



KENNESAW STATE
UNIVERSITY



MTRE 1001L Vex Claw-Bot Competition

-Spring 2024-

By: Cary Chun

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The Mars Sample Return Mission

- Ambitious multinational project to bring Mars surface material to Earth
- VERY complex!



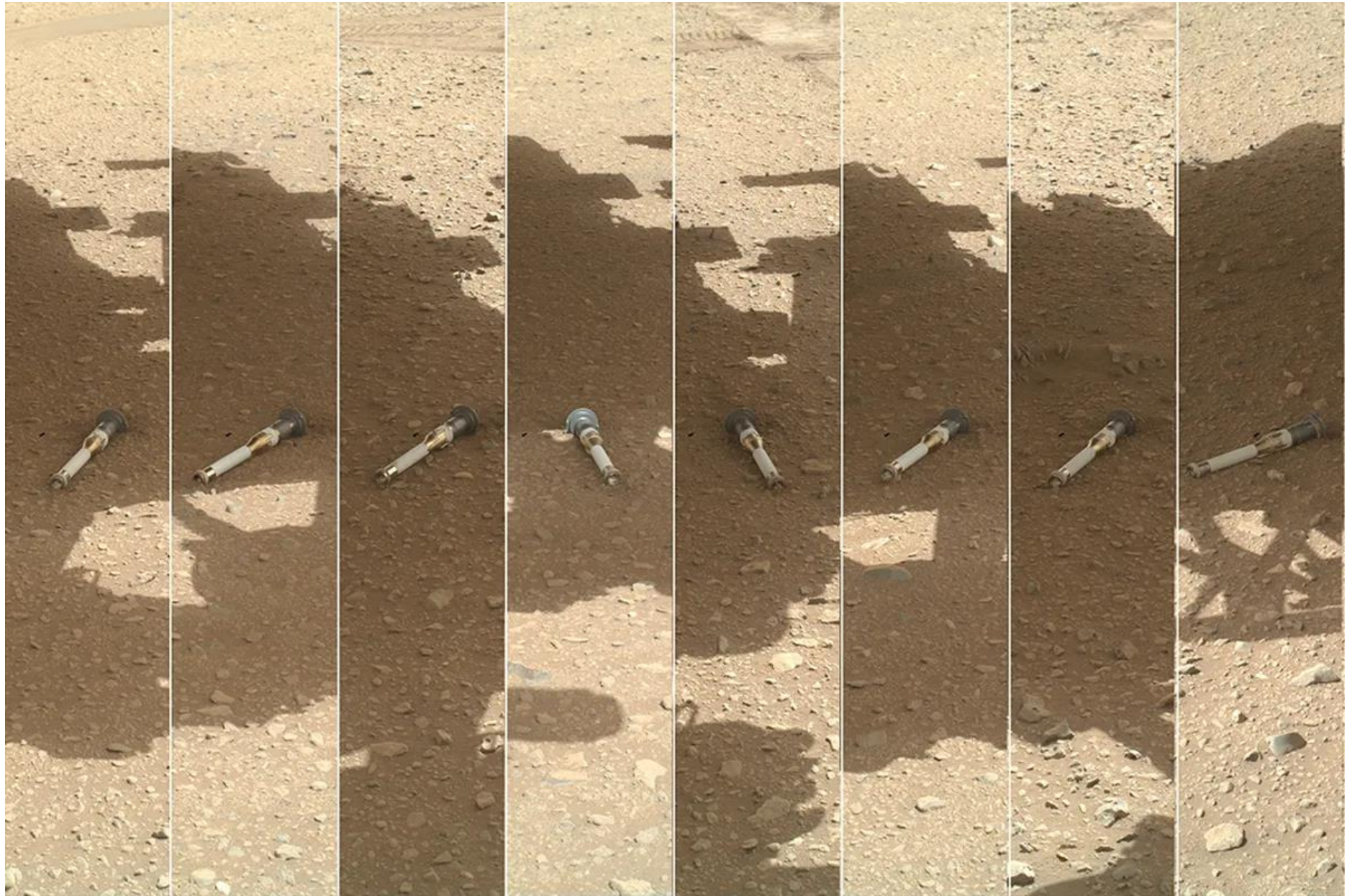
Percy and Her Sample Tubes



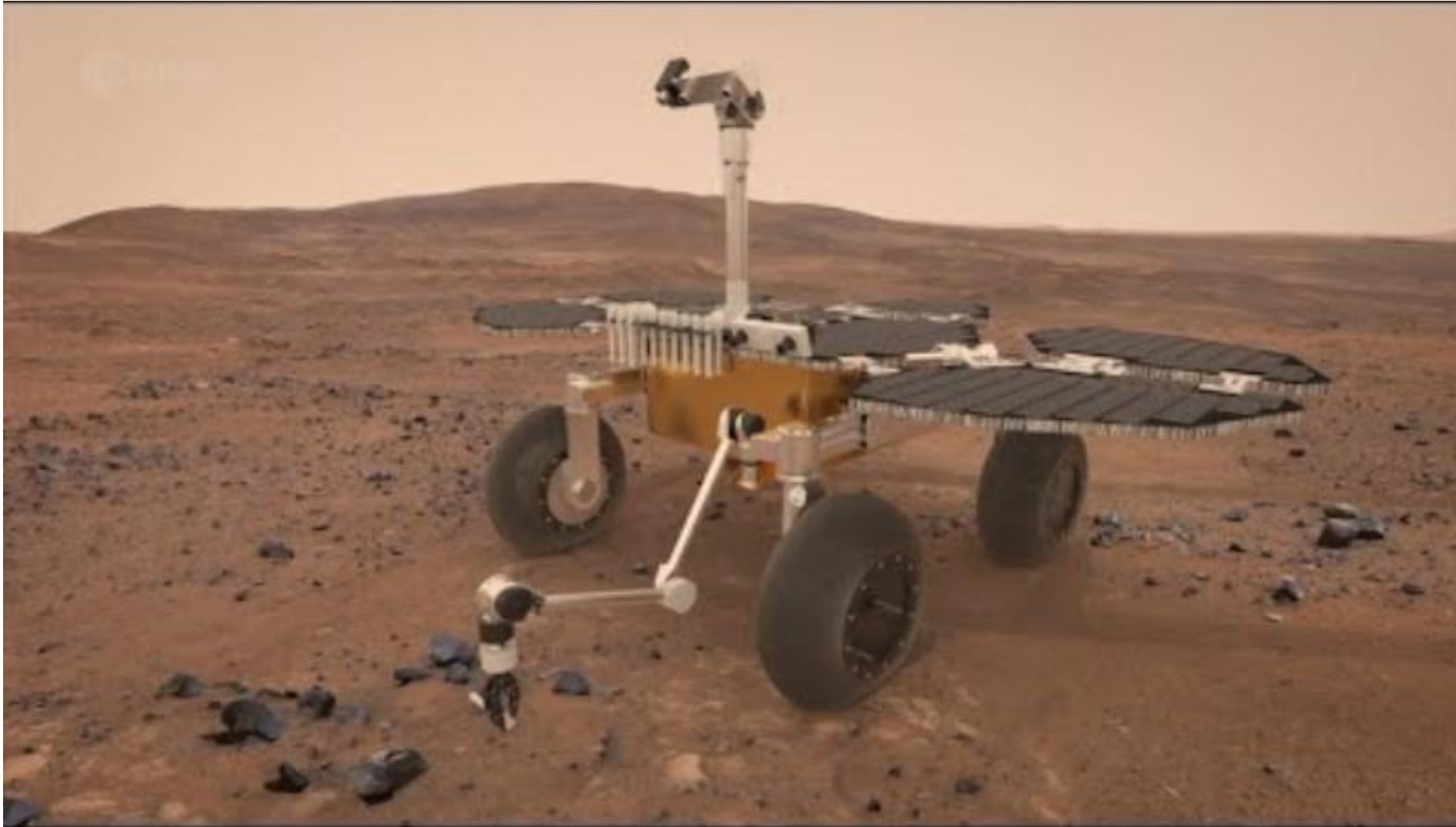
- Collected and cached by Mars 2020 (Perseverance) Rover,
- This is the first leg of the Mars Sample Return Mission completed

Tubes on Mars

- 10 sample tubes are currently lying on the surface of Mars
- May need to be collected from surface at later date



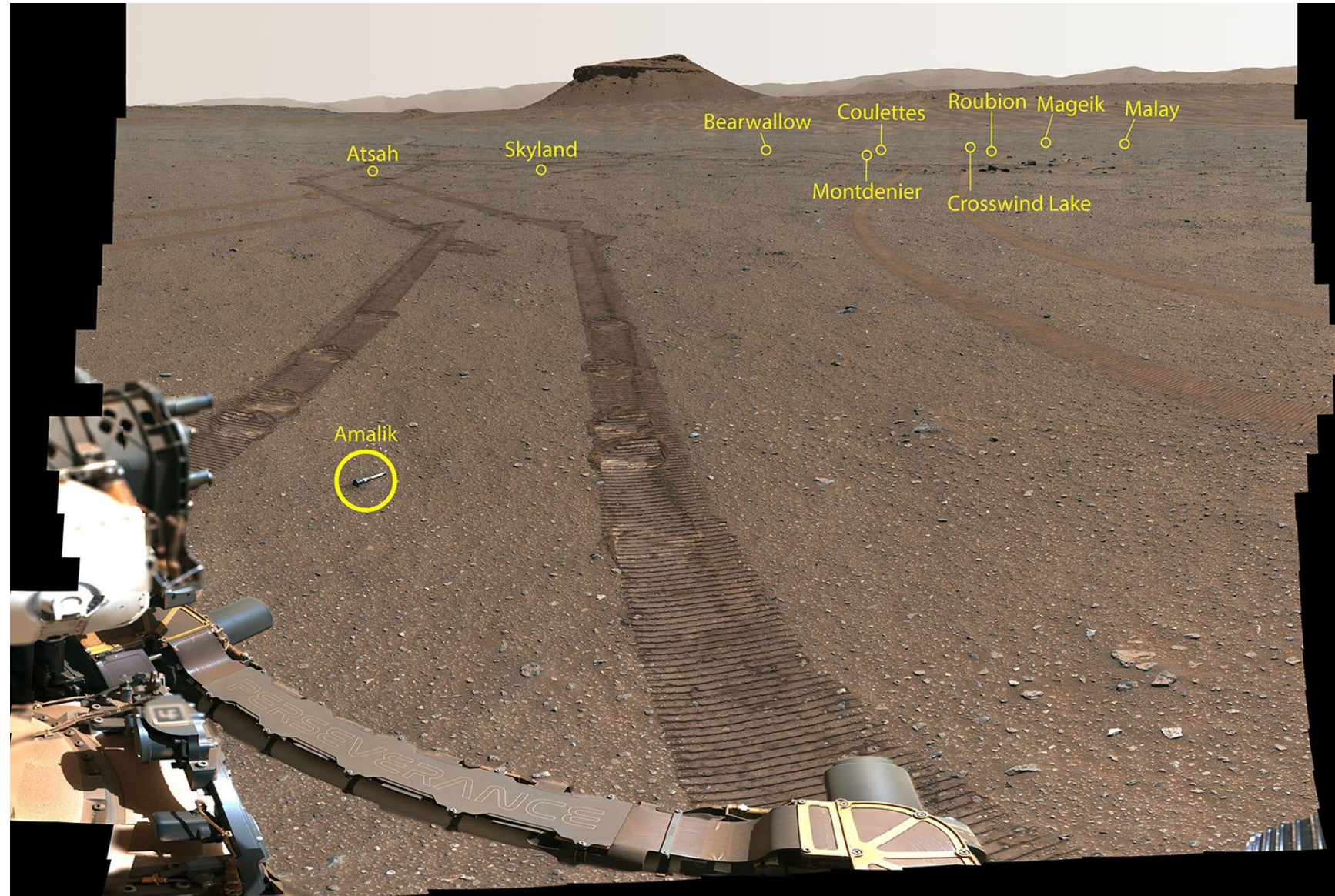
Design Challenge: Fetch Rover



- Intended to collect cached tubes from surface
- Then transfer cached tubes to MAV

Vex Connection

- 10 sample tubes have been deposited for later retrieval
- Claw-bots will practice collecting and caching tubes
- (Names indicate where they came from)



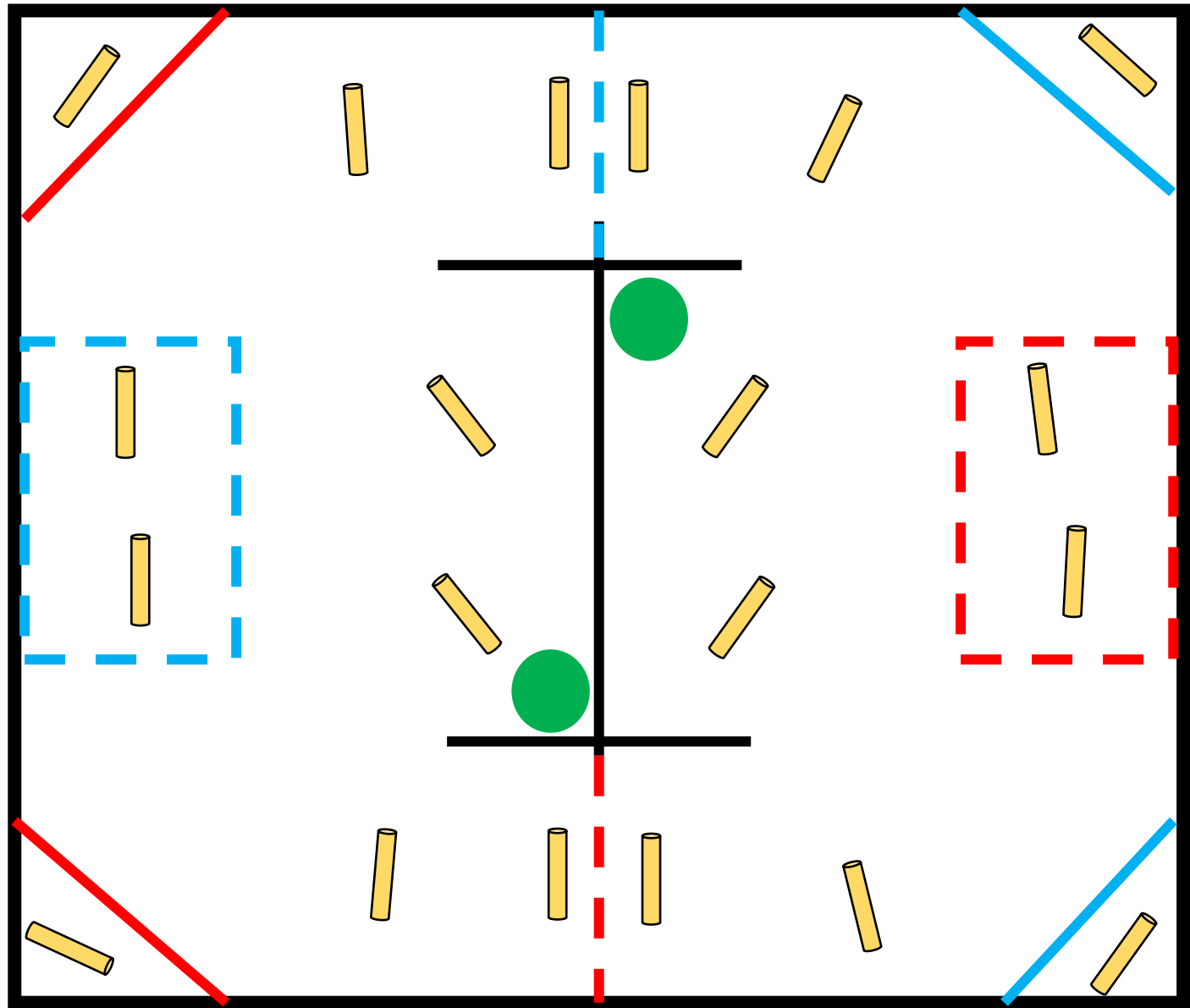
Field Layout*

— Ground Obstacle

- - Aerial Obstacle

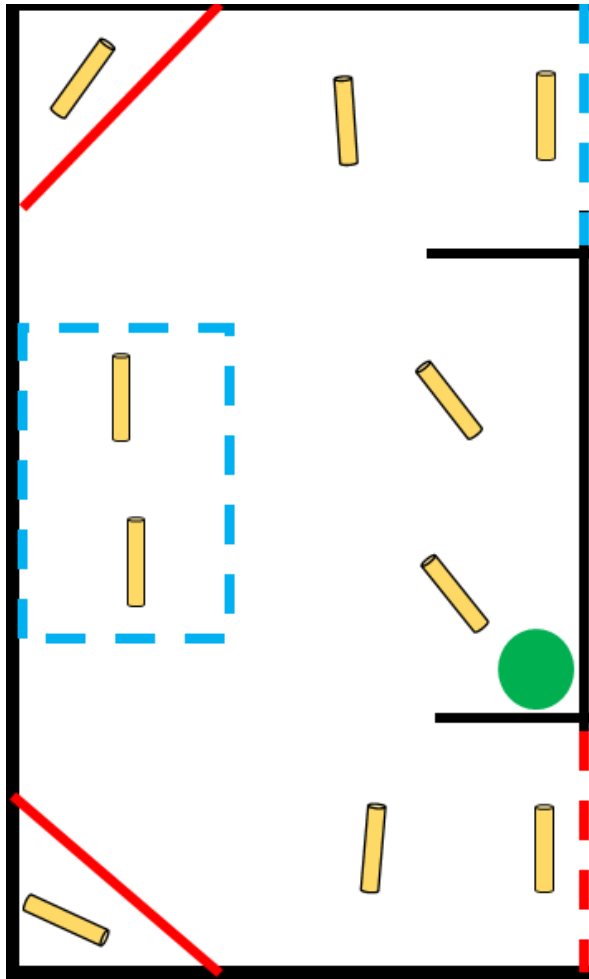
 Sample Tube Location

 Lander Canister

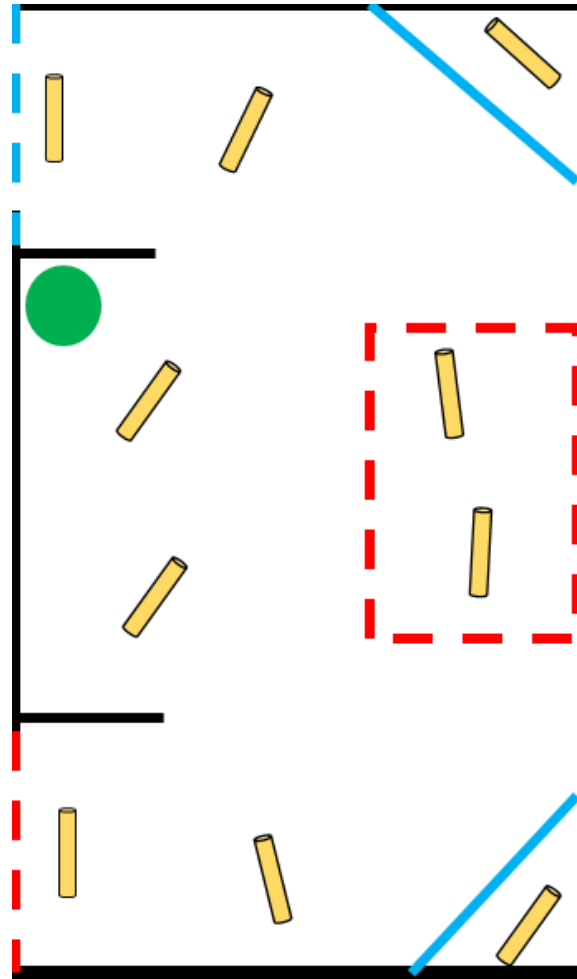


*this is only an approximate layout, actual layout may vary

Red Alliance



Blue Alliance



- Teams will be randomly assigned to one side of the field
- Watch out for potential obstacles not on these diagrams!

Game Objects

Mars Sample Tube (MST)



- Also called “Tube”

Sample Return Canister (SRC)

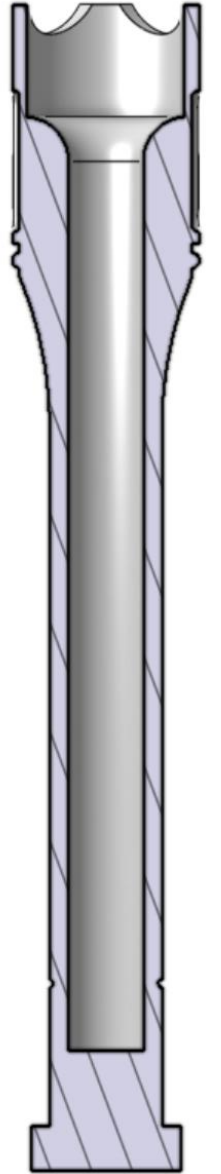


- Also called “Canister”

Anatomy of MST

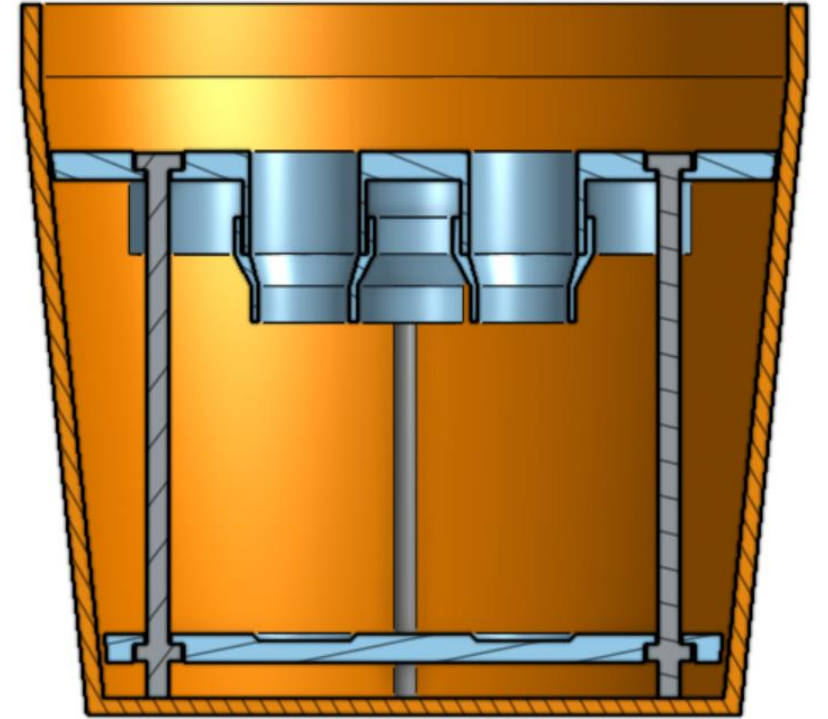


- Top (gold end)
- Bottom (silver end)
- Real MST, far Left
- 3D-printed analogue, center left



Anatomy of SRC

- 12 holes for sample tubes
- Tubes may be inserted in any order
- Tubes must be inserted in proper orientation



MST Delivery (scoring points)

Correct



- 2 points scored!

Incorrect

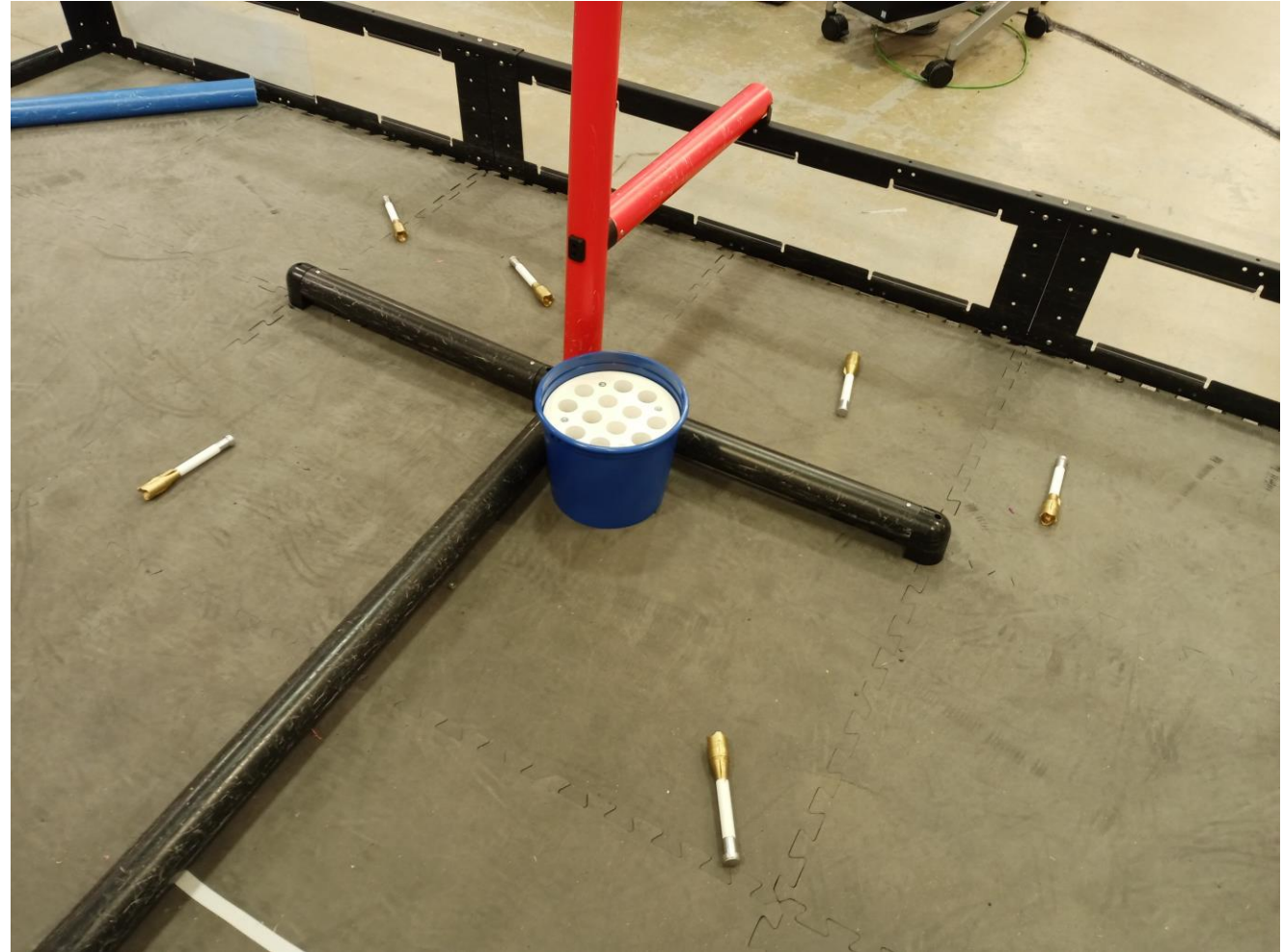


- 0 points scored!

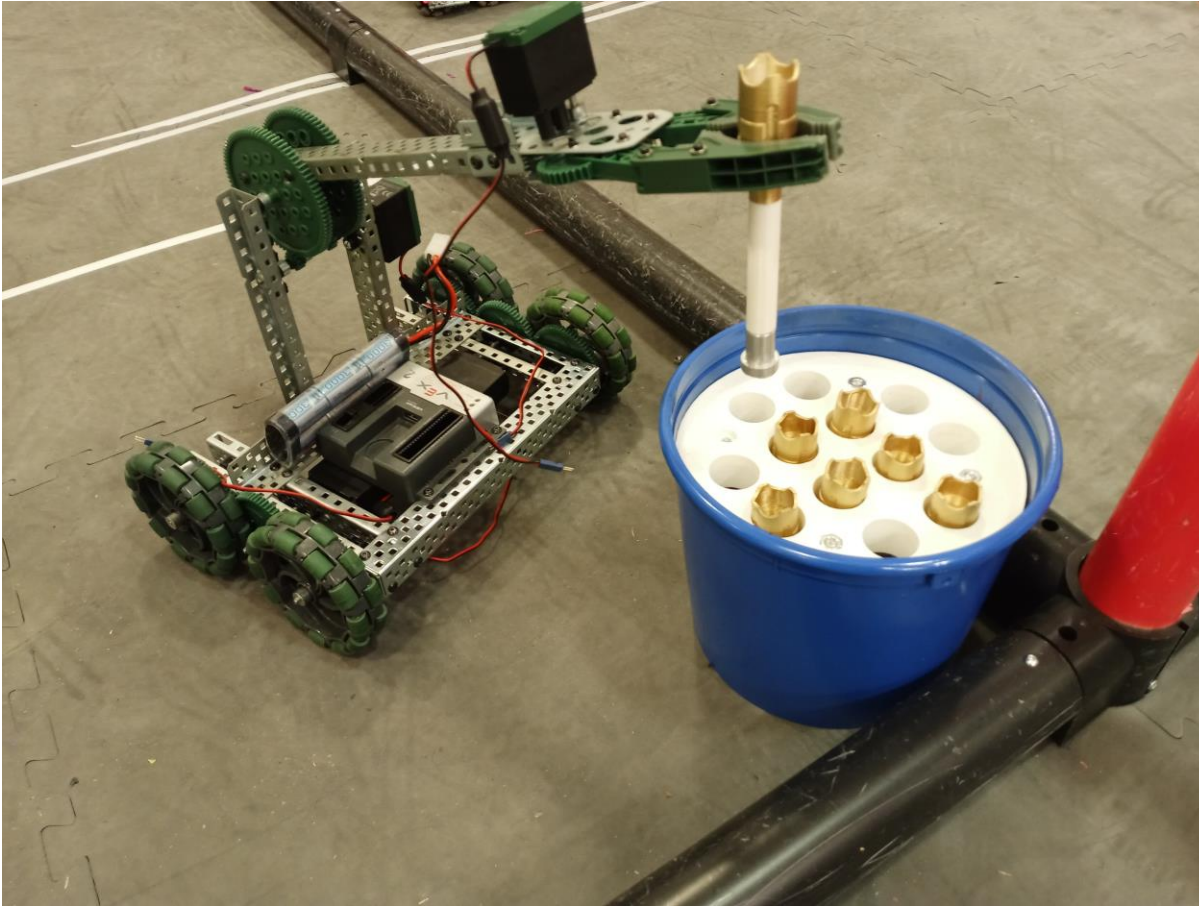
Order of Competition (1)

(1) Autonomous Period

- “3, 2, 1, GO!”
- 30 seconds
- Must be activated by remote
- After activation, remote put down
- Robot touching most tubes wins



Order of Competition (2)



(2) Manual Period

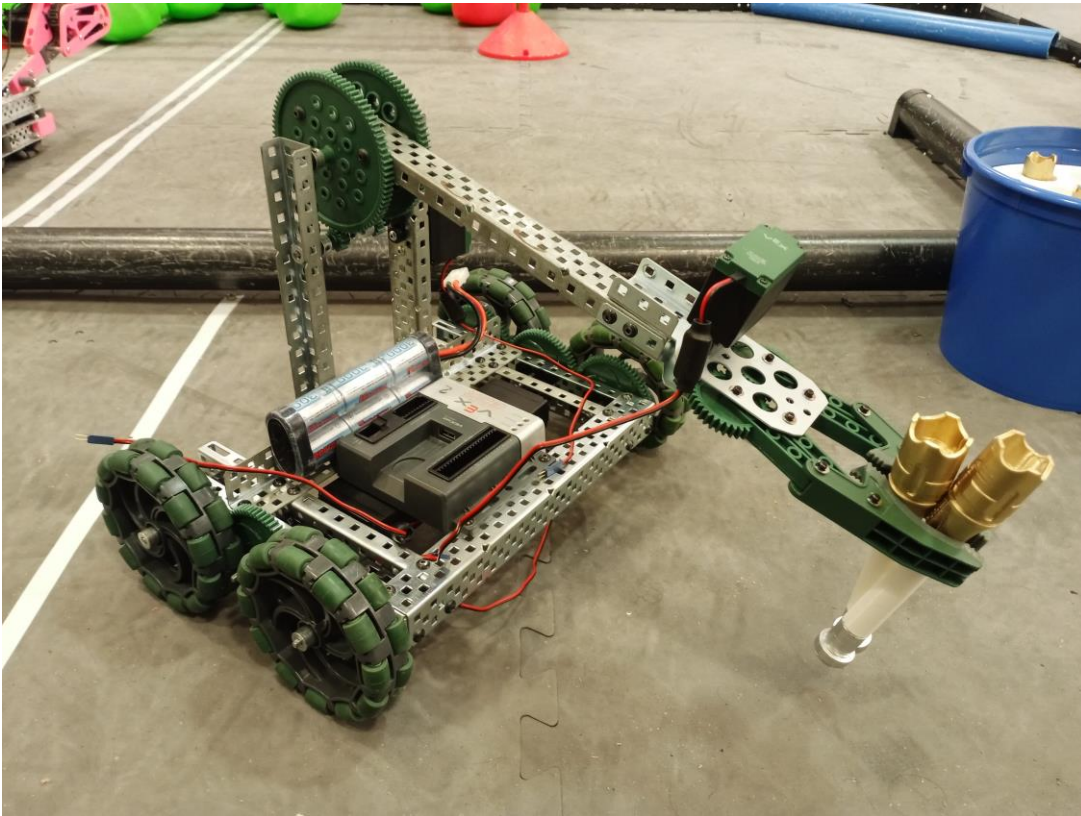
- “3, 2, 1, GO!”
- 2 minutes*
- Pickup controllers and start scoring

*May be changed at any time

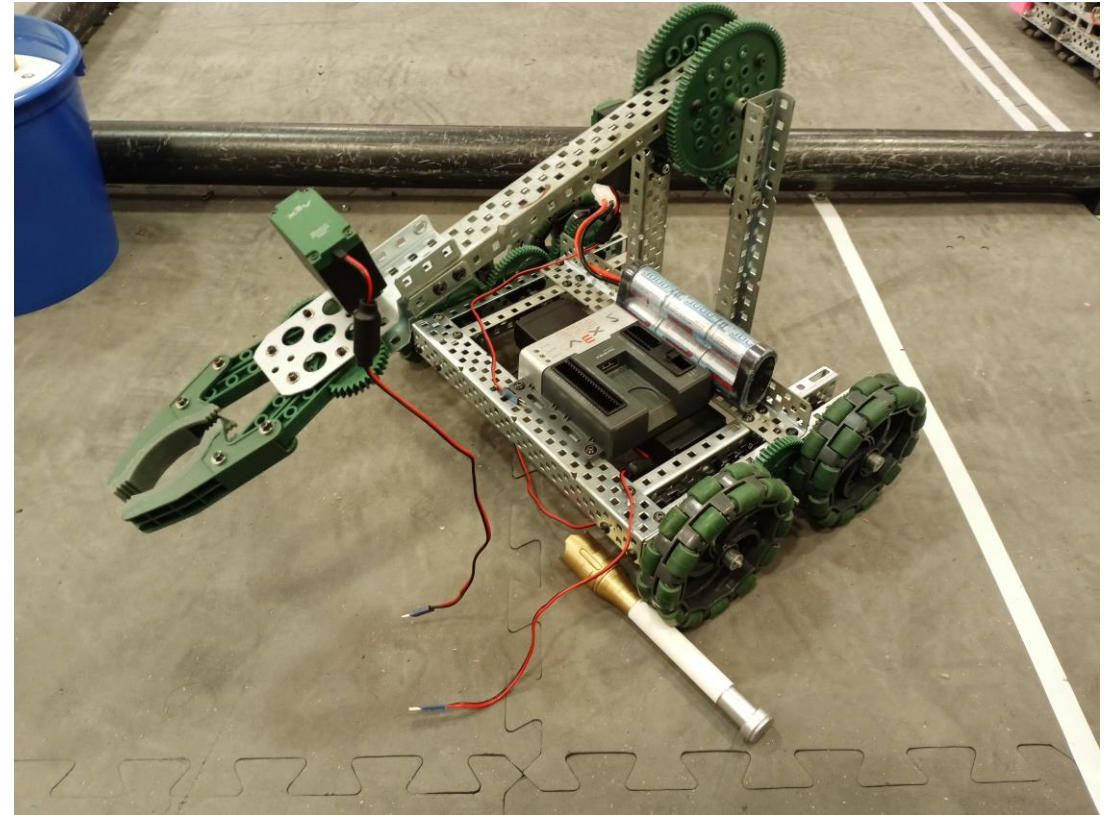
Knowledge Test!

Who Won the Autonomous Period?

Blue Alliance

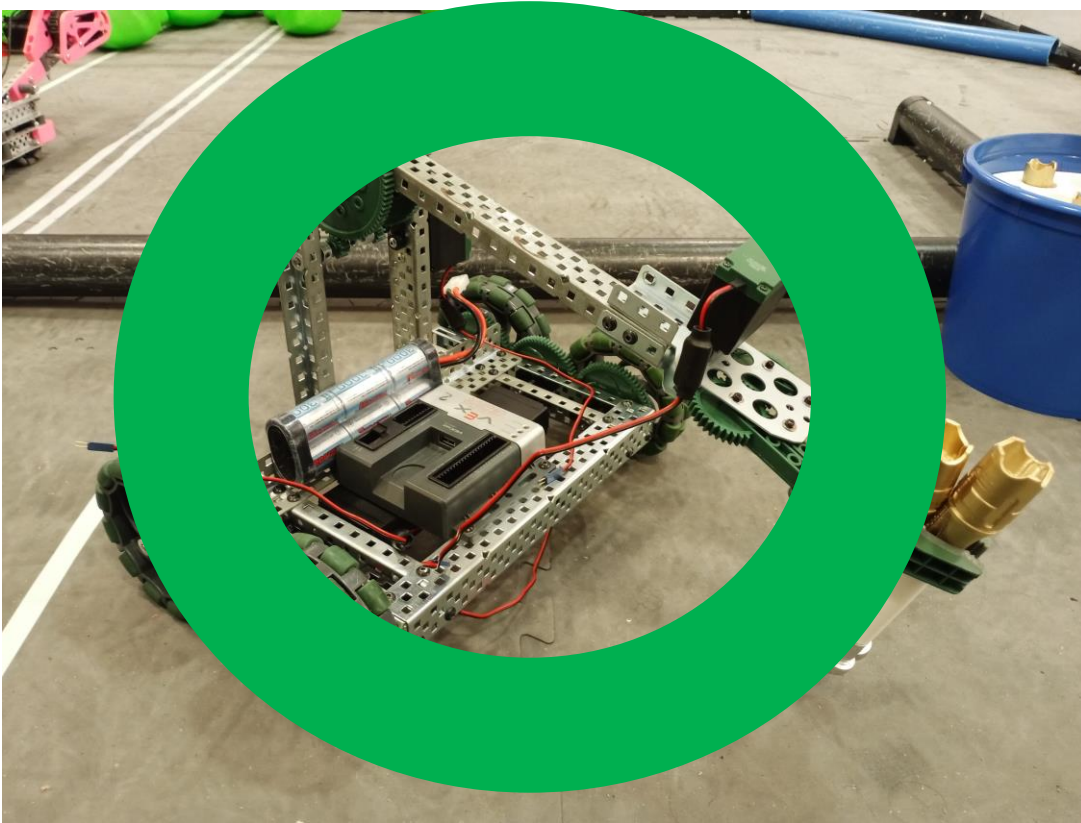


Red Alliance

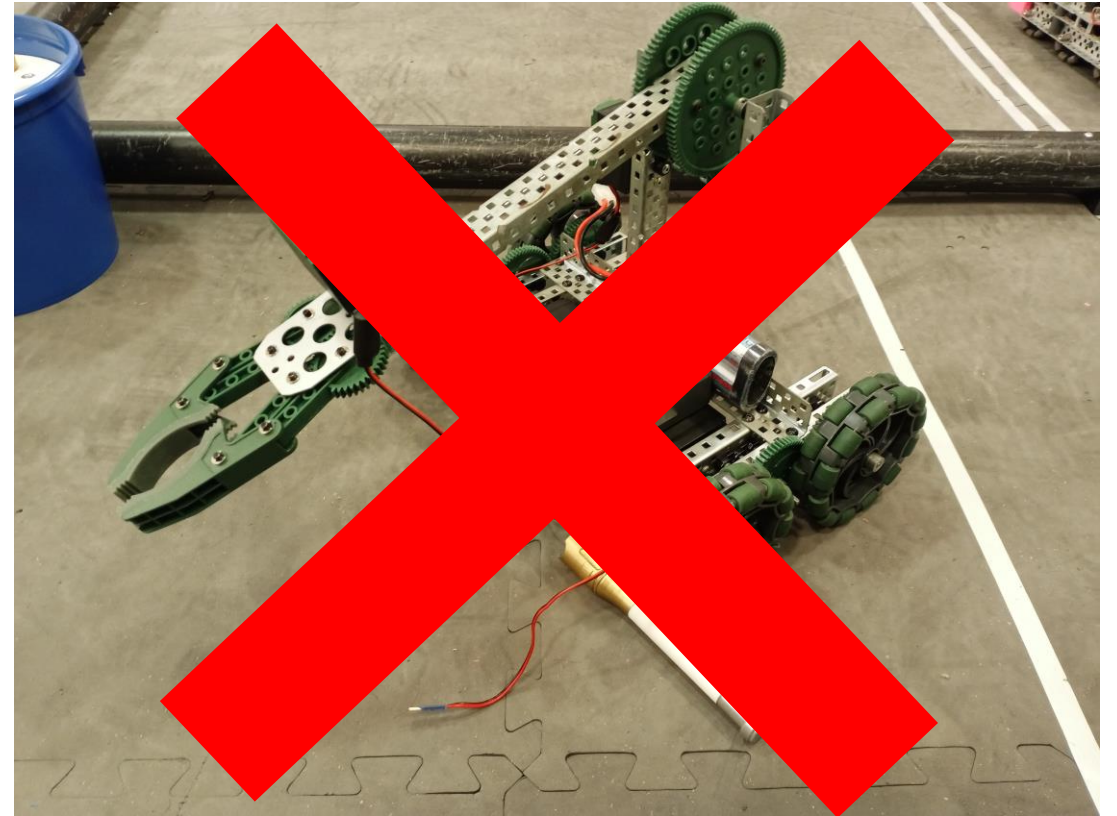


Who Won the Autonomous Period?

Blue Alliance

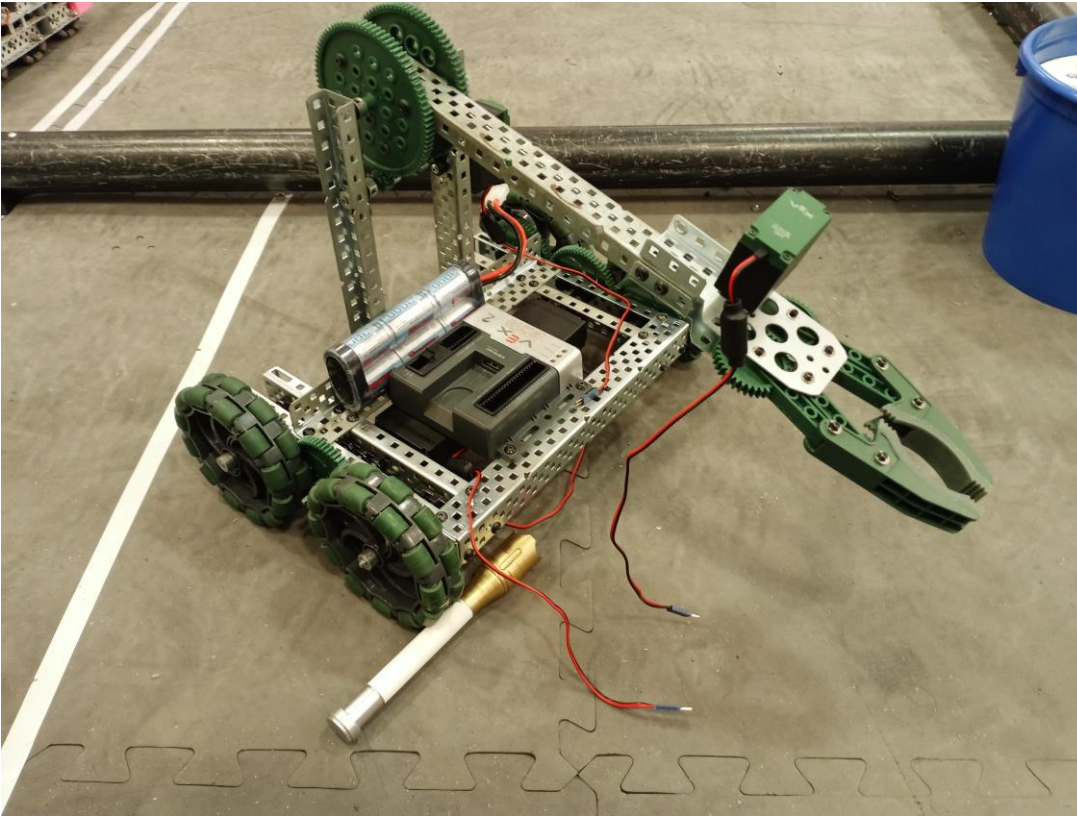


Red Alliance

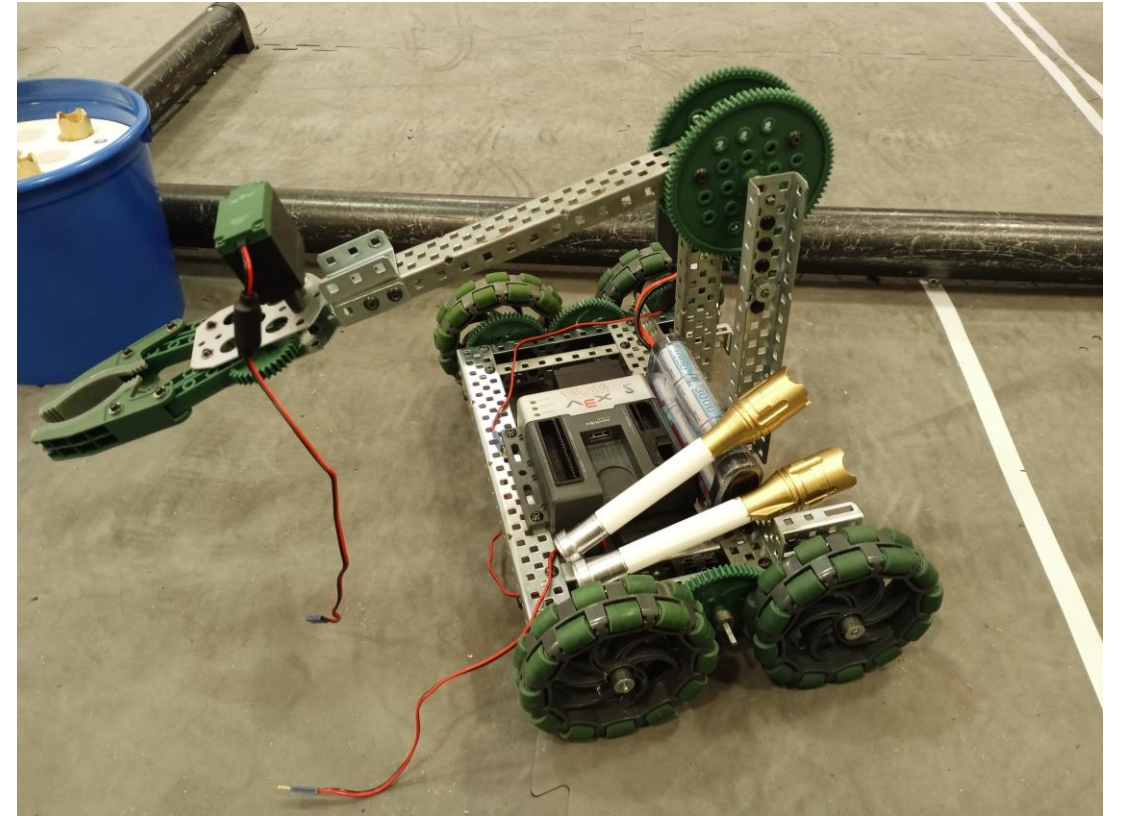


Who Won the Autonomous Period?

Blue Alliance

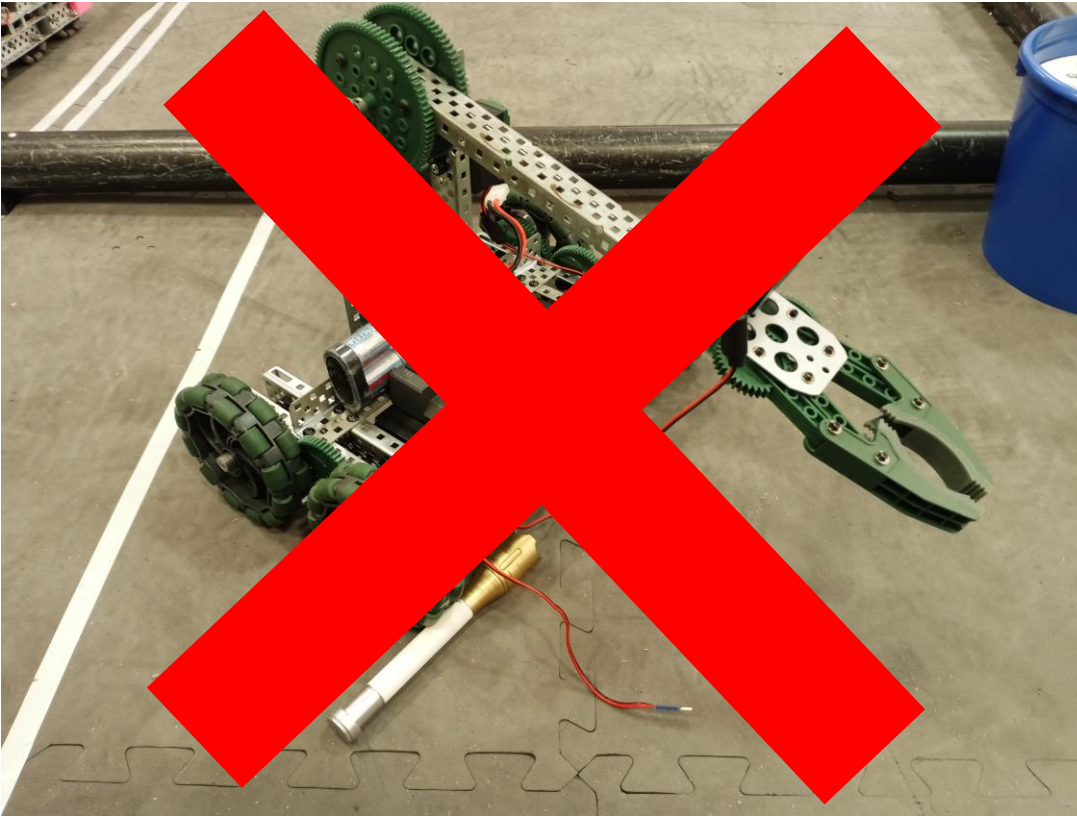


Red Alliance

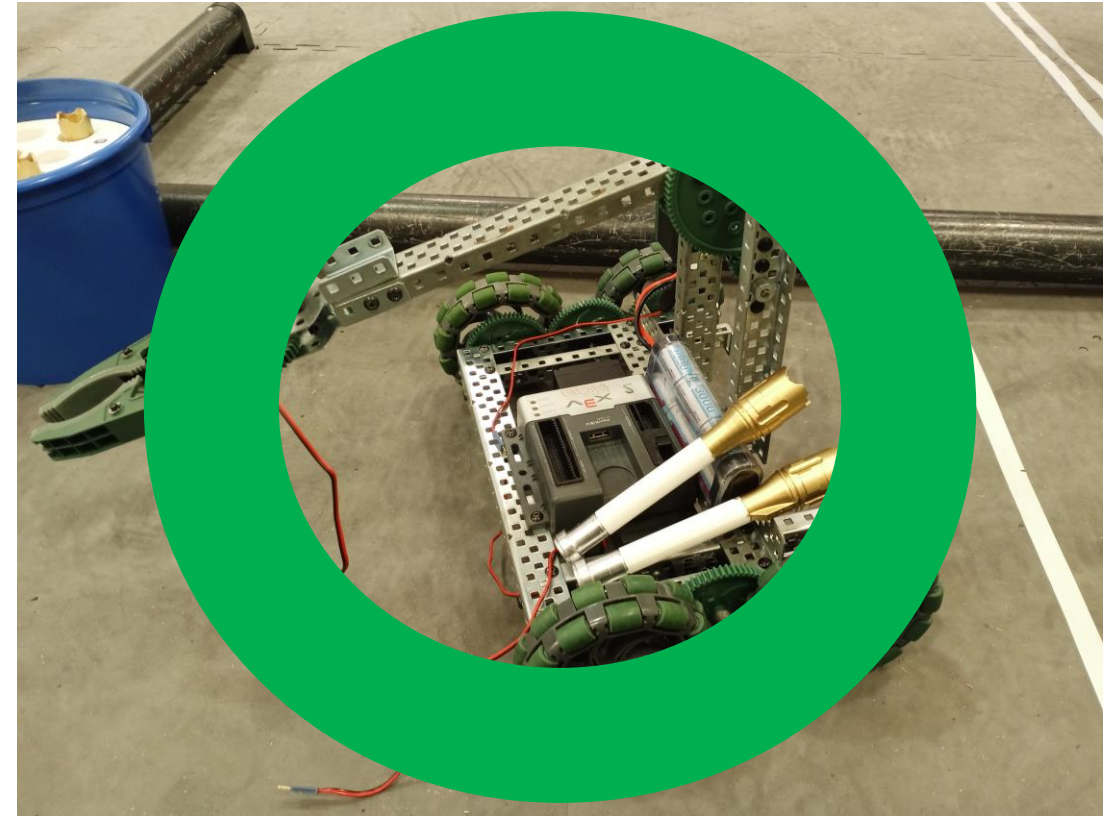


Who Won the Autonomous Period?

Blue Alliance

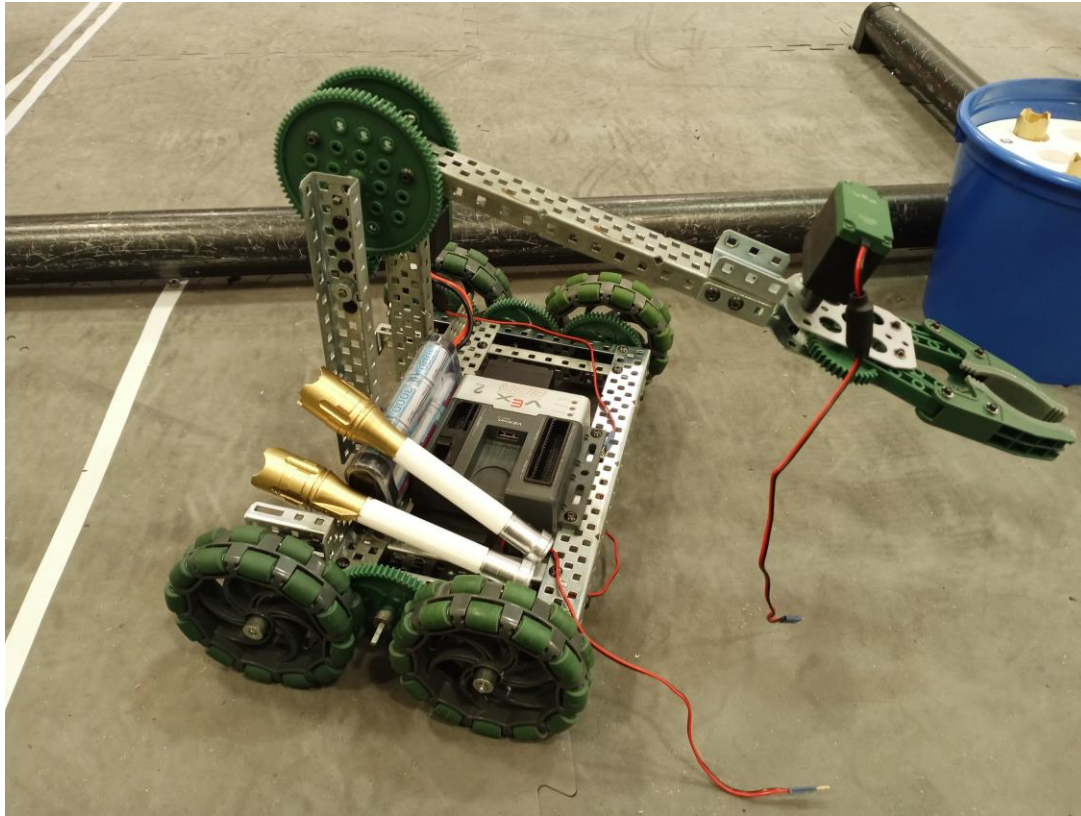


Red Alliance

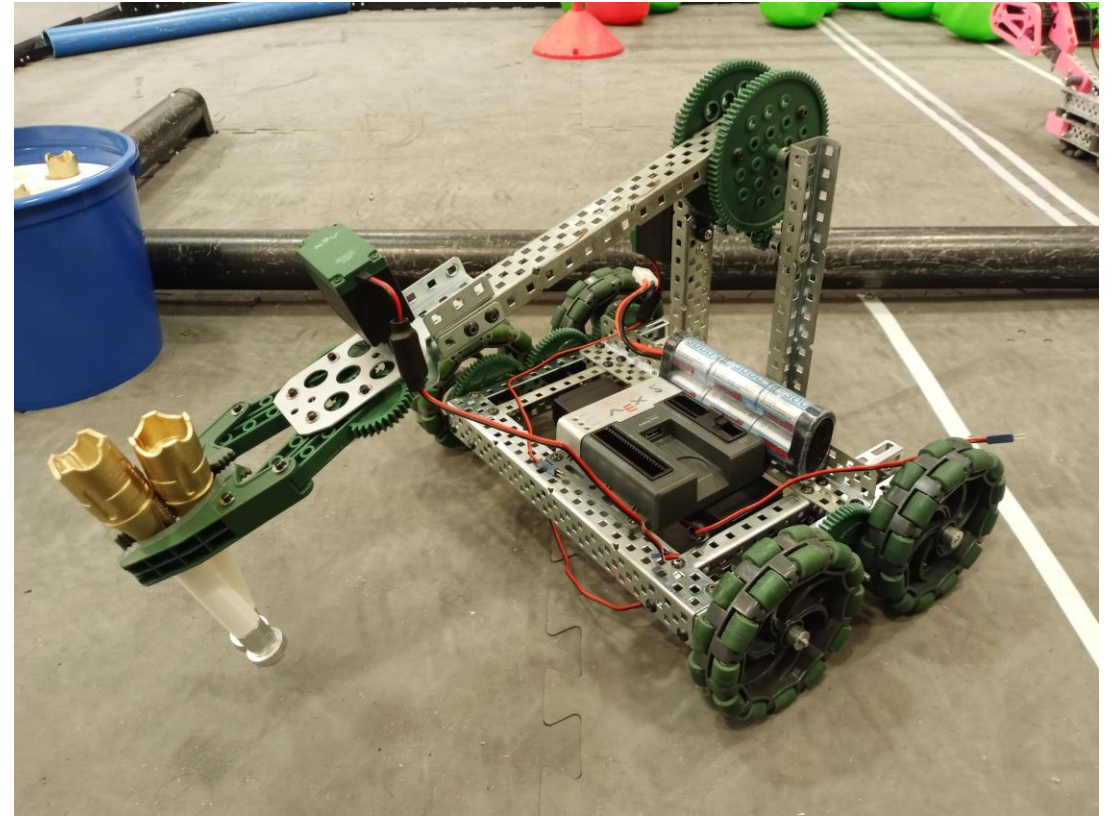


Who Won the Autonomous Period?

Blue Alliance

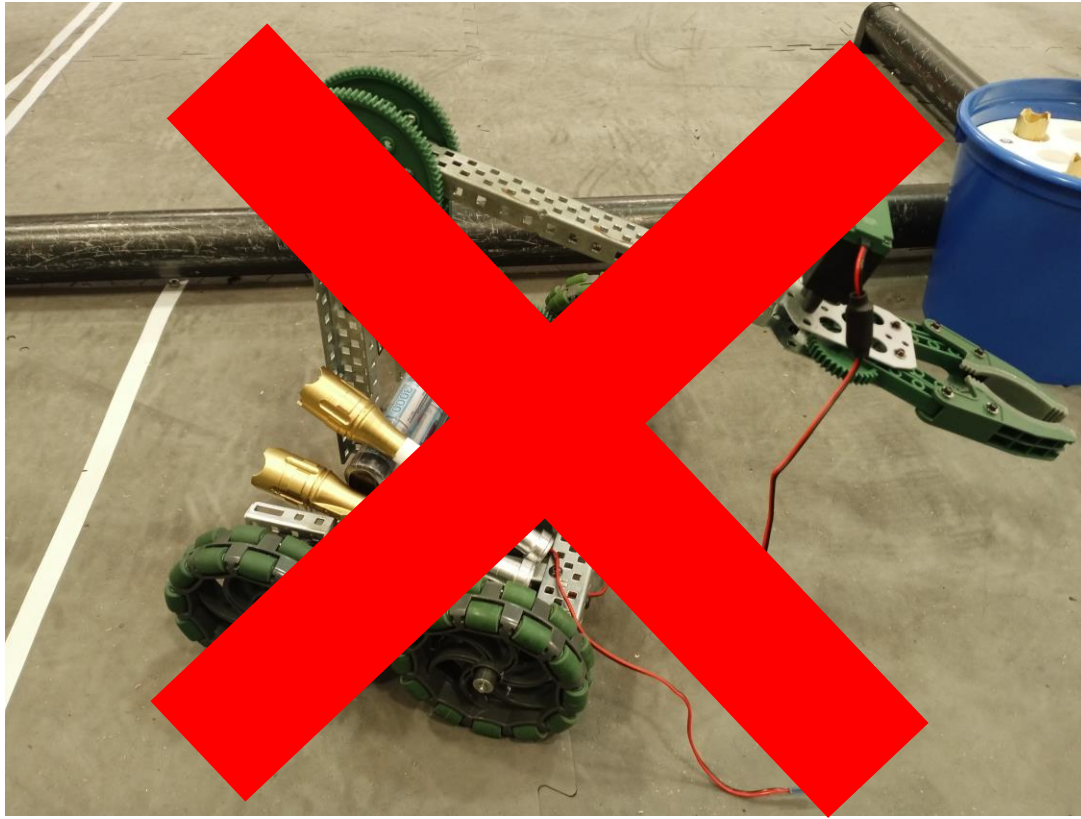


Red Alliance

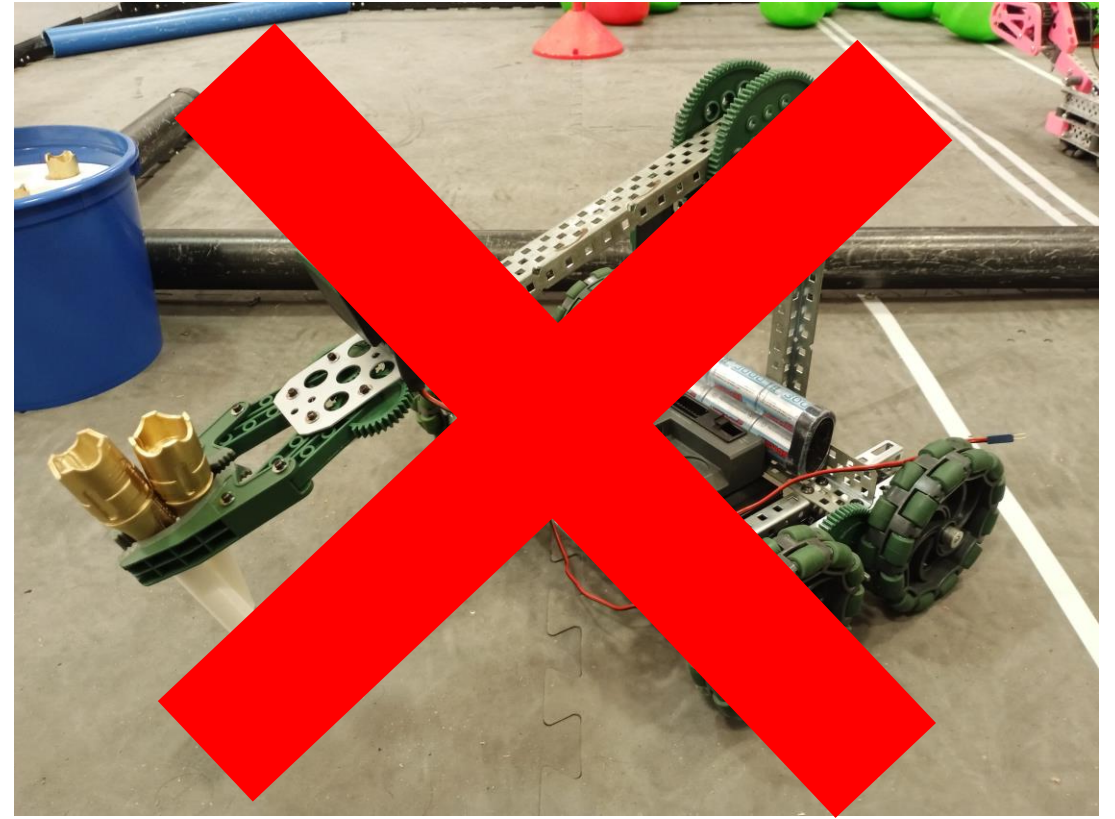


Who Won the Autonomous Period?

Blue Alliance



Red Alliance



How Many Points Have Been Scored?



How Many Points Have Been Scored?



3 tubes x 2 points/tube =

6

How Many Points Have Been Scored?



How Many Points Have Been Scored?



4 tubes x 2 points/tube =

8

How Many Points Have Been Scored?



How Many Points Have Been Scored?



Canister Cannot Close!

0

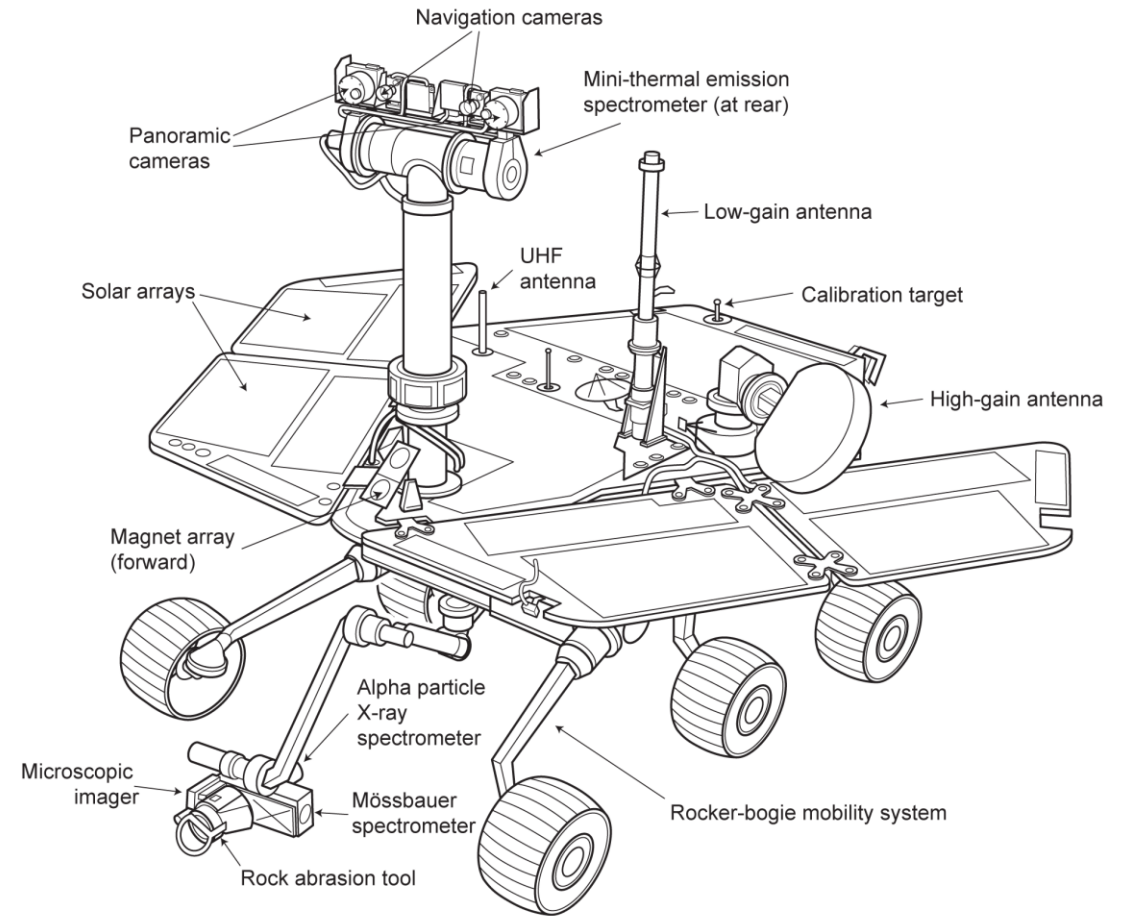
Please Review Full Rules

MTRE 1001L	Spring 2024
MTRE 1001L Competition	
Motivation The Mars San robotic planetary exp the first mission to re scientists on Earth. Ti and surface rovers wi rover, which has been Ten such tubes have i epic MSR mission. For this year's "Fetch Rover" which waiting Mars Ascent prototype rover to co and you will need to i organized a friendly i collect and fetch as n space, the rover must onboard power to cor NASA's Fetch Rover rover. Game Rules (GR1) - Match will last 30 seconds a final score. The man period. (GR2) - Matc robot each. (GR3) - Robo intentional damage or (GR4) - Robo color tape on floor). I alliance's side. Manij	(GR5) - The game will consist of one scoring object, the Mars Sample Tubes (MST). During the autonomous period, the robot that is in physical contact with the most number of MSTs will be declared the winner. Successful delivery of an MST to the Sample Return Canister (SRC) will res end of the man (GR6) - of time. In the i insertion of MS of time, no sco (GR7) - judges, an acci official. Allianc platers purpose (GR8) - Violation of thi (GR9) - period. On "go ground or a tab contact with ea winner of the a ruling on the a into the manual before the indi (GR10) be acting in a n Robot Rules (RR1) - (RR2) - controller. (RR3) - brain. No other (RR4) - depo, with the i
MTRE 1001L	Spring 2024
MTRE 1001L	
(RR5) - Edges of robot should be rounded or covered in padded material, to ensure the safety of all parti- (RR6) - i isotopes. (RR7) - i issues identified parts fall off the until it can pass.	MTRE 1001L Spring 2024 During the competition, design teams will be randomly assigned to either the Red or Blue sides of the competition field. Teams must be prepared to compete on either field arrangement. Game Objects [Mars Sample Tubes (MSTs)] - Also called "Tube" for short "Top" is colored gold and is wider "Bottom" is colored silver and is thinner - Must be inserted into SRC Bottom first  [Sample Return Canister (SRC)] - Also called "Canister" for short - Exterior is color coded to each alliance - Contains 12 holes for MSTs - No objects may stick up past the flat lid at the end of time  Scoring [Autonomous Period] - Robot with most MSTs physically in contact with any part of the robot will be declare winner - Winner of autonomous period awarded 5 points - Examples of

- See detailed competition document for additional rules
- Should be available on D2L?
- Ask questions if they arise!

Next Task: Sketches

- Remember that limited resources are available for use
- Consider how to use sensors for autonomous period
- (Make sure to test sensors before implementation)



**Link to Tube
CAD File**



**Modular Aerospace and
Robotic Systems**