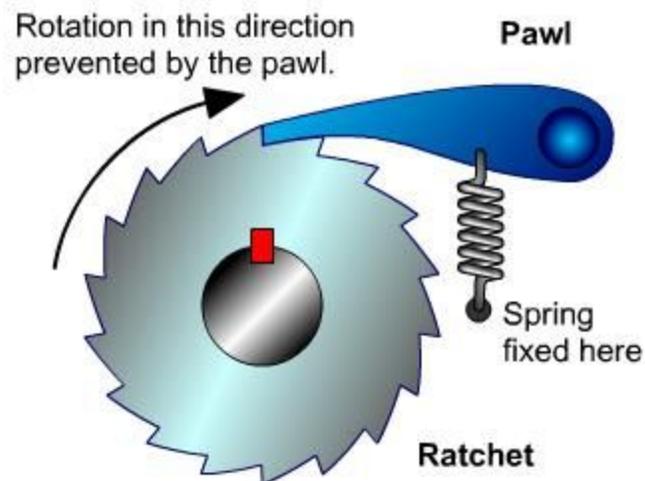


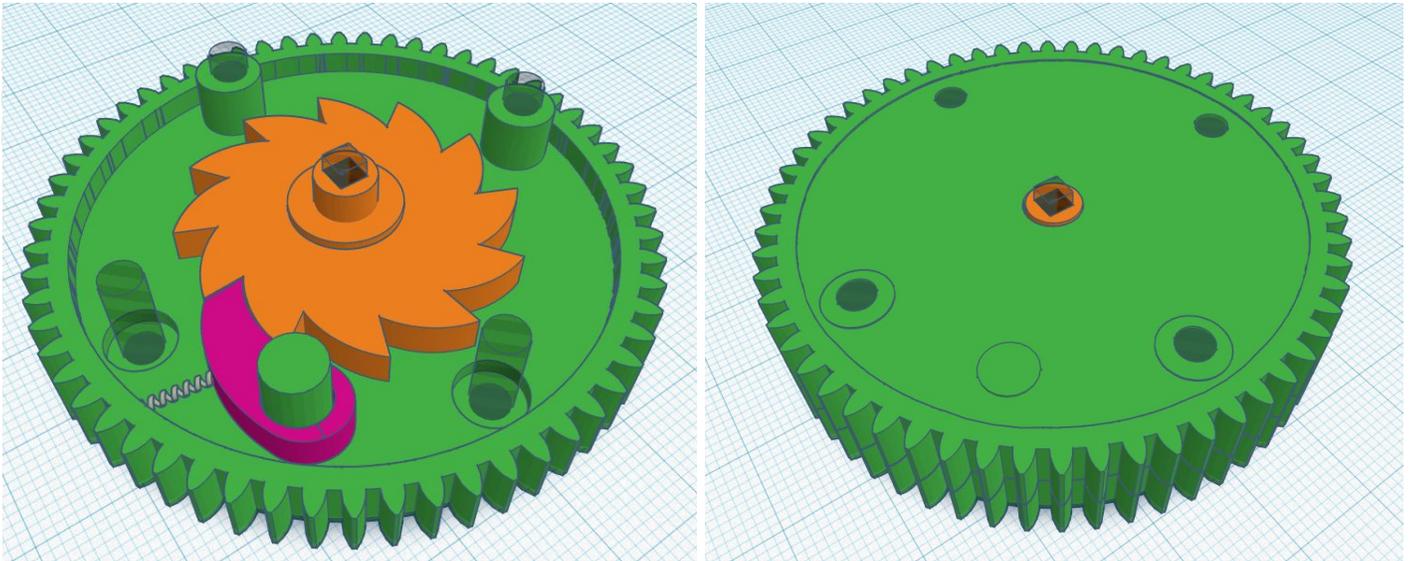
Team 65292C's Submission

Our names are Adit Paul and Dillon Mehta, and we are 7th graders at Central Middle School. For our submission, we made the Ratchet Gear! When we were in 6th grade we made an intake robot for Tower Takeover. Our biggest problem with this robot was sizing. To make our intakes fit we had to fabricate a mechanism that would flip them out. This mechanism took a long time to set and was very fallible. This all could have been easily solved though. With the Ratchet Gear.

The ratchet gear was made in Tinkercad version 2019_10_14. The ratchet and the pawl were made using Inventor 2021 Free Trial. The Ratchet Gear is deceptively simple as it is just gear with a ratchet inside of it. So when the shaft spins one way the gear and the shaft move, but if the shaft spins the other way it will just move the shaft. I have inserted a diagram to help show how this works.



As you can see, if you spin the ratchet in one direction the pawl will engage so that the ratchet can't move, meaning that the entire gear will move. On the other hand, if you move the other way the pawl will spin over the smooth side of the ratchet. This is a fairly simple and useful mechanism, but it is not yet in VEX robotics, but you can always fabricate one. This has been done, but it takes up a lot of space, parts, time, energy, and most importantly RELIABILITY. That is where the Ratchet Gear comes into play. It is a 64 tooth high strength gear that has a 12 tooth ratchet inside. It includes 4 different parts: The ratchet assembly, The Pawl, The top half, and the bottom half. The ratchet assembly includes the ratchet, the shaft insert, and two washers to keep the ratchet from moving up and down inside the ratchet. The bottom is the same as the top, except it has a small shaft coming out of the ground for the pawl to go on. The bottom and the top both have two sticks coming out of them, and two small inlets. A stick fits into the inlet meaning they easily fit together. Then they can be glued together so it stays. Here is a photo of the bottom piece with the ratchet and pawl in it so you know what I'm talking about.



This part would be put in a competition robot by inserting a shaft through the gear and putting shaft collars on the outside. You can also put a screw through the holes that keep the top and bottom together, so you can bolt it to something such as a C-Channel. Now back to our problem last year. If we had a part like this and we put it in the right place. We would have been able to intake blocks if we moved the intakes in, but if we tried to roll the intakes out, they actually move to the side of the robot. Then when you want to suck blocks back up again you could just roll the intakes in, and the intakes would come back into position, clamping on the block, and sucking it up. This same thing can be applied to change up, all you need to change out is the Tower Takeover blocks with the new Change Up balls. Some other uses that we think would be great with this piece are: making a flip-out intake that flips out or in while spinning an intake in one direction, a flywheel, or anything that you want to share a motor. One of the great advantages of this design is that if you want to change the direction of the pawl's engagement all you have to do is flip it around. There are many different ways a person can go about using this piece, and there are many ways you can make it better, but the standards of this very useful piece can be met with such a simple design. We look forward to using Tinkercad at home, and Inventor at school for other projects such as this one. I love CADing my engineering ideas, and I think that Autodesk Inventor and Tinkercad are great ways for me to do it. We hope you liked our conceptualization of the Ratchet Gear, and we also hope that this piece has inspired you in some way or another. So keep on engineering and have a good day!

