Team OctoCat

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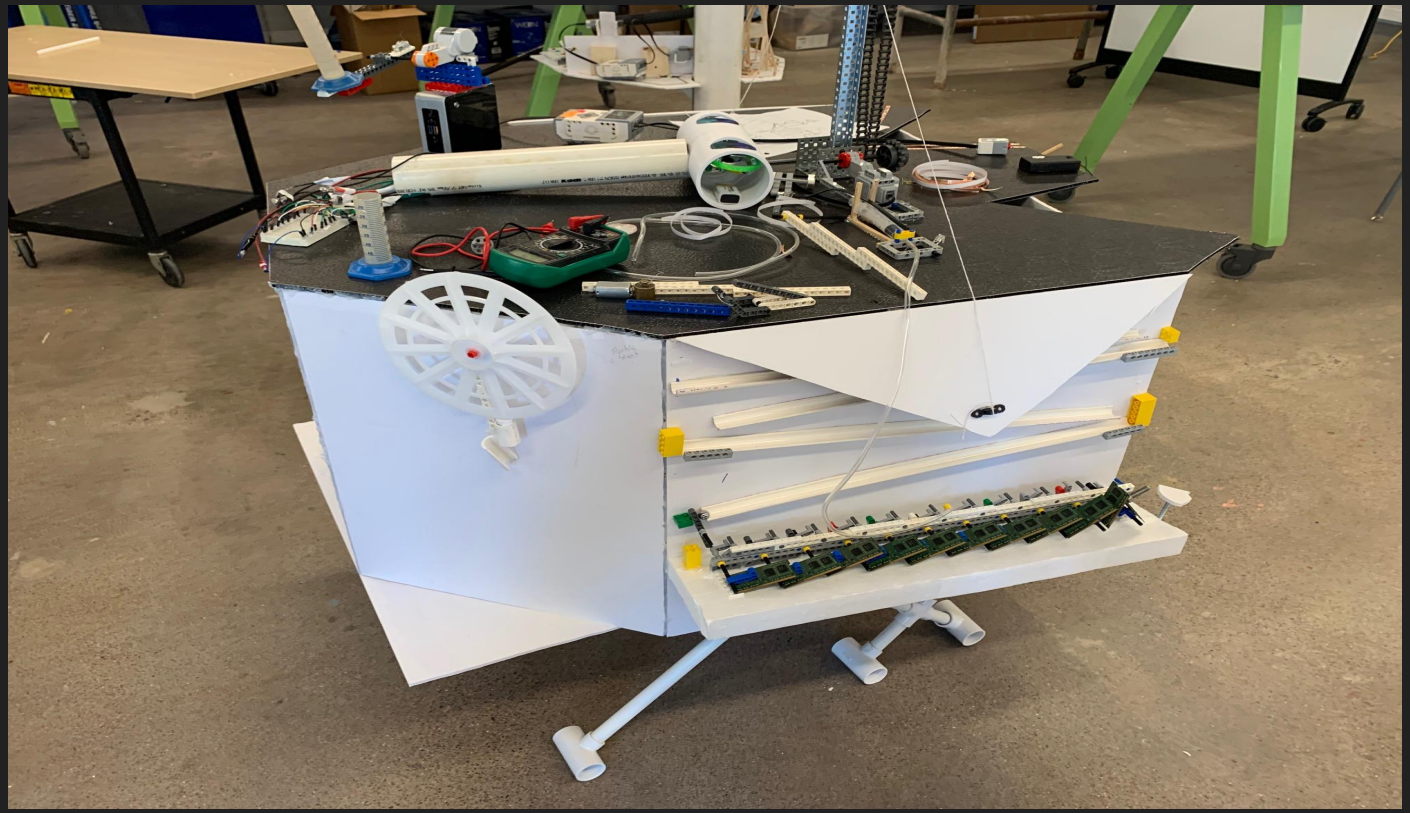
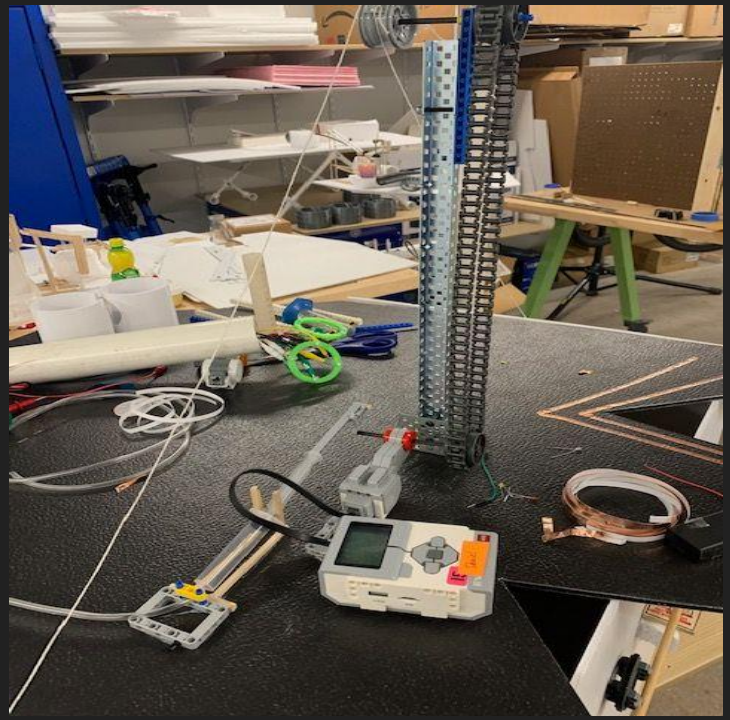
Almost done! We need to mount the wheels, the head, and work out the bugs!

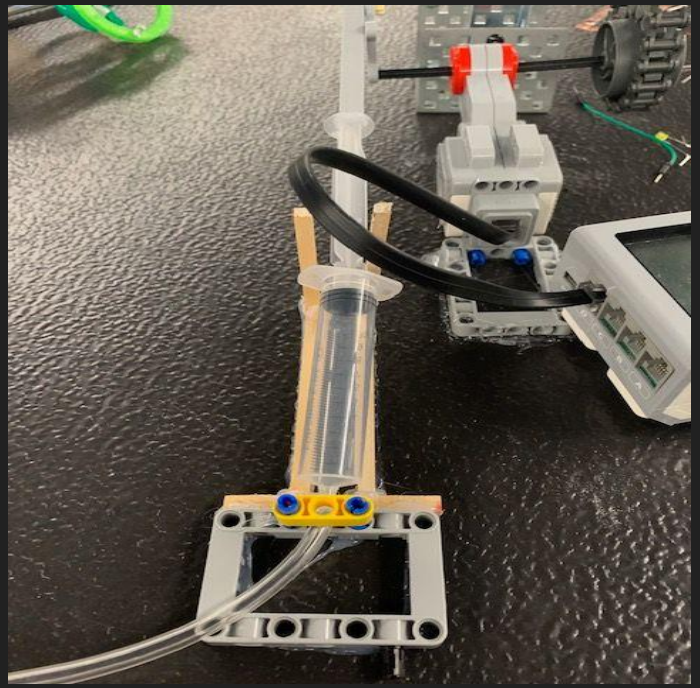


Step 1 and 2

Step 1: Rover is activated and the program is selected. This activates a motor that raises the rovers solar panel wings and…

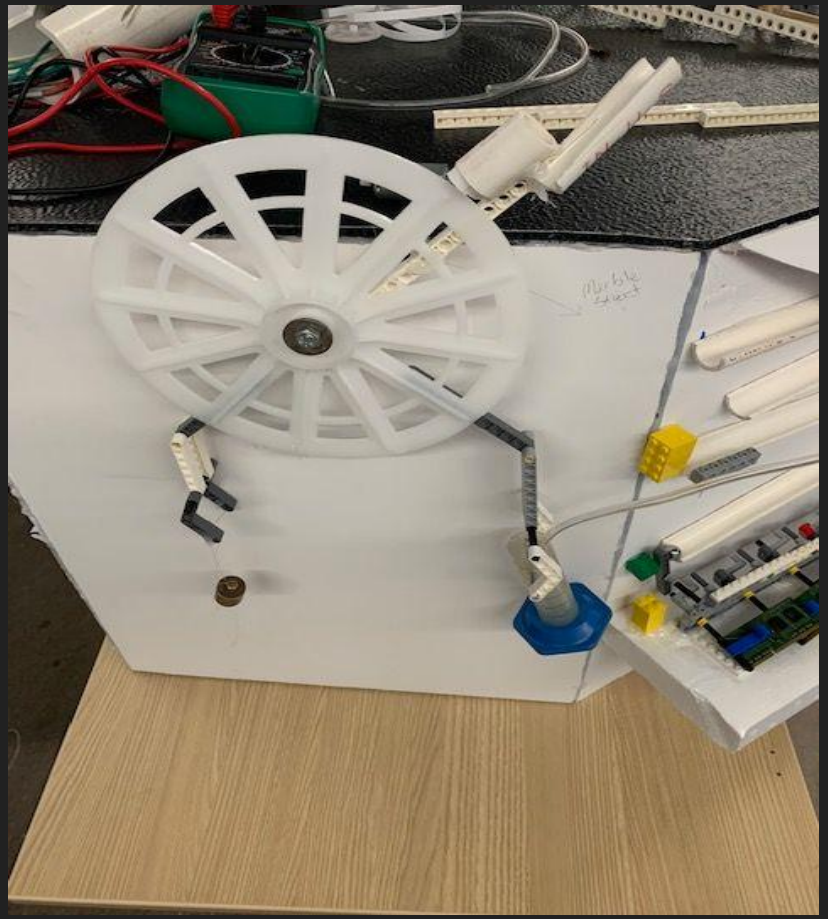


Step 2: Activates a piston filled with fluid that then flows out of a tube. Advanced step - Fluid Power



Step 3

The fluid flows down a tube and into a mechanism that turns due to the added weight of the fluid



Step 4

The turning wheel drops a marble onto a marble track

Championship event upgrade!

Step 5

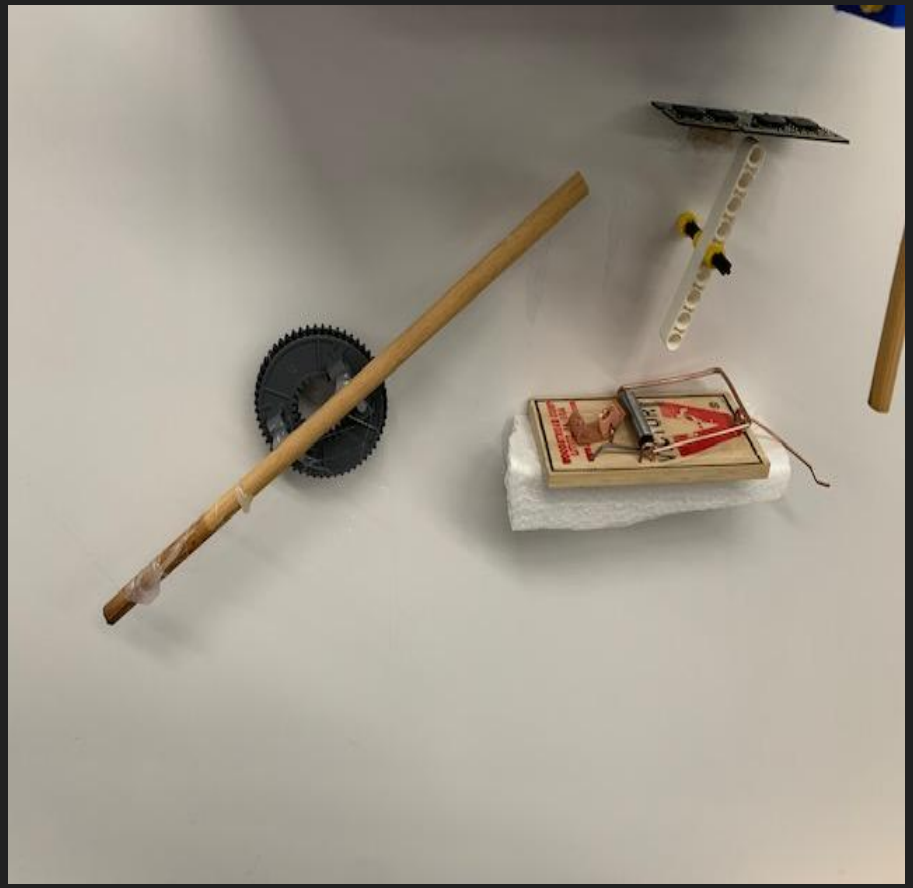
At the end of the track the marble hits a lever which activates a domino run

Step 6

At the end of the domino run the last domino pushes a weight off of a shelf.

Step 7

The falling weight has a string attached to it which pulls a lever down

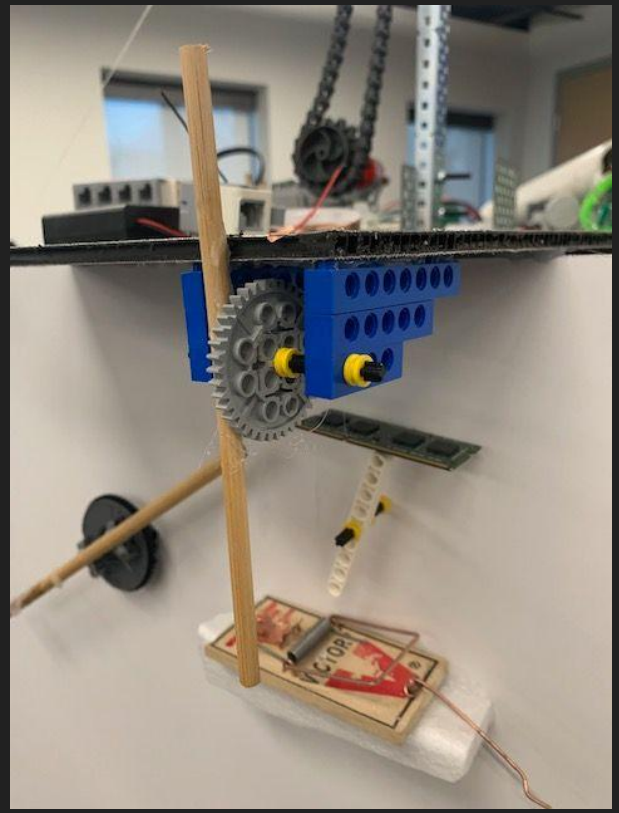


Step 8

The pulled lever activates a mousetrap

Step 9

When it is triggered the mousetrap knocks a support out from underneath a small shelf



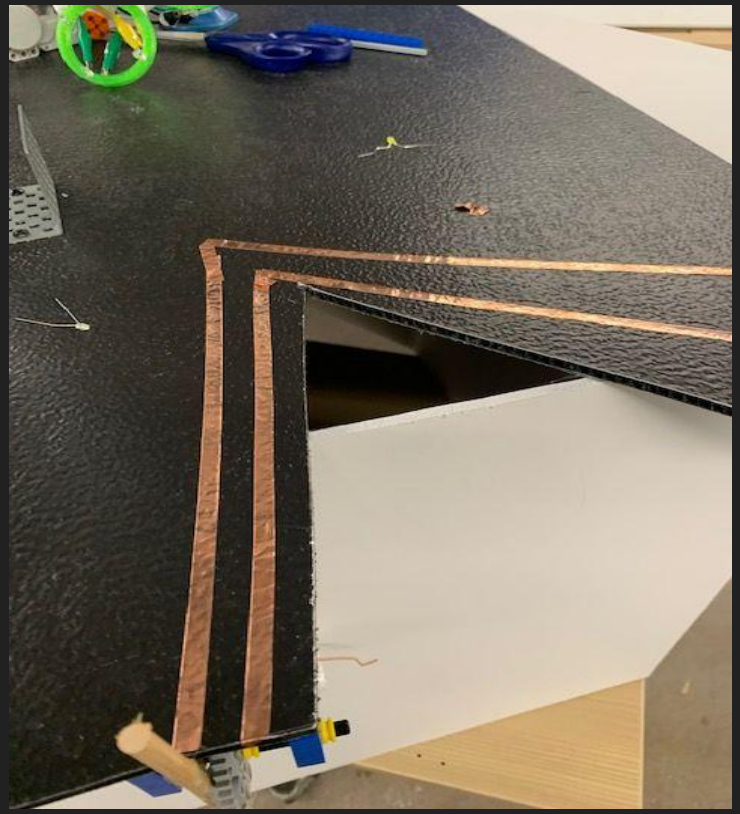
Step 10

The shelf falls down and releases a weight that is attached to the end of a stick - the stick is attached to a rotating LEGO piece above it

Step 11

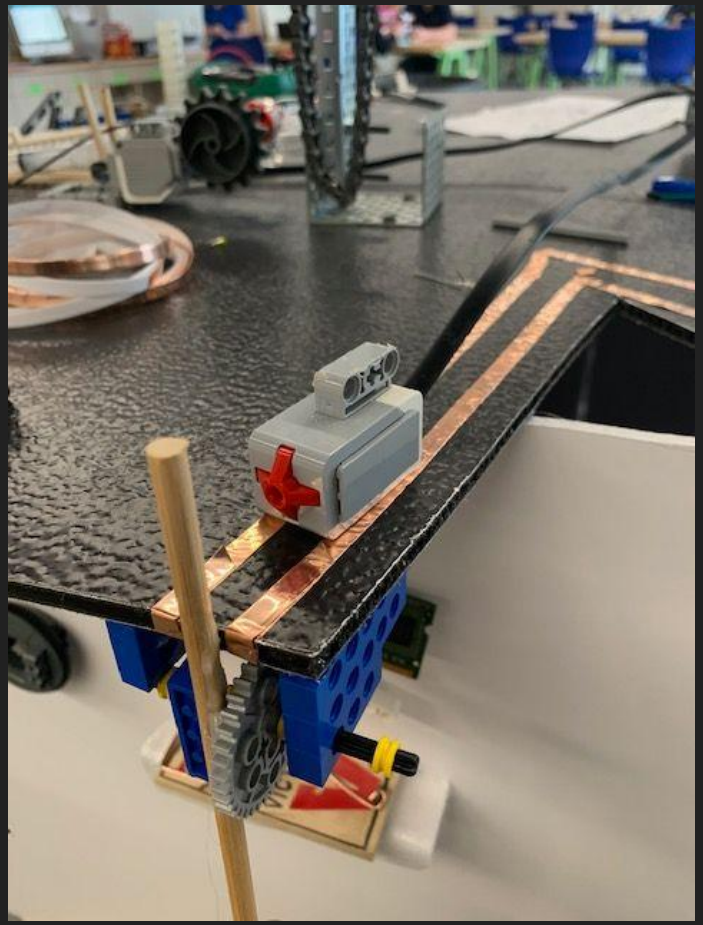
The rotating stick has copper foil tape on it and when it moves into its final resting position it connects a gap in the circuit to operate LED bulbs.

Advanced step - Electricity



Step 12

The rotating stick also activates a touch sensor which sends a signal to the brain to activate a motor.



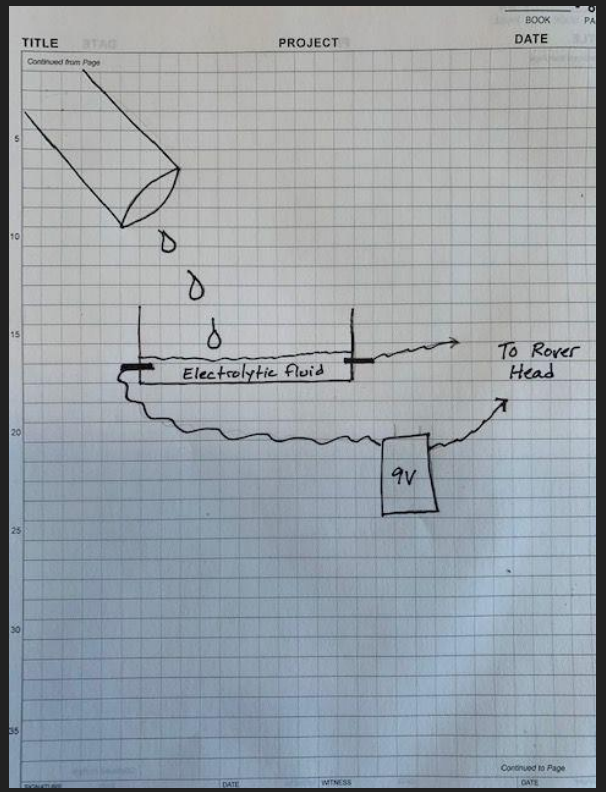
Step 13

The stick also activated a touch sensor which signals the motor to begin the program.

Here is that step in the final prototype.

Step 14

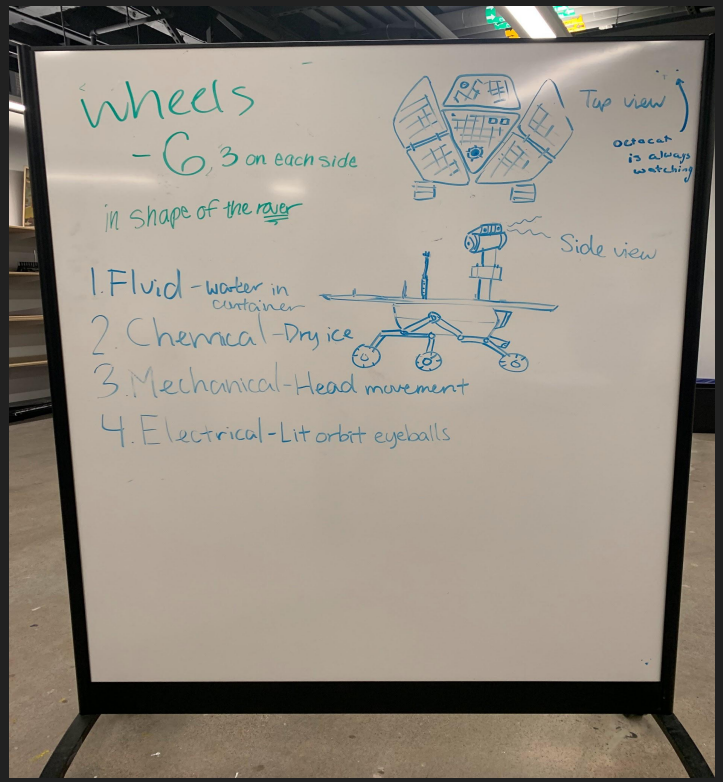
The rotating motor activates the rotation of the electrolytic fluid tank so that it pours into the head circuit gap



Step 15

The presence of ions in the electrolytic solution allows current to flow from the battery to the LEDs that are inside the head

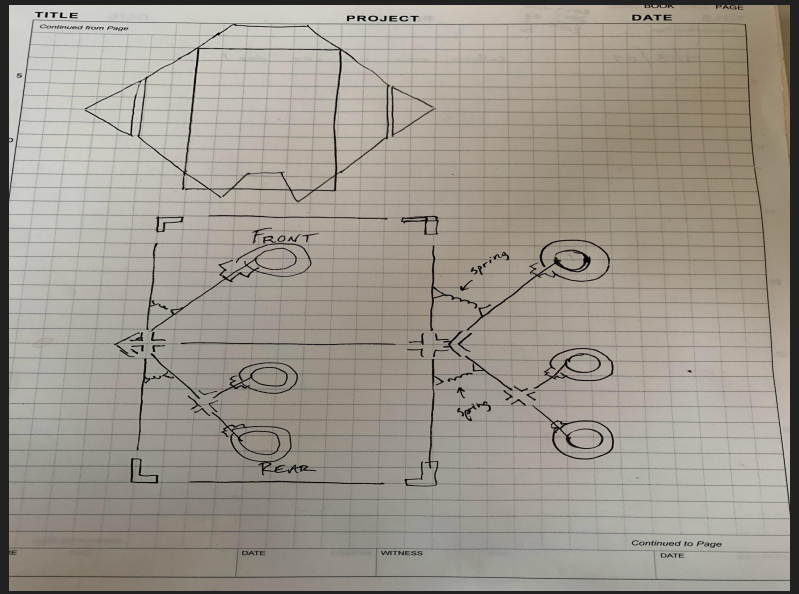
Original Plan



After plenty of ideas were tossed around, we found inspiration in a documentary called “Oppy” which is about the NASA Rover named Opportunity. This choice fit well with the theme of this year’s competition and it seemed like a really fun shape to play with. Although some changes were required throughout the build process, most of the original ideas stayed intact!

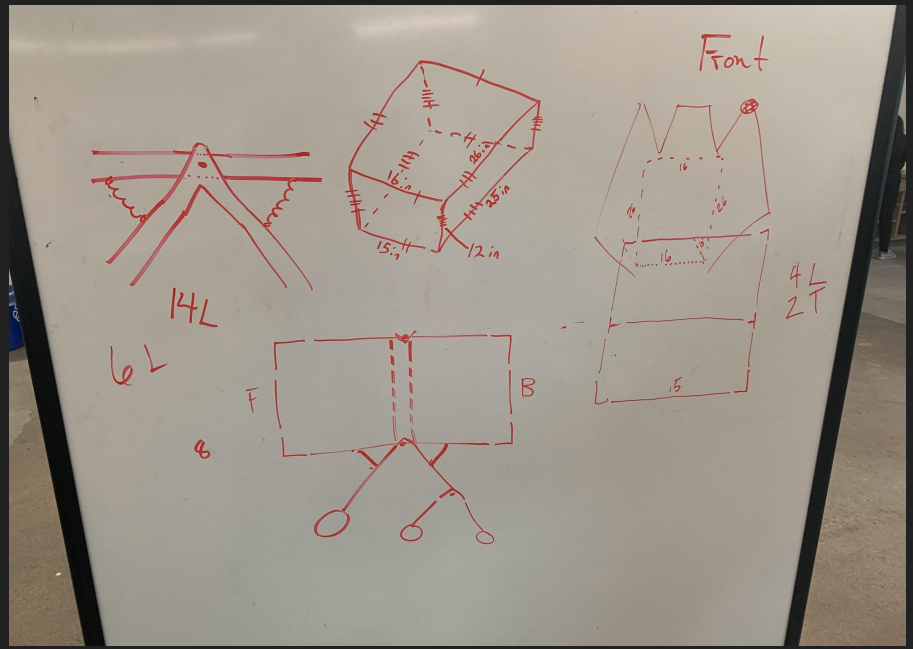
STEM Process - The Rover Chassis

The wheel frame/chassis of the rover was made from 1’ PVC tubes. A few iterations were discussed and everyone had some great ideas. In the end we decided to mimic the actual Opportunity Rover in how its wheels were arranged.



STEM Process - The Rover Body

The rover body had many iterations. Originally, we planned to use an already constructed box as our main body. We discovered the scroll saw was so much fun to use (and precise!) that we decided to cut each panel out of foam-core board and create our own.



Material	New	Used - borrowed - repurposed
4x4ft section of exterior trim paneling		repurposed
5 36x48 in foam core	$30	
Various EV3 Lego parts and motors		borrowed from STEM lab
Various VEX hardware and beams		borrowed from STEM lab
Rover wheels - 3D printed	30	
4ft of PVC pipe		repurposed from STEM lab
2 chemistry beakers		repurposed old science equipment
Tubing and piston/syringe	$8	
Wheel made of plastic		repurposed packaging
Circuit card dominos and PCU		repurposed old computer equip
String		repurposed from STEM lab
PVC "Neck"		repurposed from STEM lab
Rover head - 3D printed	$7	
Wires for LED eyes		borrowed from science dept
Breadboard and leads		borrowed from science dept
8 LEDs	$3	
Total Estimated Cost	$78	

Reflection

What a strange name, The Octo-Cats. How did it happen? It turns out that our science teacher has an eight legged cat sealed in a jar, which for some reason, inspired (and weirded us out!) us to take on that name. We were also inspired by a recent documentary called “Oppy” which tells the story of the Mars rover, “Opportunity” and its adventures on Mars. Watching this, we thought it would be fun to build our own and we thought it fit well with the theme “Into Orbit”.

There were many challenges. Our biggest challenge was designing the main body of the rover and imagining what the wheels would look like. There were many iterations of brainstorming and prototyping before we had our plan and went to work. We are all very busy high school students with other clubs, sports, jobs and schoolwork, so being available and together as a full team was also very tough to do. Once we really got rolling, things came together, and we put a lot of time in near the end. In fact, as of this submission, there are many small tweaks and adjustments to be made yet.

This was our first year at this event and we are excited to show our work.