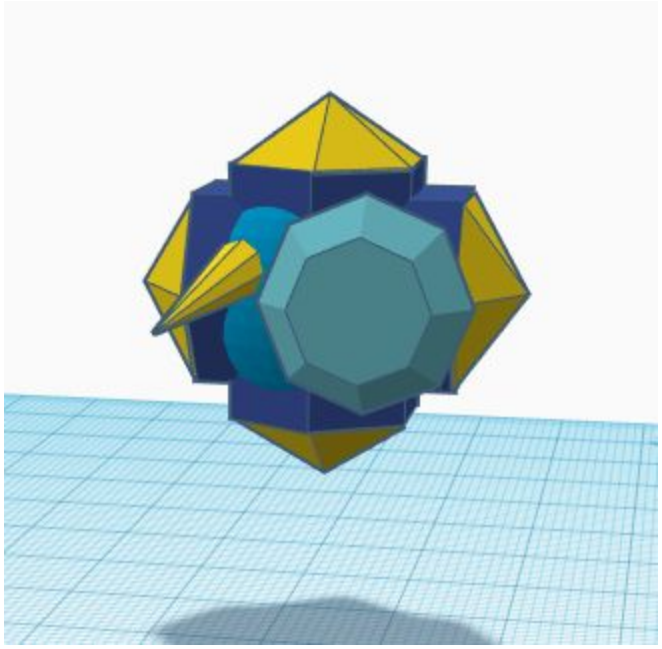
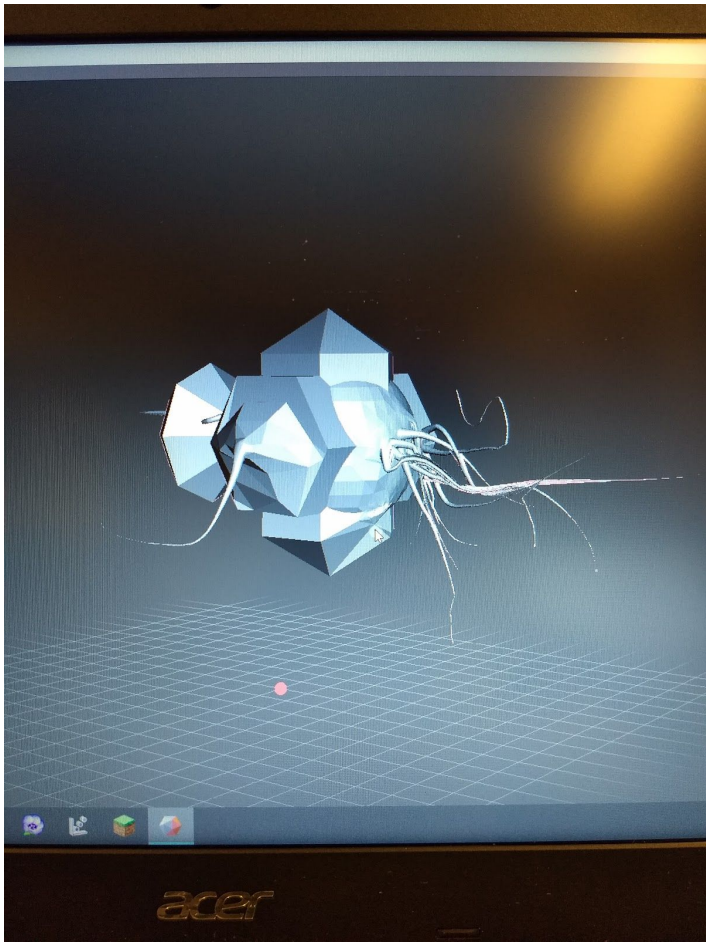
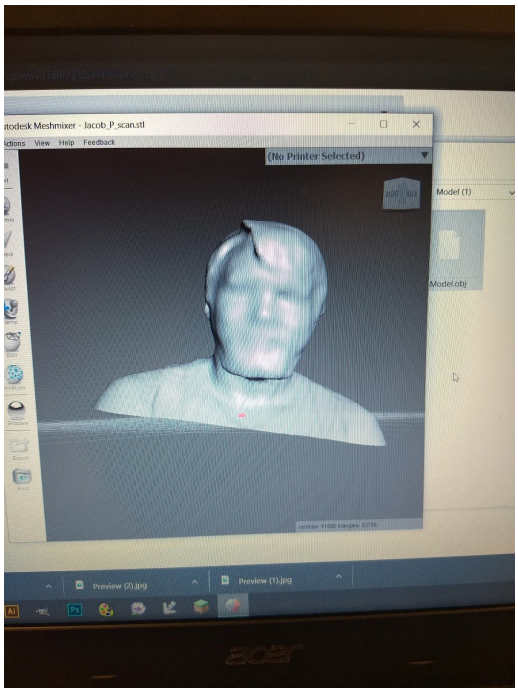
In class, I originally intended to make a castle on a tiny planet. It ended up looking like a little knight instead of a castle, so I added a spear and shield and made it an alien instead.



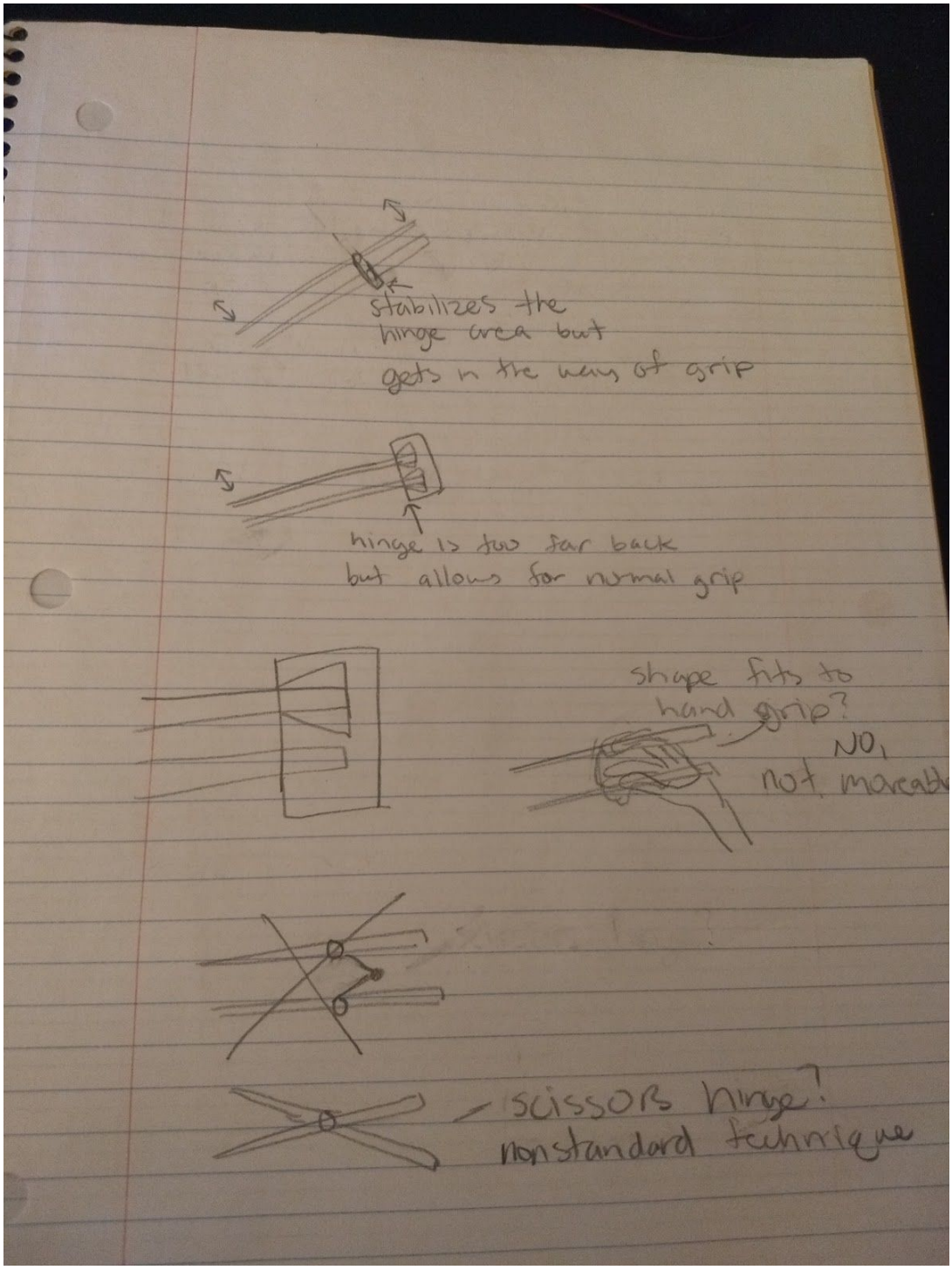
In Meshmixer, I added arms and weird root-like shapes to the back.



In our scanning class, I cleaned up a scan of Jacob:



My first idea for my final was to make an aid to help people learn to use chopsticks. I originally thought to print chopsticks with a build-in aid, but my friend Ada mentioned that long, thin items like chopsticks would be hard to 3D print, so I decided instead to make an attachment for pre-existing chopsticks.



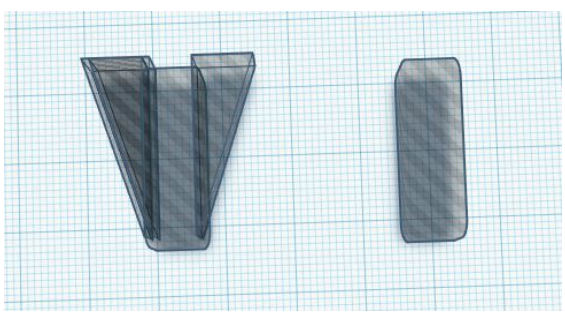
My first option was to have a bar in the middle that helps separate and stabilize the chopsticks. This way, the user does not have to focus as much on holding the chopsticks in position and can instead get used to the correct feeling of the chopsticks in their hand while ideally having greater control that unaided beginners. However, the bar would get in the way of the user's grip if placed in the correct pivot point.

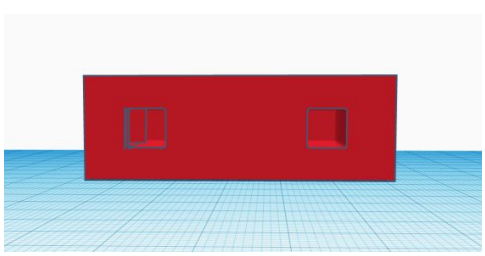
An alternate option would be to have the aid attached on the end of the chopsticks, with space cut into it to allow the chopsticks to rotate. This would move the pivot farther back than ideal, but would allow the user to get the right hand grip on the sticks. I also thought it would be interesting to allow only one of the sticks to rotate. When you use chopsticks, the bottom stick should be stable relative to your hand while only the top stick moves. Having the bottom stick stable in the tool would help reinforce this in the user's mind while also making it less likely for the tool to fall off the chopsticks. This is the design I ultimately decided to make a model of.

I briefly considered trying to make an aid that fits into the shape of the user's hand. I decided against this because it would make it hard to actually move the chopsticks, and also it doesn't allow for the user's grip to change, which can happen during the learning process.

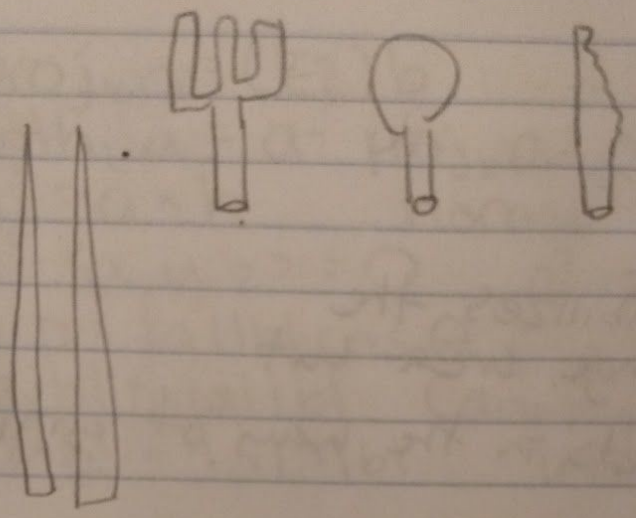
My last design idea was to have a scissors-like hinge at the pivot. This would replicate the way I personally hold my chopsticks, but I decided it would be better to teach newbies to hold their chopsticks with a more standard technique.

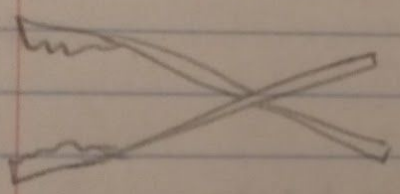
I implemented the design in TinkerCAD. It's a very simple box with holes cut into it. I measured my chopsticks and found that the thick ends were squares with rounded edges and 8 mm sides. I placed the two holes about 2.5 cm apart and gave the moveable end 8 mm of leeway on either side.



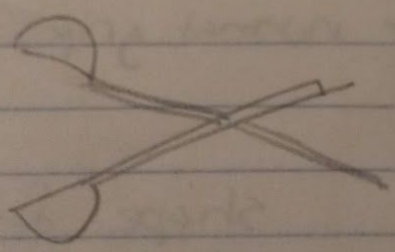


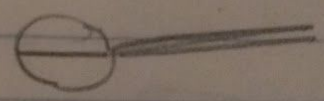
While making my first design, I thought about other possible attachments to chopsticks. Thus my second design was a set of utensils that would convert chopsticks to forks, spoons, or knives.

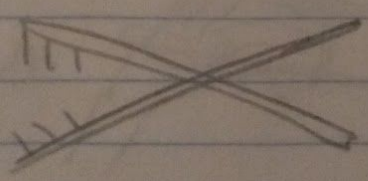




Scissors!



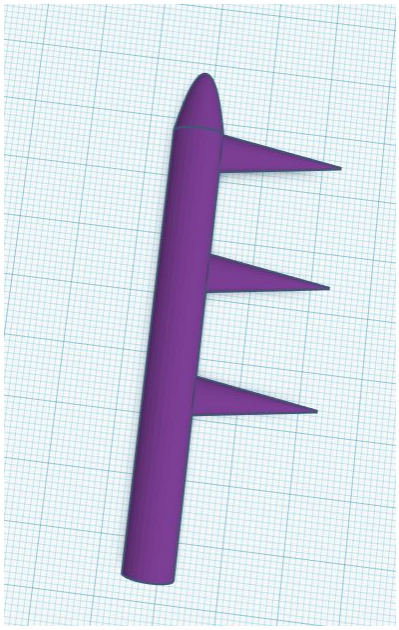


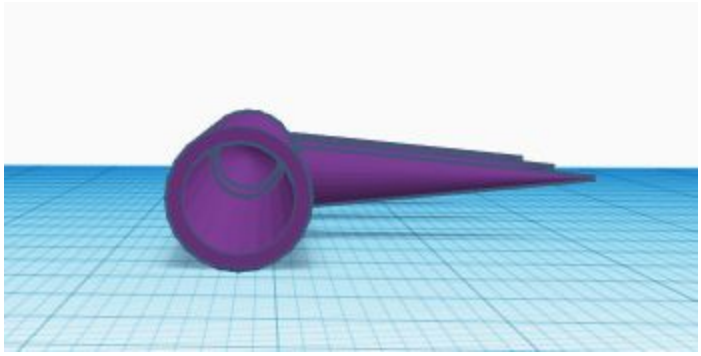


My first idea was to make simple extensions that would fit onto the ends of the chopsticks. This could potentially save storage space by using the chopsticks as handles for all your utensils, but they would be hard to hold. It also seemed like a bit of a boring design.

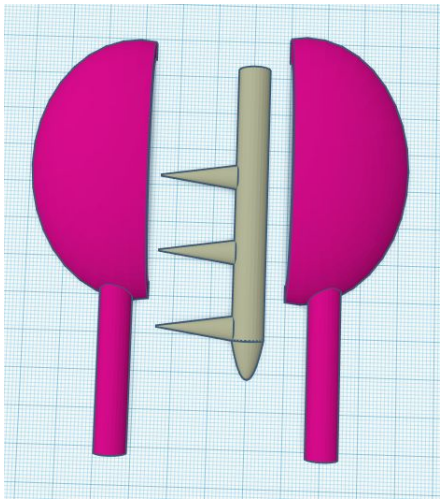
Instead, I brainstormed ways to use both chopsticks at once to simulate utensils. I liked the idea of making scissors out of chopsticks, but functionally this would be the same as just adding a knife to the end of each stick. For a spoon, I had half a spoon attached to each chopstick, with the two sides coming together to form a full spoon. This could be useful for tasks like eating rice, but would likely be ineffective for soups and other liquidy foods. For a fork, I added spikes to the sides of the chopsticks which would poke into the food the way forks do. This could help pick up slippery foods easier, though forks in general are largely redundant to chopsticks so applications would be niche.

I made the fork in TinkerCAD first. I measured the thin ends of my chopsticks as 6 mm diameter circles, and made the tines as 2 cm long cones, attached to a 7 cm tube. However, I later realized that since the chopsticks start to widen immediately, 6 mm would not be large enough 7 cm down the stick, so I increased the inner tube to 6.5 mm (you can kind of see the line where the thickness changes in the second picture).





For the spoons, each side of the spoon was half of a half-ellipsoid 4 mm thick. I decided not to make the knife, since the main consideration on a knife would be making a sharp edge, which wasn't a task I was particularly keen on (pun intended).

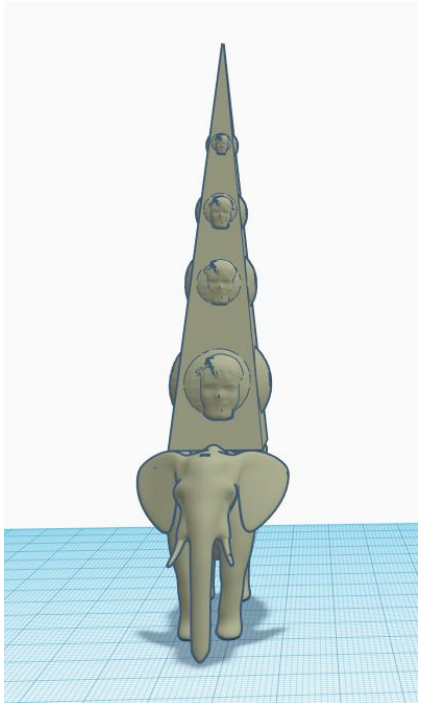


For my third design, I considered two options. My first idea was to do a version of Michelangelo's David with a scan of my face edited in (take a piece of traditional art and alter it to be a representation of who you are today). I also considered making a model of part of the Salvador Dali painting The Temptation of St. Anthony (turn a famous painting or drawing into a 3D model). I thought of this painting because the arms and root-like extensions I added to my alien reminded me of the legs of the elephants in the painting. I chose the latter in an effort to avoid NSFW content in a class assignment. That said, The Temptation of St. Anthony is also mildly NSFW, so I will not be including an image of the full painting in this post.

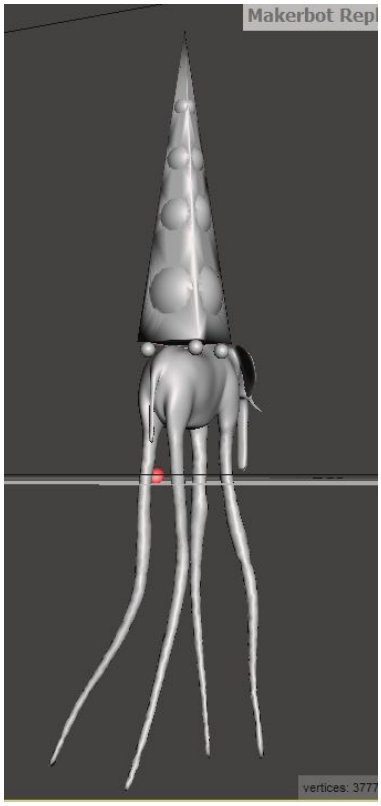
Salvador Dali was a Spanish surrealist painter, perhaps best known for The Persistence of Memory, with its melting clocks. The Temptation of St. Anthony is a later piece, featuring St. Anthony being tempted by symbolic representations of sin in a desert. It

currently belongs to a museum in Belgium. I chose to make a model of the second elephant, which is itself an homage to Elephant and Obelisk, a sculpture by Gian Lorenzo Bernini.

I started with a free 3D model of an elephant (David can also be found for free online), and combined it with an obelisk made with pyramids and spheres. I incorporated a scan by putting faces on the spheres, which I think added to the surreal nature of the piece.

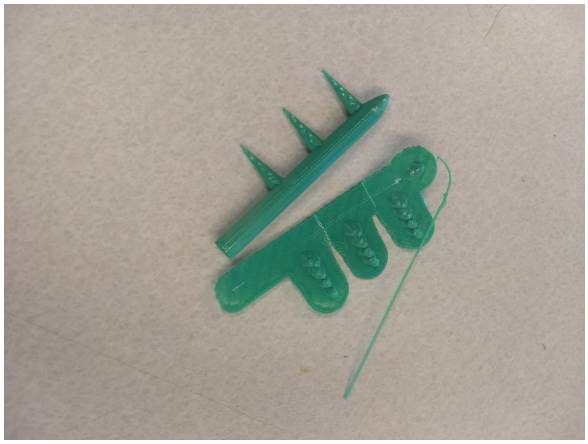


I exported this model to Meshmixer, where I elongated the elephant's legs.

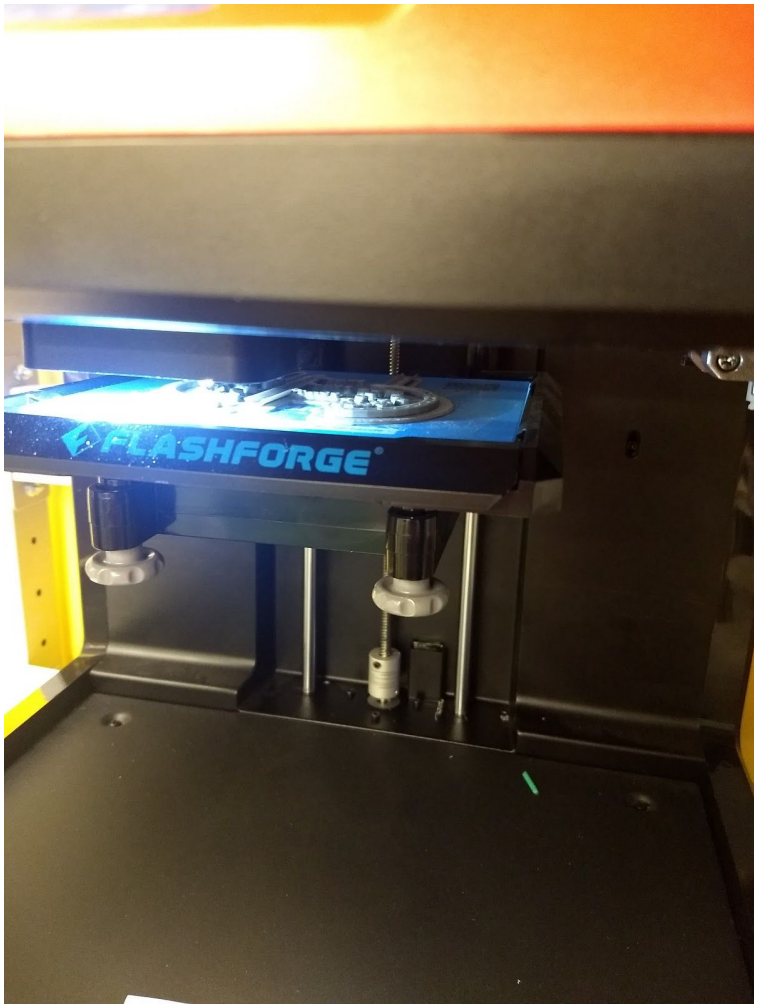


I decided to continue with printing my second design. The elephant was interesting, but realistically it would not stand up well and would be hard to display. The chopsticks aid would be useful, but it was a pretty boring shape. The utensils would not be food-safe, but they would at least be an interesting proof of concept.

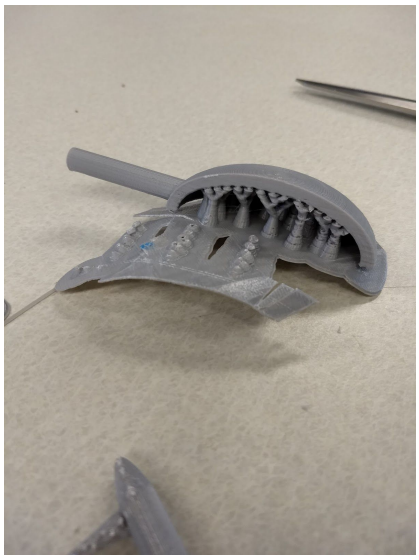
I started by printing a single fork, just to make sure the size of the holes would fit with my chopsticks. I used the auto-generated supports with a raft and a 15% infill density. The utensils were pretty small with a high surface area to volume ratio, so a high infill density would be unnecessary. I used a FlashForge 3D printer.



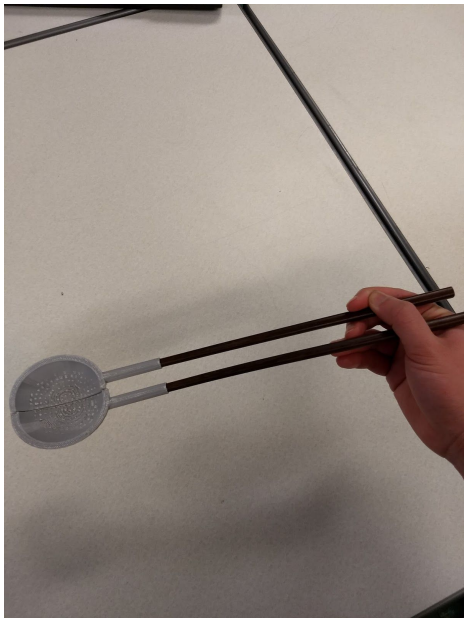
It fit, so I continued and printed the three other pieces with the same settings with the same machine.

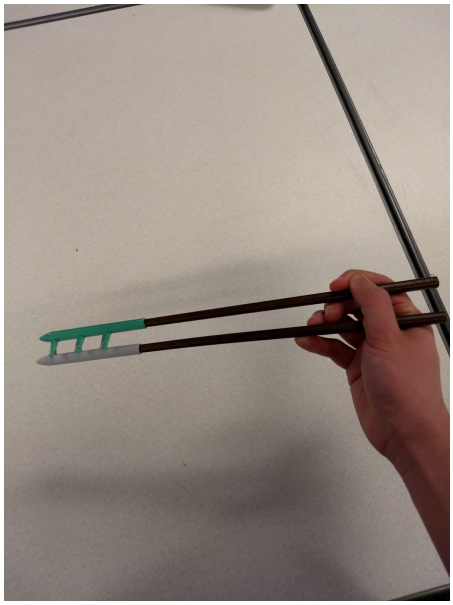


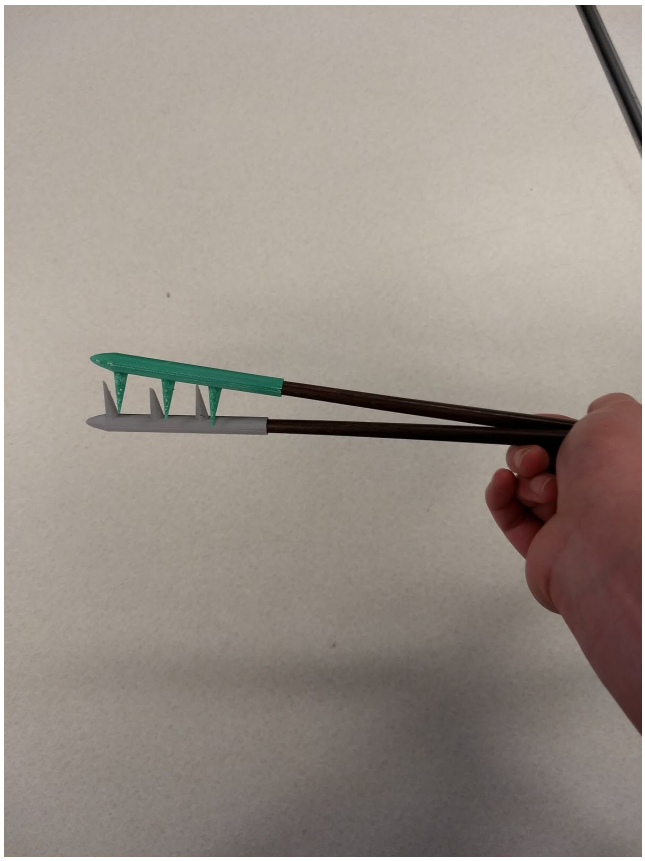
The supports on the spoons were hard to cut off smoothly.

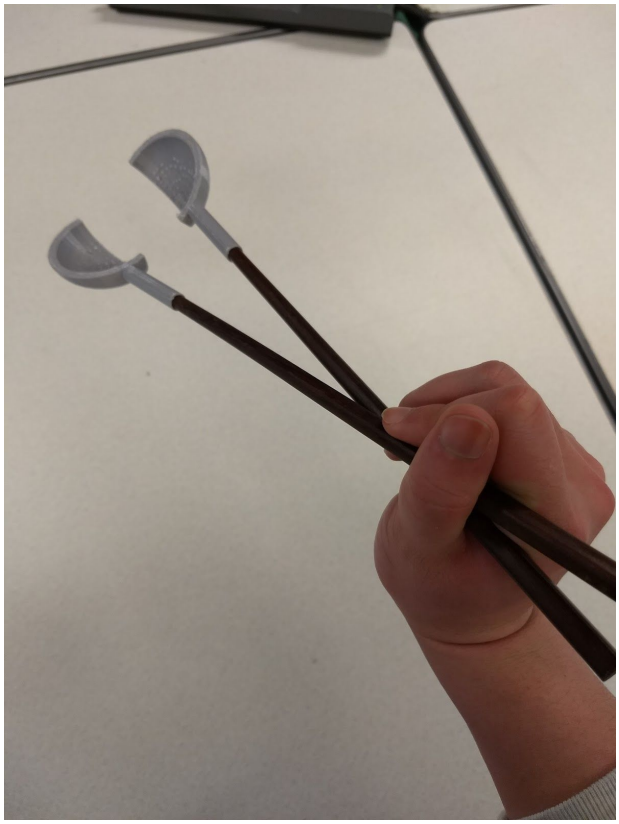


Both the spoon and fork worked better with a standard chopstick grip rather than my personal preferred grip (bottom). It would be interesting to try to personalize these utensils to my style, but I don’t think it would work well because the closeness of the chopsticks to each other and the direction of motion would both be difficult to account for.









I expected the hardest part to be sizing the utensils onto the chopsticks, but it was surprisingly straightforward to size the model in TinkerCAD. The spoon ended up being bigger than I intended, so if I were to change one thing I would make it thinner and slightly smaller. I focused so much on making the holes perfectly sized to my chopsticks, but I should have thought more carefully about sizing the spoon part of the model— 4 mm doesn't sound like much, but it's very thick for a spoon! However, I did not think it necessary to print a second prototype, plus I was already over my material limit for the project.