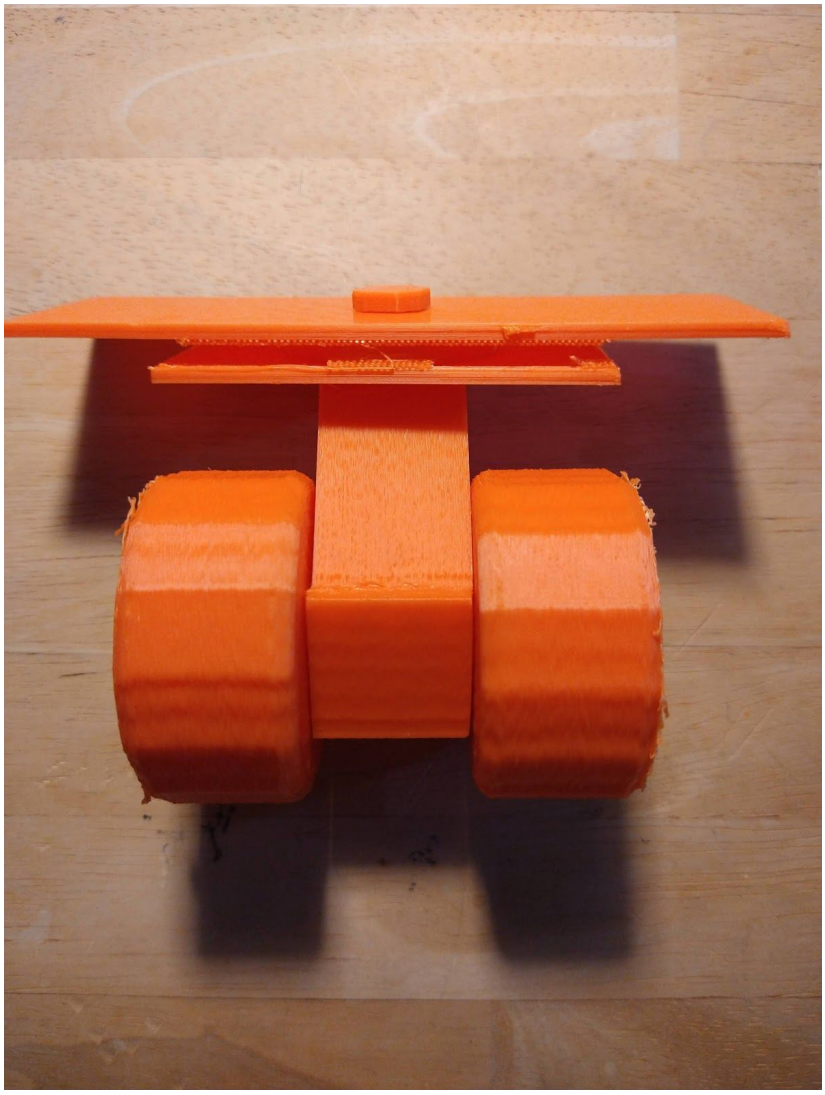
VEX Caster Wheel

This is Team 6607A's Entry for the 2020 Make It Real Competition



By Sweet Home High School Students:
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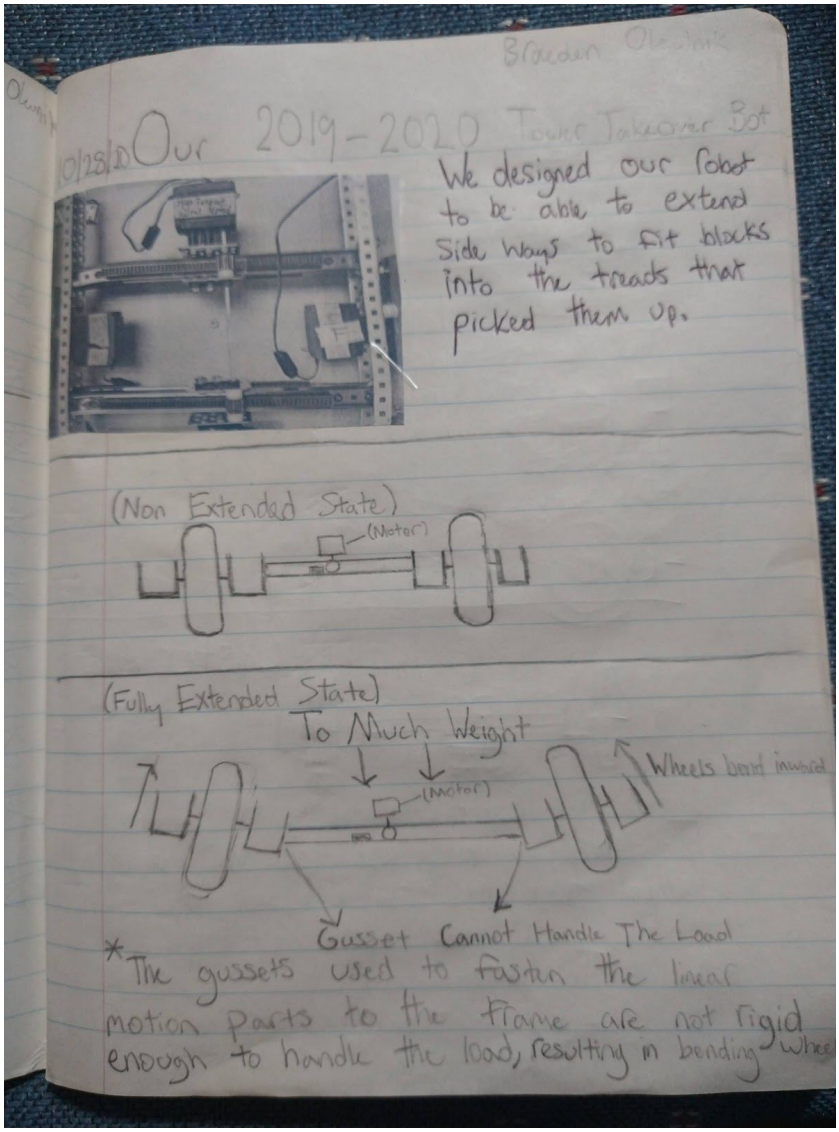
During the 2019-2020 VEX robotics competition “Tower Takeover”, we had designed our robot to pick up cubes, by using two arms equipped with a system of gears which revolved a tread. When a cube was put in between the two arms, it would be pulled by the tread into a chute with other accumulated cubes.

The first problem we came across was that the arms were too tight to fit a cube, and when we adjusted them, they were too loose to actually pull the cube into the chute. We solved the issue by using a linear motion set. This set of pieces allowed our robot to extend itself and when a cube was fit in between the arms, it could once again close and have enough traction to pull the cubes into the chute. (See Figure #1)

Figure #1



This attempt at saving our robot was riddled with flaws, many of which we were not able to fix before our competition. One of the most glaring issues was that the gussets used to attach the linear motion pieces to the frame; when fully extended, could not handle the pressure exerted from the weight of the robot itself. This resulted in the wheels and their framework bending inwards. Because the frame had no rigidity when fully extended, the various mechanisms of our robot did not run smoothly.

To solve this difficulty we brainstormed several ideas but settled on designing a caster wheel. (See figures #2-3). This wheel was designed to help take load of weight off of the gussets. It attaches to the bottom of the robot in the middle and underneath the sliding c-channels, and it is able to rotate 360 degrees due to its swivel bearing. When the robot changes its direction of movement, the wheel is able to rotate itself and spin in the direction along with the rest of the wheels. (See figure #4). Although this wheel was designed to solve one problem, it can be utilized in a multitude of ways. It will bring an increase in diversity to VEX's parts and create another option for increasing a robot's mobility.

Figure #2

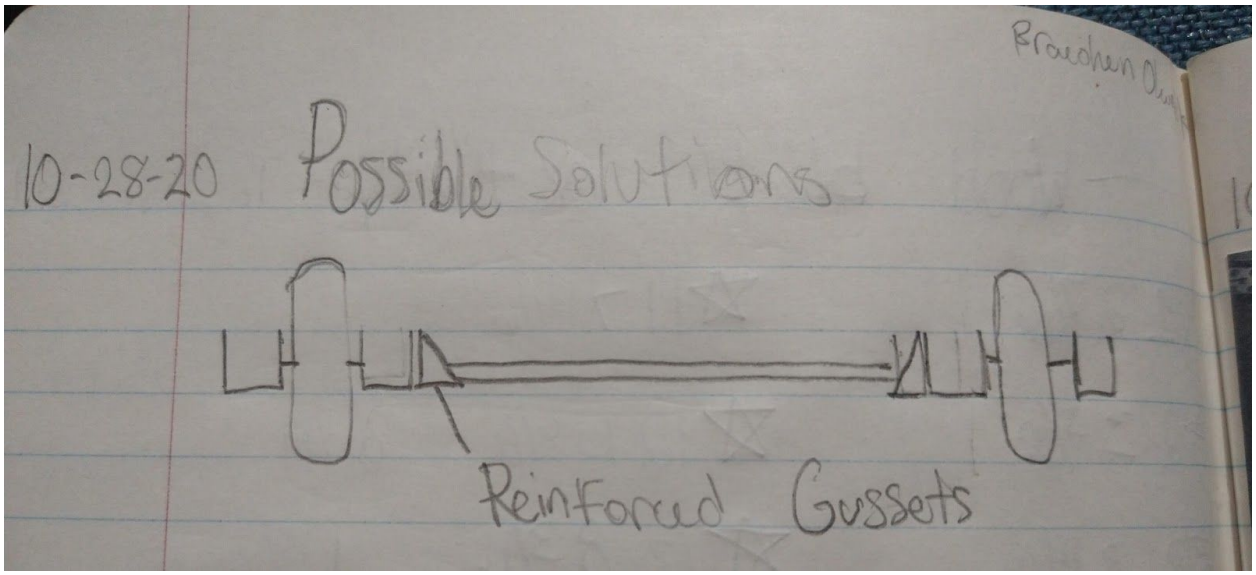


Figure #3

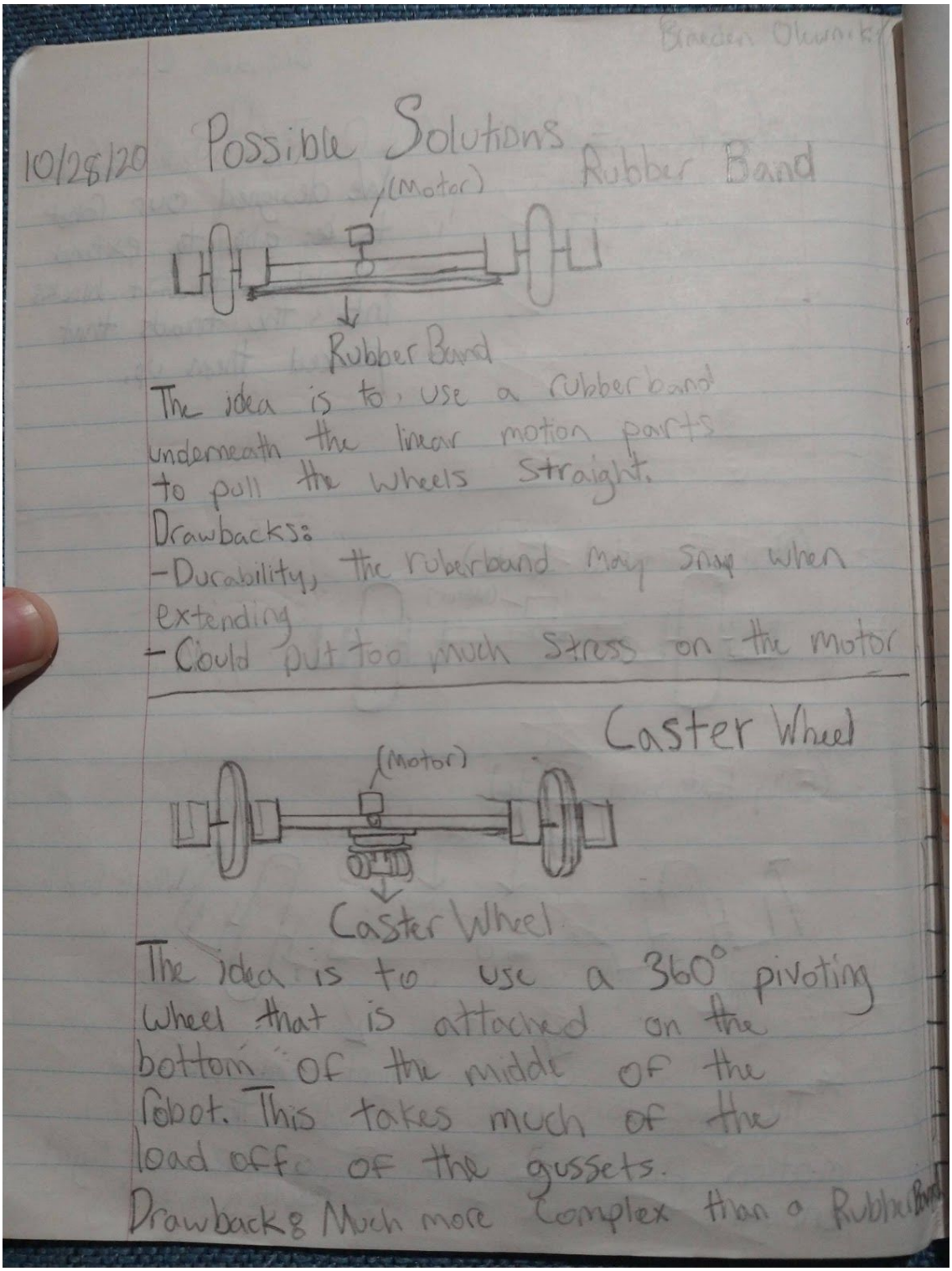
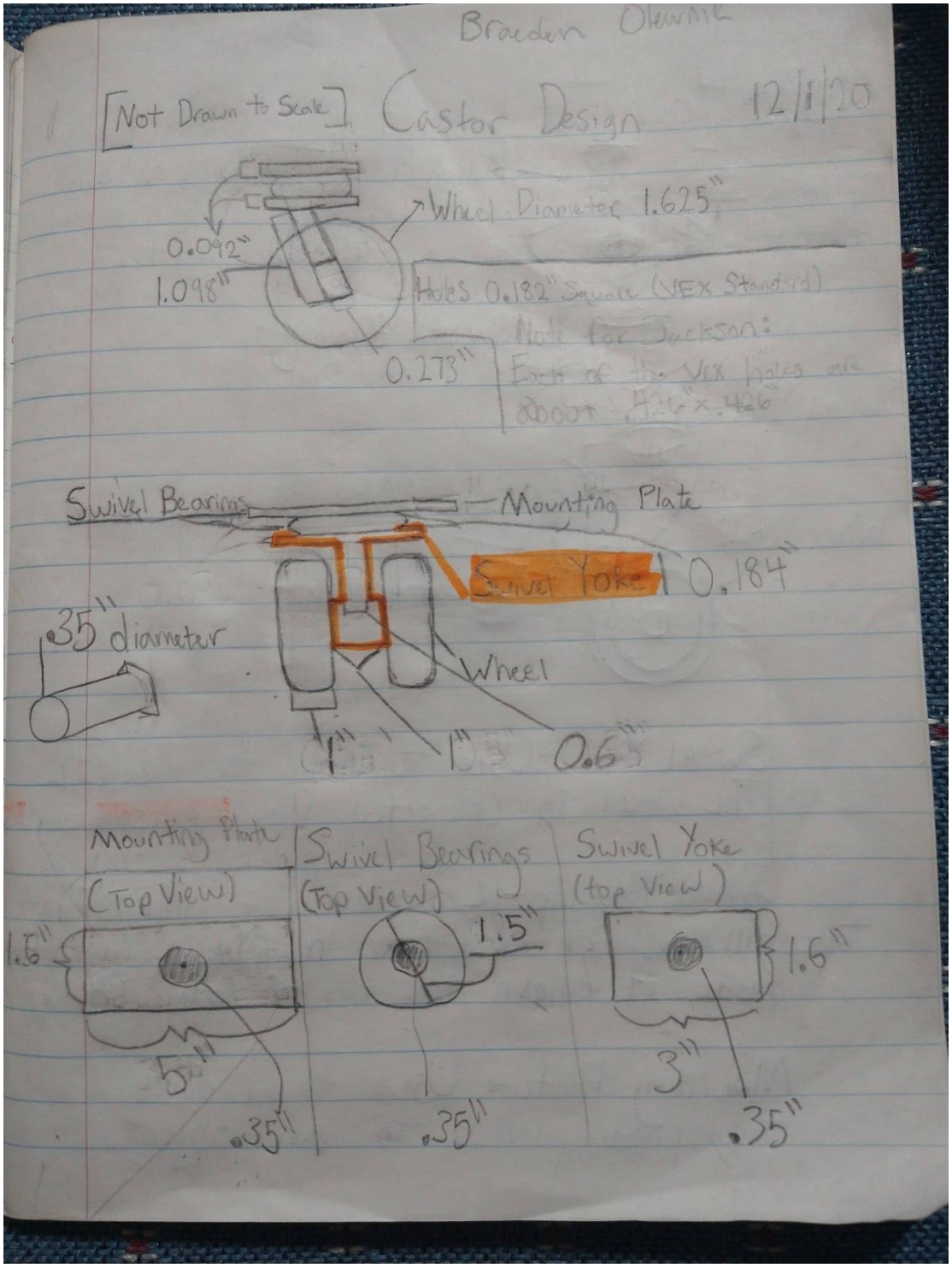
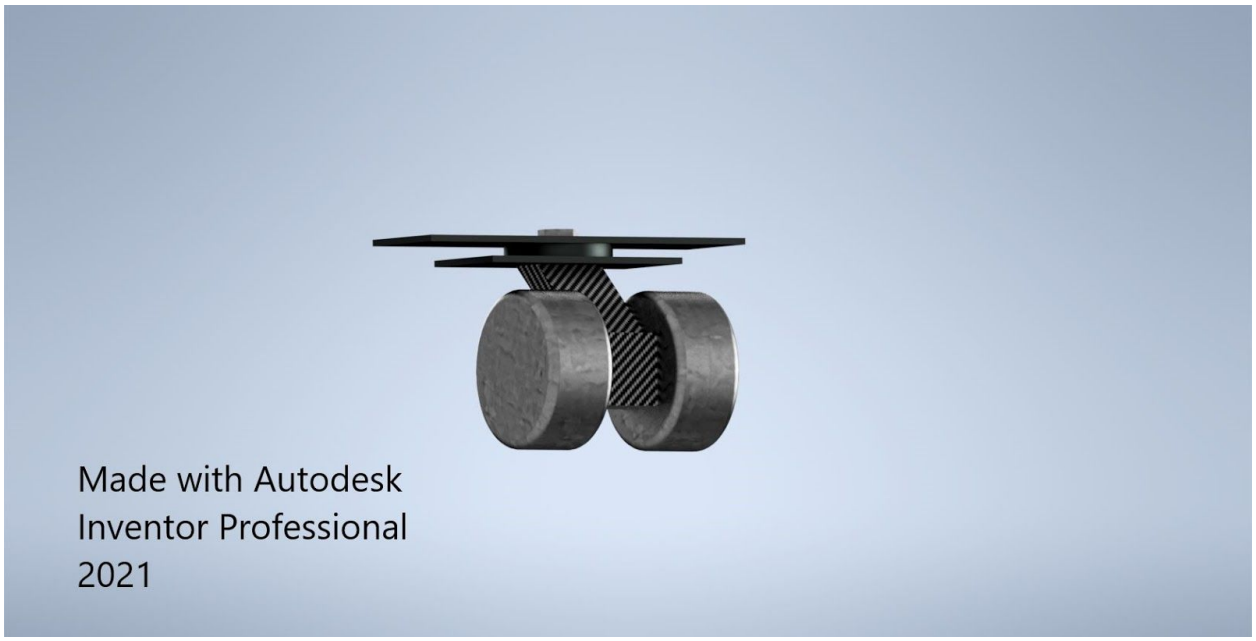

Braeden Olcznik
10/28/20
Possible Solutions
Rubber Band
(Motor)
Rubber Band
The idea is to use a rubber band underneath the linear motion parts to pull the wheels straight.
Drawbacks:
-Durability, the ruberband may snap when extending
-Could put too much stress on the motor
Caster Wheel
(Motor)
Caster Wheel
The idea is to use a 360° pivoting wheel that is attached on the bottom of the middle of the robot. This takes much of the load off of the gussets.
Drawbacks Much more complex than a Rubber

Figure #4


Braeden Olewnik
[Not Drawn to Scale] Castor Design 12/1/20
Wheel Diameter 1.625"
0.092"
1.098"
Holes 0.182" Square (VEX Standard)
Note for Jackson:
Each of the VEX holes are
about .426" x .426"
0.273"
Swivel Bearings
Mounting Plate
Swivel Yoke
0.184"
.35" diameter
Wheel
1"
1"
0.6"
Mounting Plate
(Top View)
Swivel Bearings
(Top View)
Swivel Yoke
(top View)
1.6"
1.5"
1.6"
5"
3"
.35"
.35"
.35"

We used Autodesk Inventor Professional 2021 to create a more accurate model of our designed caster wheel. After this competition me and my team will continue to test and edit our design using Inventor. (See Figure #5)

Figure #5



This competition has taught us the power and usefulness of 3D modeling. Participating in this project has also taught us the importance of communication, especially during times like these. In the future me and my team will use CAD modeling in order to design our VEX robots before we start building them.