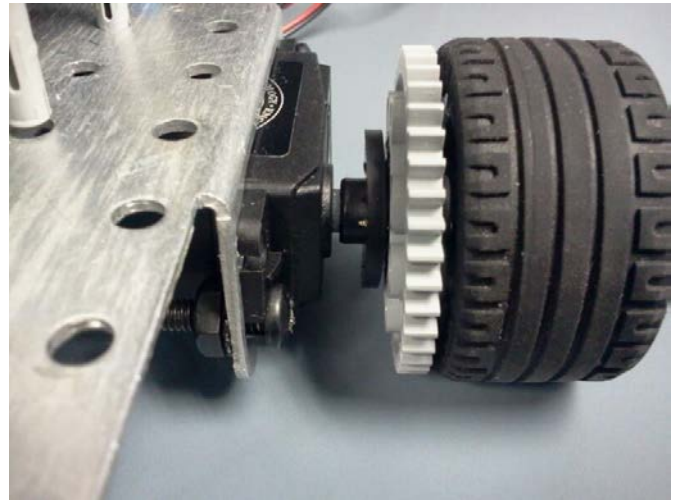# Period 2 Mechanical Design

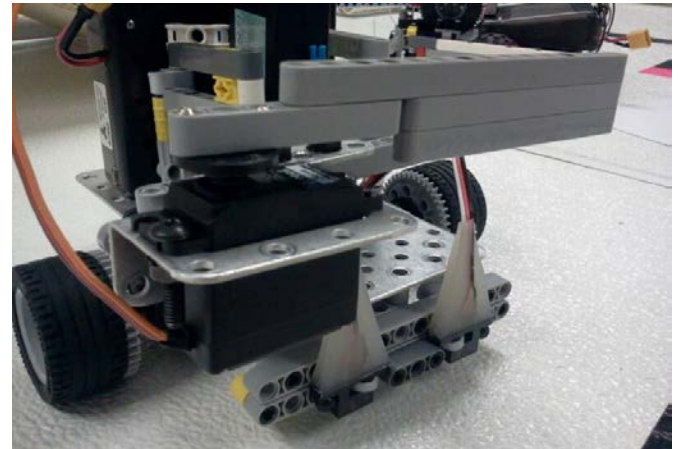## Drive train

- The drivetrain on our smaller robot is a simple motor, gear, and wheel system. It uses a gear mounted onto a motor. A wheel is attached to the gear with a small axle and bushing.
- Another possible drivetrain would have the wheel directly mounted onto the motor, without a gear and used the larger rounded tire. While our design uses more parts, it does have more traction.
- We decided to use the flatter tires because they make more contact with the ground, giving the robot more traction as it goes up the ramp to reach the crater rim.
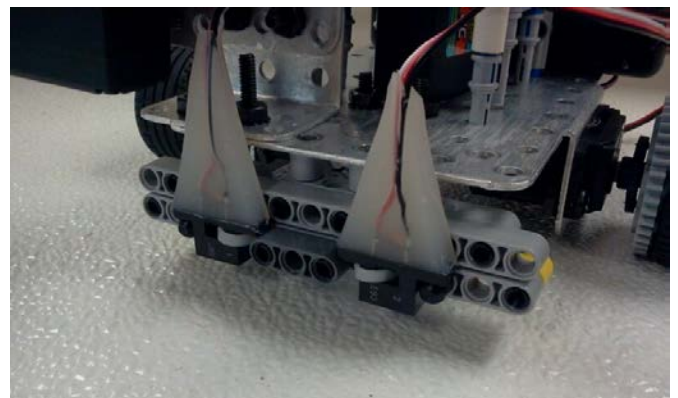

Effector

- The effector is a simple swinging arm on a servo meant to knock Martian soil (red poms) off of the solar arrays.
- Another possible effector could have been a claw on an arm to lift the poms off and place them elsewhere. The swinging arm moves the red pom off quicker, is much lighter, and uses fewer parts.
- Our effector works quickly and uses few parts giving the robot more time to complete other tasks.

Sensor Mount

- Our sensor mount is two tophat sensors bound to lego beams with zip-ties. It also has LEGO pins to help keep the sensors aligned.
- We had previously used one tophat bound between two LEGO beams with zip-ties. It wasn't able to follow the line up the ramp as well as we needed it to.

Data Section

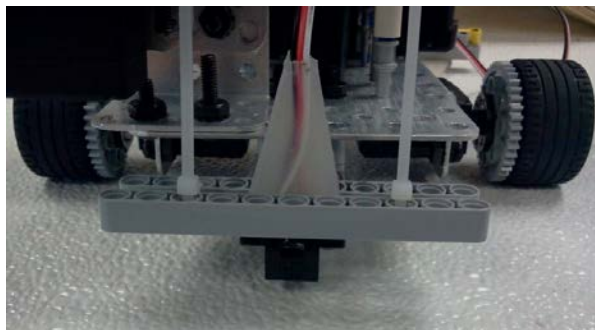| Trial Number	Climbs ramp?	Clears solar array?	Gets to other ramp?	Climbs other ramp?	Parks on other crater rim?	Points scored
1	no	no	no	no	no	0
2	no	no	no	no	no	0
3	no	no	no	no	no	5
4	no	no	no	no	no	0
5	no	no	no	no	no	0

This is our chart to gather robot performance. We run the robot and checked off weather or not it completed the tasks it was meant to complete. We also counted up how many points it scored on each run. At this time our performance tests are not very good. We are making significant changes to improve our performance.
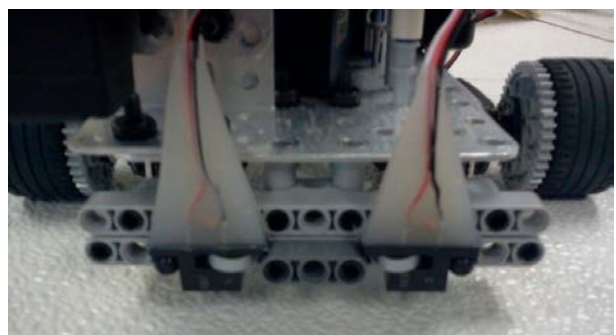
Data Evaluation Section

The data shows how the robot performs as a whole, since its effector isn't something meant to score as many points as possible, but rather score a set number of points consistently. The data shows weather or not it completes the tasks that it was to complete. In all of the trials the robot was unable to complete its intended task, however, in trial 5, by veering off course it was able to knock down the composter onto the crater floor, scoring 5 points. The sensor mount is also too low for it to be able to climb the ramp and the code does not allow it to reach the ramp. We will be moving the sensor so that the robot can drive up the ramp and adjust the code so that it can get to the ramp in the first place.

Modified System

Before:

After:

Our original sensor mount had only one tophat sensor, however it wasn't able to follow the line on the ramp. In order to fix this we altered the mount to have two tophat sensors. With the two tophat sensors it would be able to better correct itself on the ramp as well as determine when it reaches the top of the ramp. We will continue to test in a similar manner to how we did with the one tophat, just with the new code and hopefully better results.