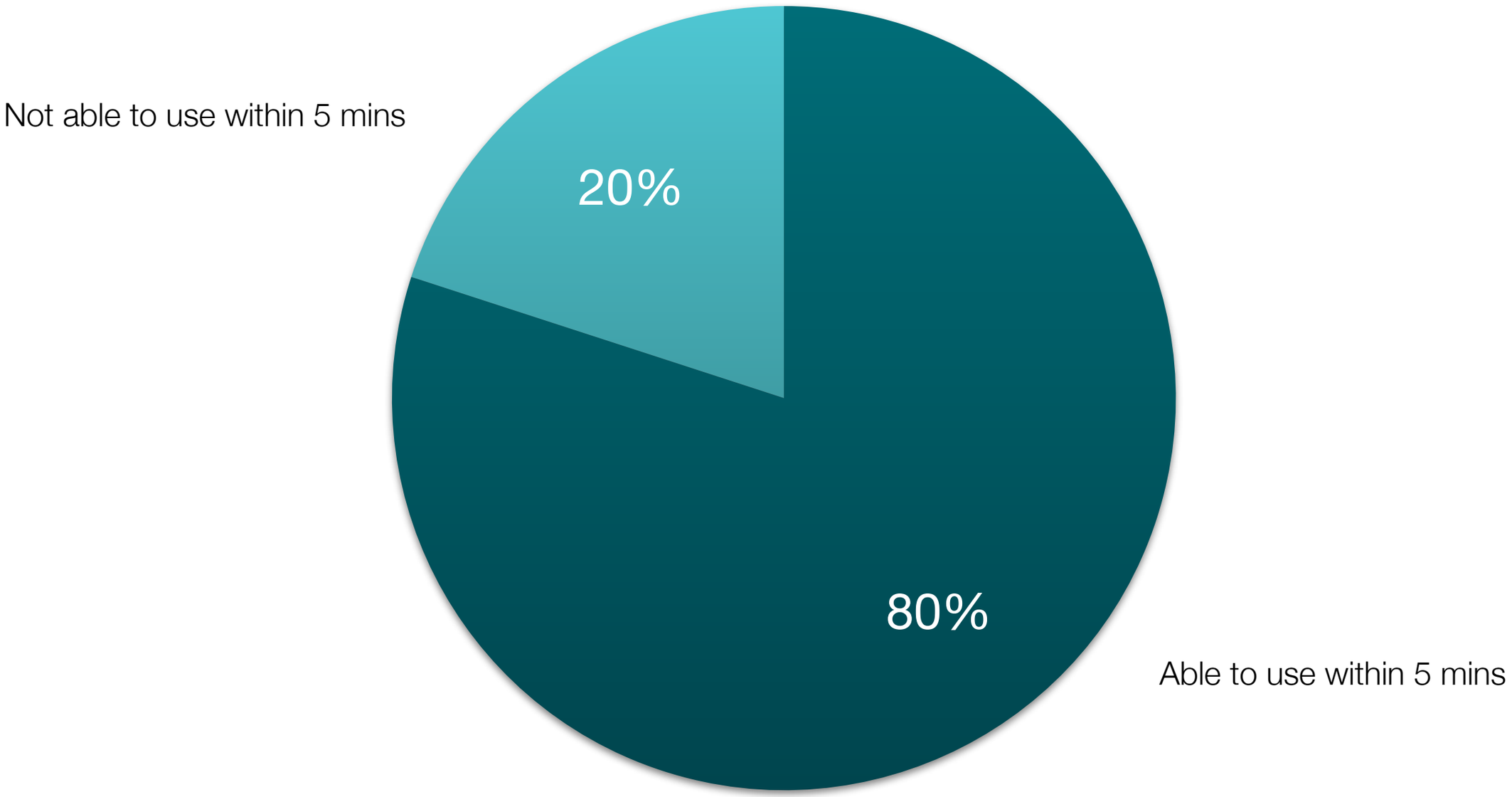
Prototype #1

Playing around magnets and metal balls, I discover that magnetized metal balls are able to transfer an identical metal ball from one finger to another.



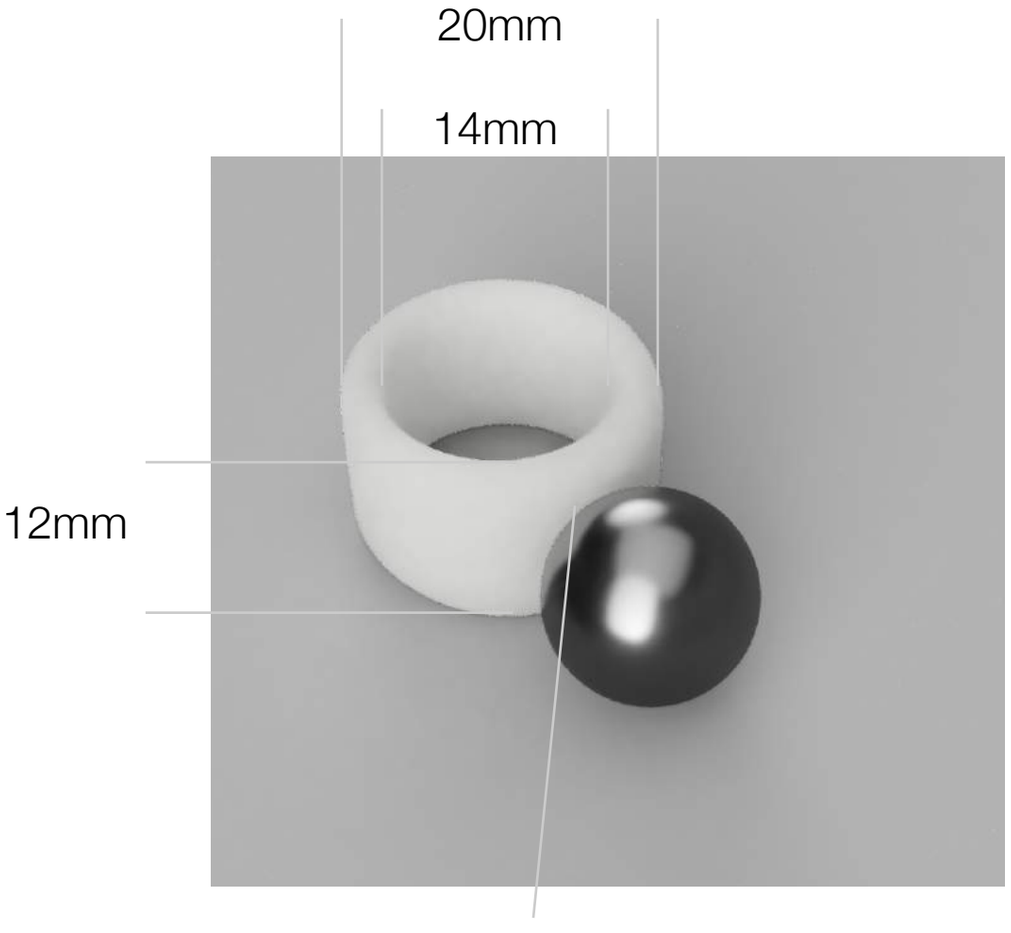
Prototype #1

From a sample size of 10 people in my design class, 8 people liked and got the game within the 5 min of playing with the prototype.

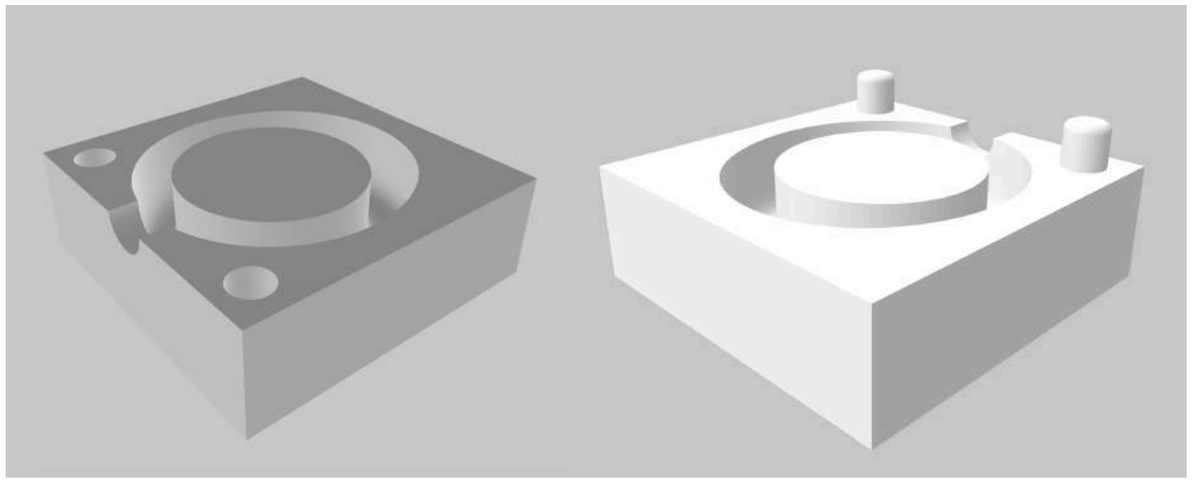


Prototype #2

Since the material should be stretchy and soft to fit on fingers of different sizes, I then tried casting silicone rubber in 3D printed molds that were modeled in Fusion 360. The problem with this cast is that it only has one hole for the liquid silicone to pour in, no holes for the air to go out.



Thicker wall where the magnet is placed

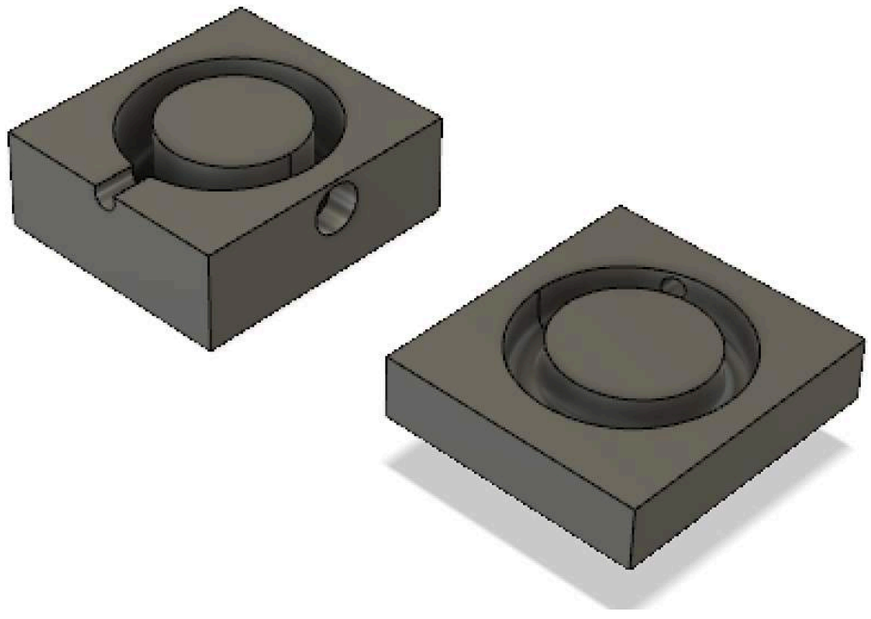


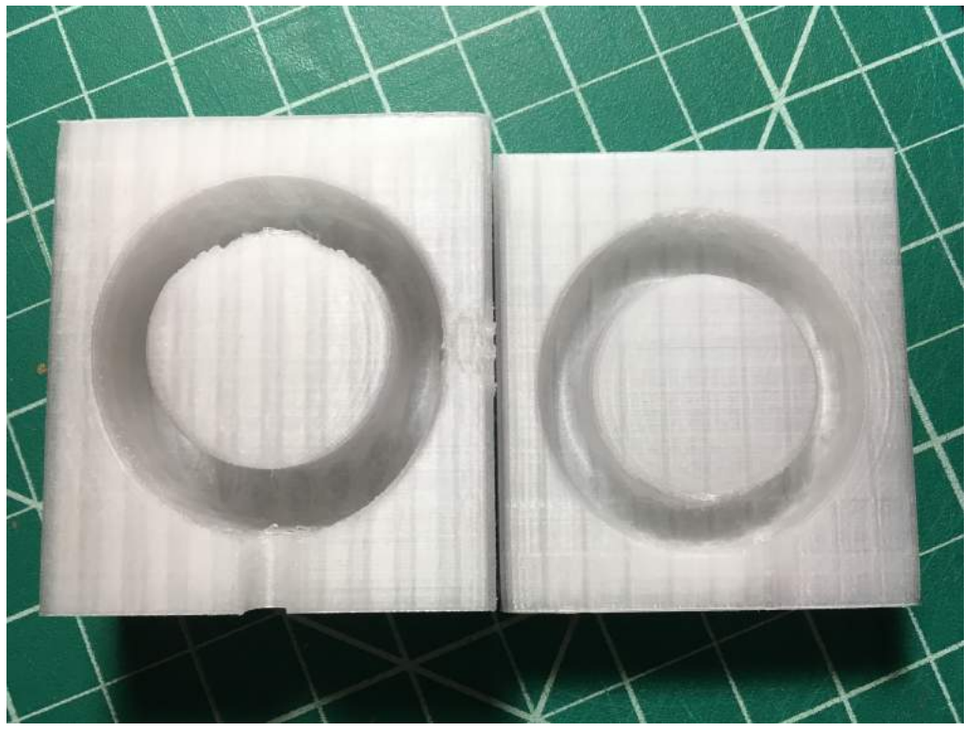
Prototype #2

Home-made silicone rubber (caulk and corn starch) was not the best material. Although I made a functional prototype at the end.

Final Models

I remodeled the cast: added more holes to let air out, and enlarged the injection hole. I used cooking oil as an alternative to the release agent.

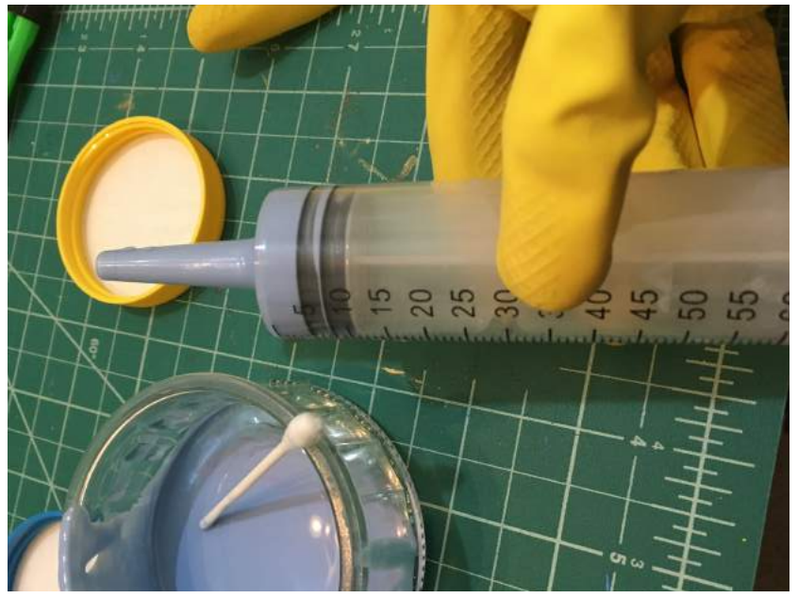




Final Models

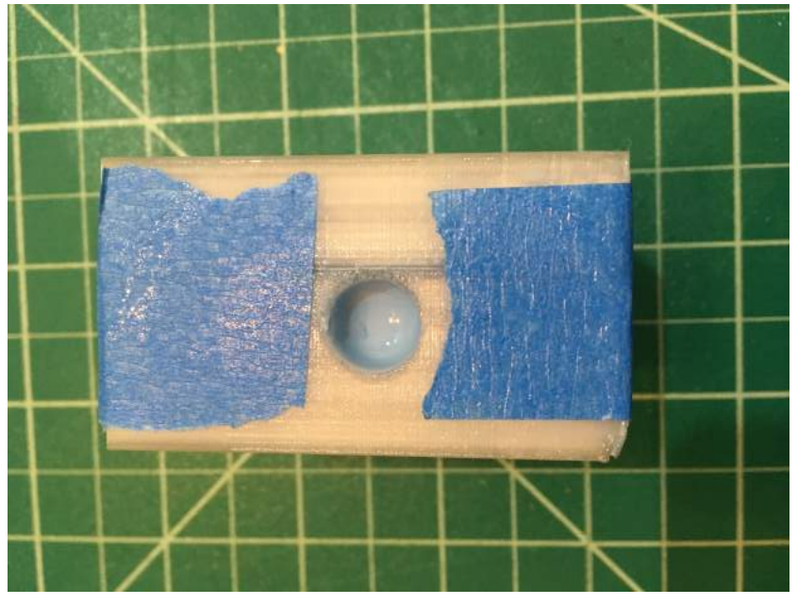
The process of making the final models.

the “real” silicone kit from Smooth-On



a 60ml syringe to inject liquid silicone

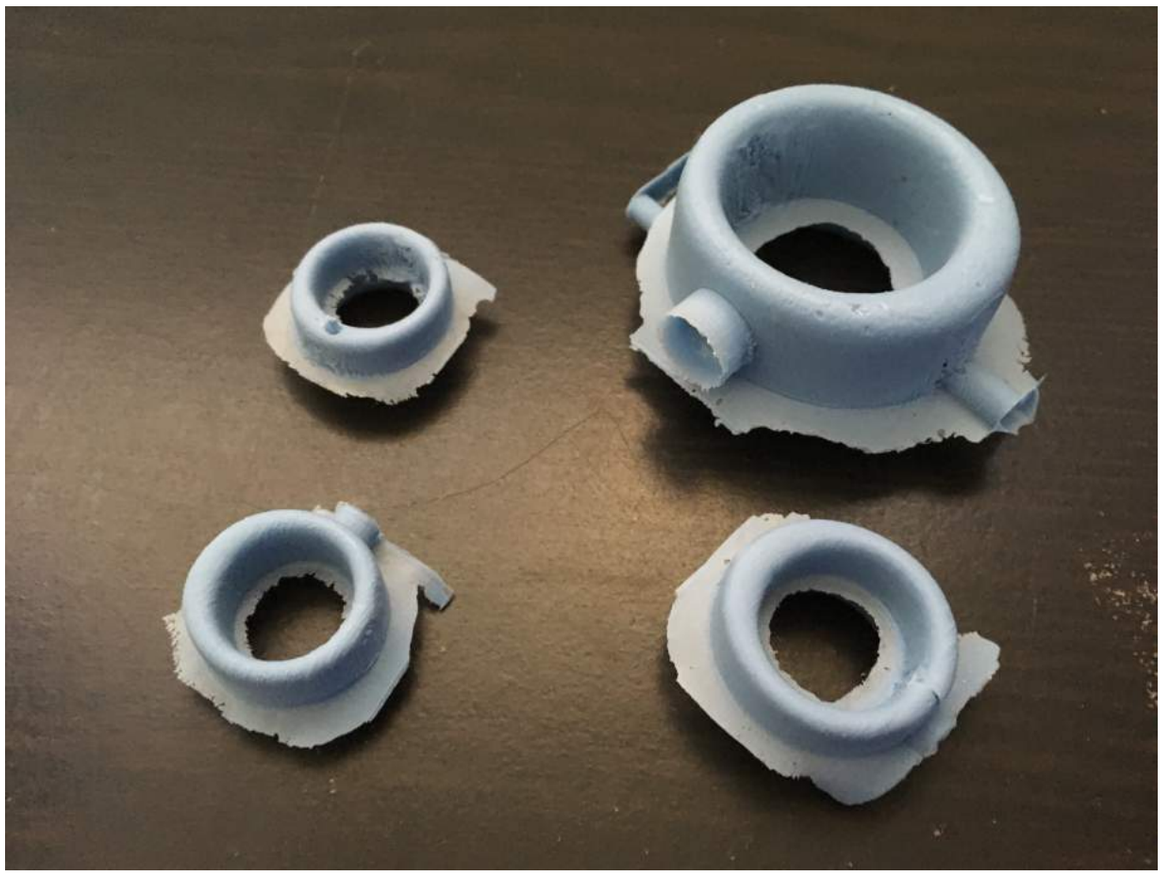
outside magnets to keep the inside magnet in place

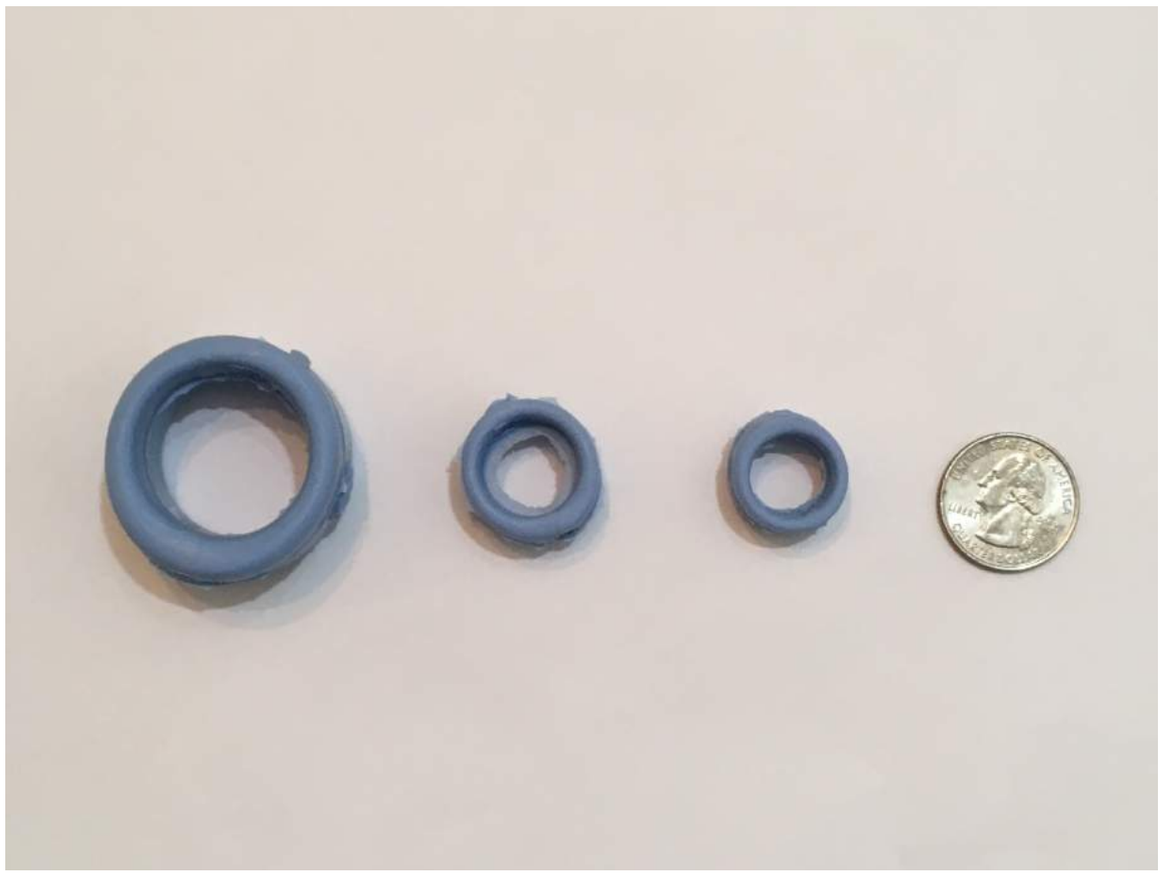


tape to keep the top and bottom cases in place

Final Models

The models include: two 100% prototype, a 120% prototype and a 200% prototype.





Prototypes compared with a quarter.

Final Models

Assembled 100% prototype models.

Next Steps

Problems

- Silicone rings are too loose on the fingers
- Air bubbles inside the rings
- Magnets fall out easily because the silicone layer around them is too thin

Possible Solutions

- Smaller and thicker rings
- Use vacuum chamber to take out the air inside silicone mixture before pouring it into the molds
- Modify the molds so that the outside magnets can be placed inside the circle of the mold. As a result, the inside magnet is moved more towards the center of the ring. More silicone will be between the silicone and metal ball