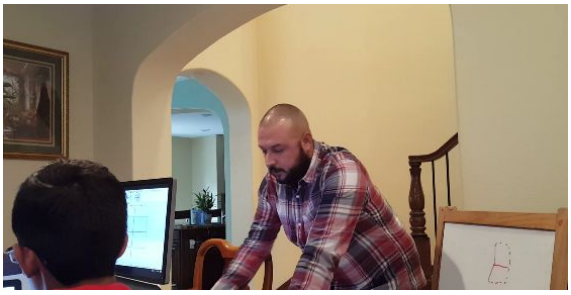
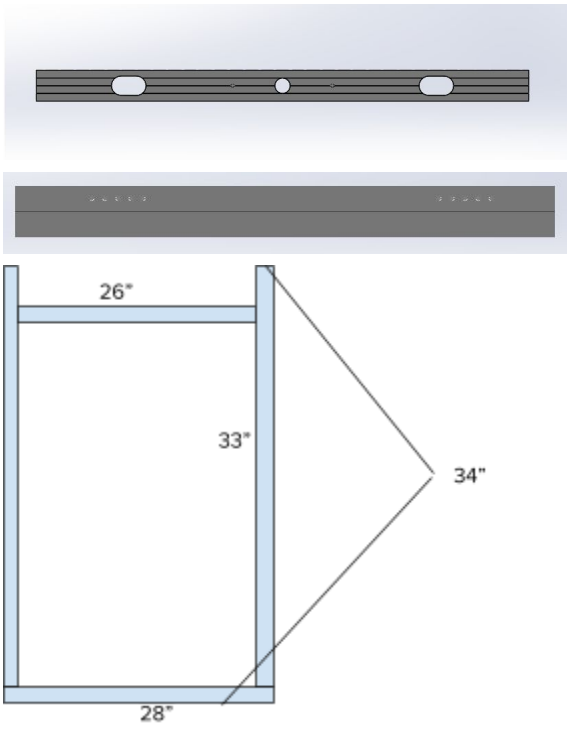
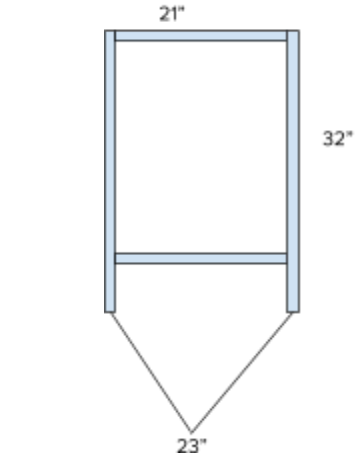
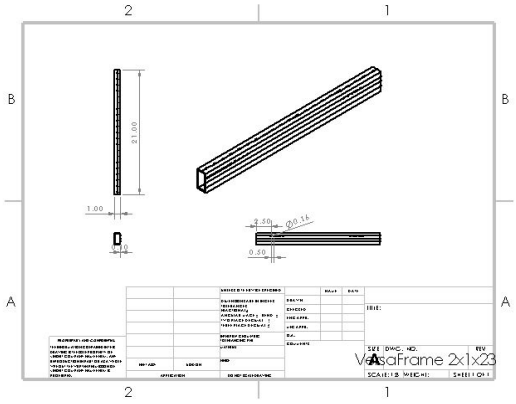
# ***CAD Engineering Notebook***

This year, we used Solidworks Student 2016.

| ***Picture*** | ***Explanation*** |
| --- | --- |
|  | ***November 26th, 2016***<br><br>**Work Done:**<br><br>We had  learning session with a mentor in the CAD field, Raul Cruz. He taught us how to use Solidworks and gave us some practice parts to make. |

| ***Picture*** | ***Explanation*** |
| --- | --- |
|  | ***January 8-12th, 2017***<br><br>**Work Done:**<br>We designed the bars for the chassis. The bars on the side have slots for the wheel hubs, with one hole in the center for the gearbox.<br><br>The design will be 33” by 28”, with a smaller 26” bar in the front 3” inside the chassis so that the gear mission has some extra space. |

| ***Picture*** | ***Explanation*** |
|---|---|
|  <br>  | ***January 13-18th, 2017***<br><br>**Work Done:**<br><br>We realized that the chassis size we had designed did not include an extra 4” on the sides for the wheels, so we had to change the size of the bars to 21” by 32”, with the gear bar and the back bar the same length.<br><br>The new chassis looks like picture 1. There is still space in the front for the gear, but the main change is that the bar in the back is the same length as the bar in the front.<br><br>On the longer, 32” bar, we still had the holes for the gearbox and for the versa wheel hubs. However, we changed the spacing. There is 6” between the end of the bar and the center of the first versa hub.<br><br>On the short bar, there are holes so that we can attach the gear mission to the bar. Other than that, there are no new holes. |

| ***Picture*** | ***Explanation*** |
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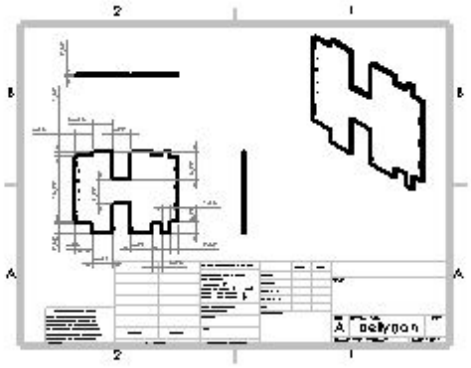
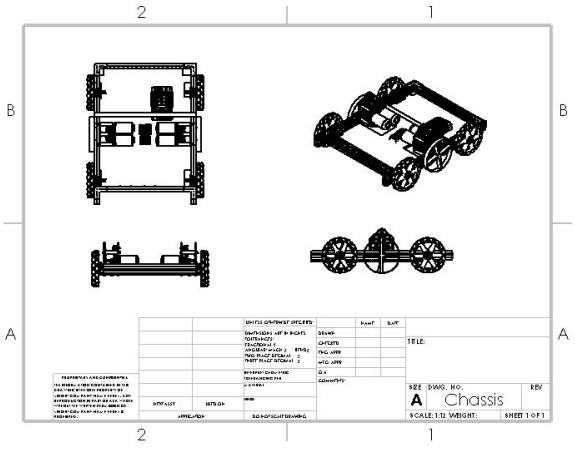
|  | ***January 19th, 2017***<br><br>**Work Done:**<br>We designed the electronics plate. In the past few years, we have put electronics on the side. However, this year, we decided to put them on the bottom because we didn't want the electronics to be too exposed in this year's ball shooting game. |

| ***Picture*** | ***Explanation*** |
| --- | --- |
|  | ***January 21st, 2017***<br><br>**Work Done:**<br><br>We finished the entire chassis! |

| ***Picture*** | ***Explanation*** |
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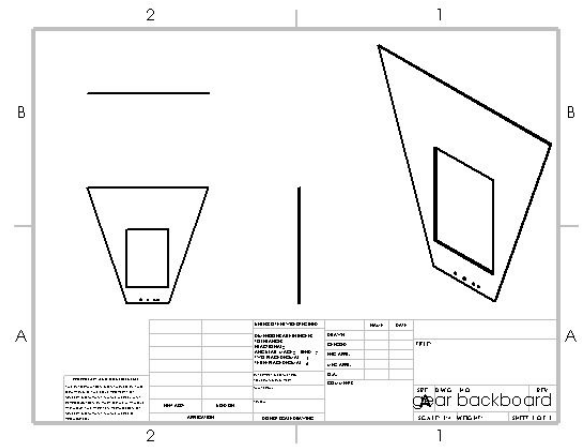
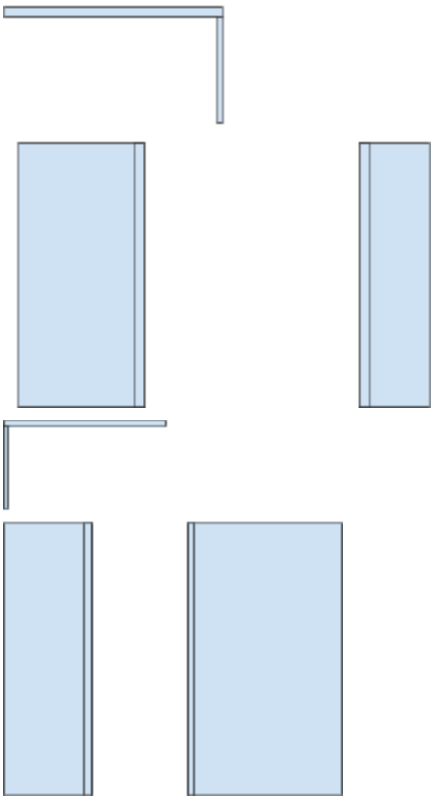
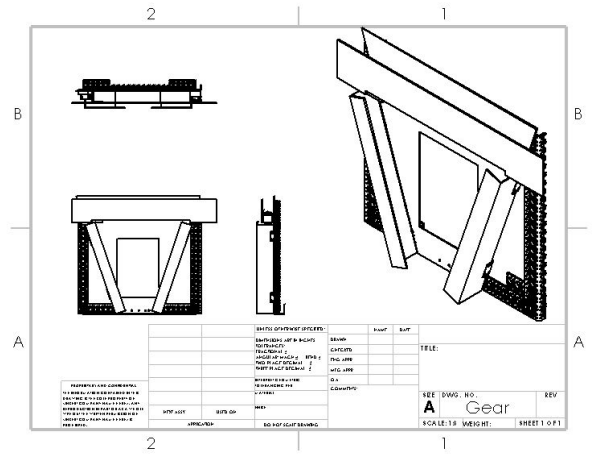
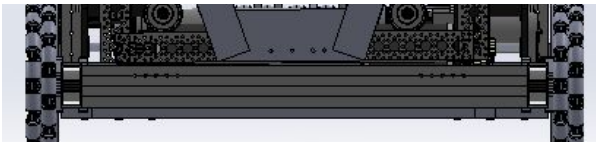
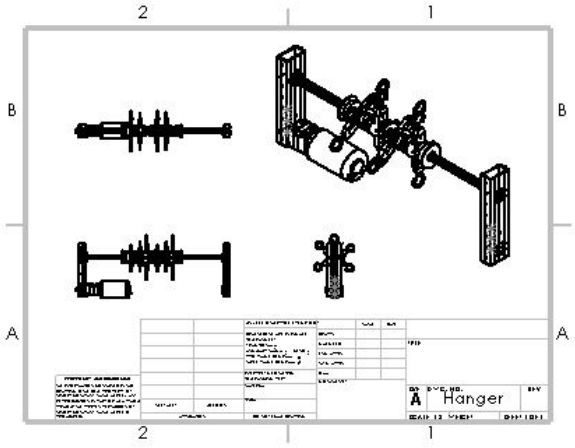
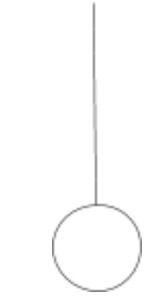
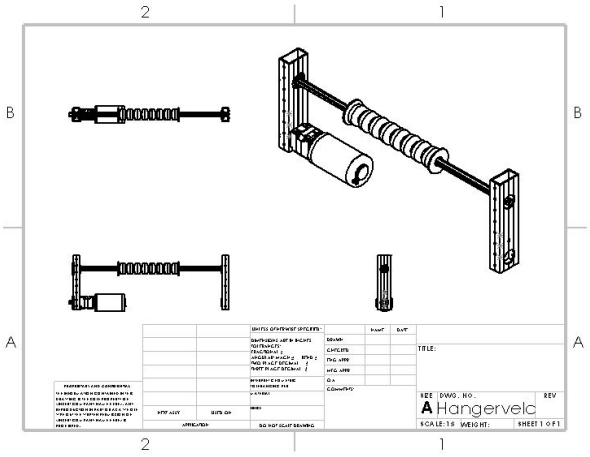
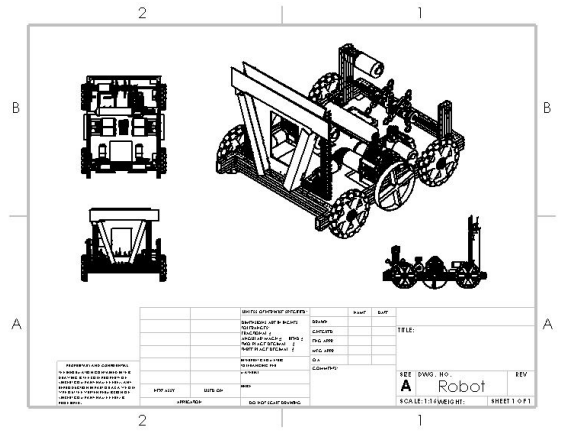
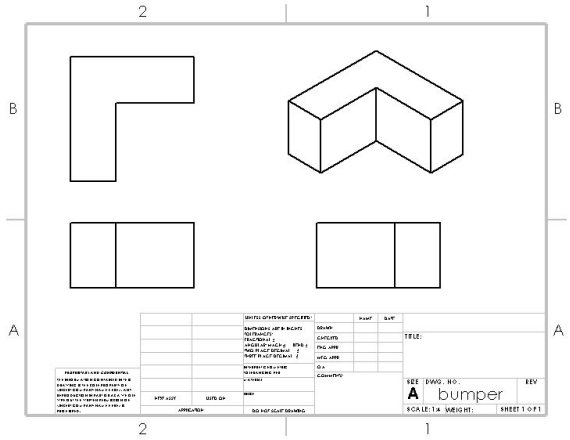
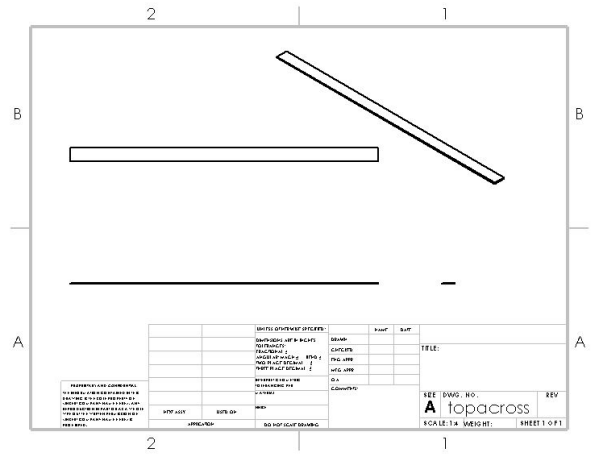
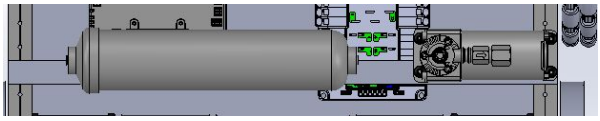
|  <br>  | ***January 22nd-27th, 2017***<br><br>**Work Done:**<br><br>We started to design the gear mission. We wanted a piece of metal that would not bend too much but had some give to give the gear in, so we decided on a thickness of 0.125”. We realized that it was best to angle the gear collector so that the gear could be contained properly. We will test it out when we are done building it.<br><br>We plan on adding flaps to the sides to hold the gear in. The will be controlled by pneumatic pistons and have a 90 degree angle so that they can stop the gear from falling out if we suddenly brake on the field. |

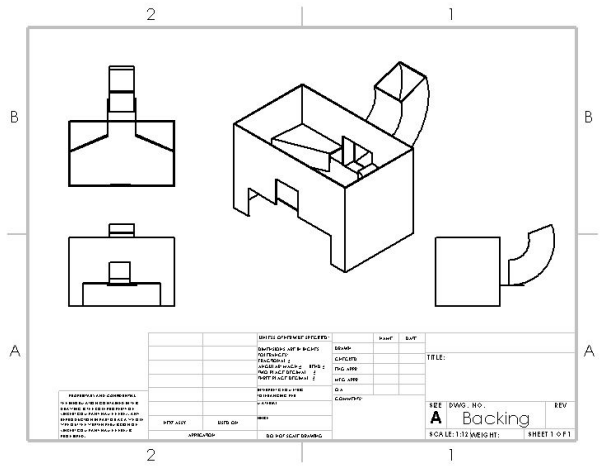
| ***Picture*** | ***Explanation*** |
| --- | --- |
|  <br>  | ***January 28th-31st, 2017***<br><br>**Work Done:**<br><br>We had to decide how to attach the gear to the chassis. Previously, we had thought that we could attach the gear mission right to the bar, but we realized that the metal was bending too much. We decided to support it in certain key areas such as the extremities. We finished the gear mission!<br><br>Because of that, we decided to rivet the support bar to the chassis from the top.<br><br>Side note: We also helped the people who were building the second robot with the chassis size and the rivets. |

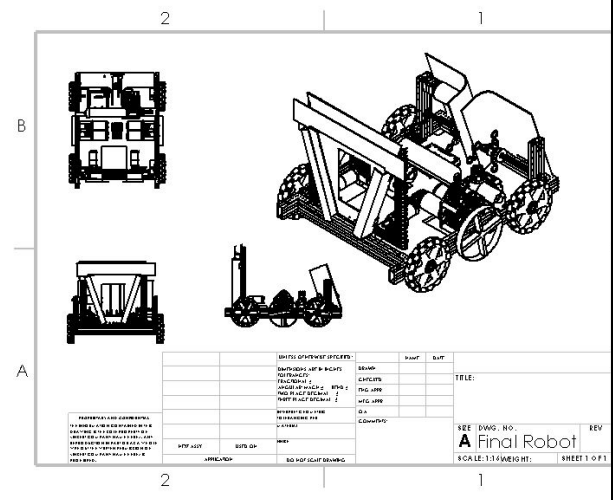
| ***Picture*** | ***Explanation*** |
| --- | --- |
|  | ***February 1st-7th, 2017***<br><br>**Work Done:**<br><br>We started designing the hanger mission. Our first plan was to use velcro on the robot, but we did not know if it was legal in the game rules. We made one version of the hanging for velcro and another with a loop in the rope for hooks to catch on to. We are done with the hanger mission! |
|  | The rope will look like this with hooks to grab onto the loop. |
|  | This is the velcro version. There are no hooks, and the flywheels will be covered in one side of velcro to attach to the other side. |

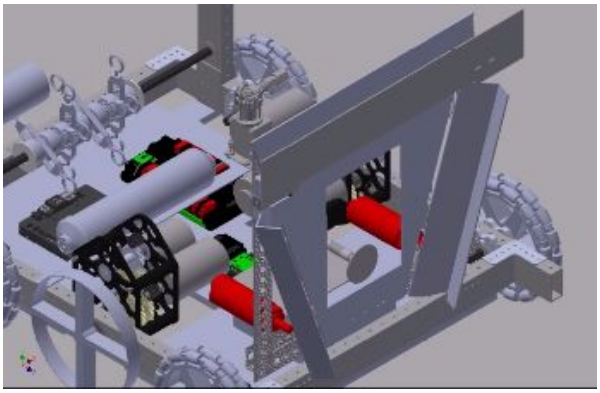
| ***Picture*** | ***Explanation*** |
|---|---|
|  | ***February 8th, 2017***<br><br>**Work Done:**<br><br>We attached all of the robot together! |

| ***Picture*** | ***Explanation*** |
|---|---|
|  | ***February 9th, 2017***<br><br>**Work Done:**<br><br>We designed the bumper for the robot.<br><br>We also placed them on the robot. We had to attach brackets around the frame so that the bumper had space between the wheels. |

| ***Picture*** | ***Explanation*** |
| --- | --- |
|  <br>  | ***Feb 10th, 2017***<br><br>**Work Done:**<br><br>We designed a hinged plexiglass piece that goes across the chassis that holds the pneumatic compressor and air tank.<br><br>Here, it holds the compressor and the air tank. These were the best choices for the hinge because they did not have good positions. |

| ***Picture*** | ***Explanation*** |
| --- | --- |
|  | ***February 17-25th, 2017***<br><br>**Work Done:**<br><br>We created an idea for a ball shooter. There would be a large box in between the hanger and the gear mission. It would shoot out from the side of the hanger so that we could shoot and drop off the gear at the same time. However, we decided against it because we didn't want to make too many major changes at the last second. Also, it was very complicated. |

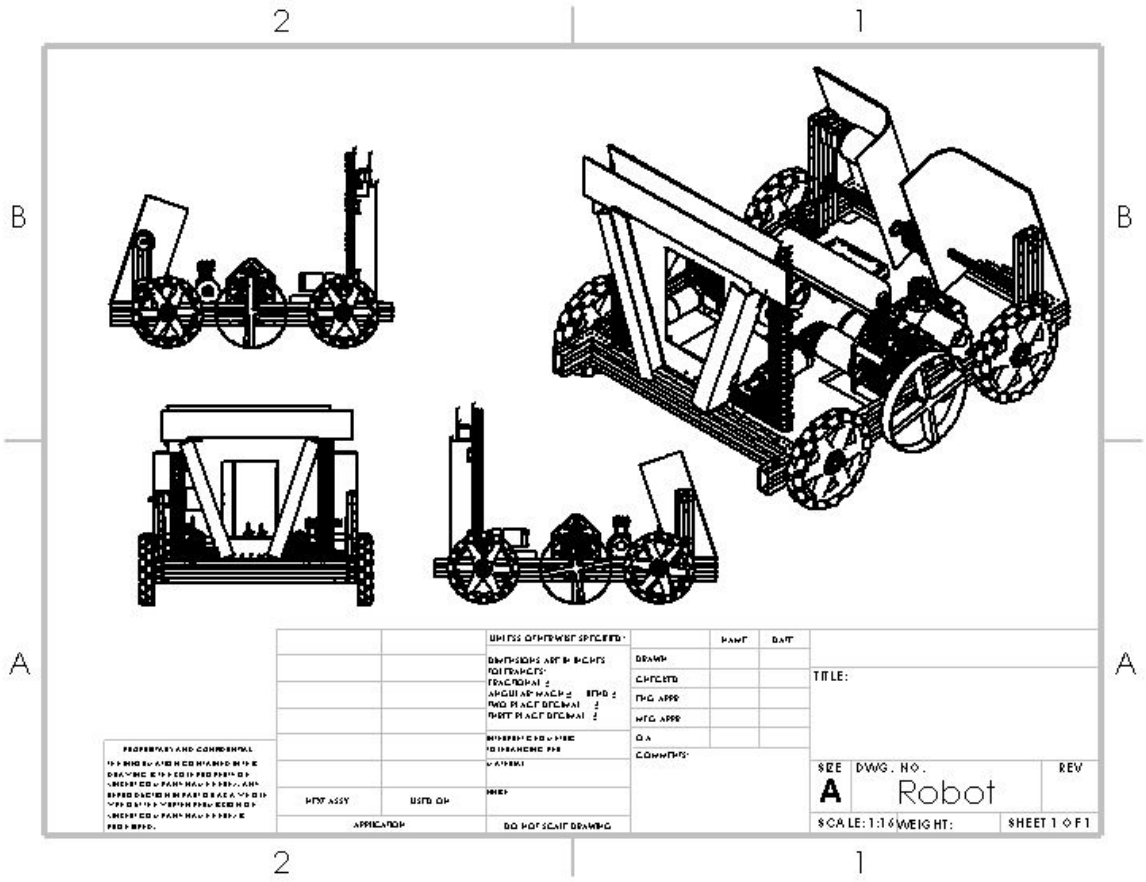
| ***Picture*** | ***Explanation*** |
| --- | --- |
|  | ***February 25th- March 11th, 2017***<br><br>**Work Done:**<br><br>We finished of all of the small changes to the robot and are ready for the first regional. |

| ***Picture*** | ***Explanation*** |
| --- | --- |
|  | ***April 5th, 2017***<br><br>**Work Done:**<br><br>We finished the CAD animation with all of the small changes and one large change, the bazooka piston in the center of the robot that pushes out the gear. |

# Drawings

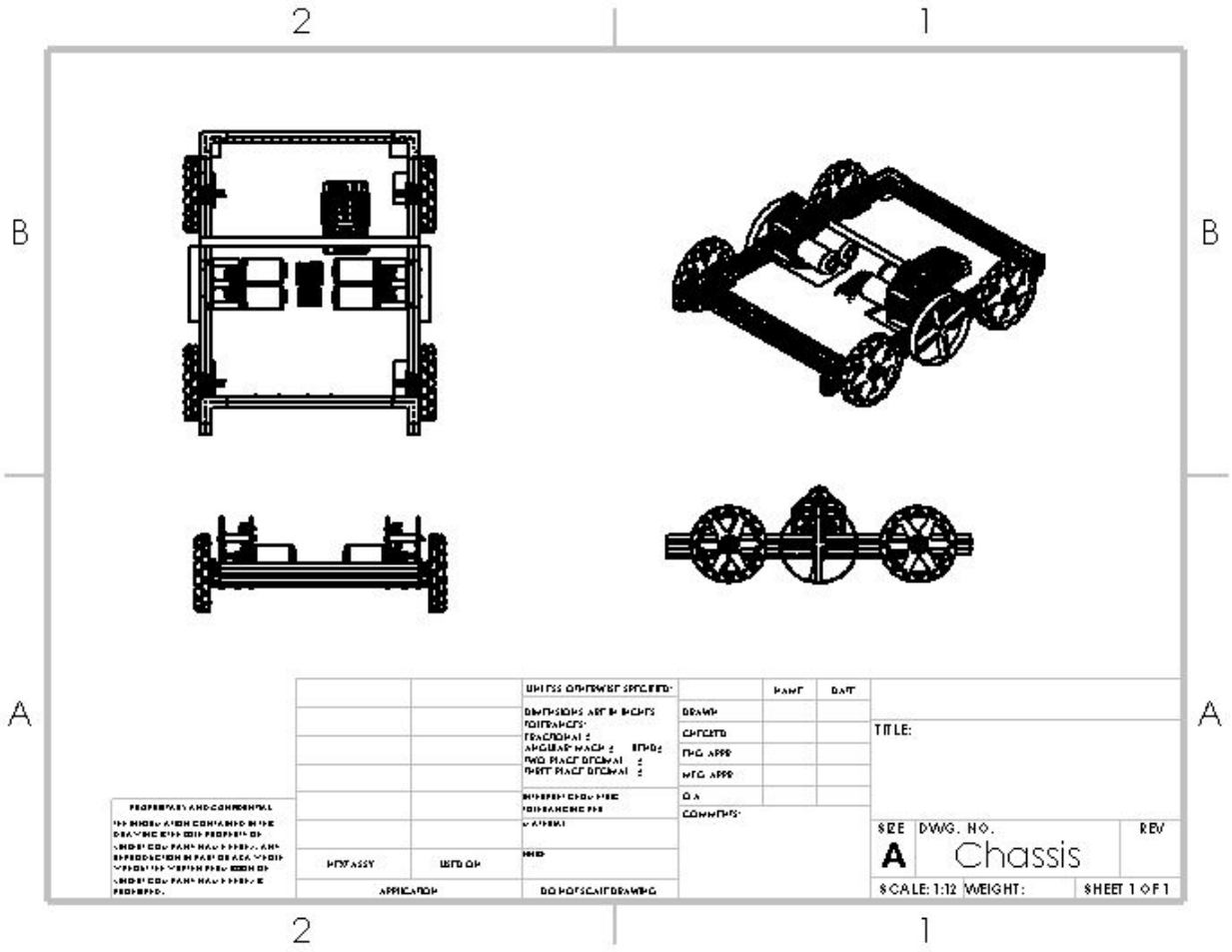
These are drawings of the parts that we have in the robot.

## Robot




This is our entire robot's CAD file. There are three main subassemblies in our robot: the chassis, the hanger, and the gear mission. The next few pages will have these drawings.

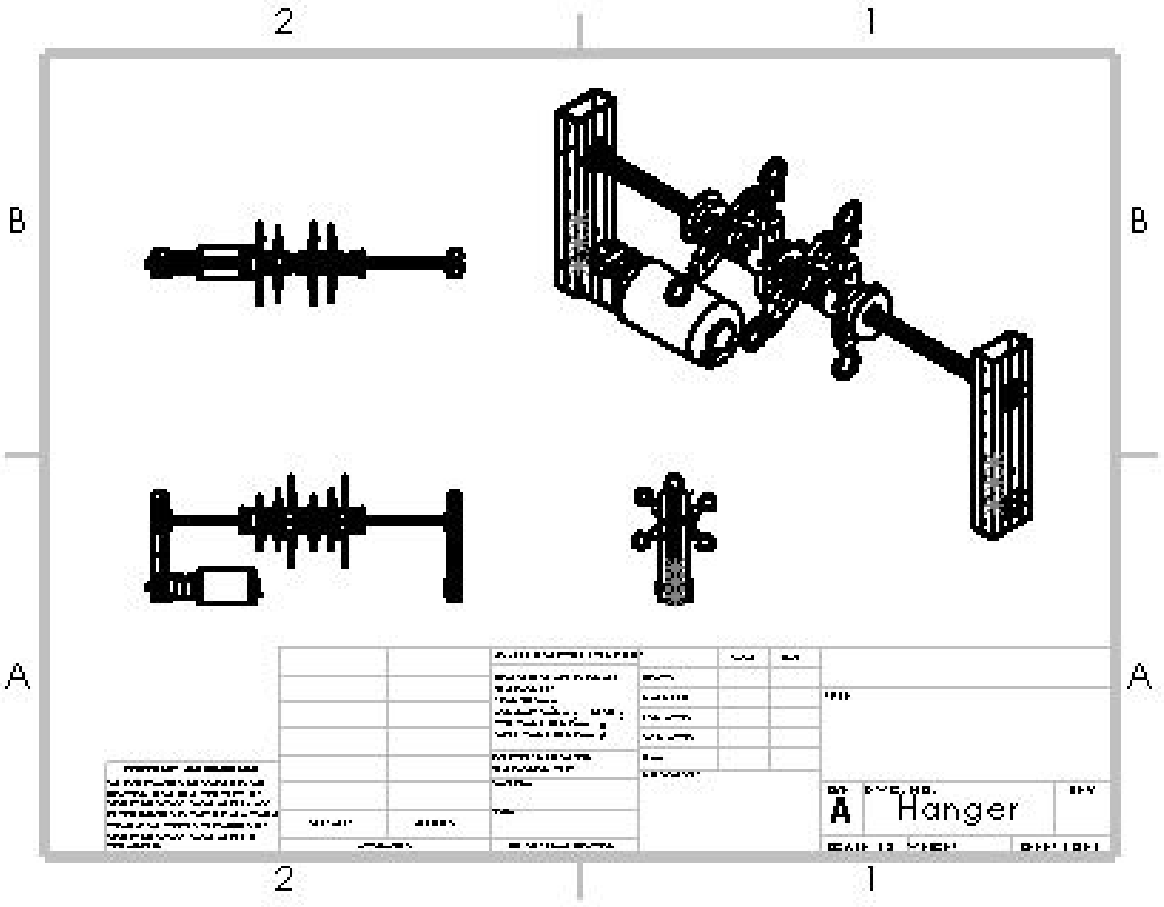
# Chassis




This is our chassis. It supports the entire robot. There are four main support bars, along with a flat plate on the bottom for the electronics. The flat plate holds up the gearbox and electronics.

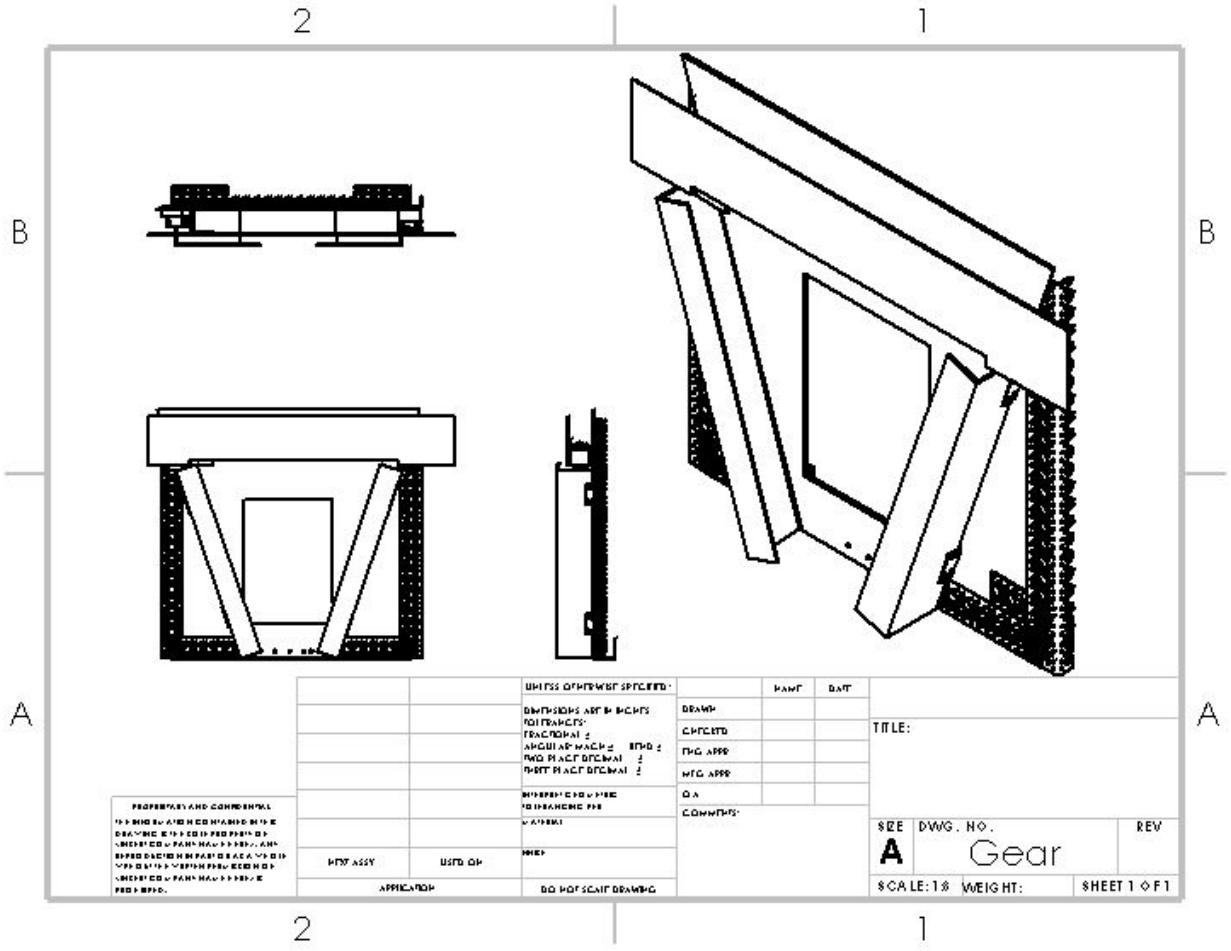
We have a six-wheel drive robot. The outer four wheels are 8” omni wheels, and the middle wheel is a plaction wheel that is slightly larger than the other wheels, which means that there is a west coast drive style drivetrain. As you can see in the innovations log part of our engineering notebook, the drivetrain style is there so that we can turn easily.

# Hanger




This is our hanger. The bars on the side attach to the back of the chassis. There are multiple hooks so that there is a higher probability of the hooks grabbing the loop. On one side, there is a cim motor connected to a versaplanetary gearbox. This powers our entire hanging mission. The sprocket chain setup that connects the cim to the actual hooks is on the outside of the bar.

# Gear

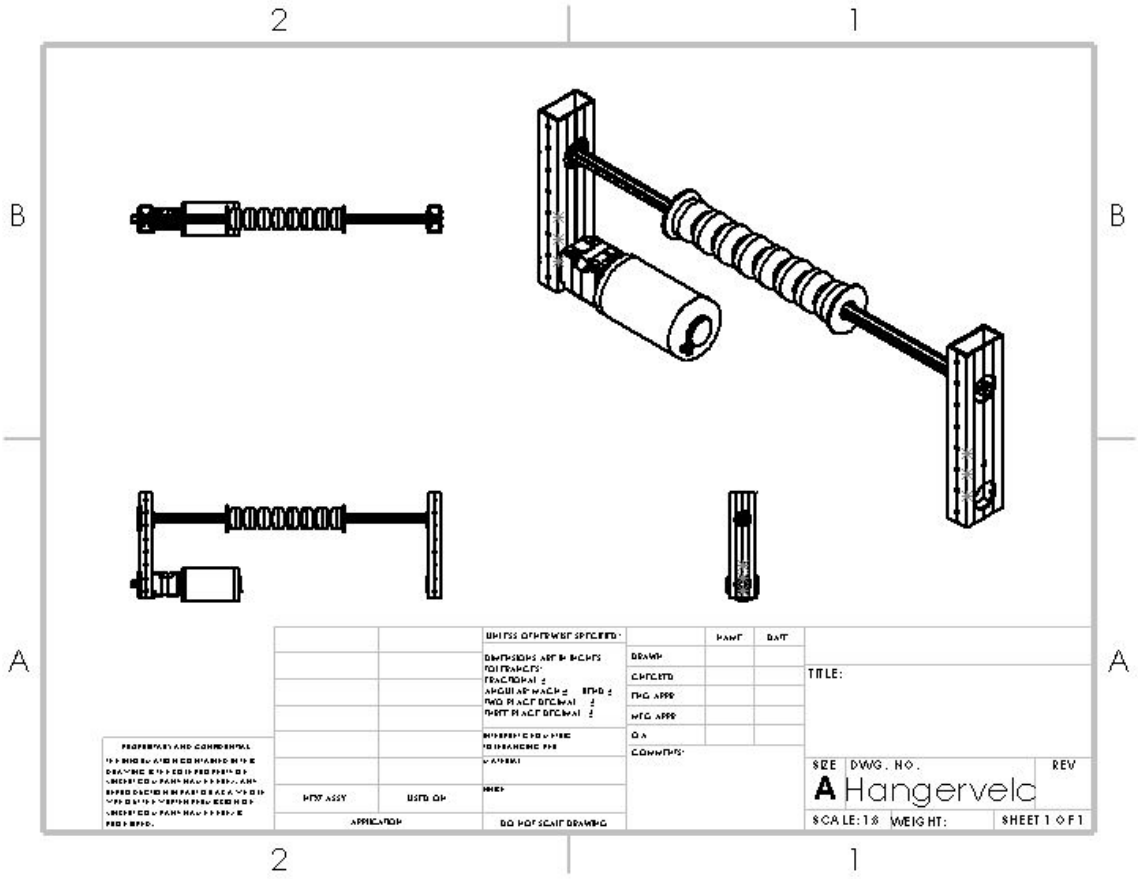



This is the main mission of our robot. There are two main flaps that keep the gear up, with pneumatic pistons to open and close the flap. There is a servo on the top that opens a flap, which guides in the gear into the assembly.

# Extra Parts

These are parts that did not make it onto our main robot.

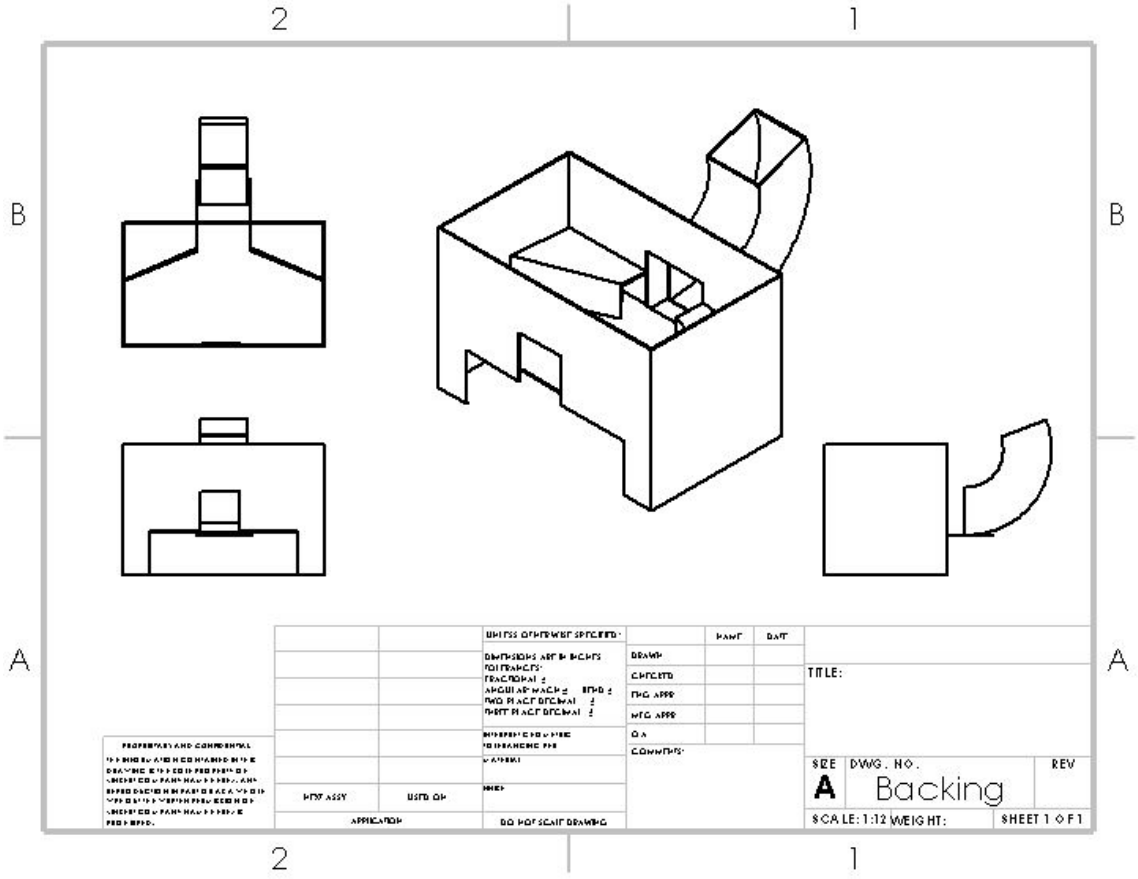
## Second Hanger Design




This is our second velcro design that incorporates velcro. The wheels are covered in velcro.

We decided not to use this design because the hooks were more efficient and faster.

# Ball Mechanism




This is the ball mechanism that we were planning on using. The main container held all of the balls, with a shooter on the end.

We decided not to use this because it would not be very efficient. Also, we did not want to make major changes to the robot at the last second.