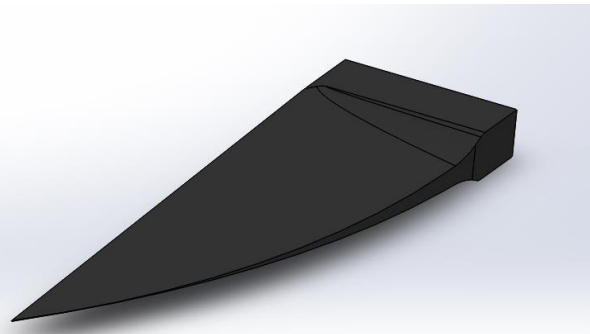
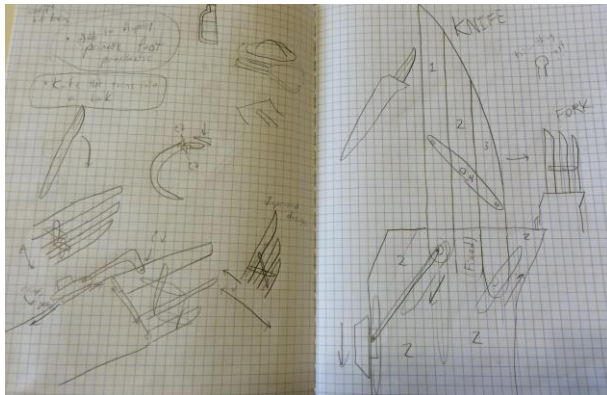


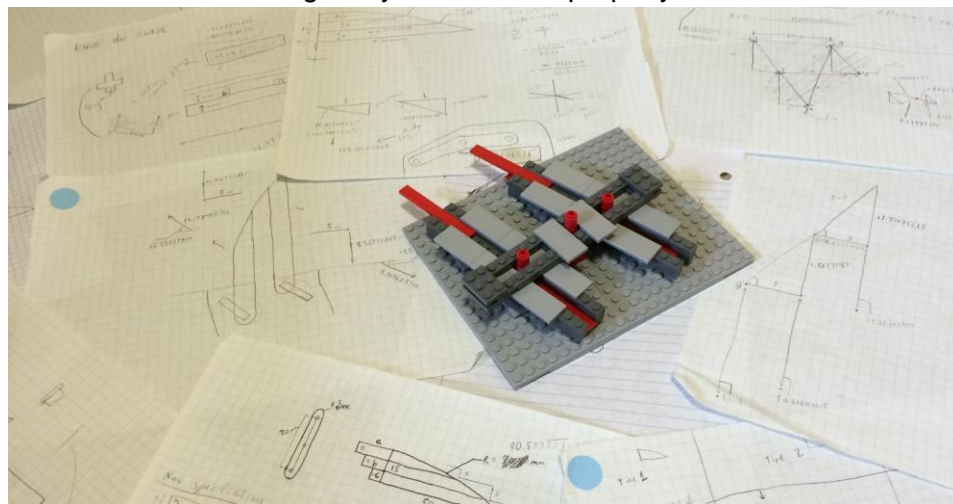
3D Maker Final Project Reflection

For the 3D Maker final project, I wanted to commit to a goal that would require me to design a system of moving parts. Alternating periods of broad contemplation where I considered my likes, dislikes, and competencies and more focused mental conjuring of gadget ideas resulted in my fixation upon the concept of a fork that turns into a knife. The (f)utility of such a device places it in that infamous aisle all kitchen stores possess that contains sleek products for cutting *one* specific type of fruit or vegetable and motorized forks for twirling spaghetti, but I had fun throughout the course of the project, so I really don't care.

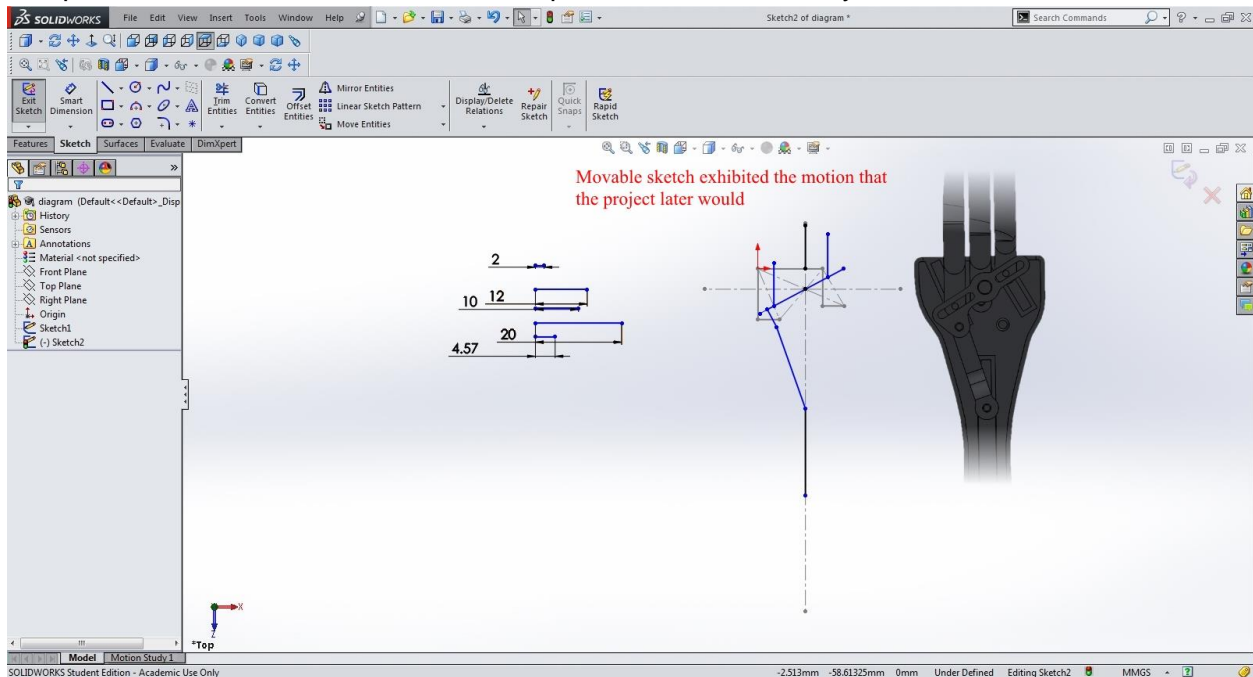
The design process began with a sketch of the vague mechanism I had in mind:



After this initial concept was on paper, I briefly created a blade template from which to model the three fork tines. All work following this first action required solving simple geometric relations relating to the positions of the parts, whether moving or static, in order to obtain the necessary variables with which to dimension parts and mates. I also prototyped the primary function with Lego bricks to ensure it worked properly under real conditions, as the Solidworks assembly simulation behaved in strange ways even when properly mated.



Eventually I settled upon a mechanism to control the motion of the tines and these calculations were condensed into an interactive set of sketch relations, at 1:1 scale, mirroring the actual motion of the knife-fork, or knork. This sketch greatly helped me to envision the components I would need to make to complete the mechanical system.



Once the components were all finished, I was very excited to see them manifested in plastic rather than pixels. My enthusiasm was not particularly dampened when the first printing resulted in a prototype rendered unusable by holes too small and pegs too big that broke in short order; I had expected problems, and now that they were diagnosed, modified the design accordingly. The second printing, on the other hand, surprised me a bit due to new and more fundamental problems that still left the knork brittle and unable to perform its function.



There was nothing to do but fix these problems, however, and a considerable overhaul of many key aspects of the design followed. Besides greatly thickening the lever that drives the tines to their respective positions and modifying other parts to mirror changes it underwent, I also decided to change a few details to optimize the printing process, which included splitting the largest component in two.

When the third print finished, I was relieved to find that none of the errors I had sought to fix were present. The motion was still a bit dogged by friction, but there was enough leeway to fix the problem with some silicone lubricant (As this utensil is used to eat, I've since determined that vegetable oil would be a much safer alternative). I'm very pleased that I was able to become proficient enough with the Solidworks modeling software to execute this project in a manner that so closely matches my original vision. Though I slightly regret not attempting a more aesthetic-oriented project to focus on modeling unusual details, you can't always have it both ways and I enjoyed working outside of my comfort zone on a more mechanical project.

