

Fig. 9

schat op 4,6 cm dikte in het midden en de straal van de bolle zijde op 24 cm.
De lens is op deze schaal getekend.

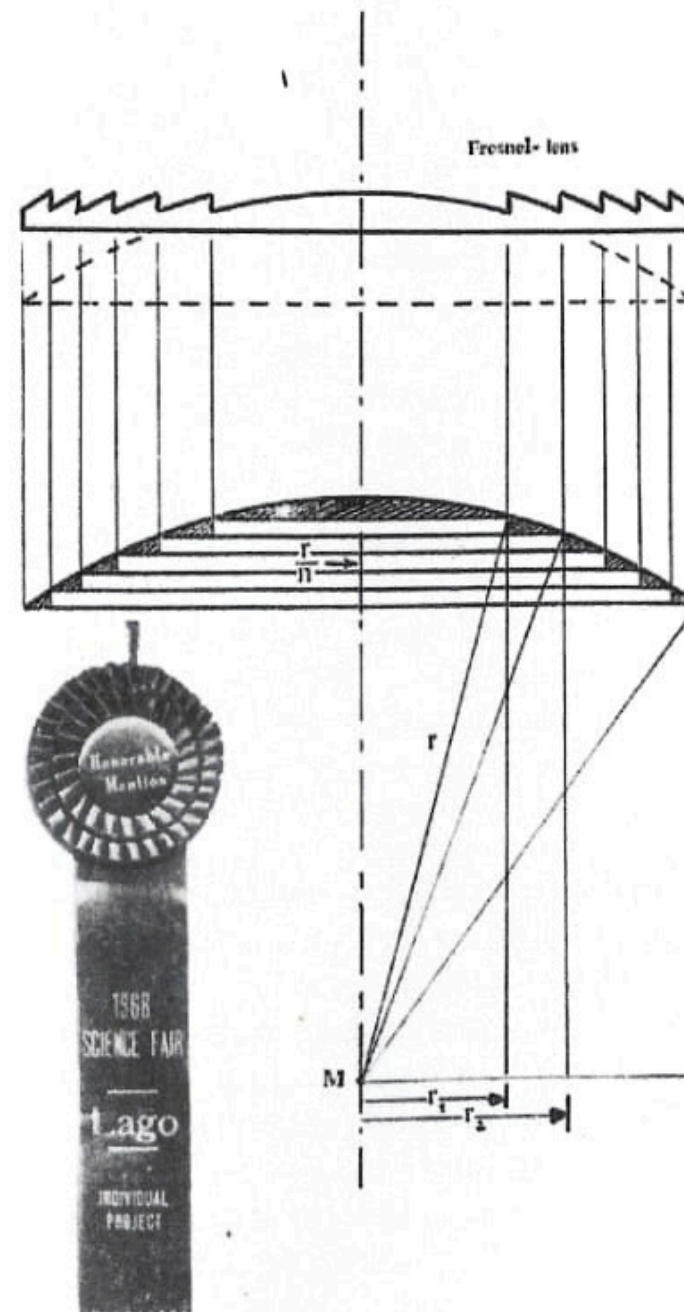


Fig. 10

°°Je zult gemakkelijk inzien, dat, als je de tanden even hoog wilt houden, de stralen van de diverse groeven niet even groot kunnen zijn.

Stel de laagdikte r/n . Lees nu af in de figuur:

$$r_1^2 = r^2 - (r - r/n)^2$$

dus $r_1 = r/n \sqrt{2n-1}$

evenzo $r_2 = r/n \sqrt{4n-4}$

en $r_3 = r/n \sqrt{6n-9}$ enz.

Represented by:

Quintin Lochtenberg, Angeline Lacle, Ruarth Lampe,
Guiyan de Nobrega & Princess Thaisha Tucker



**FIRST GLOBAL
CHALLENGE 2024**
ATHENS / ΑΘΗΝΑ



KIVI robotic presentation



HELLENIC REPUBLIC
Ministry of Digital Governance



mellonlab



**FIRST
GLOBAL**

Introduction & Pre-competition:

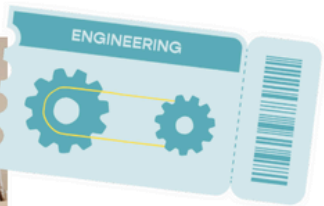
- Stem Embassy & Robotics Hackathon, Team Aruba
- **Building the Robot and Initial challenges:**
- First Global Challenge: Feeding The Future - Game Rules
- **Final Design and Coding:**
- Mechanics Simulation
- Coding, Assembling and Operating the Robot
- **Competition and Lesson Learned:**
- Event at Greece, Opening and Participants
- Challenges and Opportunitites During Games
- Results and Experience



The STEM Embassy



**Education.
Representation.
Inspiration.**



The Stem Embassy

The STEM Embassy is a place of knowledge and resources which aims to assist our youth on the islands of Aruba, Bonaire, and Curaçao in their self-discovery and development in the fields of Science, Technology, Engineering, and Mathematics (STEM) on the islands.

TheStemEmbassy.com

Hackaton: Part of the AD

powered by The STEM Embassy

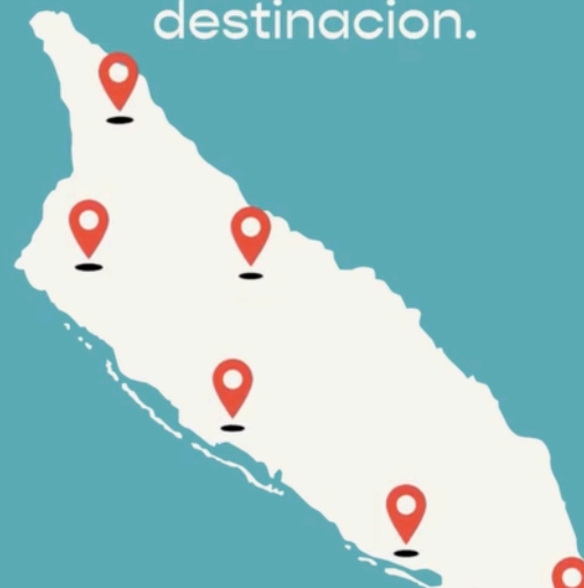
The
STEM
Embassy

Bin yuda nos traha un sistema
di transporte nobo y
sostenibel pa Aruba!



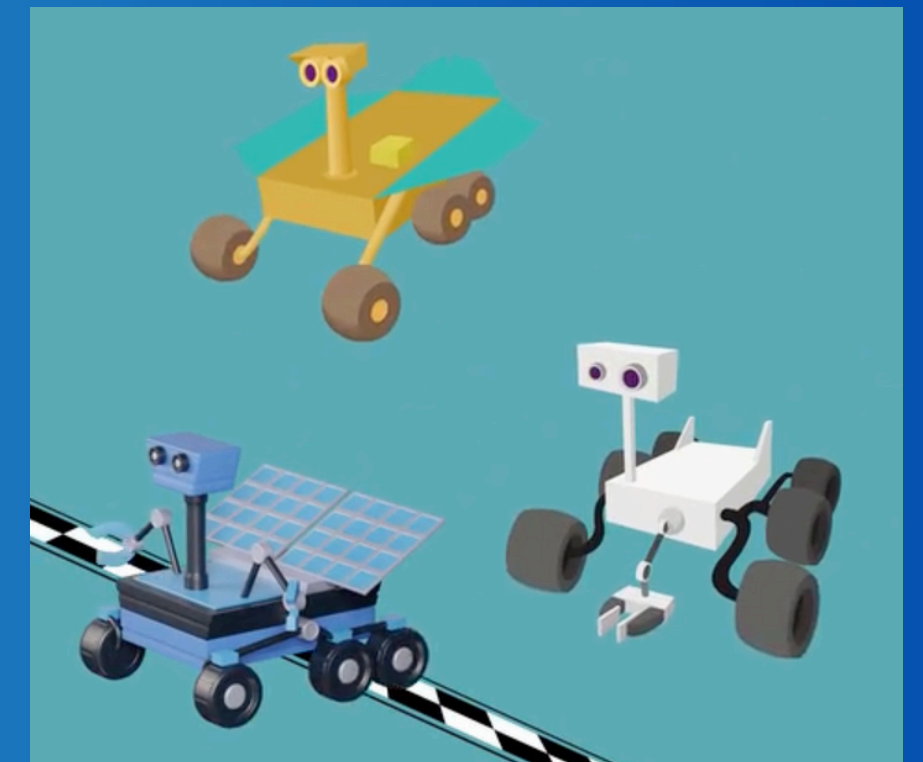
Como ingeniero nobo abo ta
haya un lista di pasahero cu
abo mester transporta.

diferente bario y mester
wordo hiba na nan propio
destinacion.



Despues bo tin cu bay programa
bo robot pa core e ruta.

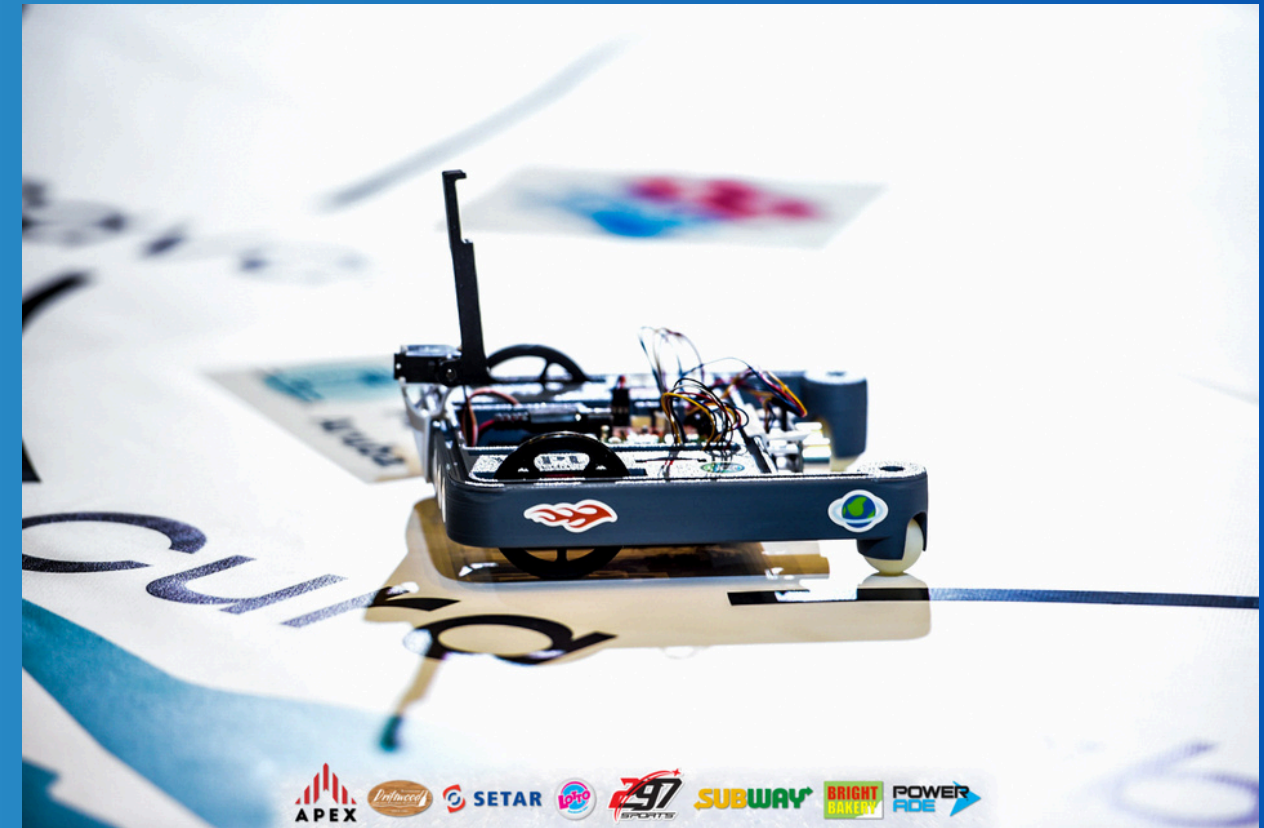
The
STEM
Embassy



Robotics Hackathon 2024

powered by The STEM Embassy

- A Pre Course was given about robotics & Sustainability
- Ended Up in a Hackathon
- Presentation about sustainable transportation
- Robot should work autonomous and Manually operated in a Battle Bot challenge



TEAM ARUBA



First Global challenge

FIRST: For Inspiration & Recognition of Science & Technology

FIRST Robotics: Transforming culture by fostering a world where science and technology are celebrated, inspiring young people to become future leaders in these fields.

The **FIRST Global Challenge** is an **Olympic-Style**, international robotics competition that takes place in a different country each year.

Advocating for: Robotics as a Sport

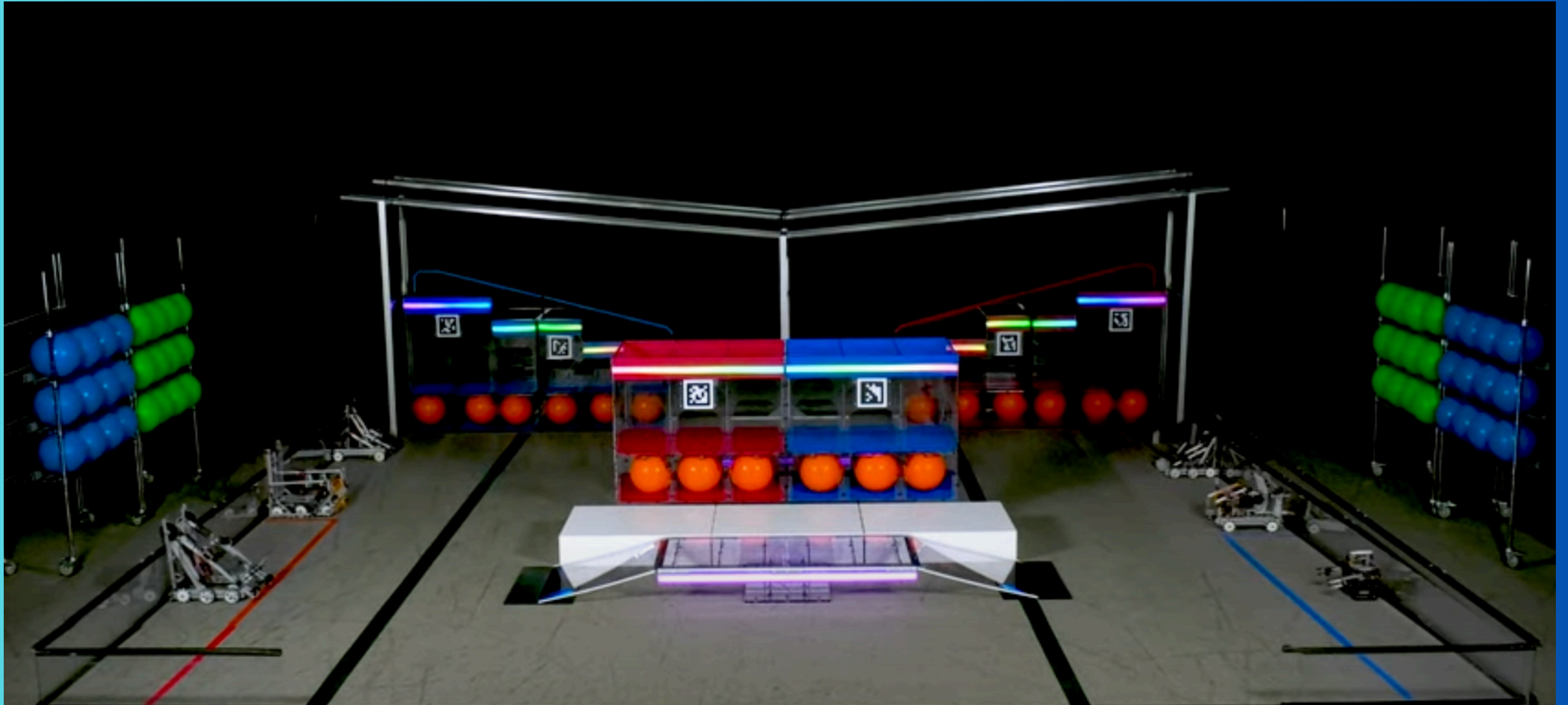


FGC: Feeding the future

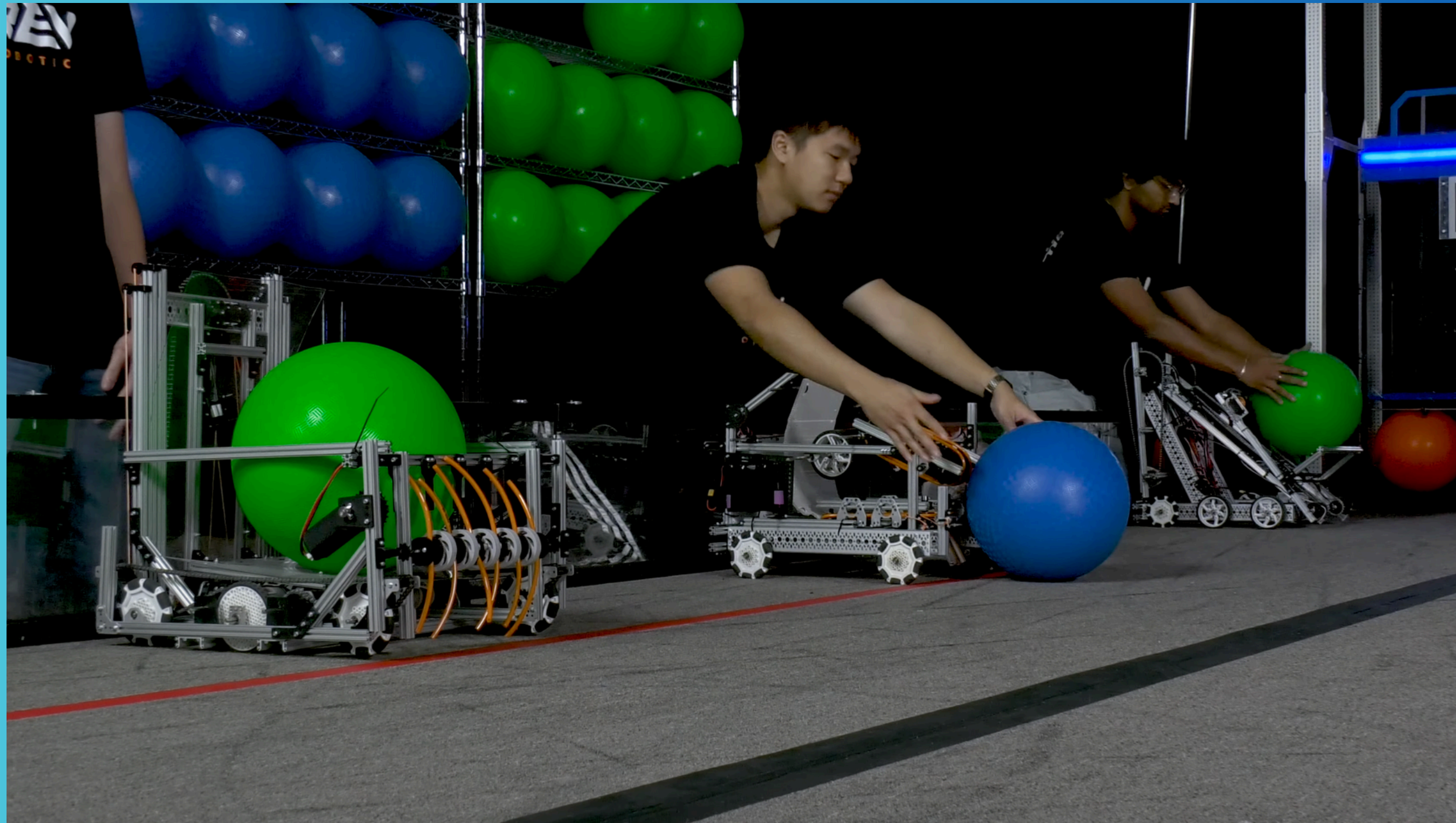
In addition to focusing on robotics, participants must engage and have online meetings with other teams and participate in different activities such as create videos that address global issues



Game Rules: Basics



Game Rules: Basics



Game Rules: Basics



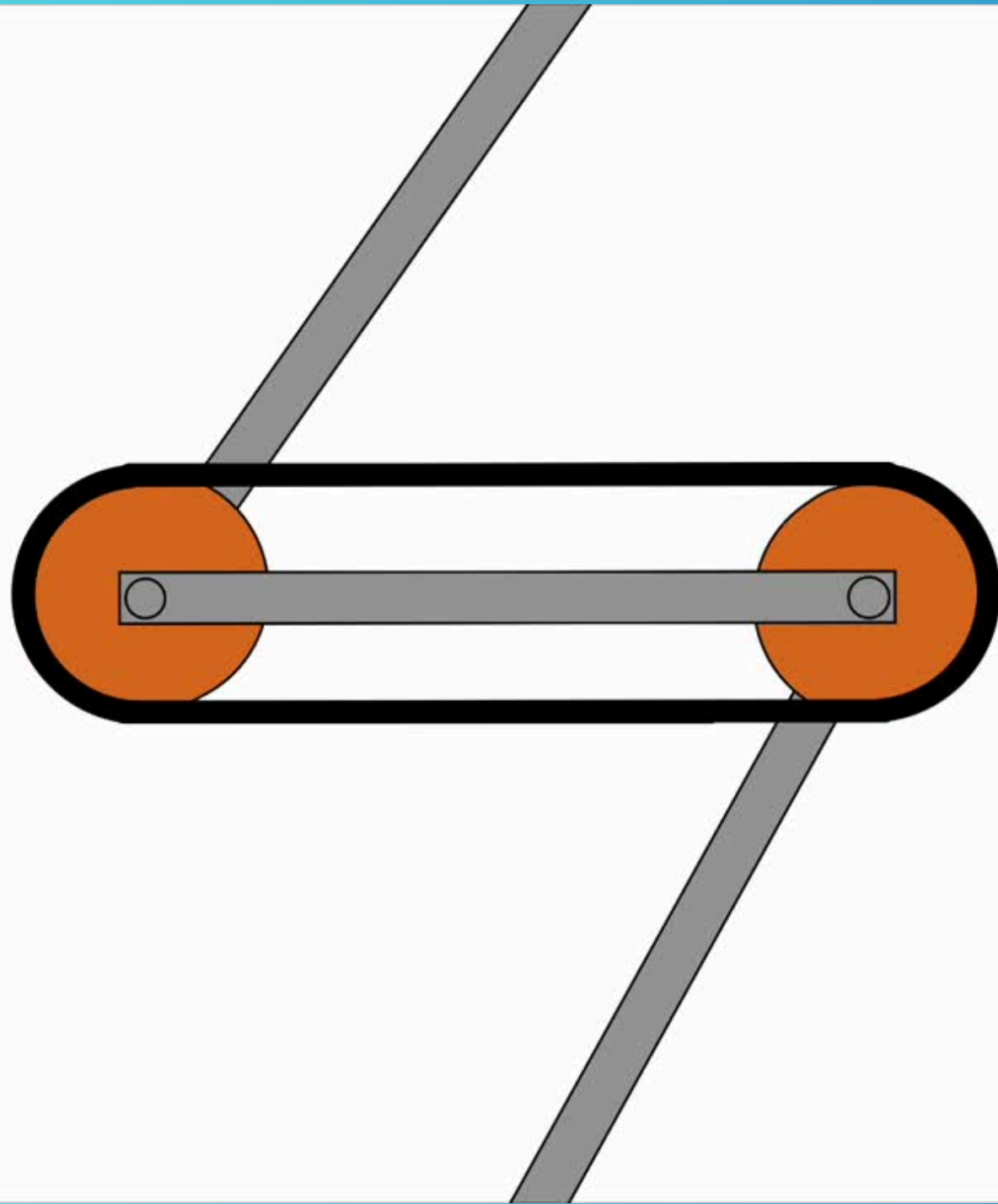
The Mechanics

Ball control can be categorized in two main parts:

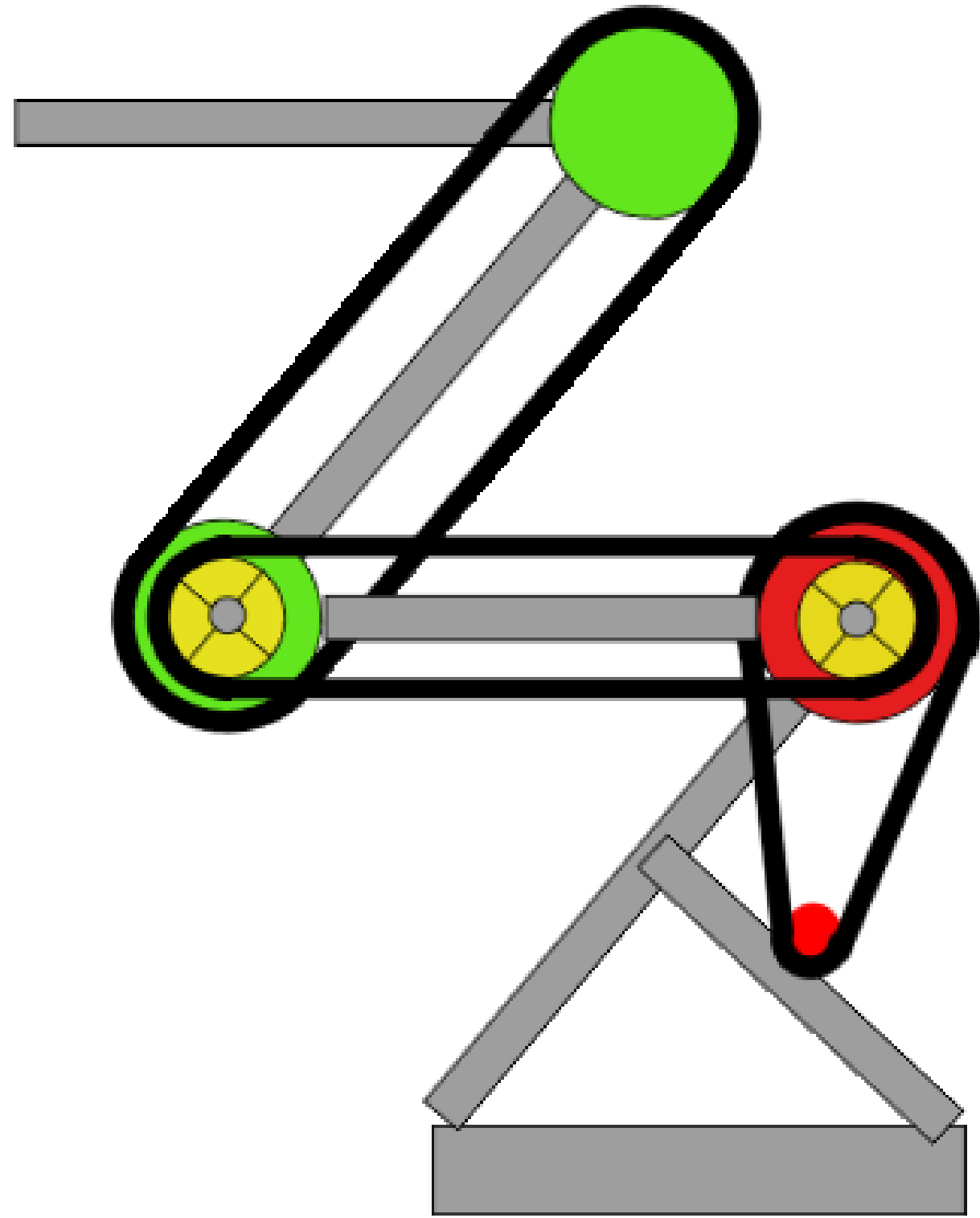
- Lifting the Ball
- Pick and Release the Ball



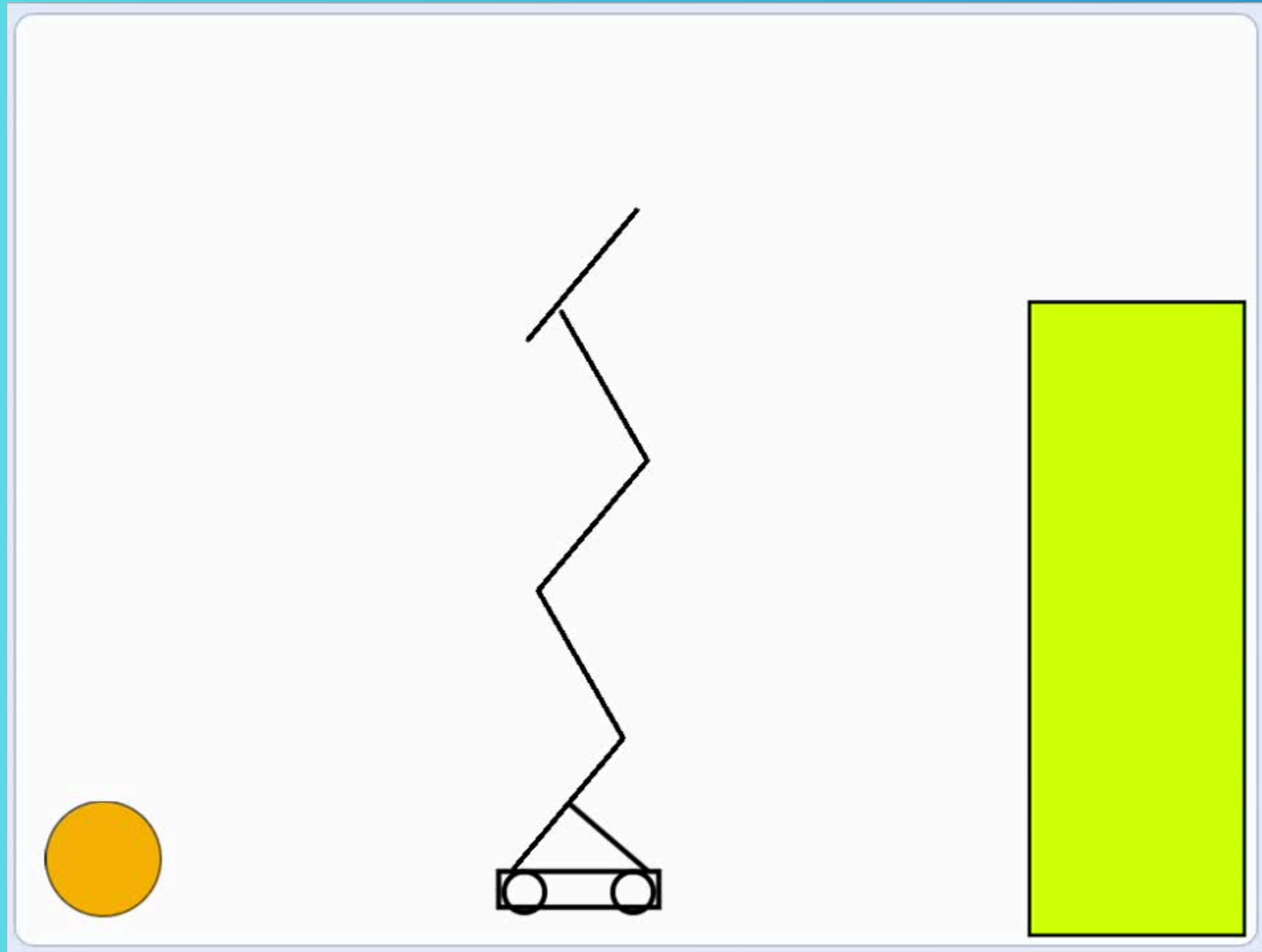
Lifting the Ball



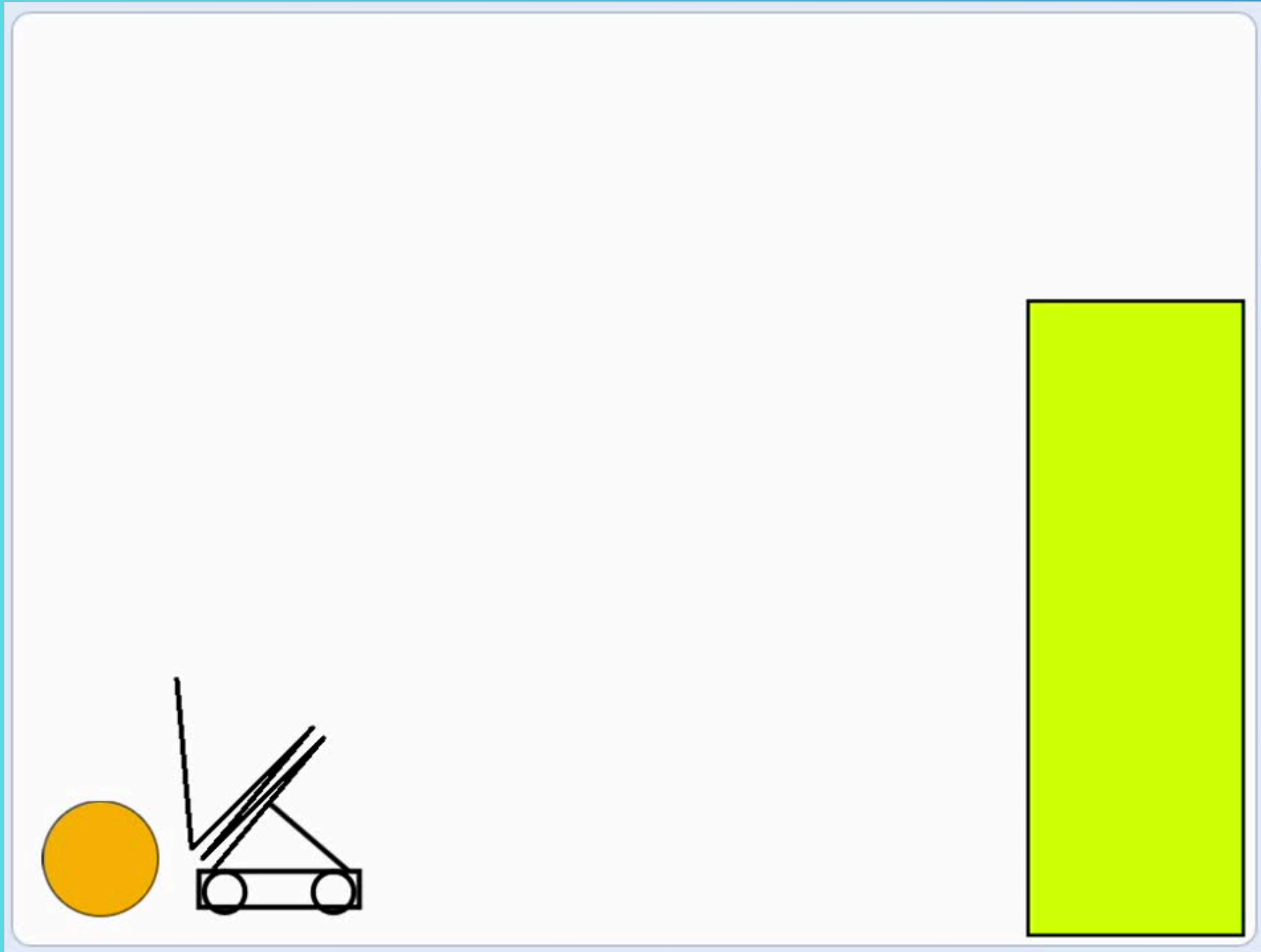
Lifting the Ball



Lifting the Ball



Picking and Release the Ball



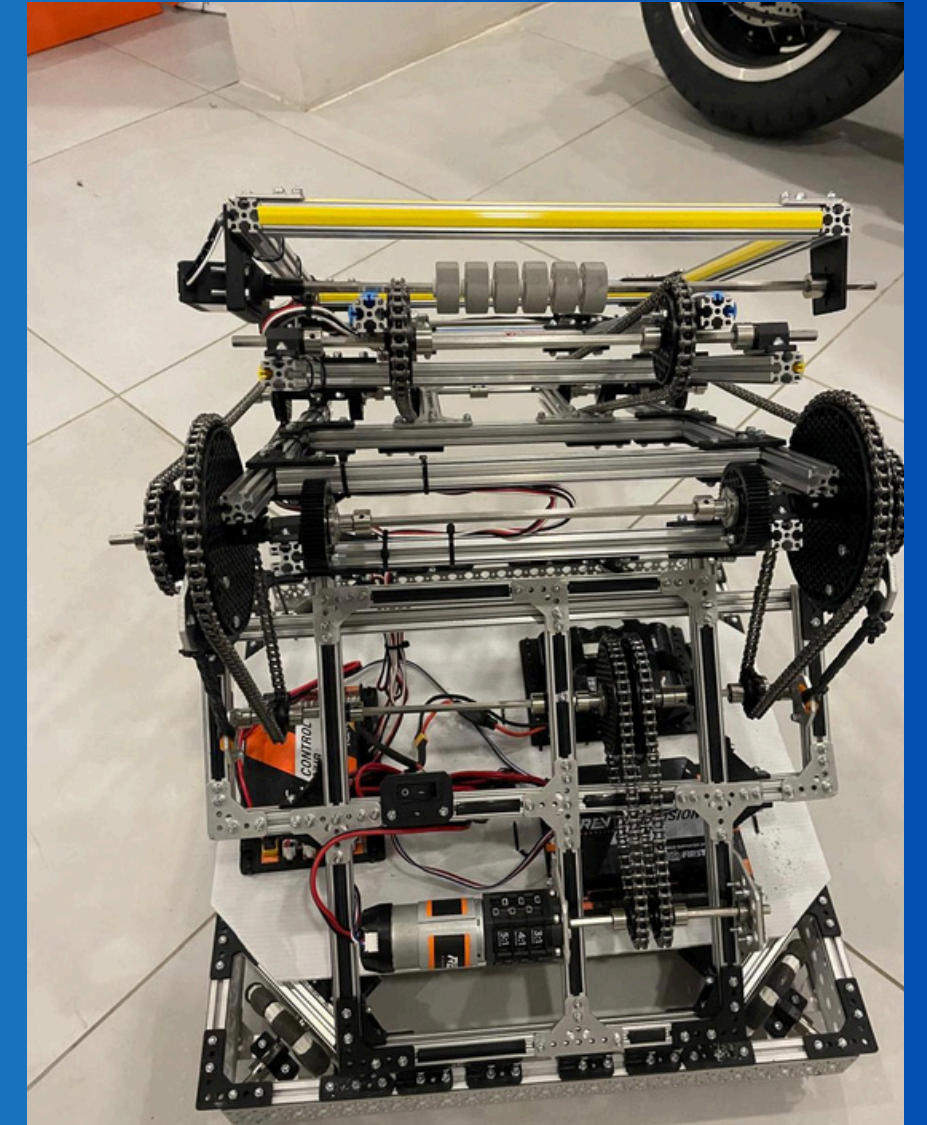
Coding, Wiring and Operating the Robot

- Interpret Movement into Code
 - Initialize components, add movement and assign to controller
- Assembling & redesign
 - (several long night trial and error)
- Operating the Robot



Coding

- The setup / initializing
 - Motors
 - Constants
 - Sensor
- Main loop / Robot brain
 - Movement
 - Arm raising



The Setup

```
to runOpMode
  FGC_Aruba
  Put initialization blocks here.
  set MAG_SENSE . State to true
  Drive Motors
  set Drive_1 . Direction to Direction . REVERSE
  set Drive_2 . Direction to Direction . REVERSE
  set Drive_3 . Direction to Direction . REVERSE
  set Drive_4 . Direction to Direction . REVERSE
  DRIVE MOTOR SPEED
  set Motor_Speed to 1
  set Negative_Motor_Speed to -1
  set Rotate_Speed to 0.6
  set Negative_Rotate_Speed to -0.6
  Arm Go Motors
  set Arm_Motor . Direction to Direction . REVERSE
  WHEEL
  set WHEELS . Direction to Direction . REVERSE
  set WHEELZ_UP . Direction to Direction . FORWARD
  set WHEEL2_UP . Direction to Direction . REVERSE
  call waitForStart
```

The Brains

```
do Put run blocks here.
repeat while call opModelsActive
do Put loop blocks here.
set Y to gamepad1 . RightStickY
set X to gamepad1 . RightStickX
Robot-Move
if Y < -0.5 and X < -0.5
do Top-Left-Diagnol
set Power
Drive_3 to Negative_Motor_Speed
Drive_2 to Motor_Speed
set Power
Drive_1 to 0
Drive_4 to 0
else if Y < -0.5 and X > 0.5
do Top-Right-Diagnol
set Power
Drive_4 to Negative_Motor_Speed
Drive_1 to Motor_Speed
set Power
Drive_3 to 0
Drive_2 to 0
else if Y > 0.5 and X < -0.5
do Bottom-Left-Diagnol
set Power
Drive_4 to Motor_Speed
Drive_1 to Negative_Motor_Speed
set Power
Drive_3 to 0
Drive_2 to 0
else if Y > 0.5 and X > 0.5
do Bottom-Right-Diagnol
set Power
Drive_3 to Motor_Speed
Drive_2 to Negative_Motor_Speed
set Power
Drive_1 to 0
Drive_4 to 0
```

```
else if Y < -0.5
do Forward
set Power
Drive_3 to Negative_Motor_Speed
Drive_1 to Motor_Speed
set Power
Drive_4 to Negative_Motor_Speed
Drive_2 to Motor_Speed
else if Y > 0.5
do Backward
set Power
Drive_3 to Motor_Speed
Drive_1 to Negative_Motor_Speed
set Power
Drive_4 to Motor_Speed
Drive_2 to Negative_Motor_Speed
else if X < -0.5
do Left
set Power
Drive_3 to Negative_Motor_Speed
Drive_1 to Negative_Motor_Speed
set Power
Drive_4 to Motor_Speed
Drive_2 to Motor_Speed
else if X > 0.5
do Right
set Power
Drive_3 to Motor_Speed
Drive_1 to Motor_Speed
set Power
Drive_4 to Negative_Motor_Speed
Drive_2 to Negative_Motor_Speed
else Neutral
set Power
Drive_3 to 0
Drive_1 to 0
set Power
Drive_4 to 0
Drive_2 to 0
```

The Brains

```
Rotate
if gamepad1 . LeftStickX < -0.5
do
  Anti-Clockwise
  set Power
  Drive_3 to Rotate_Speed
  Drive_1 to Rotate_Speed
  set Power
  Drive_4 to Rotate_Speed
  Drive_2 to Rotate_Speed
else if gamepad1 . LeftStickX > 0.5
do
  Clockwise
  set Power
  Drive_3 to Negative_Rotate_Speed
  Drive_1 to Negative_Rotate_Speed
  set Power
  Drive_4 to Negative_Rotate_Speed
  Drive_2 to Negative_Rotate_Speed
```

```
Arm Go
if gamepad1 . B
do
  UP
  set Arm_Motor . Power to -1
else if MAG_SENSE . State = true
do
  DOWN
  set Arm_Motor . Power to 0
  set Arm_Motor . ZeroPowerBehavior to ZeroPowerBehavior . BRAKE
  if gamepad1 . A
  do
    set Arm_Motor . Power to 1
else
  NOTIINN???
  set Arm_Motor . Power to 0
  set Arm_Motor . ZeroPowerBehavior to ZeroPowerBehavior . BRAKE

WHEELSSSS GOOO UUPPPP
if gamepad1 . LeftBumper
do
  set WHEELZ_UP . Power to 1
  set WHEEL2_UP . Power to 1
else if gamepad1 . RightBumper
do
  set WHEELZ_UP . Power to -1
  set WHEEL2_UP . Power to -1
else
  set WHEELZ_UP . Power to 0
  set WHEEL2_UP . Power to 0

WHEELSS GOO BUUURRR
if gamepad1 . X
do
  set WHEELS . Power to 1
else if gamepad1 . Y
do
  set WHEELS . Power to -1
else
  set WHEELS . Power to 0

call Telemetry . update
```

The Mechanics of Movement

- The idea
 - Inspiration
 - Teaching
- Application
 - movement
- Explanation how it works

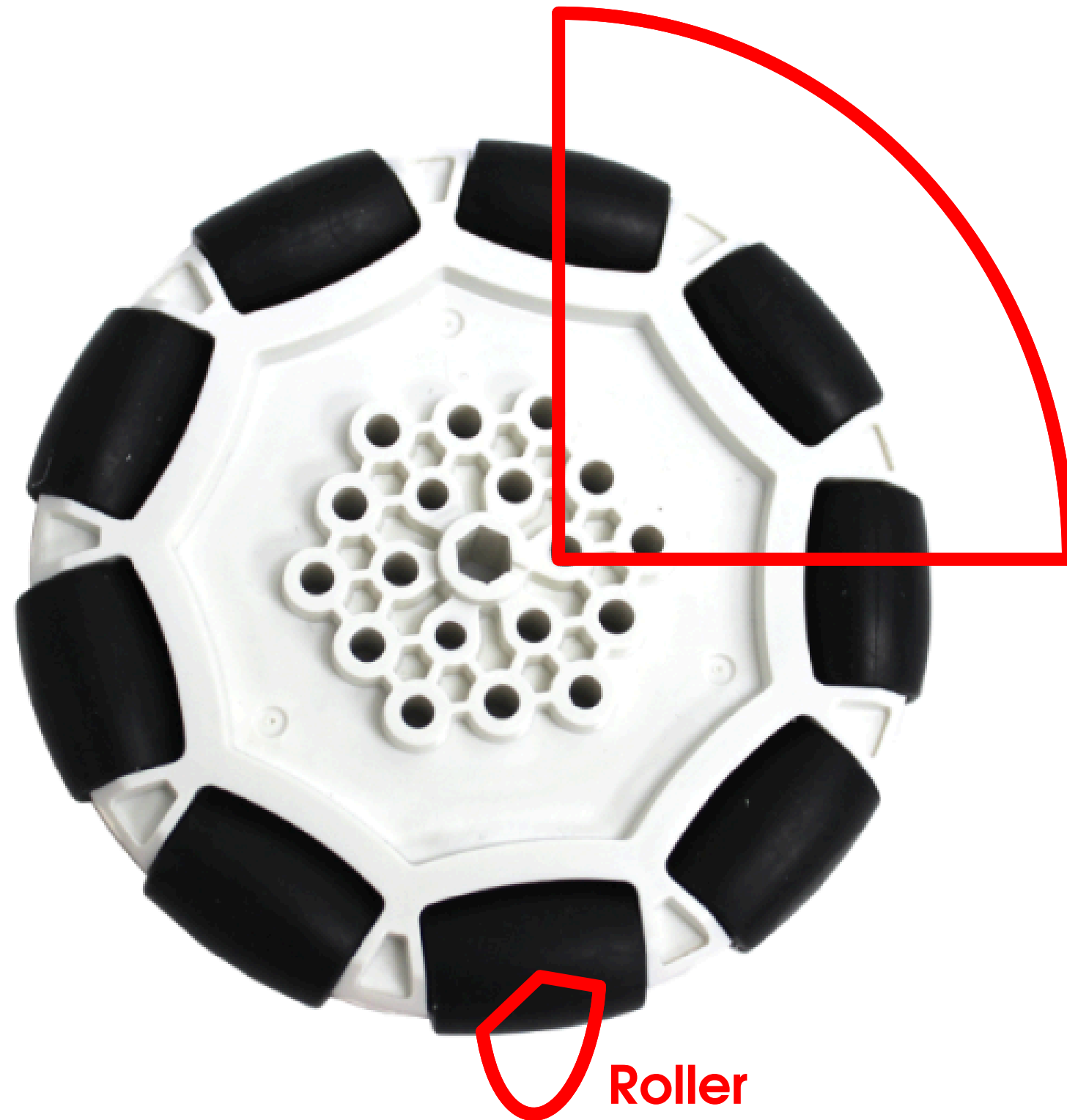
THE



Explanation and Application

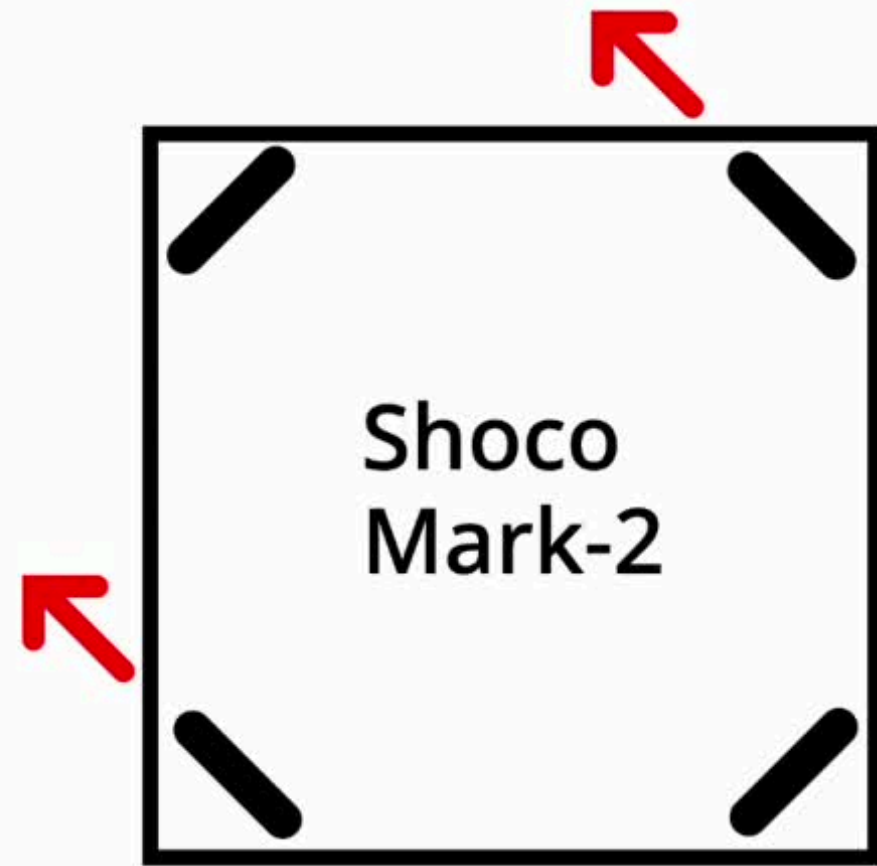


Omni Directional

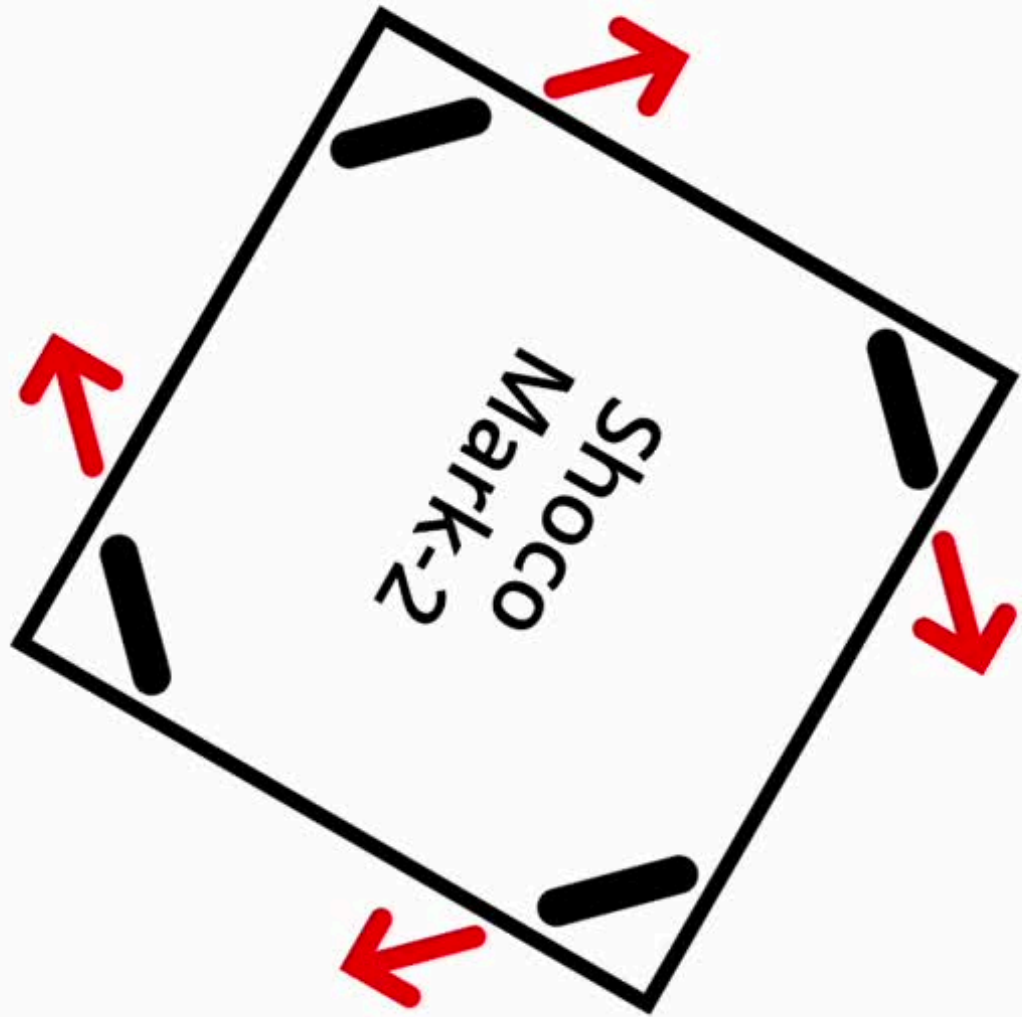


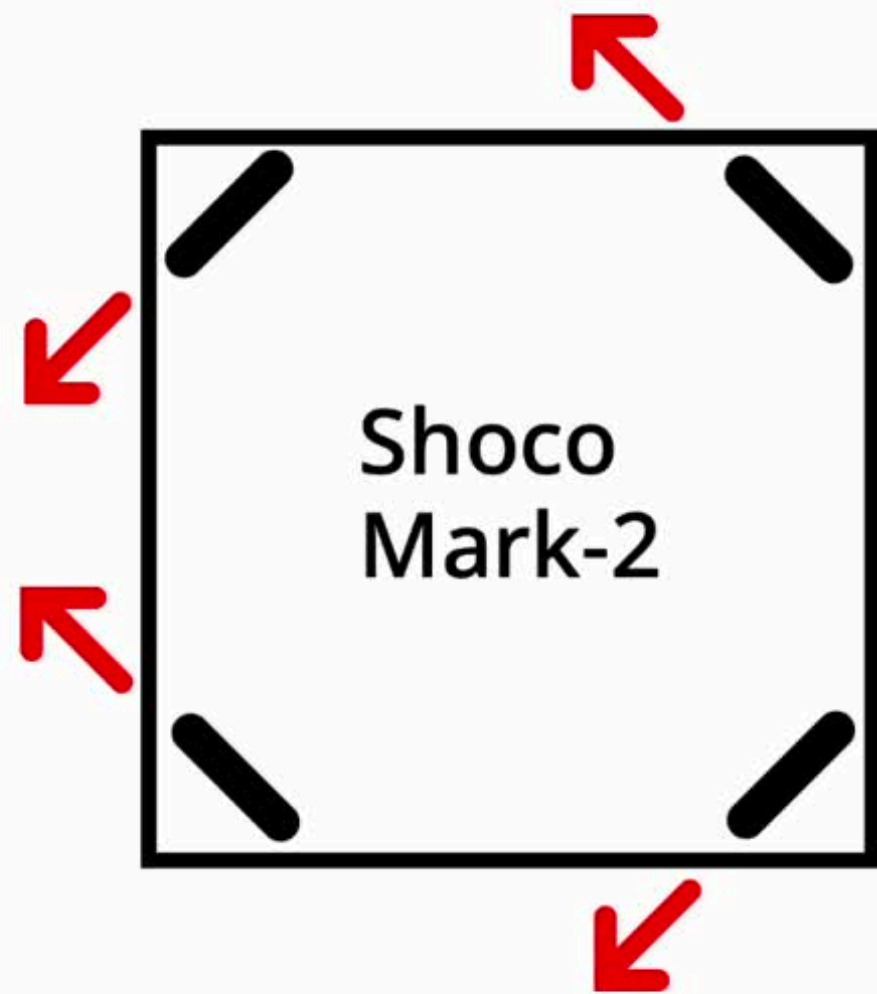
Wheel Rotates, but
can move sideways
giving an omni
directional
movement without
the need of turning
the wheel

Diagonals



Rotation





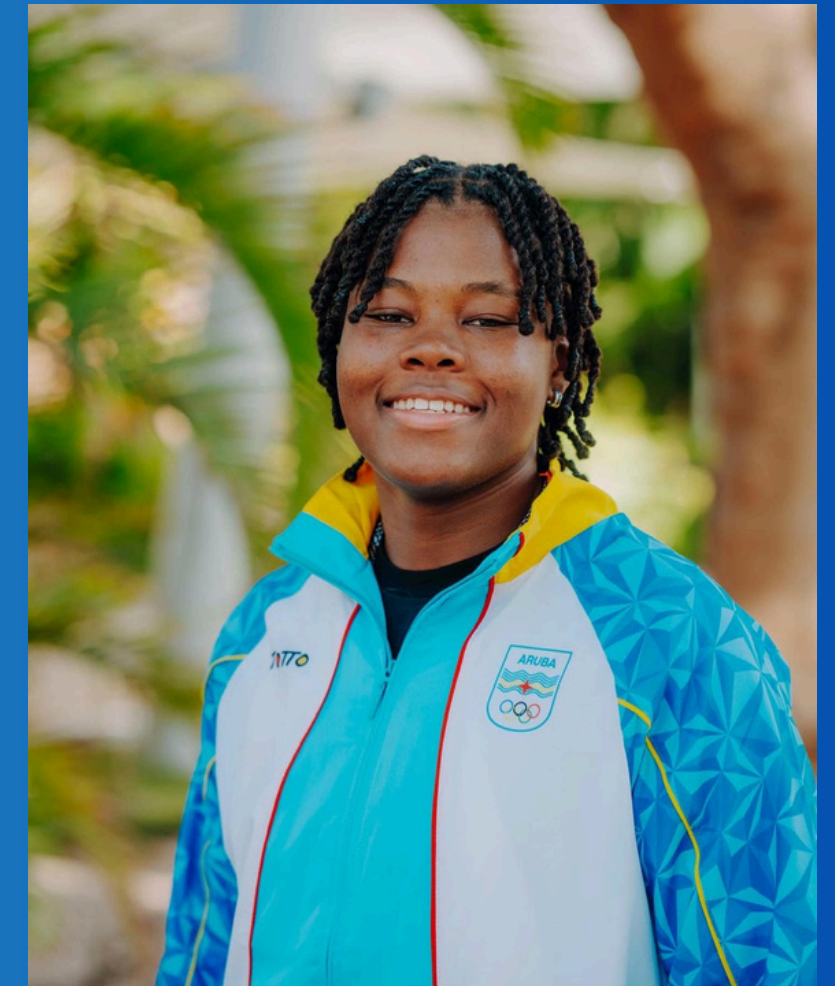
Left-Right-Forward-
Backwards

The frame



Event at Greece:

- Opening and Participants
- Challenges and Opportunitites During Games
- Results
- Special Thanks

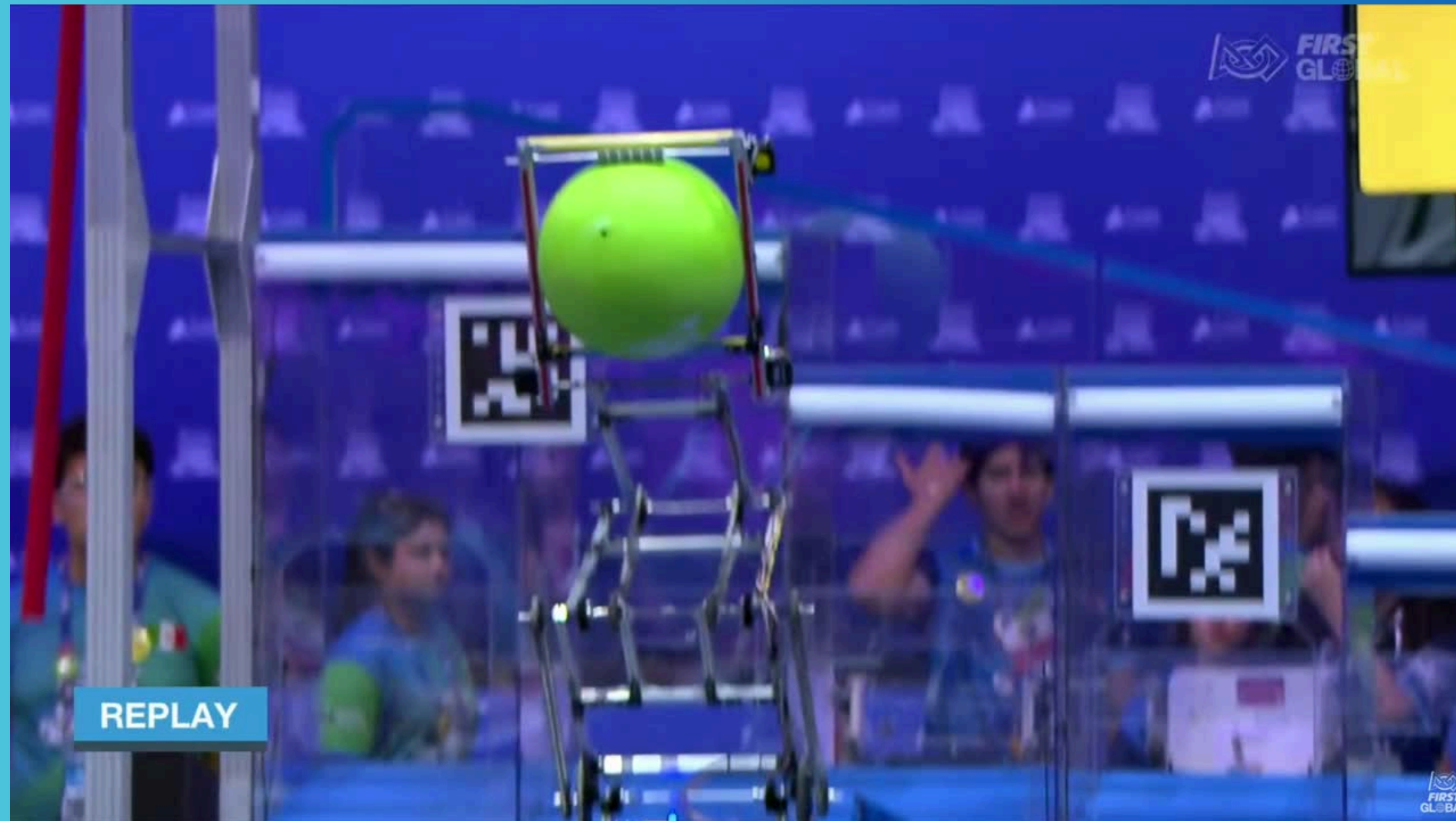


Opening and Participants



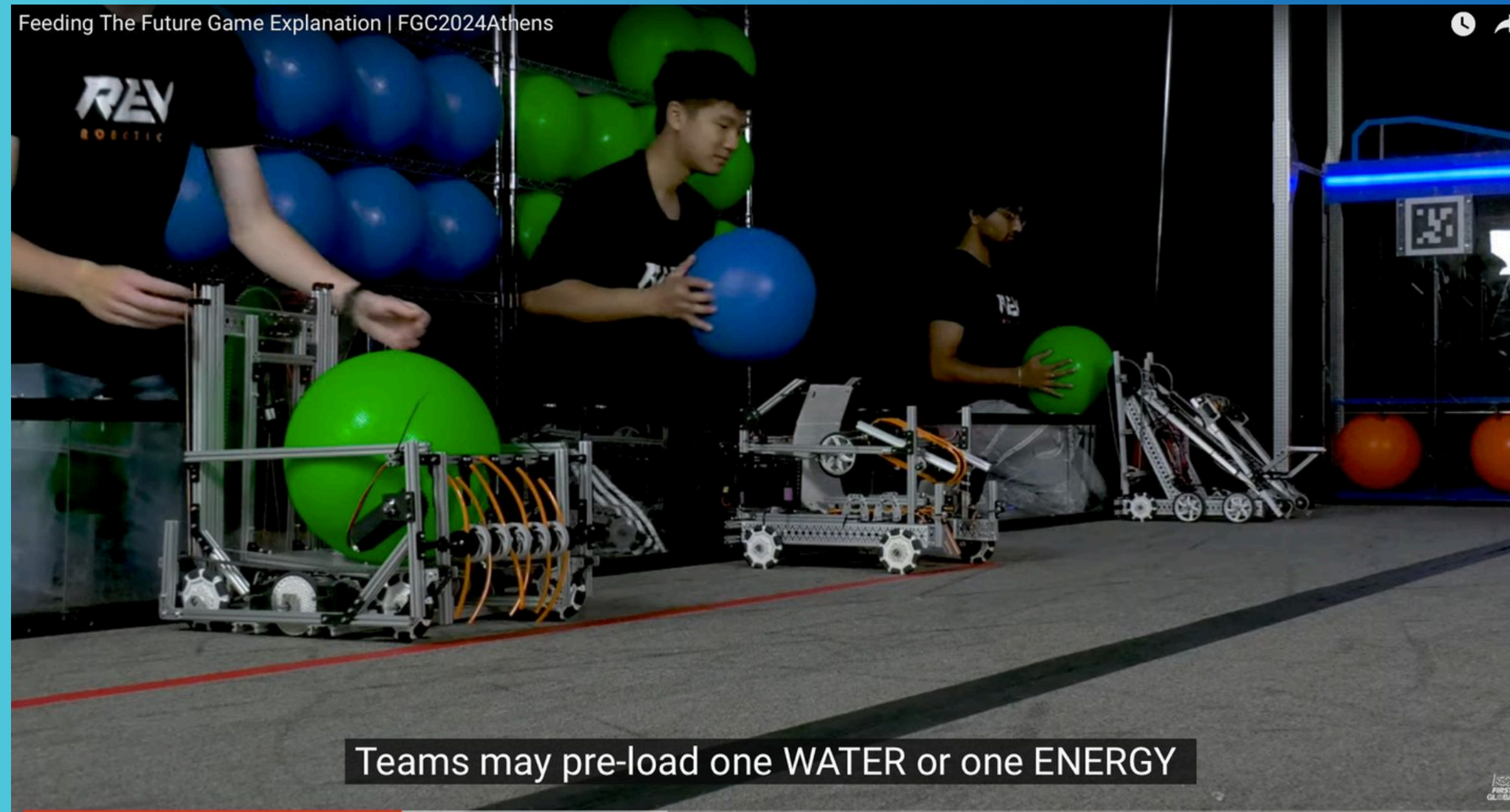
- Opening event held at the first Olympic Stadium, 193 Countries

Opportunities During Games: Speed and Manueverability



- Our Robot was robust and didn't need any maintenance during the matches

Challenges During Games



- In the Game Explanation Video Rules they mention that Teams “May” pre-load one blue ball or one green ball

Challenges During Games



- Many countries did design their robot to handle one ball

Challenges During Games



- Most countries that reached the finals did lift 2 or more balls

Results

- 2024: Rank 86 out of 194 ☒ **Top 45%**
- 2023: Rank 151 out of 191

2024 *FIRST* Global Challenge Event Results

26-29 September 2024 in Athens

Finals Tournament **Rankings** Matches Results Awards

Rank ↑	Team	Ranking Score	Highest Points	Total Food Sec
85	Team Cyprus	66.18	114	140
86	Team Aruba	66.18	109	138
87	Team Sierra Leone	65.73	110	120

Special Thanks

- The Stem Embassy to make all this possible
- To Coach Jean Pierre Solognier & LeAnn Tromp to guide us through this process
- The whole team, assistance of parents, and the group that went with us to Greece
- To all of you to show interests in what we did and what Robotics is all about

