The Standoff Slide Truck
Created by *THE RESISTANCE*

Introduction
The standoff slide truck is a simple, compact, and lightweight method to create linear mechanisms. Especially for passive linear mechanisms where linear slide rails are commonly used, the low profile standoff slide truck provides a significantly lighter alternative for linear motion.

How the Part Would be Used
A standoff sits in the hexagonal channel and moves back and forth along the truck. Two holes on the bottom of the part allow it to be attached on a structure of the robot. Multiple trucks can be used to incorporate longer mechanisms and provide more stability. Applications of the standoff slide truck include anti-tilt mechanisms (see image 4) and angled sliding mechanisms (see image 10).

How Inventor was Used
Autodesk Inventor Professional 2017 was used to design and render the standoff slide truck. The sketch, extrude, hole, and chamfer tools were used to create the new component. Then, the assembly environment was used to make sure the truck matched up with the VEX hole pattern and the VEX standoffs fit inside the truck. Lastly, Inventor Studio was used to render images of the standoff slide truck.

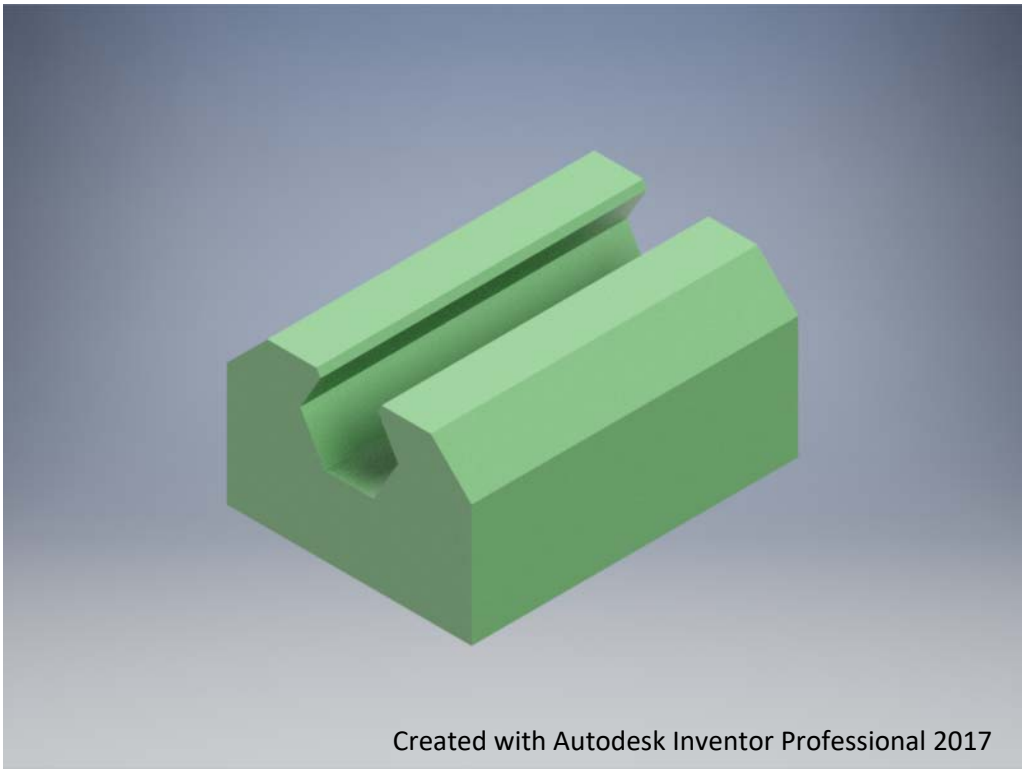
Design Process
This component was inspired by the challenges presented in the VEX Robotics Competition. In addition to rotational mechanisms, linear mechanisms are important ways to transfer energy and deploy extensions. The linear motion kit includes slide rails and acetal slide trucks to achieve this functionality, but the weight of the rails is a major drawback. Each 12” slide rail weighs 0.21 lb. We brainstormed new ways of creating linear motion, eventually arriving at the idea of using standoffs. Standoffs are easy to connect to each other, have a slimmer profile, and are lighter than slide rails. In contrast to a 12” slide rail, a 12” standoff made of six 2” standoffs weighs approximately 0.75 oz or 0.047 lb.

This part was designed to be compatible with the VEX Robotics Design System. The standoff slide truck has dimensions 0.750” wide, 0.500” tall, and 1.000” long,

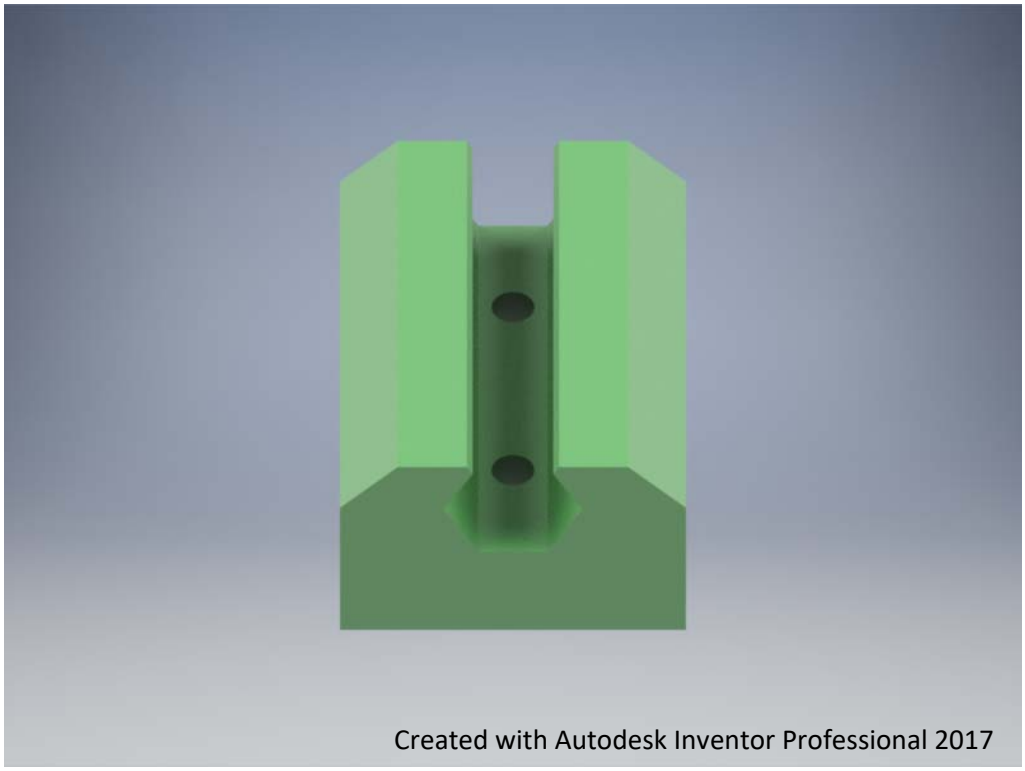
with two holes on the bottom. The two holes are spaced to align with VEX hole pattern, facilitating attachment to VEX structure including C-channels, L-channels, rails, plates, etc. The low profile allows the standoff slide truck to fit inside of a C-channel and in tight spaces. The component was modeled in Autodesk Inventor and then 3D printed to illustrate its operation (see image 9).

Conclusion

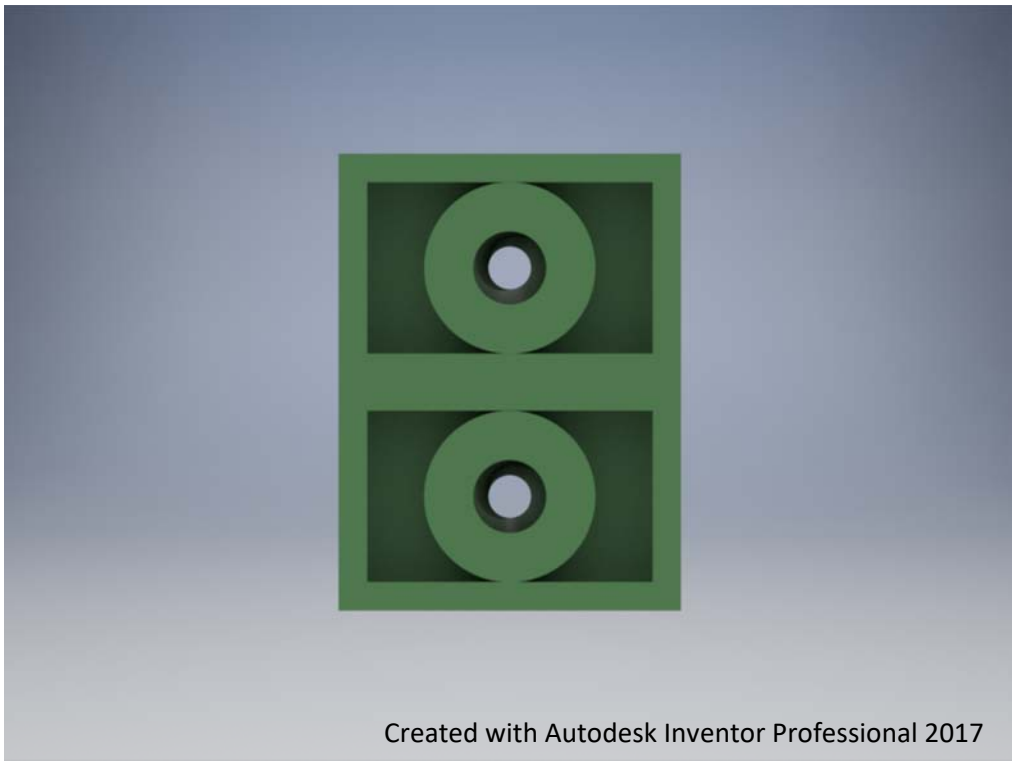
I will continue to use Autodesk Inventor to model robots and other projects. There are many advantages to modeling ideas in Inventor before building the real structure. By modeling the robot, we can test the feasibility of an idea. For instance, this year, we wanted a two-bar lift mechanism on our robot. After building the lift, we found that the positioning of the lift made the robot longer than 18”, putting it out of size. If we had modeled our robot, this error could have been avoided. We can catch simple errors in the CAD model before beginning the building process. I know that many companies rely on modeling software such as Autodesk Inventor to design their components, just as I have with the standoff slide truck. Experience with modeling software will help me in my future career as an engineer.



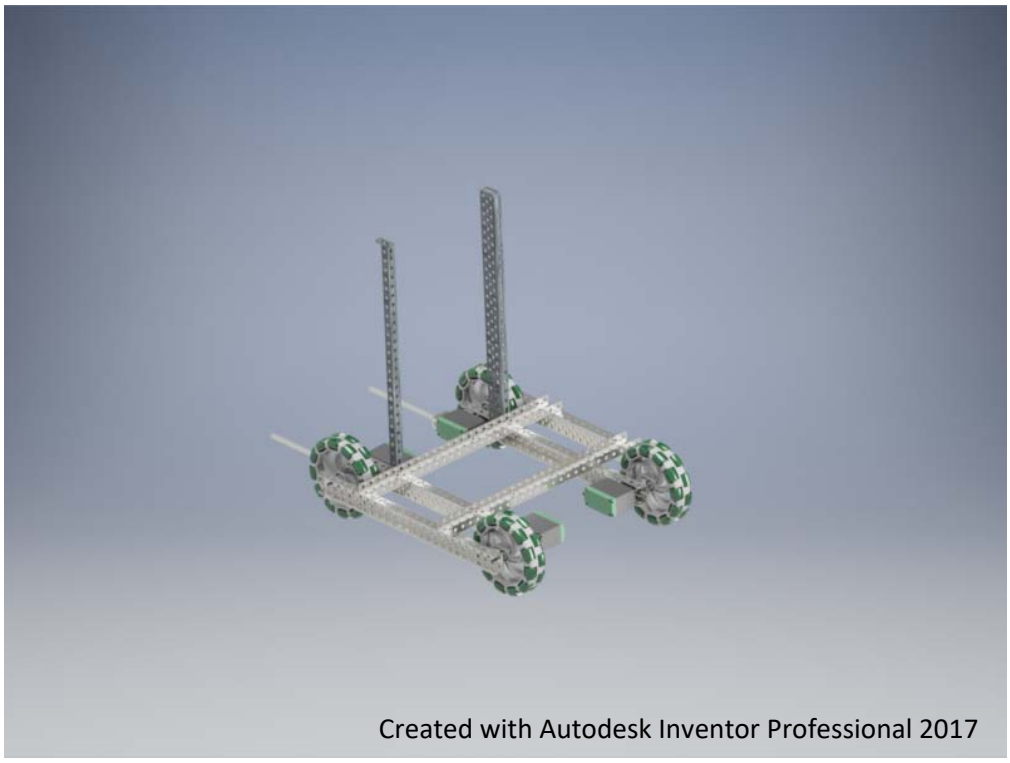
1. Isometric view of the standoff slide truck



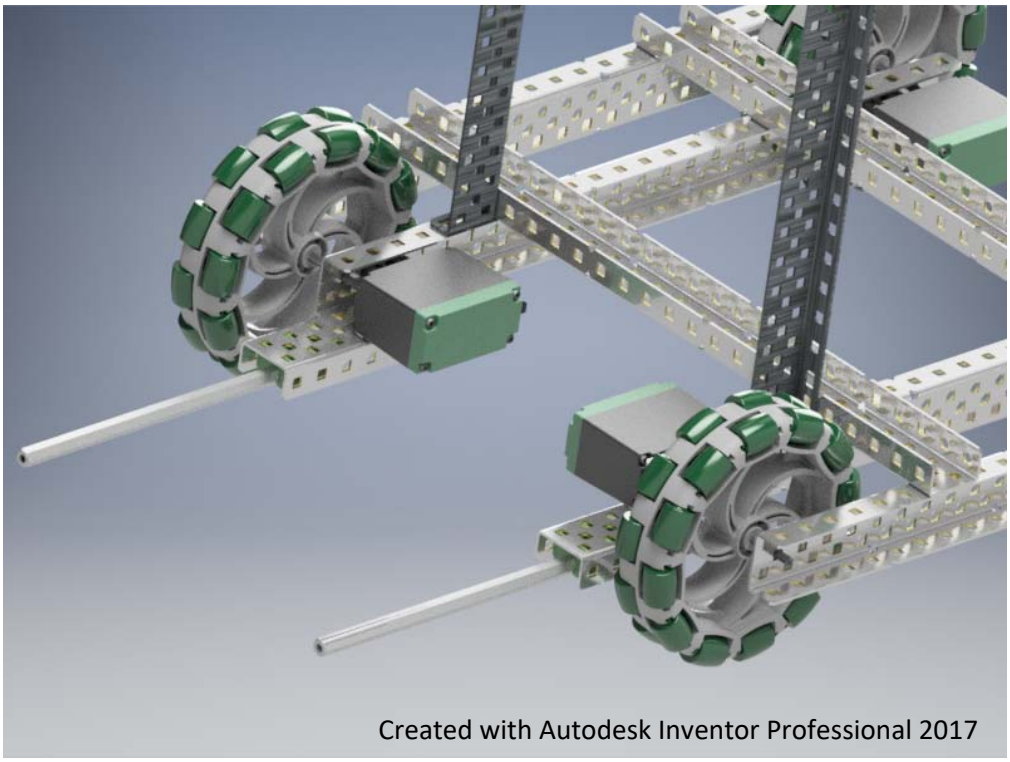
2. Front-top view of the standoff slide truck



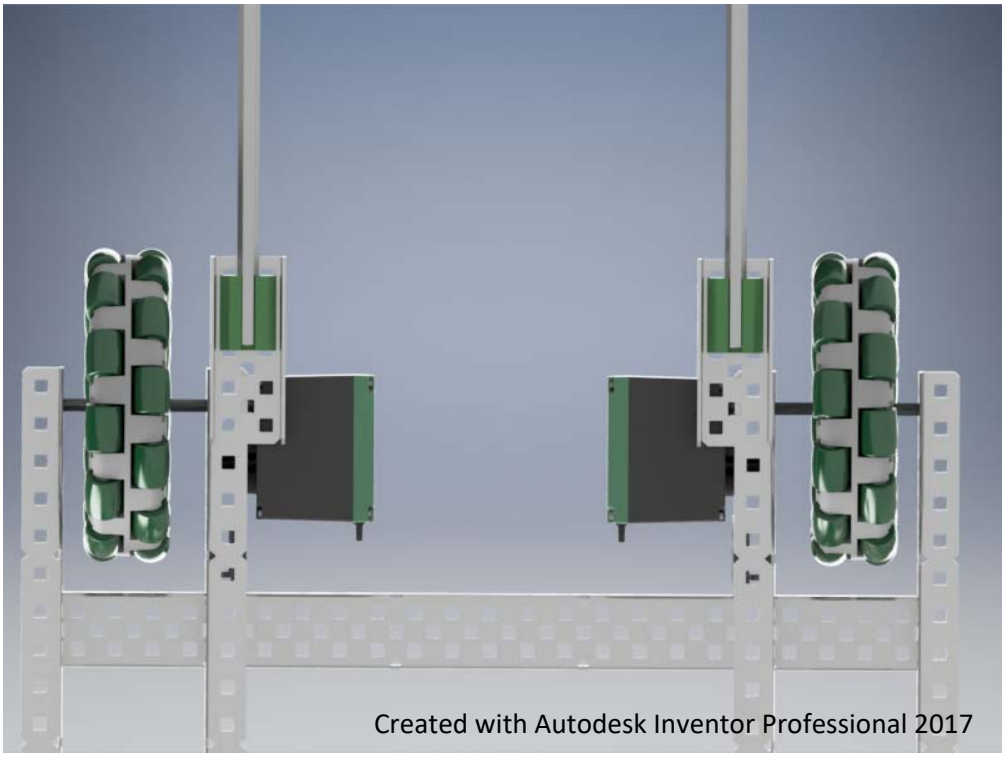
3. Bottom view of the standoff slide truck



4. Anti-tip mechanism incorporating the standoff slide truck



5. Close-up of the anti-tip mechanism



6. Bottom view of the anti-tip mechanism

7. Isometric view of the 3D printed standoff slide truck

8. Front-top view of the 3D printed standoff slide truck

9. Bottom view of the 3D printed standoff slide truck

10. An angled sliding mechanism using the standoff slide truck