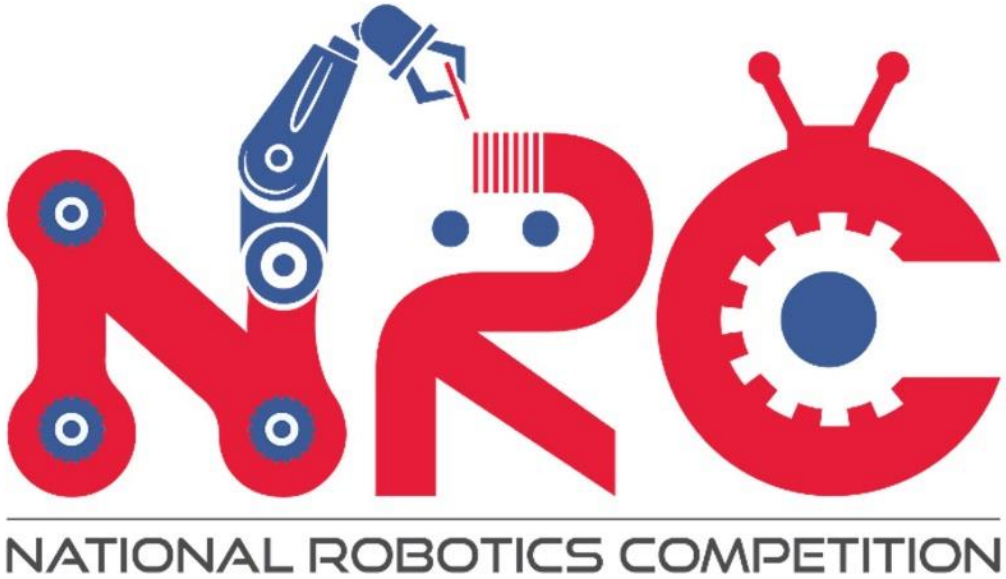


Welcome to National Robotics Competition 2023

Organiser:

Sponsored by:

Supported by:

NRC Moving Forward

- Remains the only robotic competition in Singapore supported by the Ministry of Education (MOE)

- Celebrating the process of learning through interactive and meaningful experiences

Organiser:

Sponsored by:

Supported by:

NATIONAL ROBOTICS COMPETITION

NRC Regular Category

Lower Primary: 7-9 years old | Upper Primary: 10-12 years old
Secondary: 13-16 years old | Tertiary: 16-19 years old

NRC Open Category

Primary: 8-12 years old | Secondary: 13-16 years old | Tertiary: 16-19 years old

NRC AI Maker Series

Primary: 8-12 years old | Secondary: 13-16 years old

NRC Pre-School (Kubo and ARTec Challenge)

5-6 years old

NRC CoderZ Coding Challenge (Online)

Primary: 8-12 years old | Secondary: 13-16 years old

NRC RoboCup Singapore CoSpace Coding Challenge *NEW*

Primary: 8-12 years old | Secondary: 13-16 years old | Tertiary: 16-19 years old

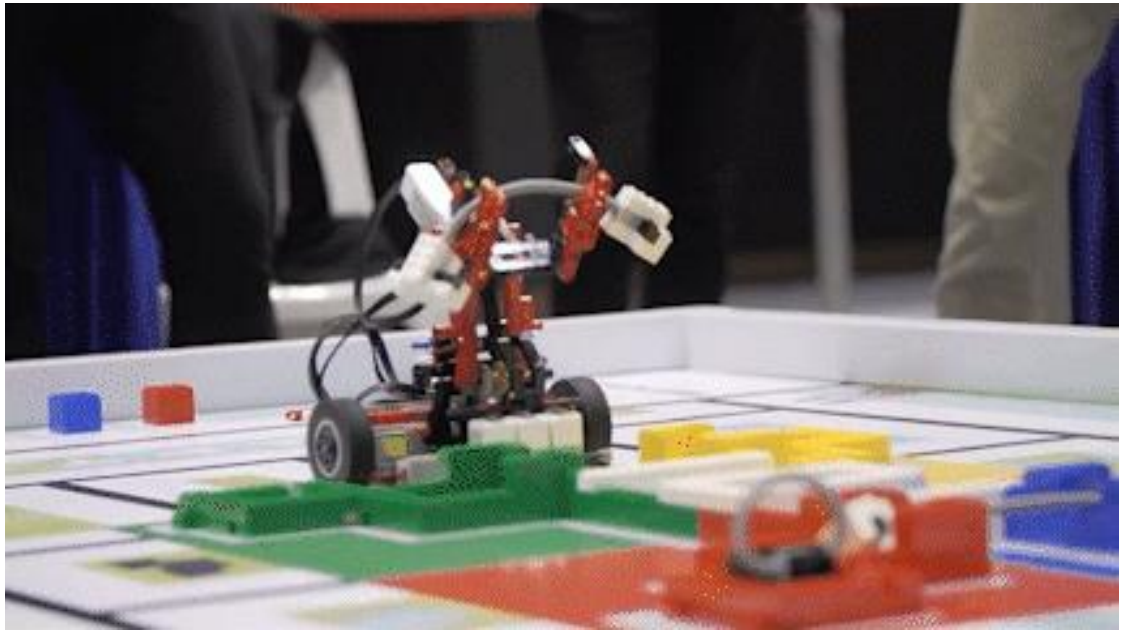
Organiser:

Sponsored by:

Supported by:

NATIONAL ROBOTICS COMPETITION

Held live on-site at Science Centre Singapore from 21 August to 9 September 2023



Organiser:

Science Centre Singapore

DUCK LEARNING opportunities in education

Sponsored by:

Ministry of Education SINGAPORE

Supported by:

GLOBAL ROBOTICS GAMES

SP Singapore Polytechnic

RoboCup SINGAPORE

WOW Learning

NRC Regular Category 2023

Tertiary Category

Organiser:

Sponsored by:

Supported by:

Agenda for the Webinar

- Introduction to the NRC Regular Category 2023
- Introduction to the NRC Tertiary Category Theme
- Introduction to Gameplay & Game Props
- Robot Materials and Artificial Intelligence
- Scoring
- Qualifiers and Finals
- Important Dates

Organiser:

Sponsored by:

Supported by:

NRC Regular Category 2023

Presentation and Robot Runs

- Presentation based on themes of individual categories
- Robot Runs based on scores from solving missions

Organiser:

Sponsored by:

Supported by:

Introduction to NRC Regular Category 2023

General rules

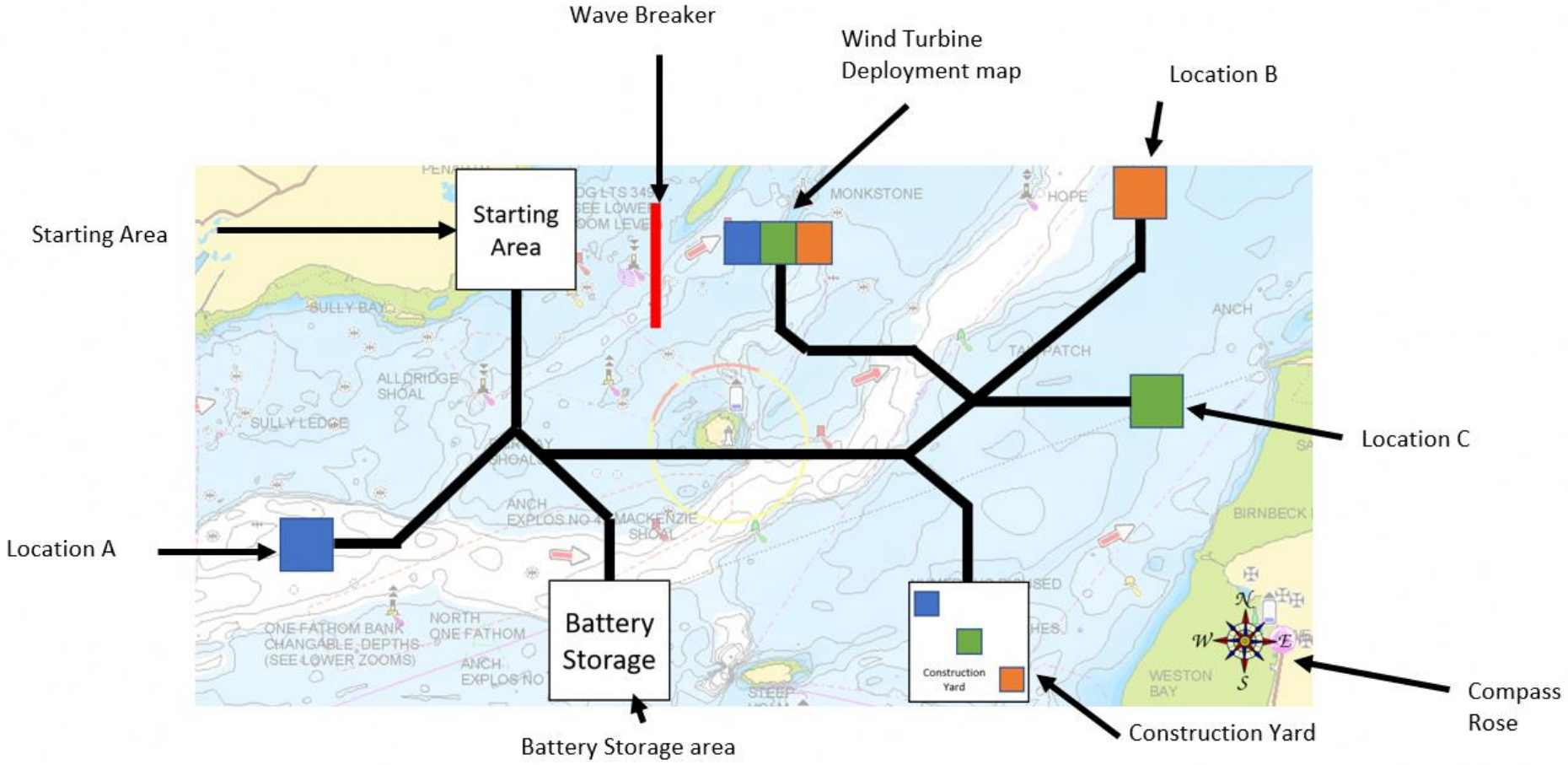
- Teams
  - 2 to 3 team members per team
- Age groups
  - Lower Primary: 7 to 9 years old (born in 2014 to 2016)
  - Upper Primary: 10 to 12 years old (born in 2011 to 2013)
  - Secondary: 13 to 16 years old (born in 2007 to 2010)
  - Tertiary: 16 to 19 years old (born in 2004 to 2007)

Organiser:
Sponsored by:
Supported by:

Introduction to Tertiary Category theme

- This year theme is “Green World”
- How can cities and countries develop new means of reliance on only sustainable sources of energy?
- Wind Turbines are one source of energy that is sustainable.
- However Wind Turbines installed on shore or close to shore only received the tail end of the possible energy from wind.
- Scientist and engineers have discovered that wind is stronger out at the oceans.
- ***Therefore, this years Tertiary Category will focus on offshore floating Wind Tubines.***

Game Mat (I)



Organiser:

Sponsored by:

Supported by:

Game Mat (II)

- The playfield design has to be printed on a mat that is pasted onto the game table.
- The game mat must be printed with a matt finish/overlay on a PVC tarp.
- The dimension of the mat is 2362 mm x 1143 mm.
- Game tables should have the same size or max +/- 5mm in each dimension.
- The official height of the borders of a game table is 70mm.

Introduction to Gameplay & Game Props

Organiser:

Sponsored by:

Supported by:

Tertiary Category: Green World

Robot Missions:

- Deliver Expired Wind Turbine to Construction Yard
- Deliver correct New Wind Turbine to correct location
    - Place New Wind Turbine to face correct direction of wind
- Deliver Energy Tokens to Battery Storage

Game Props: Wind Turbines

Retired Wind Turbine

Yellow Wind Turbine

White Wind Turbine

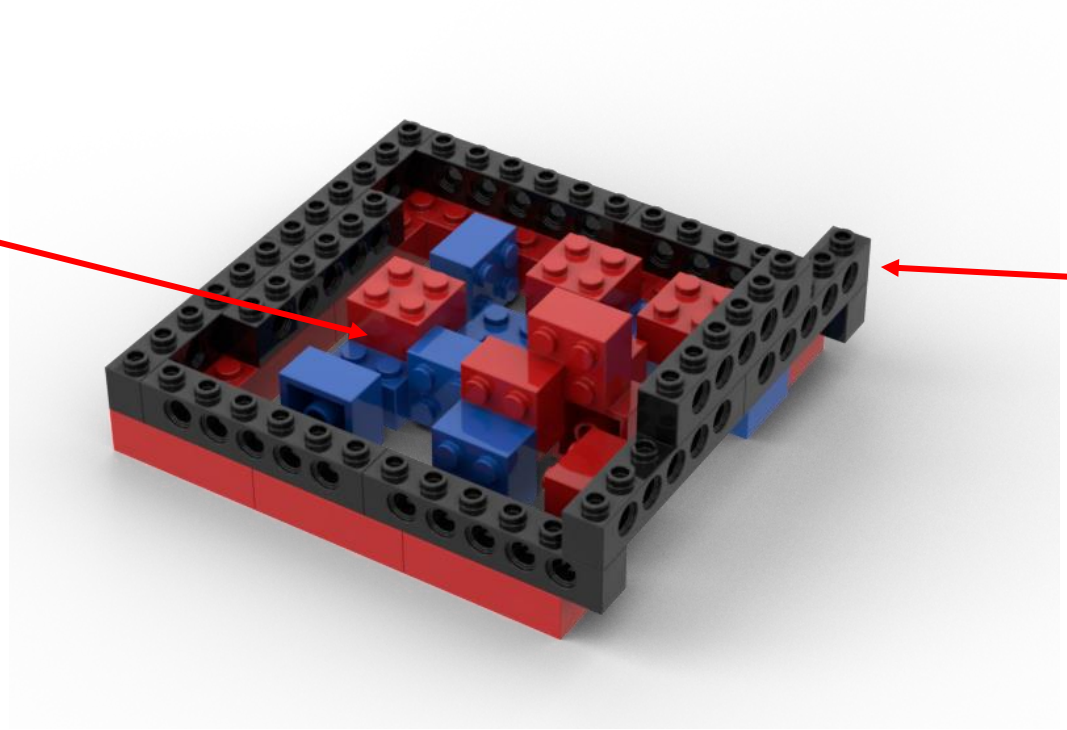
Organiser:

Sponsored by:

Supported by:

Game Props: Energy Tokens and Energy Bed

Energy Tokens



Energy Bed

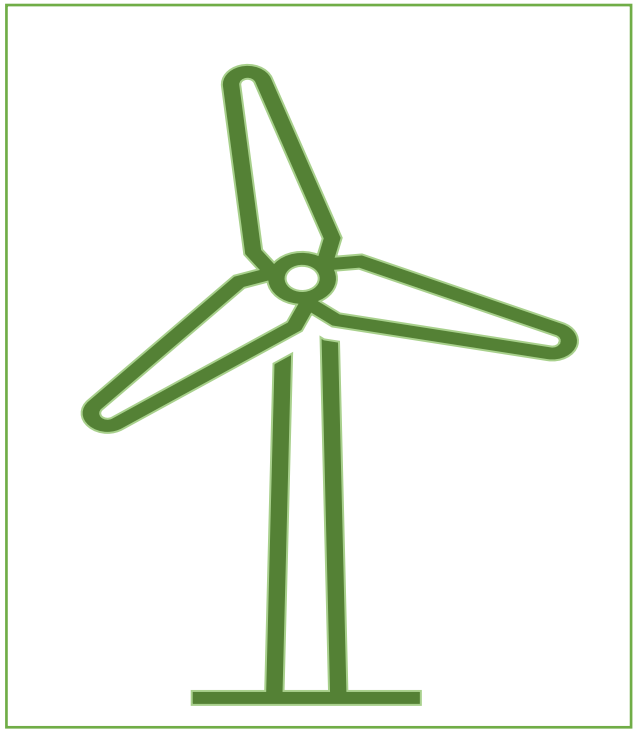
Energy Tokens in Energy Bed

Organiser:

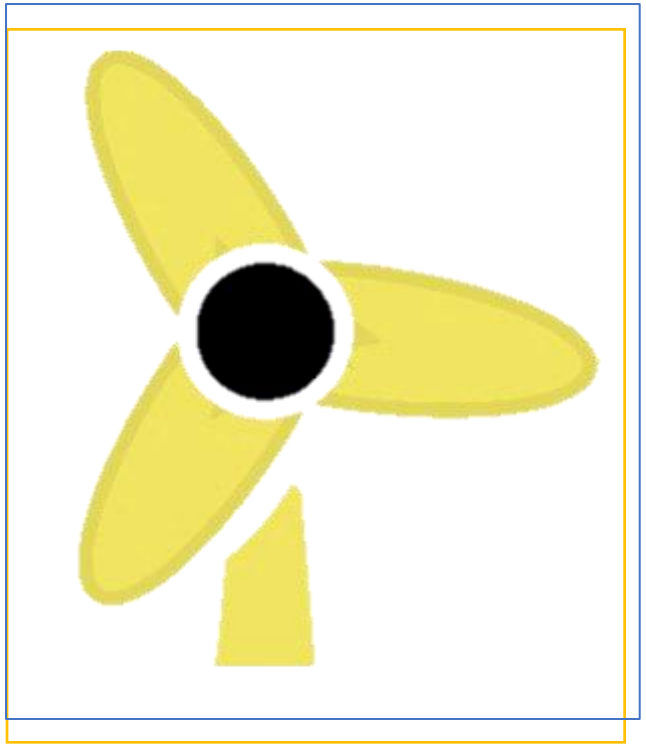
Sponsored by:

Supported by:

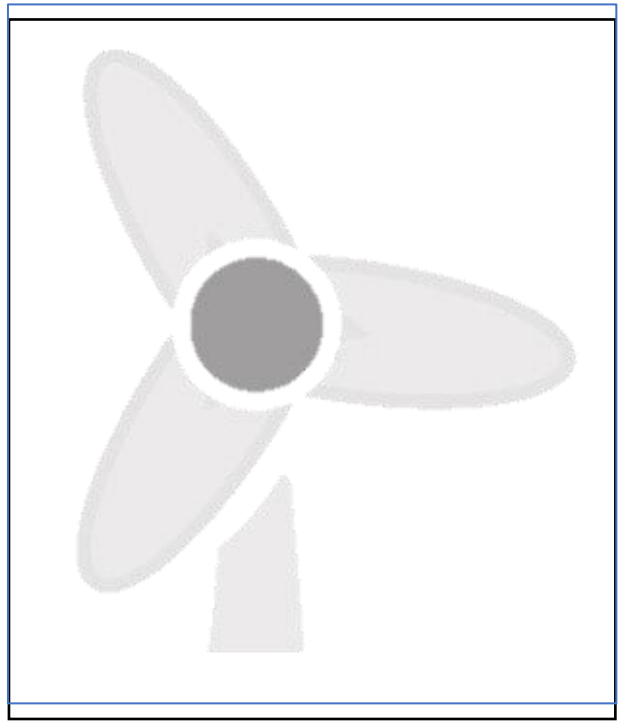
Game Props: Wind Turbine cards



Retired Wind Turbine Card



Yellow Wind Turbine Card



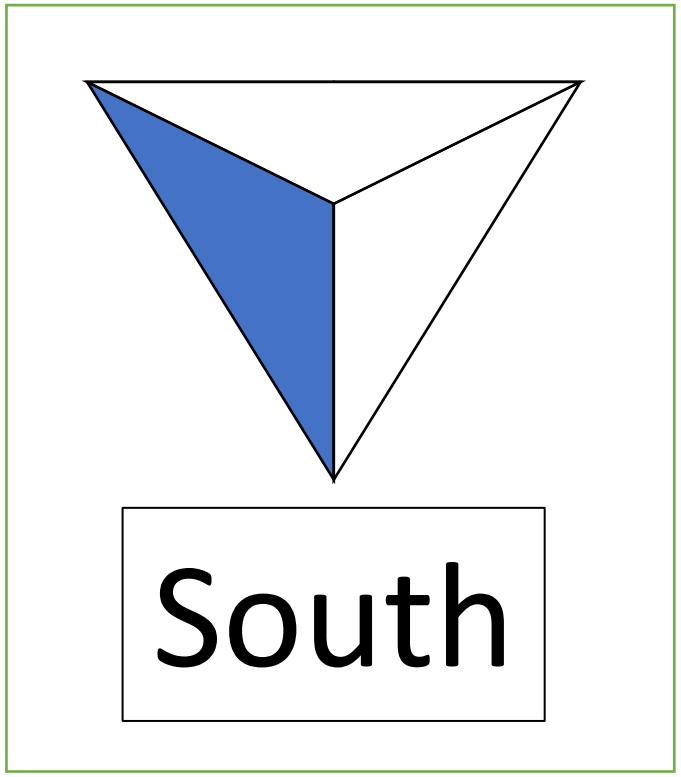
White Wind Turbine Card

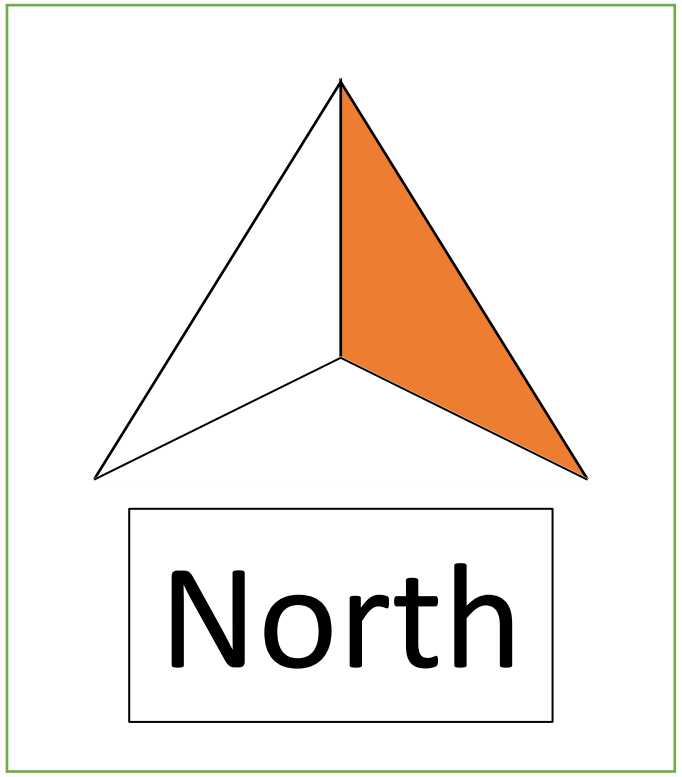
Organiser:

Sponsored by:

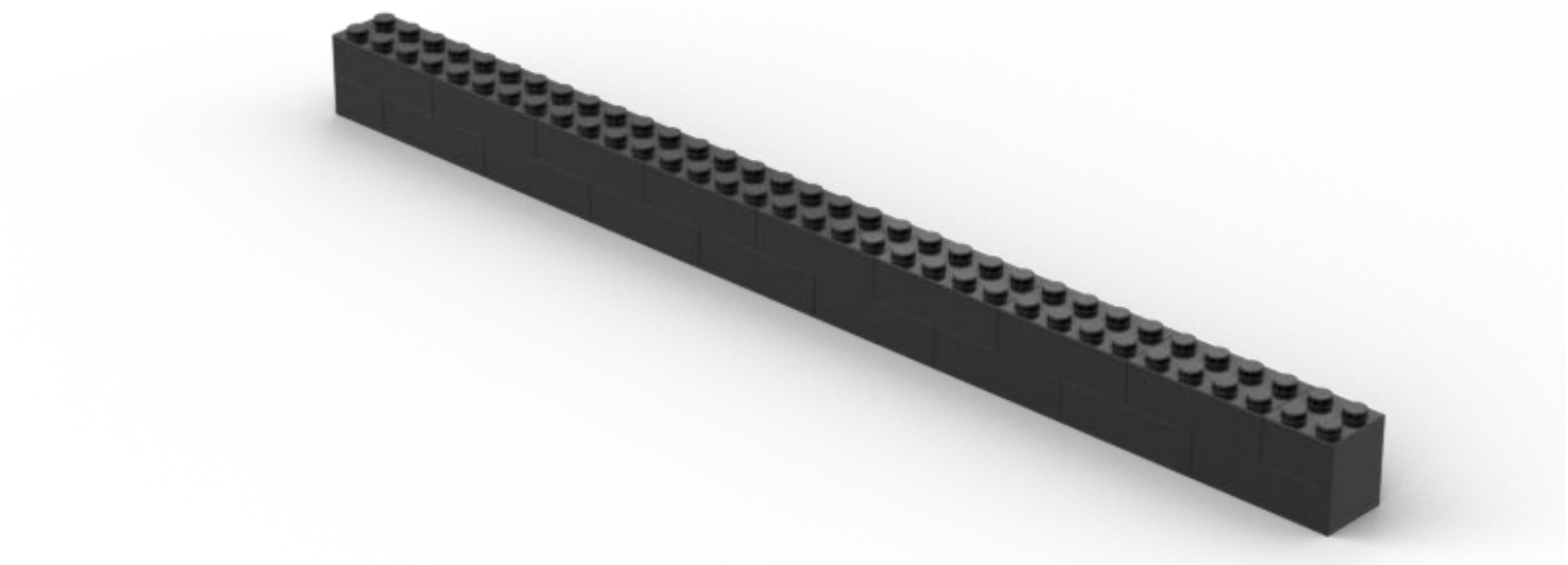
Supported by:

Game Props: Wind Turbine Directional Cards





Game Props: Wave Breaker



Organiser:

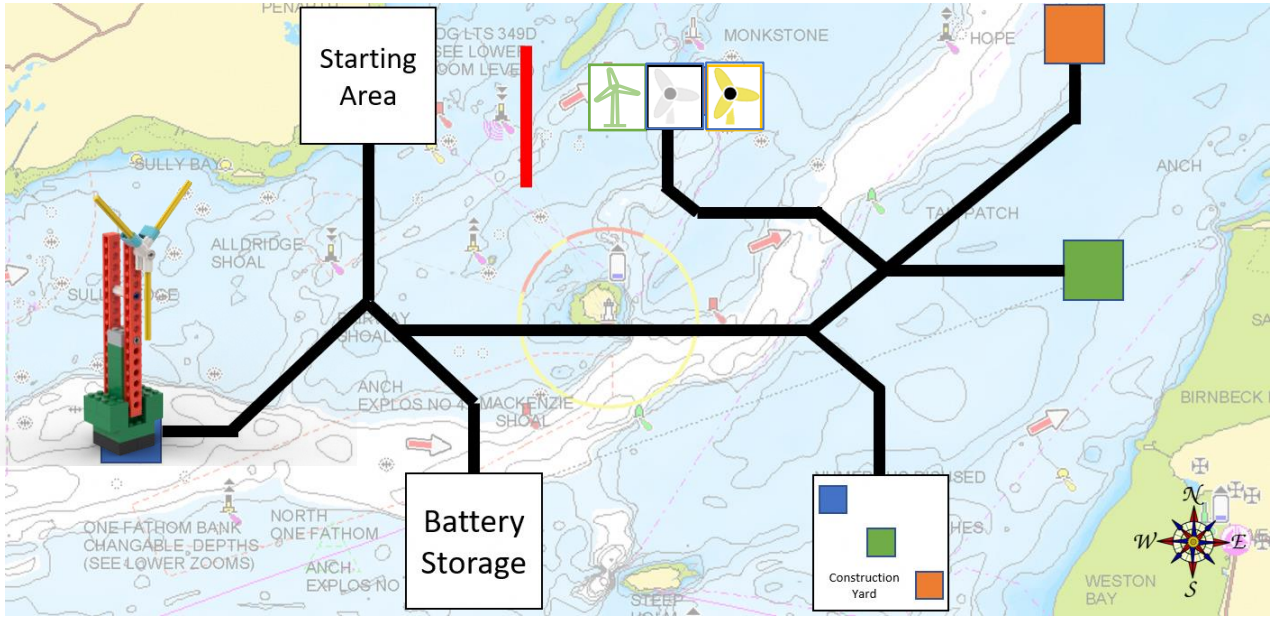
Sponsored by:

Supported by:

Mission (I) –

Task

Deliver Expired Wind Turbine to Construction Yard



Organiser:

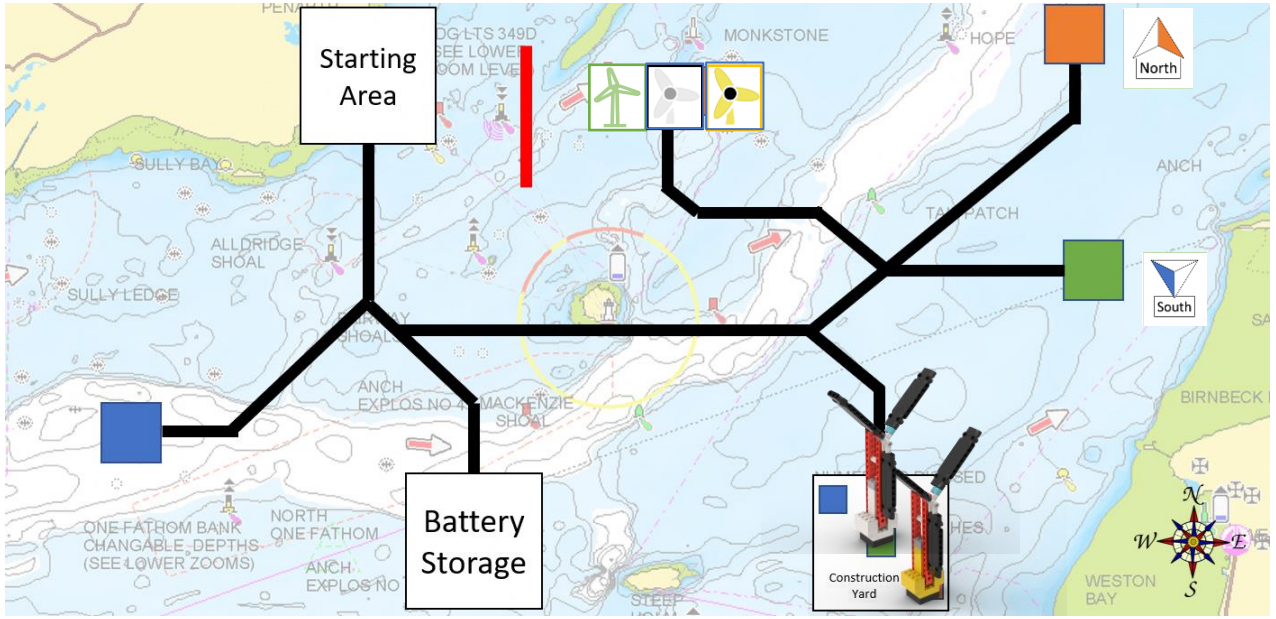
Sponsored by:

Supported by:

Mission (II) –

Task

- Deliver correct New Wind Turbine to correct location
  - Place New Wind Turbine to face correct direction of wind



Organiser:

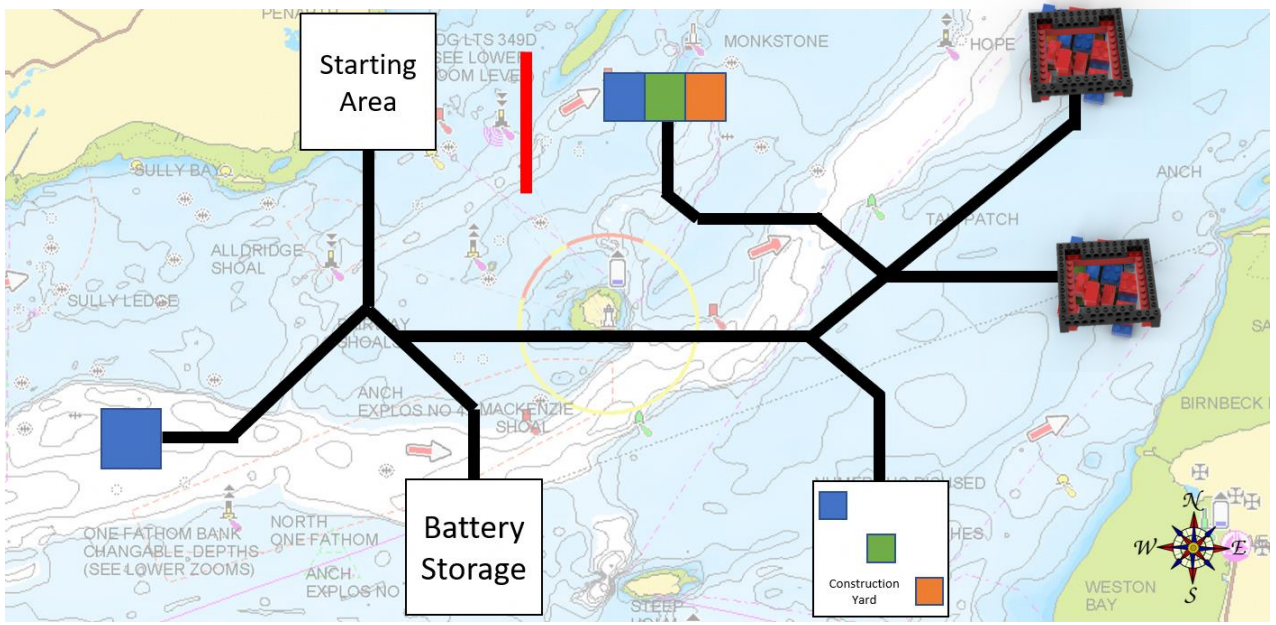
Sponsored by:

Supported by:

Mission (III) –

Task

- Deliver Energy Tokens to Battery Storage



Organiser:

Sponsored by:

Supported by:

NATIONAL ROBOTICS COMPETITION

Game Rules

Organiser:

Sponsored by:

Supported by:

Sub-Category Game Rules (I)

Pre-Run

a) Robot and construction equipment will be inspected by referees according to the requirements prior to quarantine

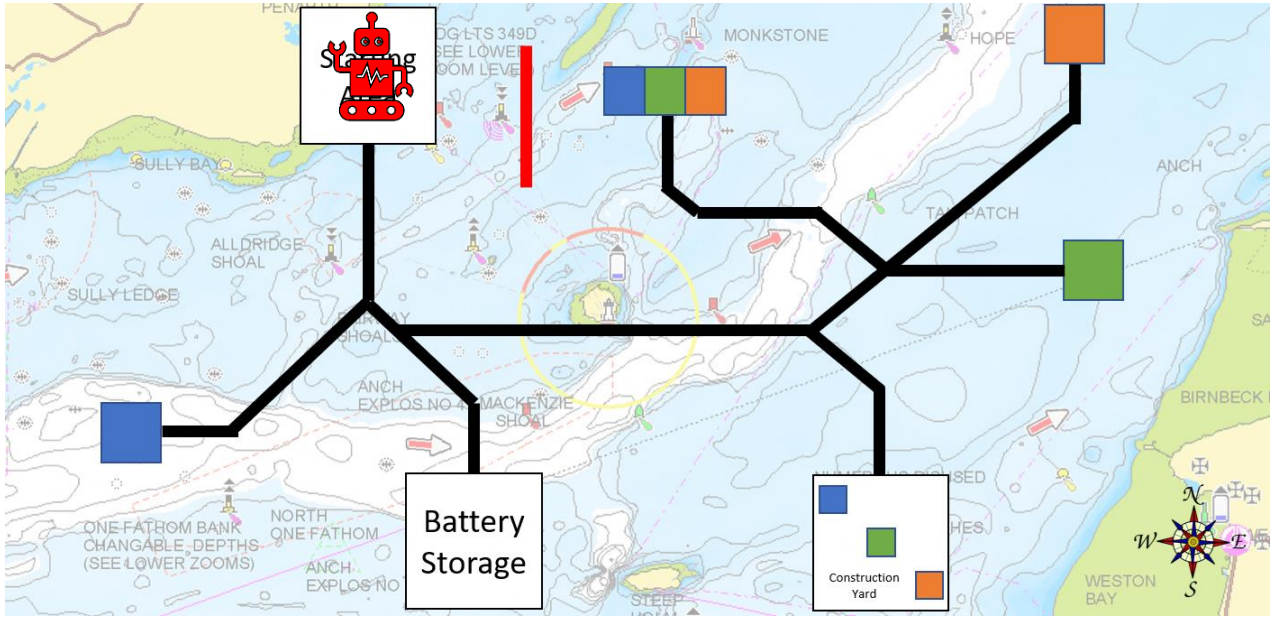
b) Robot must be placed in the respective starting area so the projection of the robot on the game mat is completely within the start area

c) Teams are allowed to make physical adjustments to the robot in the starting area.

d) Teams are not allowed to enter data to a program by changing positions or orientation of the robot parts or to make any sensor calibrations of the robot.

e) Referees are to inspect the placement of the Robot

f) No wireless communication (Wifi, Bluetooth etc) is allowed unless declared to the Referee (only for AI purposes)



Organiser:

Sponsored by:

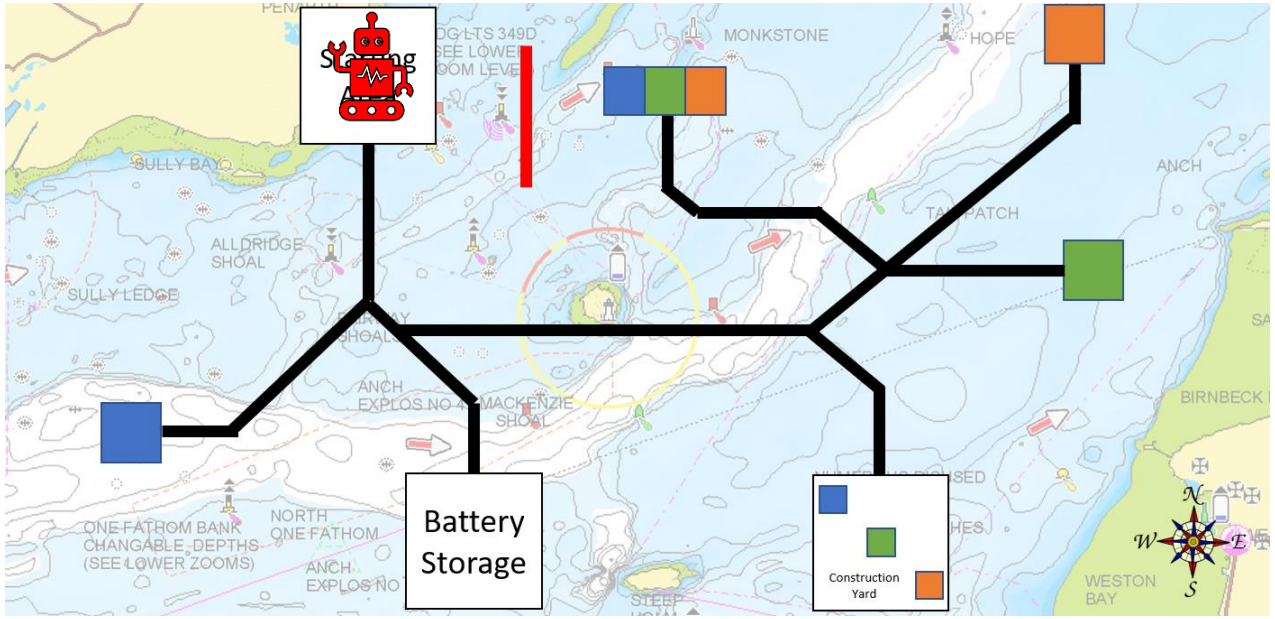
Supported by:

Sub-Category Game Rules (II)

Start of Robot Run

a) Time begins when the judge gives the signal to start.

b) Each robot attempt is 2 minutes run (120 seconds)



Organiser:

Sponsored by:

Supported by:

Sub-Category Game Rules (III)

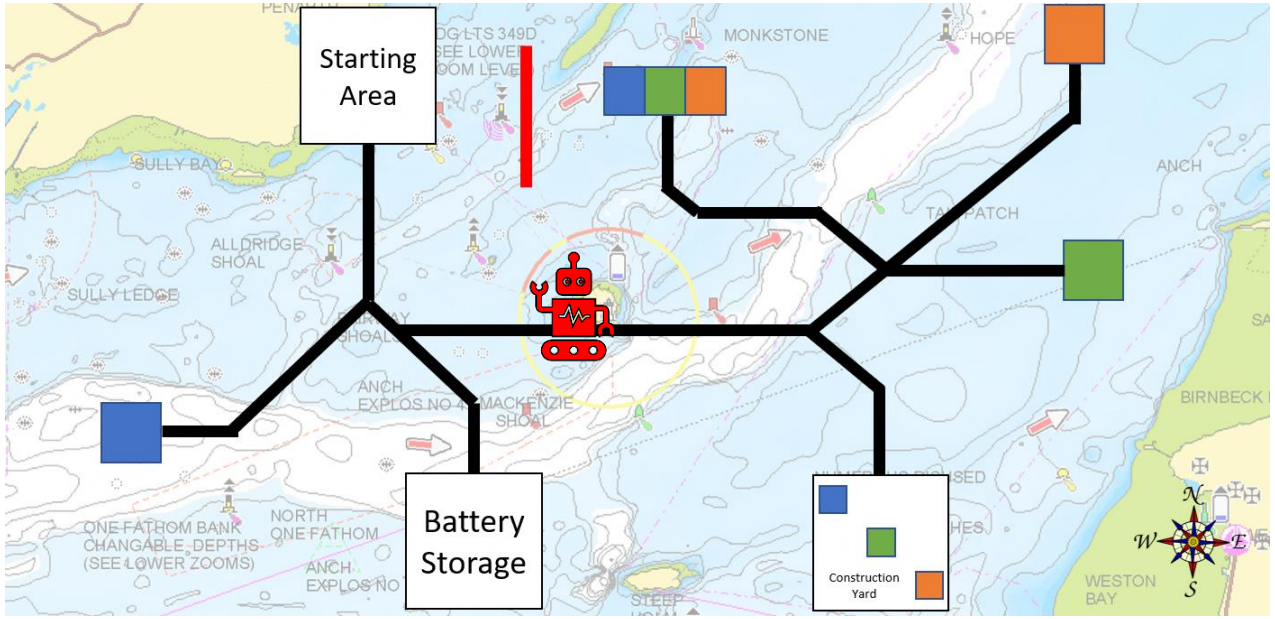
During Robot Run

Teams are <u>not allowed:</u>

a) To touch the robot when the robot is moving.

b) To reprogram and enter data into the robot during robot run.

c) To physically move any mission prop or robot equipment



Organiser:

Sponsored by:

Supported by:

Sub-Category Game Rules (III)

Ending of Robot Run

A robot attempt will end if…

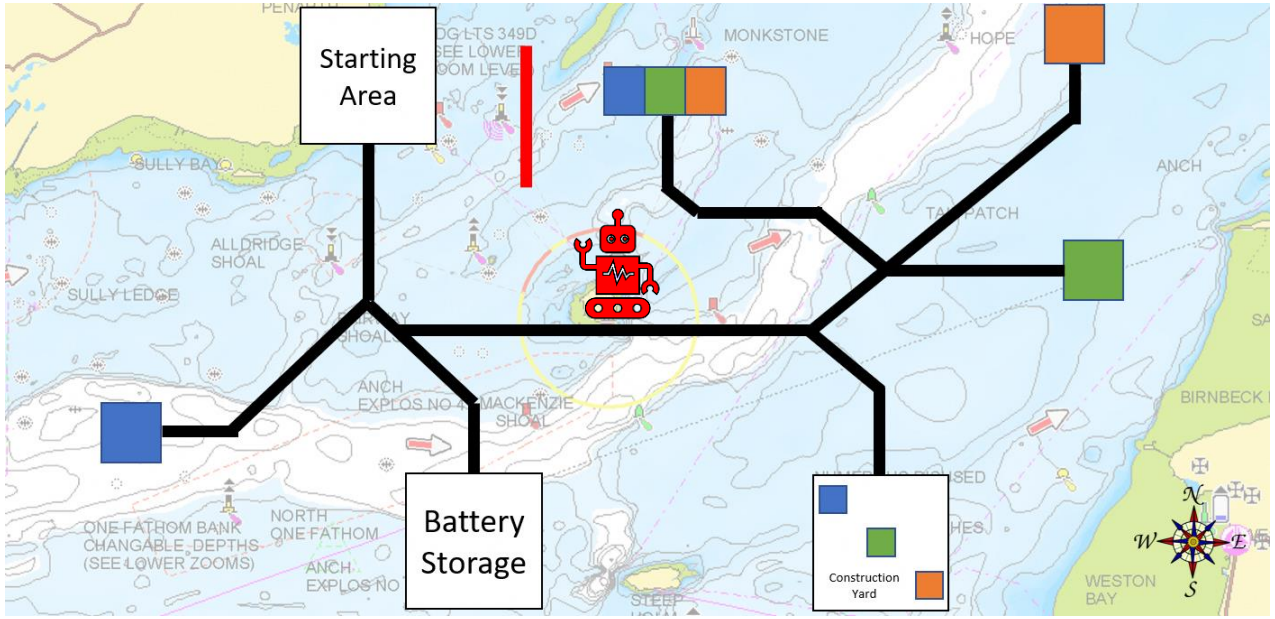
a) The 2 minutes mark is up (120 seconds).

b) The robot has reached the Starting Area

c) The robot has completely left the game table.

d) The robot or team has violated the rules or regulations.

e) A team member shouts “STOP”, and the robot does not move anymore. If the robot is still moving, the robot attempt will only end once the robot stops by itself or is stopped by the team or judge.



Organiser:

Sponsored by:

Supported by:

Robot Materials and Artificial Intelligence

Organiser:

Sponsored by:

Supported by:

Robot Materials and Artificial Intelligence

Artificial Intelligence systems

a. Teams are allowed to use any Artificial Intelligence systems
b. Teams may use more than 1 cameras for object detection
c. Teams may use any software or coding language to program their robots movement or Artificial Intelligence systems.

Robot Materials and Artificial Intelligence

- For Example:
  - SPIKE Prime + Mindstorms Inventor App

Organiser:

Sponsored by:

Supported by:

Allowed robot systems

Teams are allowed to use following materials to build the robot:

Any robot system

+

Any AI System

Organiser:

Sponsored by:

Supported by:

NATIONAL ROBOTICS COMPETITION

Scoring

Organiser:

Sponsored by:

Supported by:

Judging for Presentations

- Page 12 of General Rules
- 10 mins to present
- 5 mins for Q&A

- Best Presentation Award
- Best Research Award
- Best Programming Award
- Best Engineering Award
- Best Robot Performance Award

Category	Criteria	Points
Programming (Total Points: 50)	**Automation Level** The project uses appropriate inputs from sensors to run specific routines and clearly demonstrates automation in the completing of the tasks.	15
	Good Logic The programming options used make sense, work reliably, are relevant in terms of their use, complexity and design.	15
	Strategy Use of sub-routines and sub-functions, how the team complete mission objectives, coming up with different strategies to see what works.	20
Engineering Design (Total Points: 50)	**Engineering Concepts** The project shows evidence and good use of engineering concepts and team members are able to explain the concepts and need for use. Designer / Builder applications.	15
	Mechanical Efficiency and Structural Stability Parts and energy have been used efficiently – evidence of proper use of mechanical concepts / principles (gears/pulleys/levers/wheels & axles). The project (robots and structures) is strong, sturdy and the demonstration can be run repeatedly – parts don't detach – little need for repairs.	20
	Overall design & aesthetic The Robot design is functional yet unique and aesthetically appealing.	15
Presentation (Total Points: 50)	**Successful Demonstration** Using unique, interesting and aesthetic method to convey the project and Theme.	20
	Communication & Reasoning Skills The team is able to present their project idea in clear, concise and engaging way.	20
	Quick Thinking The team is able to easily answer questions about their project. They are also able to deal with any problems that arose during the presentation.	10
Research (Total Points: 50)	**Research contents quality and relevancy** There is evidence that team members explain their research and content relevant to the theme.	15
	Research methodology The team is to share how they conduct their research & the method on how they obtained their information. E.g. Internet, survey.	15
	Learning outcome & teamwork The team is able to explain the research journey and give an insight to what they have learnt.	20
Total Points		**200**

Organiser:

Sponsored by:

Supported by:

NATIONAL ROBOTICS COMPETITION

Qualifiers and Finals

Organiser:

Sponsored by:

Supported by:

Qualifiers

- Everybody takes part
- Presentation
- Robot Run
- Requirements listed in General Rules Document
- Top teams selected for Finals

Organiser:

Sponsored by:

Supported by:

Finals

- Presentation Finals
- Robot Challenge Finals
  - Surprise rule may be added

- Best Robot Performance Award
- Championship Awards
  - 60% Robot Performance (based on Robot Run Finals)
  - 40% Presentation Score (based on Presentation Week)

Organiser:

Sponsored by:

Supported by:

NATIONAL ROBOTICS COMPETITION

GLOBAL ROBOTICS GAMES

Introduction

Organiser:

Sponsored by:

Supported by:

About Developing Innovative Youth Ltd. (DIY)

DIY is a non-profit organisation based in Singapore which aims to:

- encourage and develop innovation amongst youth to become builders of a better future.
- Develop ecosystems for educators to build capacity to develop 21st century competencies in youth.
- Promote STEAM education amongst youth as a platform to innovate and solve mankind's problems.

Organiser:

Sponsored by:

Supported by:

What are the Global Robotics Games (GRG)?

Global Robotics Games (GRG) is an international robotics competition, comprising of various tournaments, organised by DIY.

We aim for the competition to be organised in each country by one or more operational partners culminating in an international competition that will be held in Singapore every year.

The competition will be based on a socially relevant theme each year upon which the tournaments will be designed.

GRG aims to:

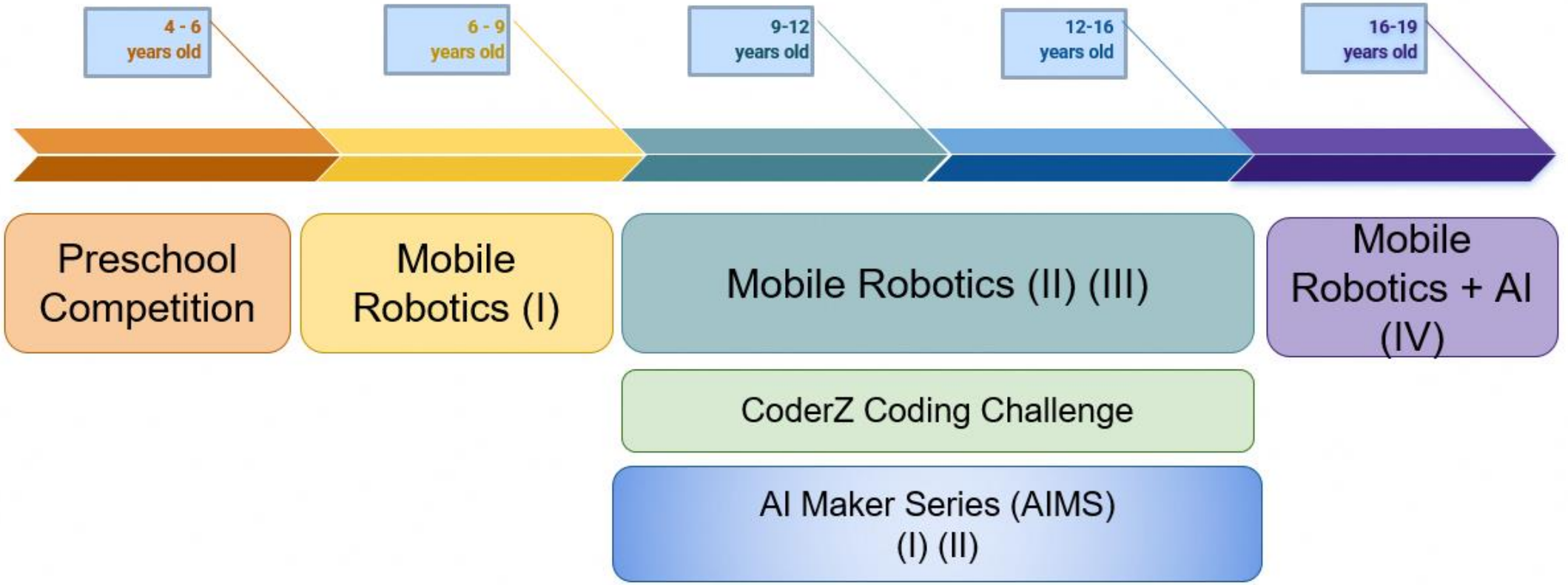
- Equip youth with relevant skills in order to be future-ready
- Develop creative thinking, problem solving and independent learning skills amongst youth
- Encourage youth to take an active interest in STEAM to use it as a platform to build the future

Organiser:

Sponsored by:

Supported by:

GRG Tournaments



Organiser:

Sponsored by:

Supported by:

Important Dates

	Dates	Time	Remarks
Trial playfield	Mid June onwards		Look out for NRC EDM
Onsite Presentation	28th, 29th & 30th Aug 2023	9am – 5pm	Subjected to changes
Onsite Competition	8th Sept 2023	9am – 5pm	
Finals & Award Ceremony	9th Sept 2023	9am – 5pm	

Organiser:

Sponsored by:

Supported by:

Contact us/Updates/FAQ

Organiser:

Sponsored by:

Supported by:

FAQ – Regular Category

1. Can the participants bring robots pre-assembled? Will there be dismantling of robots?

Ans: We do not require robots to be assembled on the spot during competition. You may bring pre-assembled robots

2. Apart from showcasing their physical robot for robot game, is the team expected to present on their robot game strategy, robot design, build and coding process?

Ans: Yes. The processes are important for judges to gauge participants' learning journey. It also helps to demonstrate originality of work i.e. not just a solution given by mentor.

3. How will the presentations be conducted? Judges go from table to table for each team?

Ans: Presentations are conducted in rooms, with judges and students in the room. Screens and HDMI cables will be provided for presentation projections.

FAQ - Registration

1. Can I register for more than one category?

Is there a maximum no. of teams each school can register for?

Ans: Yes, if the dates are not overlapped. There is no maximum no. of teams a school can register.

2. If we are registering as a private team, what do we put under school name?
Ans: You can indicate as “independent” or “private”.

3. Can we pay the registration fee by e-invoice? Is there any other method of payment?
Ans: We only accept credit card payment through our registration platform.

4. Can a coach/mentor be repeated for multiple teams?
Ans: Yes.

5. When is the latest cut off for registration?
Ans: Registration opens till 1st July 2023 Please register by 31 May for early bird discount of $10 per team

Organiser:

Sponsored by:

Supported by:

FAQ -Others

1. Can I get tickets as a bystander to view the competition?

Ans: There is no need of bystander tickets to view the competition, walk-in is allowed. There will be a designated zone for the audience to sit and view the competition.

2. Is there any preparation class from Science Centre?

Ans: There will be a workshop on 17th July for registered teams. Date was previously announced to be 28th June, now changed to **17th July, 1 – 4pm.**

Contact us/ Updates/ FAQ

Website

Social Media

Sign-up Link

For any queries

Email

NRC@science.edu.sg

Organiser:

Sponsored by:

Supported by: