Making a Rotating Claw REAL
TinkerCAD 2020 Online version

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Last year, when we were taking a Robotics I course, an issue that was frequently encountered was the inability of the claw on the VEX Clawbot to grab certain items. The challenges that we were assigned in the class were focused on picking up and moving things with the claw. However, the act of picking items up was observed to be the most challenging part of any assignment and felt more like a complete gamble than what it should have been.

To have a successfully working claw that allows for a much grander range of motion that we could accurately measure and troubleshoot, we decided to go ahead and create our own. And the thought process behind the creation of the custom part was a bit of a tricky ride. Originally, we had a multitude of radically differing ideas for what we wanted to create. We'd even thought to completely redesign the arm motor with a cylindrical shaft chock full of bevel gears. However, we're quite proud of our finalized idea.

This new component will work in conjunction with an additional motor to create a turning mechanism in the claw. All the machinery will be encased in a plastic box that attaches to the claw from the arm of the VEX robot, and in turn, this allows the claw to turn. Not only will this new part allow for a much larger amount of items that the claw can grab, but it also expands the length of the arm allotting for further grab range and maneuverability.

The aforementioned plastic box was designed in TinkerCAD. Without this crucial component, the motor would require a much more complicated series of components including long shafts, gearboxes, etc. The rotational component is a simple piece that was made in TinkerCAD. TinkerCAD has allowed us to build in a week what would normally take a month.

However, the creation of this piece is easier said than done. Unfortunately, we had only begun the challenge in the middle of November, which made for a very tight schedule if we wanted to fully complete this competition. So, we buckled down and created a rigid timeline of how we wanted to approach the challenge. This timeline included when we should have an idea of what we wanted to build when we should focus on designing and creating it in TinkerCAD, and when we should go ahead and write out this very essay. However, sticking to the schedule was almost impossible due to an unaccounted unpredictability.

This unpredictability came in the form of the unruly 3D printers. When a certain piece would be designed, we would have to guess as to how accurate the machine would create it. And oftentimes, it wouldn't be very close to the instructed measurements, meaning that a hole that should be eight millimeters in diameter would print out to be only seven and a half millimeters. In fact, we printed the rotational component an entire four times before it fit on the claw and screwed in well. We gradually had to adapt to this by making our parts bigger than we needed so that they would fit in what we needed them to.

All in all, this project has taught both of us many useful skills including creating timelines for working ahead, and perseverance in the face of tight deadlines. Seeing as how we started working on this project in the middle of November, we had to work extremely hard with creating a part that would not require too many fine details that could absorb all of our time. This project also served to show us a taste of the world of innovation in robotics, seeing as how the process of designing new parts that give you a tactical edge is everywhere in competitions.