The Martians

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CHEMICAL
REACTION!
COTTER
RAMBLERS

Step 1 and 2

STEP 1: A marble is dropped onto a marble ramp and goes down the ramp until it hits a swing lever.

Step 2: The swing lever rotates 180 degrees and hits a second marble that is perched at the top of another straight marble track.

Step 3

Step 3: The marble flies off the second track and into a PVC tube joint. The tube joint redirects the marble to roll along the floor of the level and right in front of a light gate that is programmed to detect at less than 20 cms

Step 4

Step 4: The light gate detects the rolling marble and then activates a motor to move. The movement of the motor pushes a marble through a hole in the floor of level 1.

Step 5

Step 5: The hole in the floor of level one has a marble ramp to guide the dropping marble down to where it hit a touch sensor.

Step 6

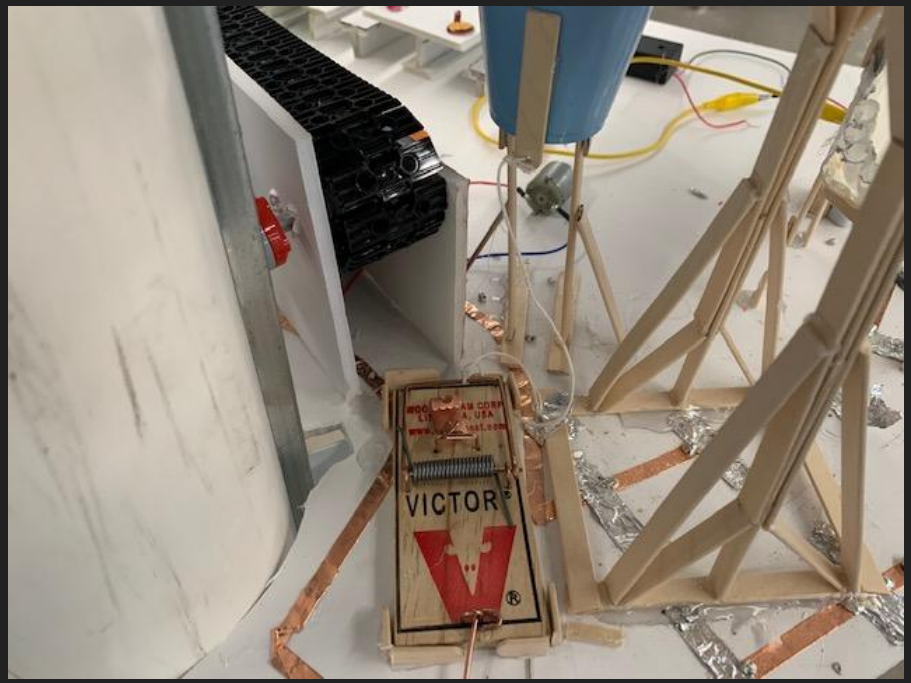
Step 6: When the marble touches the sensor, that activates the assembly line to bring food from one end to the other.

Step 7

Step 7: The food will move across the conveyor belt and will drop them onto a mouse trap, making it snap.

Step 8

Step 8: When the mouse trap is activated, it will pull a string attached to a cup full of weight and the cup will fall off the tower.



Step 9

Step 9: The dropping cup of weight will pull a string attached to a second cup. This cup is full of electrolytic fluid. The fluid will flow down the track and into the small cup below.

Step 10

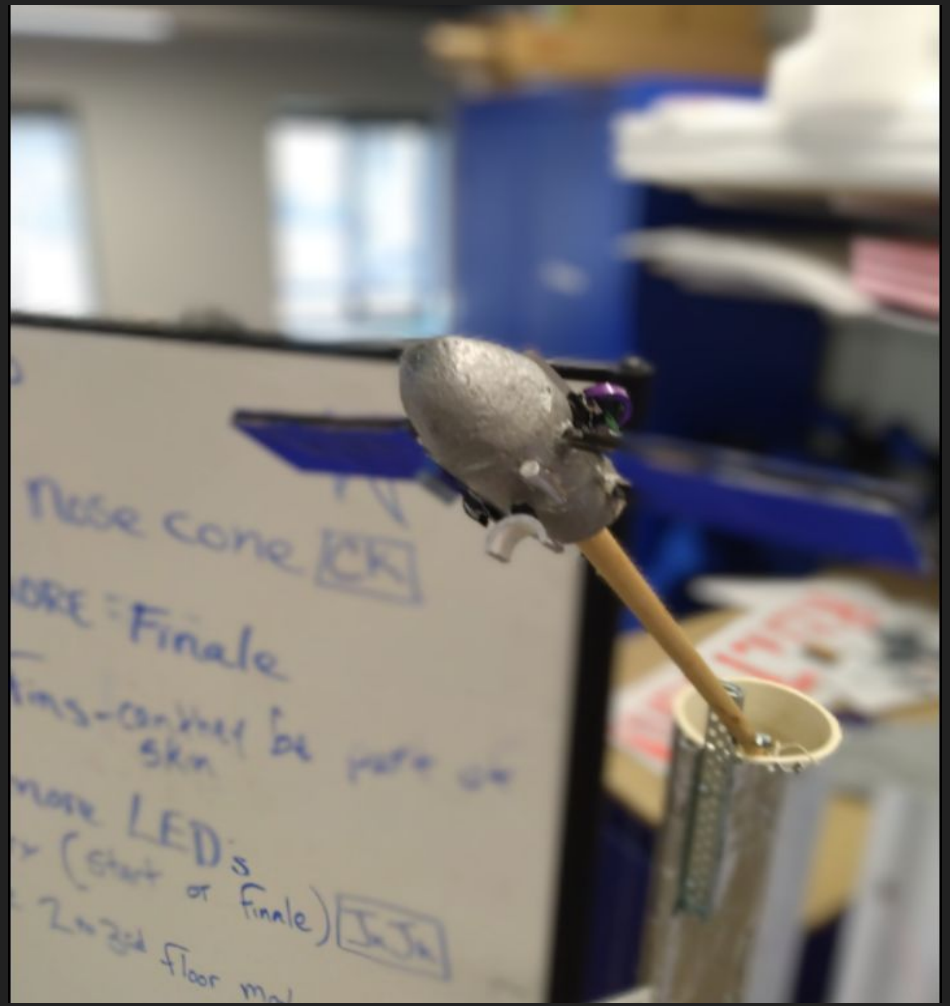
Step 10: The small cup will fill with electrolytic fluid, which will complete a small circuit and cause a small motor to turn.

Step 11

Step 11: The motor is activated which rotates a worm gear. The worm gear turns a circular gear which has a paperclip attached to it. It delivers a marble to a marble track.

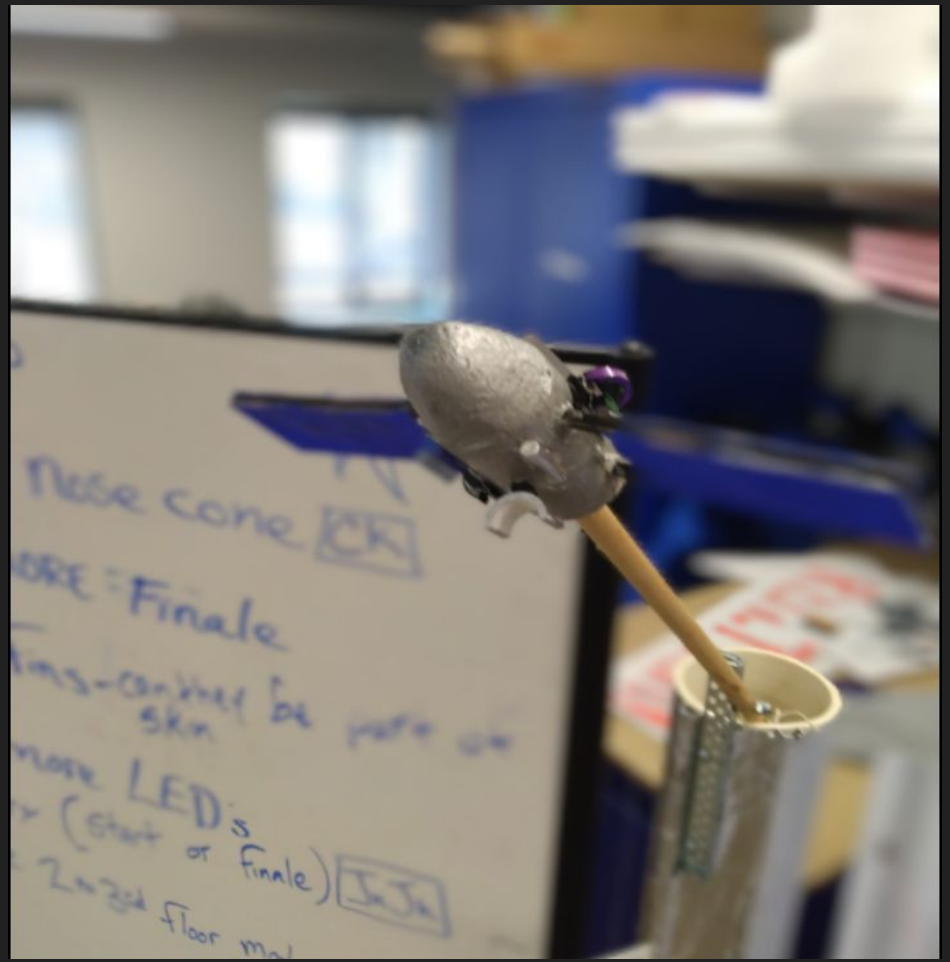
Step 12

Step 12: The marble rolls down the track and activates the final step

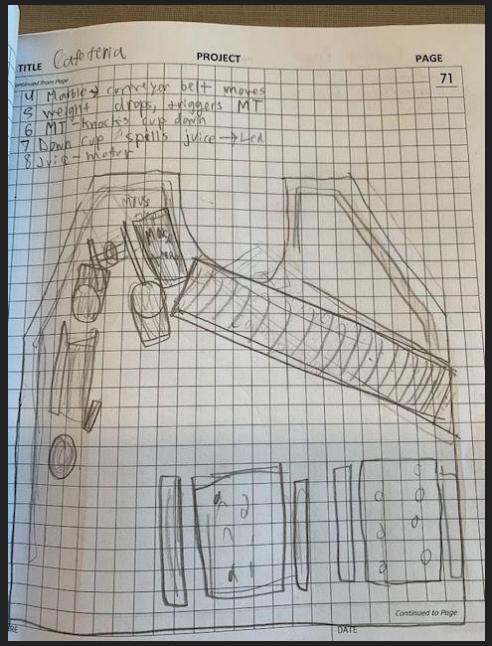


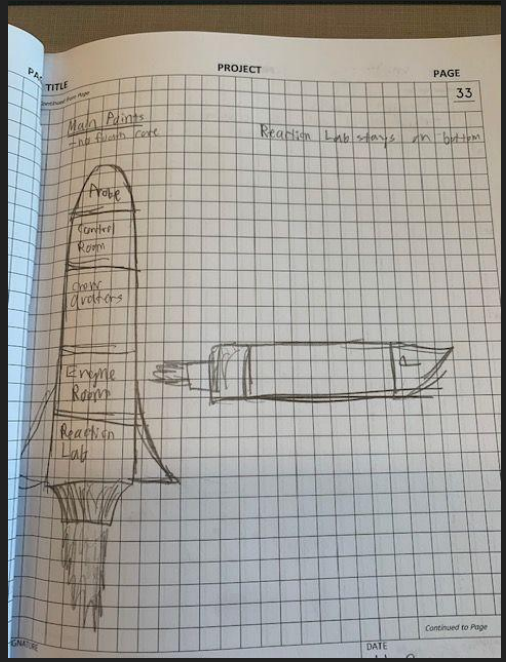
Step 13

Step 13: The final step is a string is pulled from the third level and it lifts a probe upwards to launch on level 1.



Original Plan



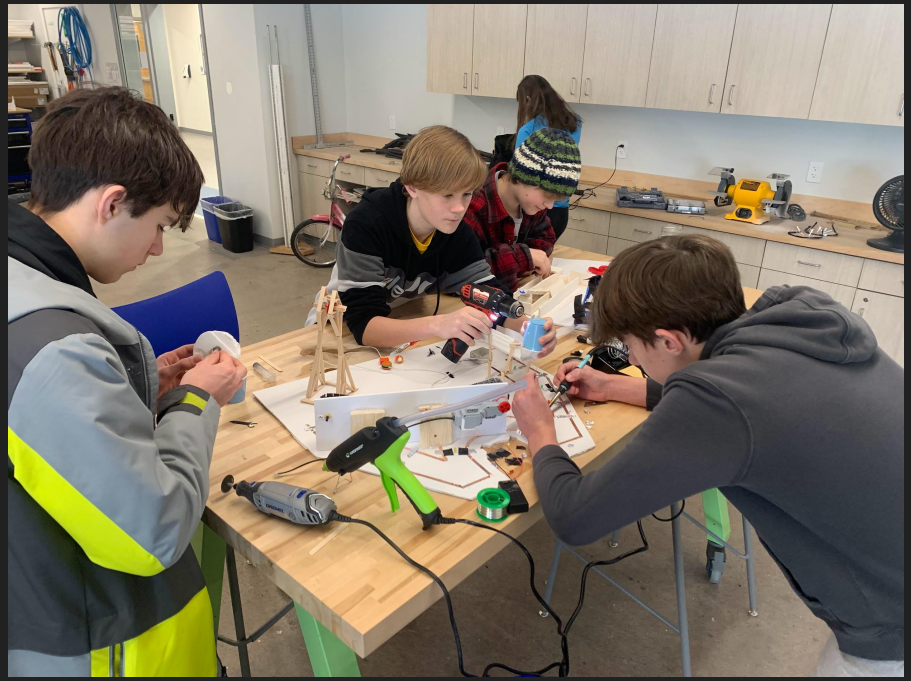


Progress Photos

Jaxson is developing multiple prototypes to get the float gauge to work correctly.

Zephyr is busy testing and soldering the 2n level LEDs

Progress Photos



TEAMS LAB at Cotter - where the magic happens!

(Technology - Engineering - Arts - Math - Science)

List of Materials and Costs

Material	Cost	Used - Repurposed - Borrowed
5 36x48in Foamcore boards	$40	
5ft PVC pipe	$20	
various plastic and paper straws	$5	
Various EV3 Lego bits, CPUs and motors		Borrowed from Sci dept
Battery packs		Borrowed from Sci dept
Copper foil tape		Repurposed from STEM lab
Mousetrap		Repurposed from STEM lab
Various foam and packing materials		Used
Total cost	$65	

Light Gate Stem Process

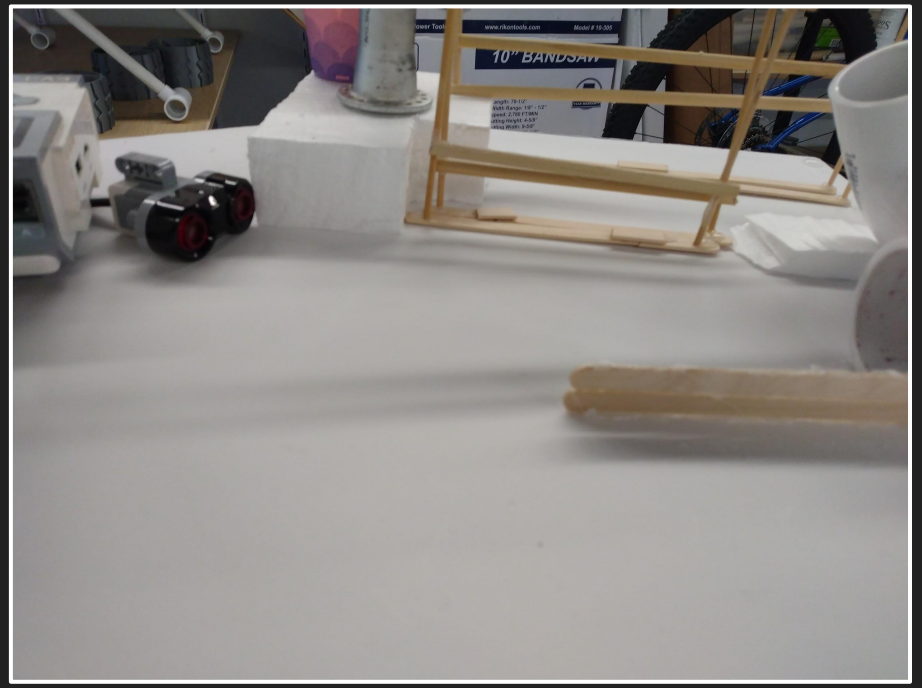
The Marble runs in front of the light gate.

The light gate detects the marble when it is within 2.5 cms.

The light gate sends a message to the brain.

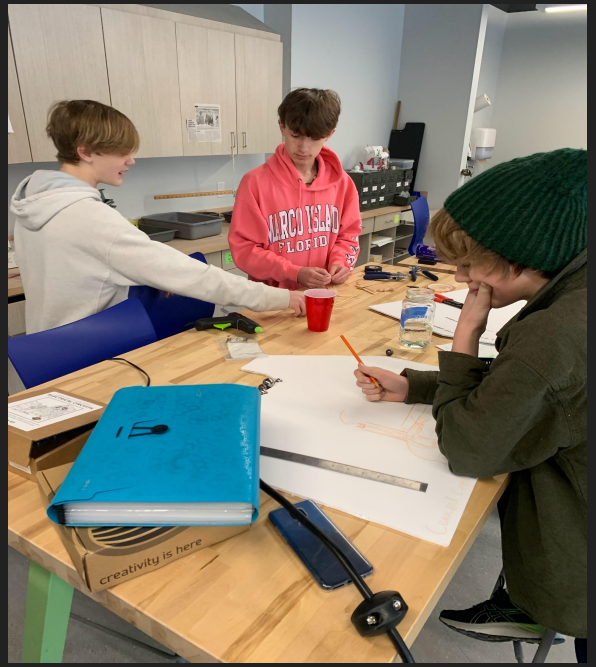
The brain tells the motor to turn counter clockwise.

The marble is activated by the turning motor.



Cafeteria STEM Process

First, a cup dumps precisely 25 millilitres of the electrolytic solution down a tube and into a small plastic cup, which will complete a open ended circuit. Once the circuit is completed a motor will turn on, triggering the next step. Making the electrolytic solution required lots of trial and error in deciding which solution we should use that would be the most reliable, using the right amount of voltage in the power supply, and finding the best electronic items like the wires and motor. As we were building the S.T.E.M. process spillage, leakage and the reliability of the electronics were the biggest challenges that we faced while building the step.



Jaxon’s Float Gauge STEM Process

- The bottle's cap is spun off by motor, which is connected by a string

- Fluid is released into the gauge, and the dial pulls a string that then moves a marble

- This marble then moves down a track to a touch sensor
- The touch sensor activates the motor that will lift the probe

Reflection

The name The Martians was chosen because we took inspiration from the movie where the astronaut eats the potatoes to stay alive. We thought about planets that might orbit each other, there were many other designs of a rocket too. We chose the final plan because we hoped it would be more achievable, yet still challenging and fun to do.

Some of our challenges we had were in the constant reconstruction of our project. Because we have different people working on different levels of the project, it required lots of communication. There were moments when we didn't fully understand where the other teams were going. Another challenge was that the availability of the members was constantly changing. We're all very busy and it was difficult to get everyone there each time. Snow days didn't help at all! The biggest challenge was finding ways to connect our levels and because we were gifted with lots of new equipment there was a lot of learning to do. This was often distracting in good ways, but it burned time.

This was our second year of the EMDC and that allowed us a chance to strengthen our STEM skills, and teamwork. Overall, were proud of our work and we think we improved a lot.

Bibliography

https://historicspacecraft.com/Rockets_Saturn_5.html

Our rocket is loosely inspired by the Saturn V rockets so this source was helpful in getting inspiration for our rockets

https://www.nasa.gov/press-release/nasa-darpa-will-test-nuclear-engine-for-future-mars-missions/

The inspiration for our engine room funciality came from this source.

https://solarsystem.nasa.gov/missions/ladee/in-depth/

The visual design for our probe which is the finale of our project came from the design of the ladee.

https://www.nasa.gov/feature/glenn/2021/history/novel-rocket-fuel-spawned-ferrofluid-industry

Our ferrofluid idea was inspired by this article from nasa.

The Gantry

The Gantry is a purely

Decorational component

Which needed extra effort

Which is why we chose to

Include it.