

Team Journal

STEAM TEAM

March 14, 2023

Transforming Space Technology Into Orbit



2023 **ENGINEERING**
MACHINE DESIGN CONTEST

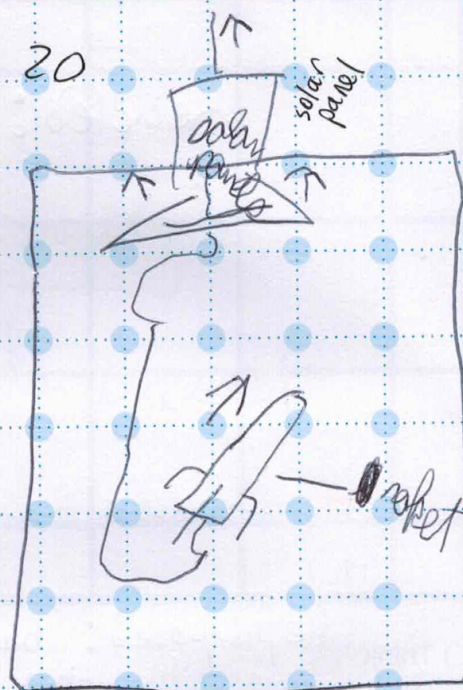
Brainstorming Monday Feb 20

Joseph Lemke

Valentino Zito

Planned Machine Design

solar panel like on ISS



Super hero dog/cat super smart

steam team = bad guys - Machine will open solar panel → powers missile to blow up moon
will dog & cat stop you



space lunch
on the first day

name

date

Field Diagram

Recycled:

- water bottle
- caps from bottle

- old remote control
- paint stirrer

- red container lid
- old book

Percent Recycled:

80% -

☐ Think

☐ Do

☐ Test

Repurposed: back boards are corn hole game

- bin lid

- marble track

- Hot wheels track

- micro:bit supplies

- blocks

- wood scraps for mouse trap

- we had space toys already

- syringe and tube

holder

Expenses: 2 mousetraps 2.00

30 Party poppers 7.50

4 extra stepper motors 9.00

spray paint 6.50

Peg board hoops 10.00

Vinegar 2.00

baking soda 0.50

\$ 37.50

name

date

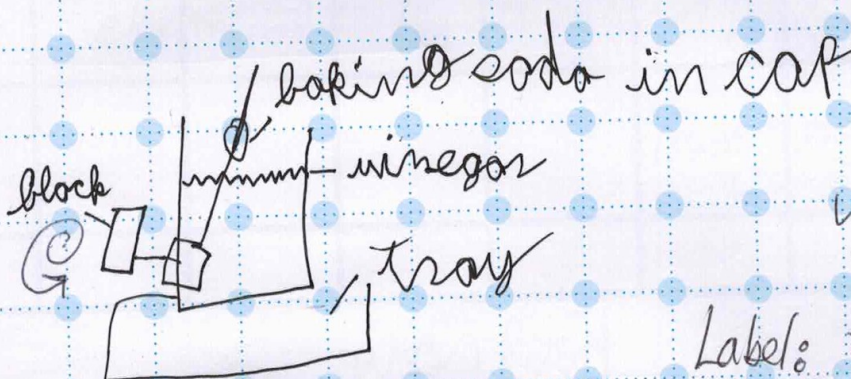


Keep your parts organized. It will save time when you are building!

4

THU ~~Mar~~ march 2

Chemical component



Problem: cap falls off

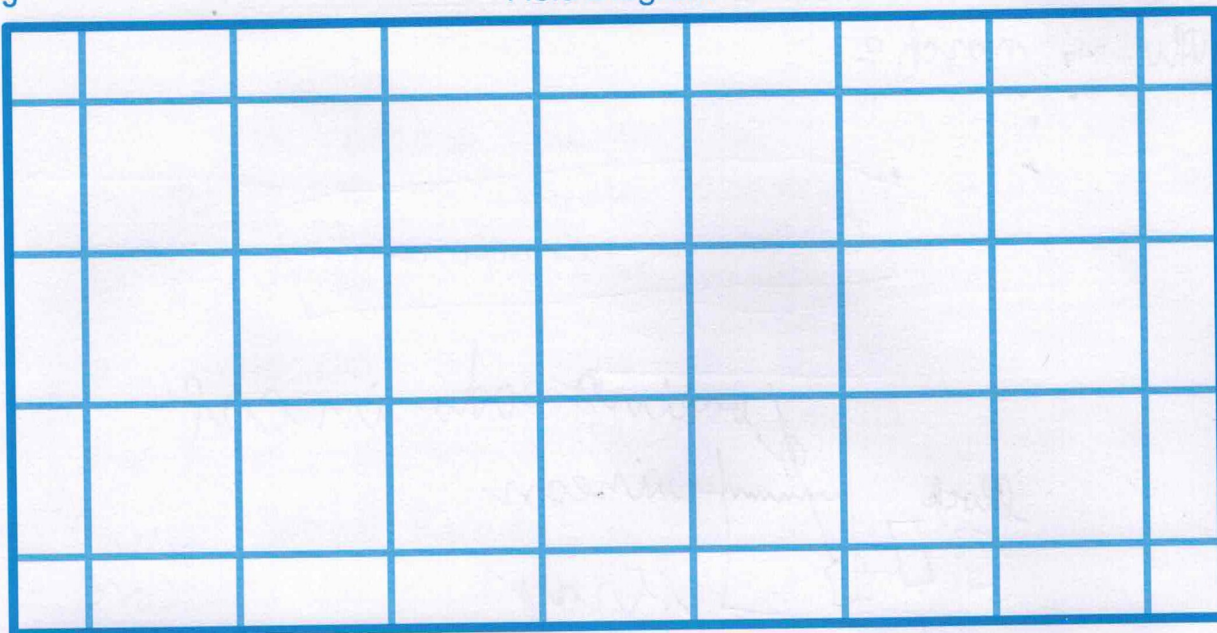
Solution: put glue dots around skewer

Danger - do not
add baking
soda

name

date

VEX IQ


☐ Think

☐ Do

☐ Test

march 4
 today we fixed the machine
 and ~~also~~ incorporated
 the ~~in~~ chemical
 reaction

Problem: Marble rolls too
 fast and bounces
 off bottom track

Label: Black
 Hole

Solution: Added funnel (cut off water bottle) to make
 motion only down, not sideways

name

date

The word **engineer** means "one who practices ingenuity." There are many people who practice **ingenuity** – the quality of being cleverly inventive or resourceful.

6

Monday March 6

Ideas: Vinegar in tray triggers
electrical: lights, alarm, escape pod

↓
blown by fan or
booster

- worked on code
to make sound
effects

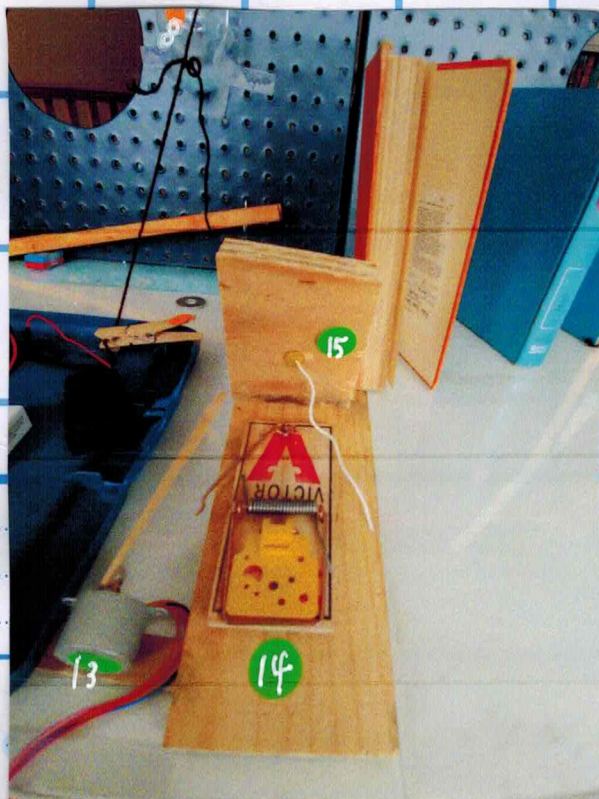
name

date

fainted Peg Boards

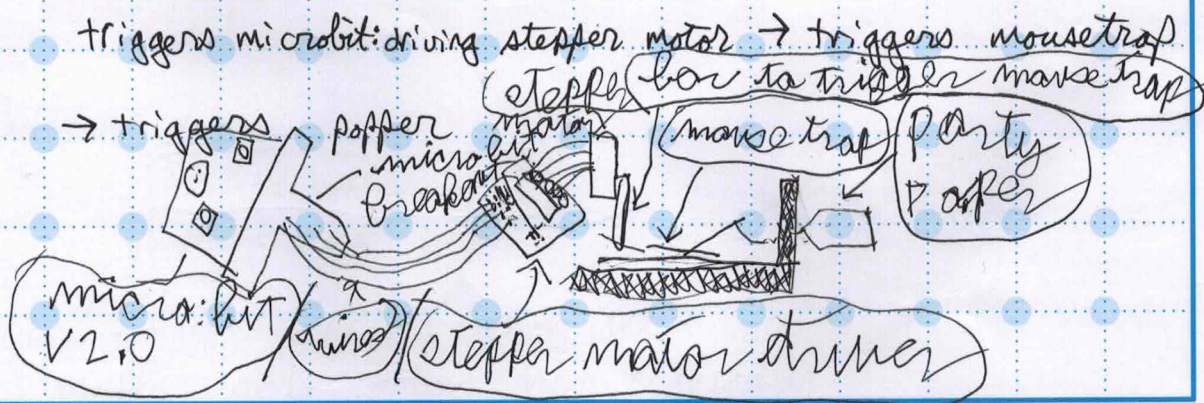


Built mousetrap / popper holder

☐ Think☐ Do☐ Test

Wed March 8

Spring → Marble → dominoes fall → pulls string for baking soda cup →
 shaft spins → Vinegar spills over → 2 wires in red lid are ~~shorted~~ shorted →
 + dumps



name

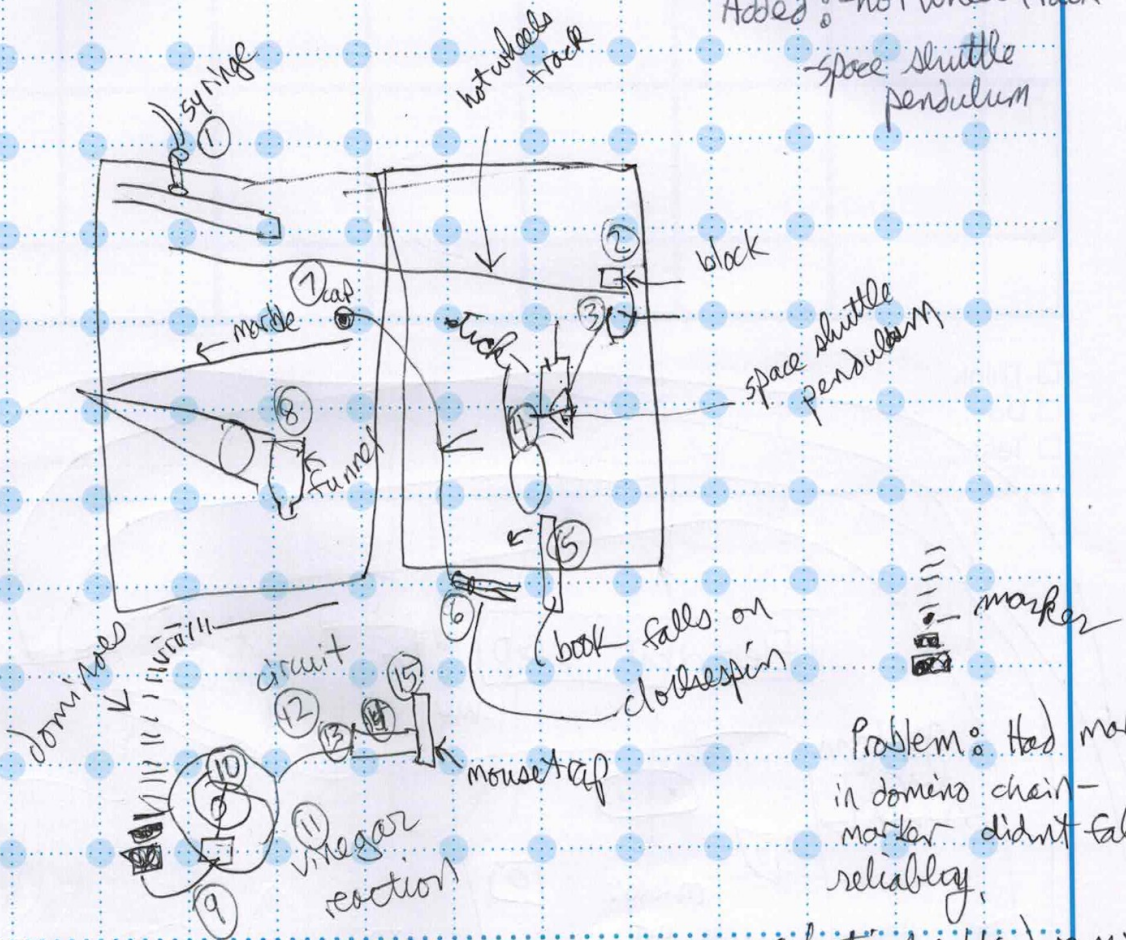
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Thursday March 9

Try: hook up all components so far

Design change: Added other wall boards to get more steps.

Added: -not wheel track
-space shuttle
pendulum



Problem: Had marker in domino chain - marker didn't fall reliably.

Solution: Used remote control

Problem: cup for baking soda - how to dispense small soda
solution: use scoop

name

date



Always leave time to write in your notebook!

10

Sat March 11

Problem: Block at end of hot wheels track not reliable

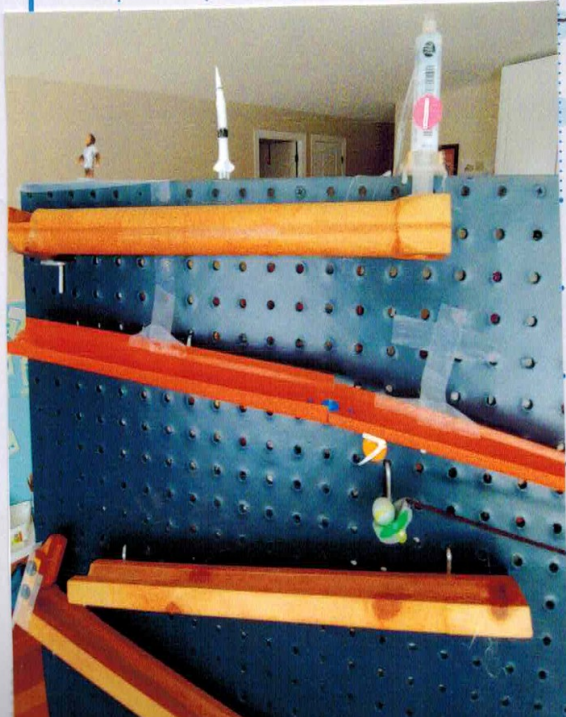
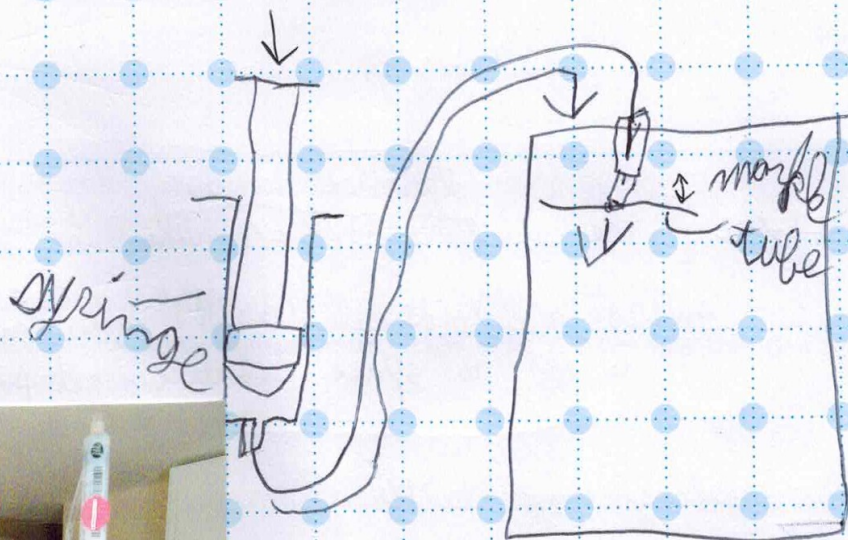
Solution: heavier? taped 2 blocks together, marked best position

Problem: Attach syringe more securely

Solution: hot glued popsicle sticks to wall board to hold syringe

Problem:

Fluid Power Step





story —
 Fighting the evil diabolical dog duo who are trying
 - enters on hydraulic arm goes through wood worm hole
 to get to space shuttle - get past "blockade"
 - stealing space shuttle - crash into Neptune (books)
 - release satellite through black hole to trigger
 asteroid belt (dominoes) destroy ship by
 spraying asteroid acid all over warp core (vinegar
 bottle) → scrambles systems but actually
 activates confetti shield

name

-need 2 dogs for decoration

date

List of Machine Steps

1. Pressing syringe lowers wooden tube, causing marble to roll out. FLUID POWER STEP
2. Marble rolls down Hot Wheels Track, knocking off blocks.
3. Falling blocks yank out peg board hook.
4. Hook releases space shuttle pendulum. MECHANICAL ACTION STEP
5. Space shuttle knocks over book, which fall on clothespin.
6. Clothespin opens, releasing yarn.
7. Loose yarn lets cap release marble.
8. Marble rolls down tracks, through funnel, and hits dominoes.
9. Dominoes knock over remote, then small block, then big block.
10. Big block pulls yarn that is wrapped around cork, which spins cap and dumps baking soda.
11. Baking soda reacts with vinegar and spills over into peanut lid. CHEMICAL REACTION STEP
12. Vinegar completes circuit between two electrodes in peanut lid.
13. Micro:bit senses the completed circuit and drives stepper motor. ELECTRICAL STEP
14. Stepper motor triggers mousetrap.
15. Mousetrap pulls string of party popper.

Bibliography

"Control a stepper motor by Micro:bit", Robotique, March 21, 2022.

<https://www.robotique.tech/robotics/control-a-stepper-motor-by-microbit/#>

Tutorial to hook up the Micro:bit to a stepper motor.

Domino Masters, Season 1, episode 2 "Holidays".

This TV show has Rube Goldberg components. This is where we saw the idea for the party popper pulled by a mousetrap.

Makecode. <https://makecode.microbit.org/#>

The code editor used to write the code that controls the stepper motor and senses the circuit made with the vinegar.

Pxt-stepper-motor/tinkertanker, Github. <https://github.com/tinkertanker/pxt-stepper-motor>

This is an interface that allows the Micro:bit to interface with the stepper motor.

15)

name

date



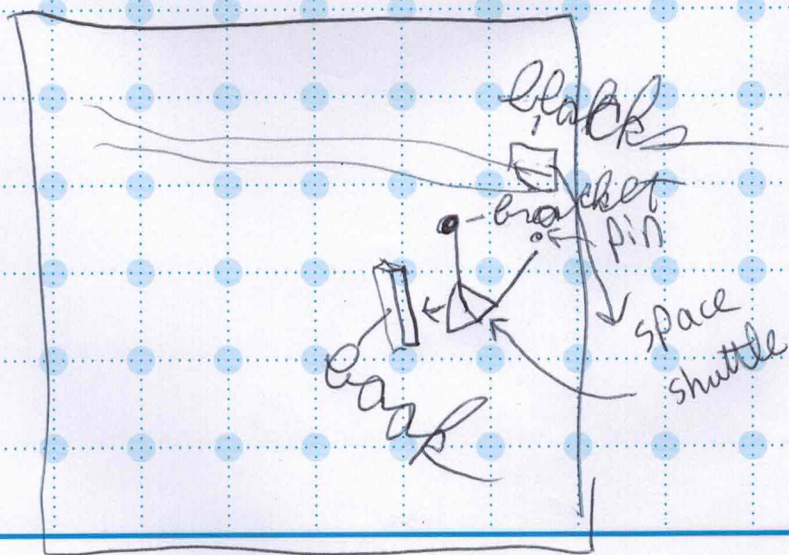


Field Diagram



Problem

Mechanical Step



name

date

Reflection

Challenge: hooking up the stepper motor. I learned that some of the pins on a Micro:bit cannot be used to hook up a stepper motor. This was most of the problem. I was trying to plug in an input on an LED display pin. That would not work since it was always active. The article at Robotique helped to learn which pins to use. Because I learned how to hook up a stepper motor, now I can use one in future applications.

Challenge: staying focused when working with a friend. I learned that it is challenging to stay focused when working with a friend. We tried playing a little bit before working on the project. Then we focused a bit better.

Challenge: Getting the blocks to fall off when the marble bumped into them. The blocks on the Hot Wheels Track were hard to place correctly so they would fall off when we wanted, but not accidentally. We drew lines on the track with a Sharpie so we could place them correctly.

Reflection Word Count: 172 words

Code

