

When I was six years old, I tried to trap lightning with melted marshmallows. I had heard that lightning could power the world, if only it could be captured! So naturally, I mixed all the sticky things I could find: syrup, melted marshmallows, and glue. I submerged a battery in it and used a multimeter larger than my face to see if the mixture captured electricity. Spoiler alert: it didn't.

Although my first invention was a failure, my desire to solve problems was far from extinguished. One sunny day, I contracted a terrible cold with a constantly running nose and severely chapped lips. Yet somehow, the most annoying part of my day was repeatedly knocking my tissues and chapstick off my desk. This minor annoyance pushed me over the edge. I asked my sister to teach me how to 3D model and instantly fell in love, despite some initial struggles. A day later, with tissues stuffed in my nose, I measured my chapstick and tissue box and printed a desk organizer with perfectly shaped wells for my Kleenex, chapstick, and phone. As I got back into bed and reveled in my newfound ability to efficiently acquire a tissue, I realized I could use my modeling powers to solve real-world problems. One step closer to capturing lightning!

Later, our family friend Steve asked me to 3D print a cylindrical plug to cover a hole in his fence when his garden hose wasn't fed through. Don't tell Steve, but I may have internally yawned at the thought of printing a cylinder. Instead, I designed a plug with an inner portion rotating on a hinge, making it a permanent and elegant addition to his fence. Although I knew I was biting off more than I could chew, I was determined to learn how to model a hinge, knowing that I turned a ten-minute project into hours of modeling and testing. It was worth it to see Steve's surprised and delighted face. This was when I realized I could use my modeling powers to help other people.

When I got an electric scooter for my 16th birthday, I was ecstatic, until I picked up Shake Shack for dinner and realized I unfortunately didn't have a third hand to hold my meal. I walked home with my burger and fries in one hand and the scooter, which crashed into my ankle every five seconds, in the other. I decided to design a basket, quickly realizing it would be my most complex design yet. I had to factor in nut and bolt holes, tolerances, structural integrity, the weight of my u-lock, and real-world physics like inertia. The basket functioned perfectly...until a month later, when I found it completely snapped and detached. I like to think I've become a better engineer since the marshmallow experiment, but apparently not quite an expert yet. Upon examination, my dad and I noticed a clean break near the top but a slight curve at the bottom. We tested breaking other 3D printed materials and discovered that that type of break could only have happened if it had collapsed from its own weight. With structural integrity in the vertical direction now at the front of my mind, version two is currently in progress!

I think I can confidently say that my engineering skills have certainly improved since the lightning capturer. Melted marshmallows have been replaced by CAD, 3D printers, tolerances, and a much better understanding of physics. But my curiosity and imagination have remained. When something annoys me, puzzles me, or simply doesn't work well, I can't help but figure out how it works—and then make it better. If anybody does ever figure out how to capture lightning (before me, that is) and marshmallows are involved, I think I deserve partial credit.

