# Make It Real CAD Engineering Challenge Report: Swivel Wheel Bracket

By Navigator Robotics: Team 4442X

## *1 Introduction*

The product that the team has created is a swivel wheel bracket. This part is made out of plastic and is able to lower the turning radius of a robot while still maintaining motor efficiency and speed. This part is able to replace unneeded wheels and prevent the tipping of your robot. Team 4442X developed a prototype of the swivel wheel bracket that is able to house a two-inch wheel or four-inch wheel – both omni-directional and rubber – with holes at four different heights for axle insertion.

Figure 1: Swivel Wheel Bracket Module With Wheel [prototype one]

The part *(Figure 1)* is our first version of the swivel wheel bracket. The part went through one revision after running tests. The general shape didn't change in the second version but the dimensions of the part changed to become more compact, and another hole was added *(Figure 2)*. This will allow for a smaller turning radius in the swivel wheel bracket, thus, enabling a team to place it in smaller areas of their robot.

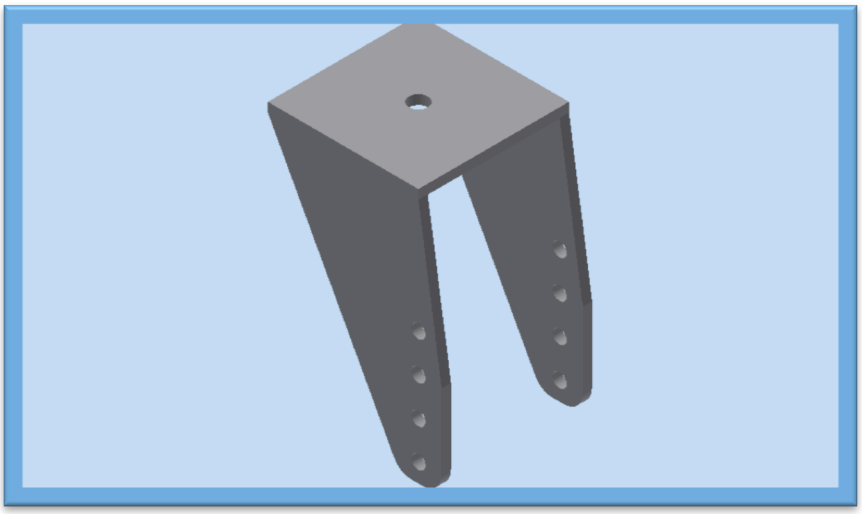


Figure 2: Swivel Wheel Bracket Module [prototype two]

## 2 *Explanation of Purpose*

This part is attached to a robot using the mounting plate on the top of the bracket and one screw to allow for a pivot point, a wheel is then placed in the middle of the bracket on one of the four holes. The bracket can be attached to any part of the robot as long as the mounted wheel is touching the ground. *(Figure 3)* The swivel wheel bracket is able to rotate completely with negligible resistance from friction. The main purpose of the swivel wheel bracket is to lower the turning ratio of one's robot, without compromising speed or motor efficiency.

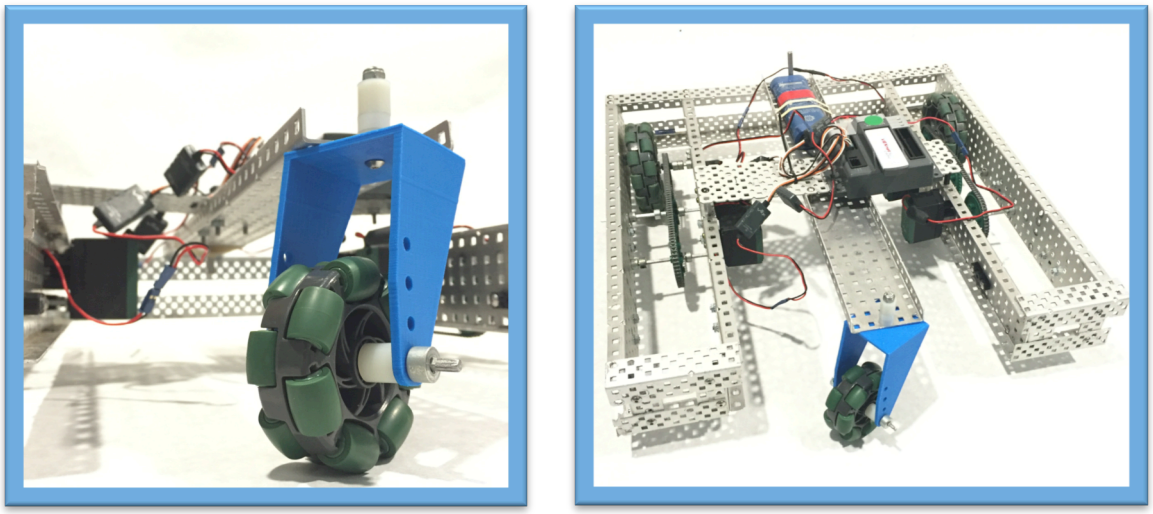


Figure 3: Attached Swivel Wheel Bracket Module [prototype two]

This product would work especially well in this year's game, Nothing But Net, because teams need to have motor efficiency and maneuverability. The swivel wheel bracket would help motor efficiency because it reduces the amount of motors necessary for a functioning drivetrain; without a swivel wheel, teams are forced to use either a motor on each wheel or use all Omni-directional wheels, which allows them to be pushed. Having a swivel wheel also helps with maneuverability because it allows for small adjustments to easily be made, while a normal drivetrain undergoes misalignment when turning. Using the product frees two motors, which can be stacked on the remaining two wheels, thus using the swivel wheel bracket does not decrease robot speed.

## 3 *Explanation of Creation*

Team 4442X uses Autodesk Inventor for competition team purposes for prototyping as well as during the school day in robotics and design technology classes. All parts for this design have been drawn on Autodesk Inventor Professional 2015 [Student Edition]. The swivel wheel bracket is made up of two components: the pivot plate *(Figure 4)* and the wheel bracket sidepiece *(Figure 5)*.

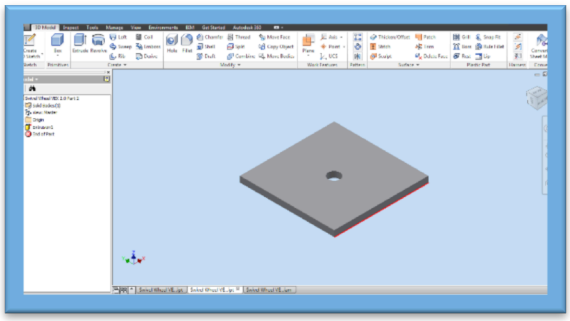


Figure 4: Pivot Plate

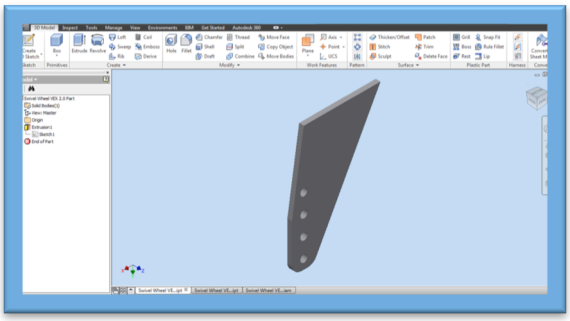


Figure 5: Wheel Bracket Sidepiece

These components were created separately in the CAD system, and were dimensionally compared to ensure each part was in proportion to the others. After printing two wheel bracket sidepieces and one pivot plate, the components where then attached together; however, it is possible to 3D print the entire module. A mock-up of the resulting module was created on Autodesk Inventor Professional *(Figure 6)*.

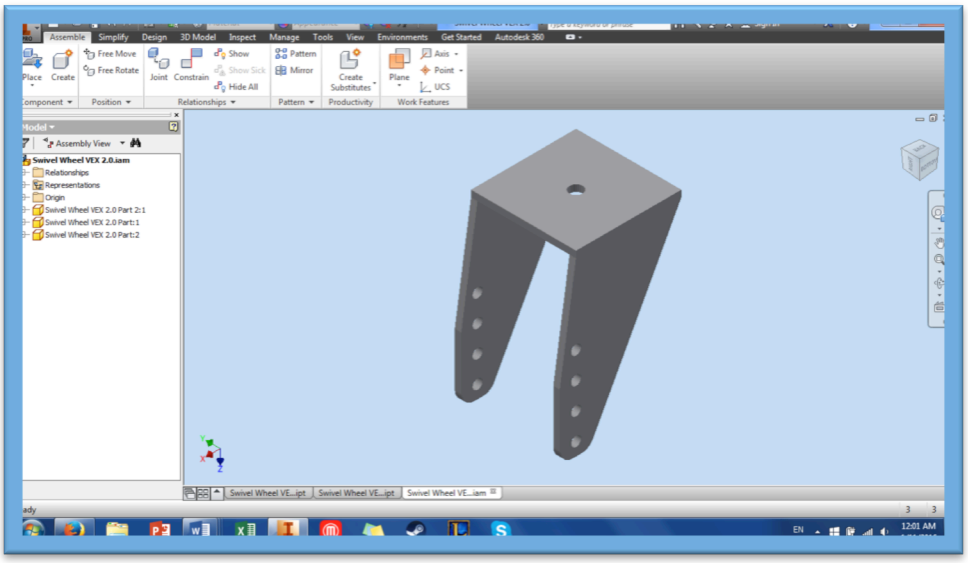
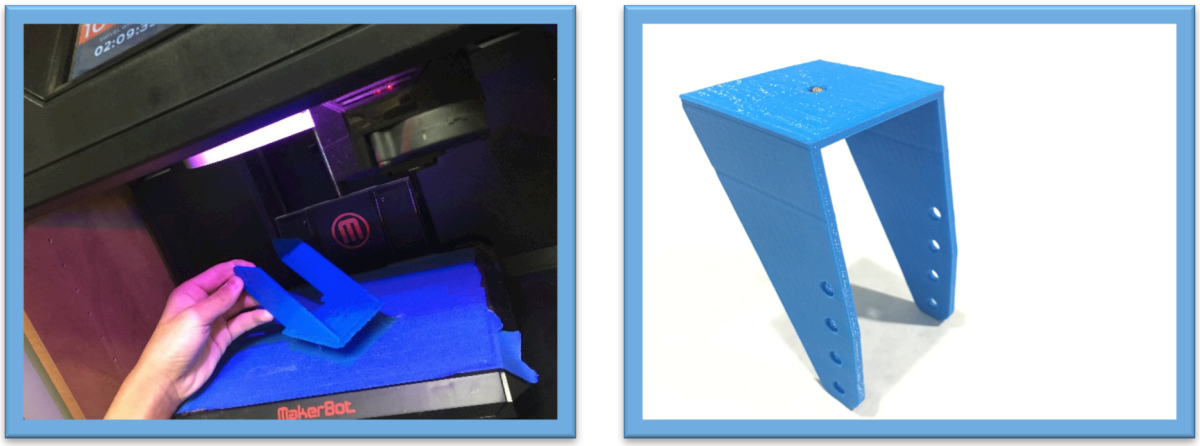


Figure 6: Swivel Wheel Bracket Module Assembled On Autodesk [prototype two]

## 4 *Conclusion*

Team 4442X has learned more about the function of Autodesk Inventor Professional and the process of creating an original product. As a team we have learned more about how to use Autodesk efficiently, and plan to definitely utilize the software in the designing process for our after-school robotics program and school classes. With Autodesk Inventor Professional, our team has been able to create our own product for the VEX Robotics Competition: the swivel wheel bracket.




Additional Photographs