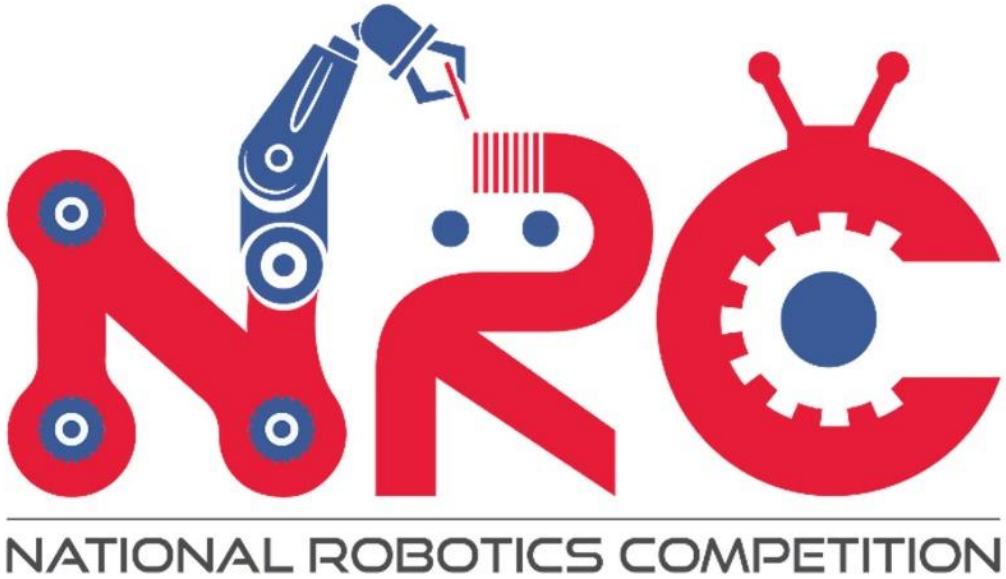

Welcome to National Robotics Competition 2023

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: 13-17 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:

Science Centre Singapore

DUCK LEARNING opportunities in education

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Ministry of Education SINGAPORE

Supported by:

GLOBAL ROBOTICS GAMES

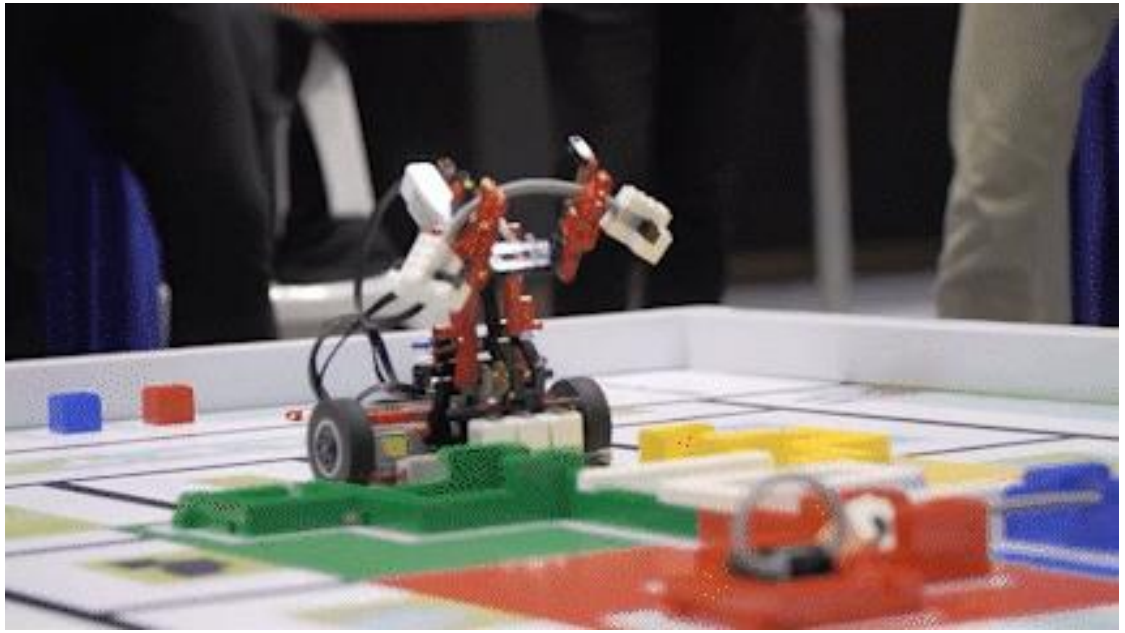
SP Singapore Polytechnic

RoboCup SINGAPORE

WOW Learning

NATIONAL ROBOTICS COMPETITION

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



Organiser:

Science Centre Singapore

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WOW Learning

NATIONAL ROBOTICS COMPETITION

NRC AI Maker Series 2023

Primary & Secondary Category

Organiser:

Sponsored by:

Supported by:

Agenda for the Webinar

- Introduction to the NRC AI Maker Series 2023
- Introduction to Gameplay & Game Props
- Mission & Game Rules
- Robot Materials and Artificial Intelligence
- Scoring
- Competition Format
- Important Dates

Organiser:

Sponsored by:

Supported by:

Introduction to NRC AI Maker Series 2023

General rules

- Teams
  - 2 to 3 team members per team
- Age groups
  - Lower Primary: 7 to 12 years old (born in 2011 to 2016)
  - Secondary: 13 to 17 years old (born in 2007 to 2010)

Organiser:

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Supported by:

Introduction to NRC AI Maker Series 2023

- NRC AI Maker Series focuses mainly on Artificial Intelligence and Machine Learning of autonomous vehicle.
- Autonomous vehicles can help transport people and goods safely; at the same time plan efficient routes and optimized charging, making it energy efficient.
- The adoption of AI vehicles can also reduce rates of work-related injuries and illnesses.

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NATIONAL ROBOTICS COMPETITION

Introduction to Gameplay & Game Props

Organiser:

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NATIONAL ROBOTICS COMPETITION

Game Mat – Primary (I)

Organiser:

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NATIONAL ROBOTICS COMPETITION

Game Mat – Secondary (II)

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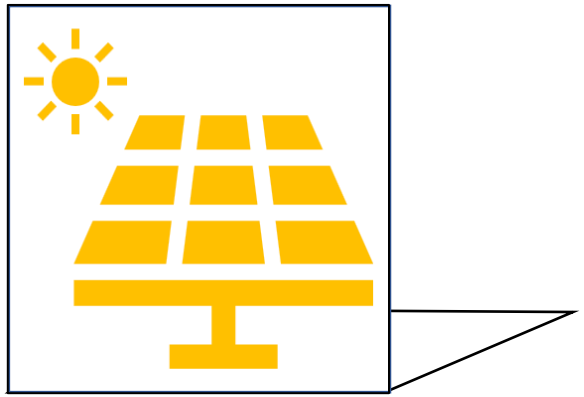
Supported by:

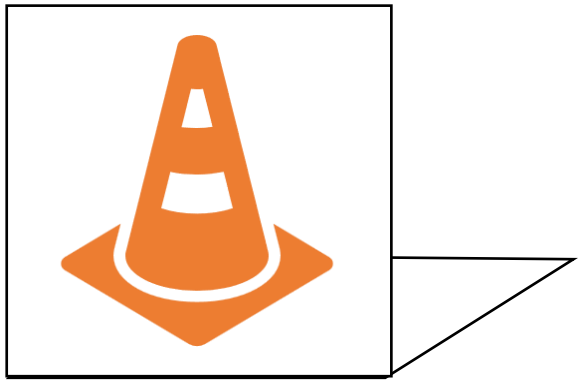
Game Mat (III)

- The game mat must be printed with a matt finish/overlay on a PVC tarp.
- The dimension of the mat is 2000mm X 2000mm
- Game Mat may be placed on a hard and flat surface for practice
- There will be no borders for the game table

Game Props:
Solar Panel & Cone Cards



Solar Panel Card



Cone Card

There are 2 types of Cards

- **Solar Panel Cards**
- **Cone Cards**

Organiser:

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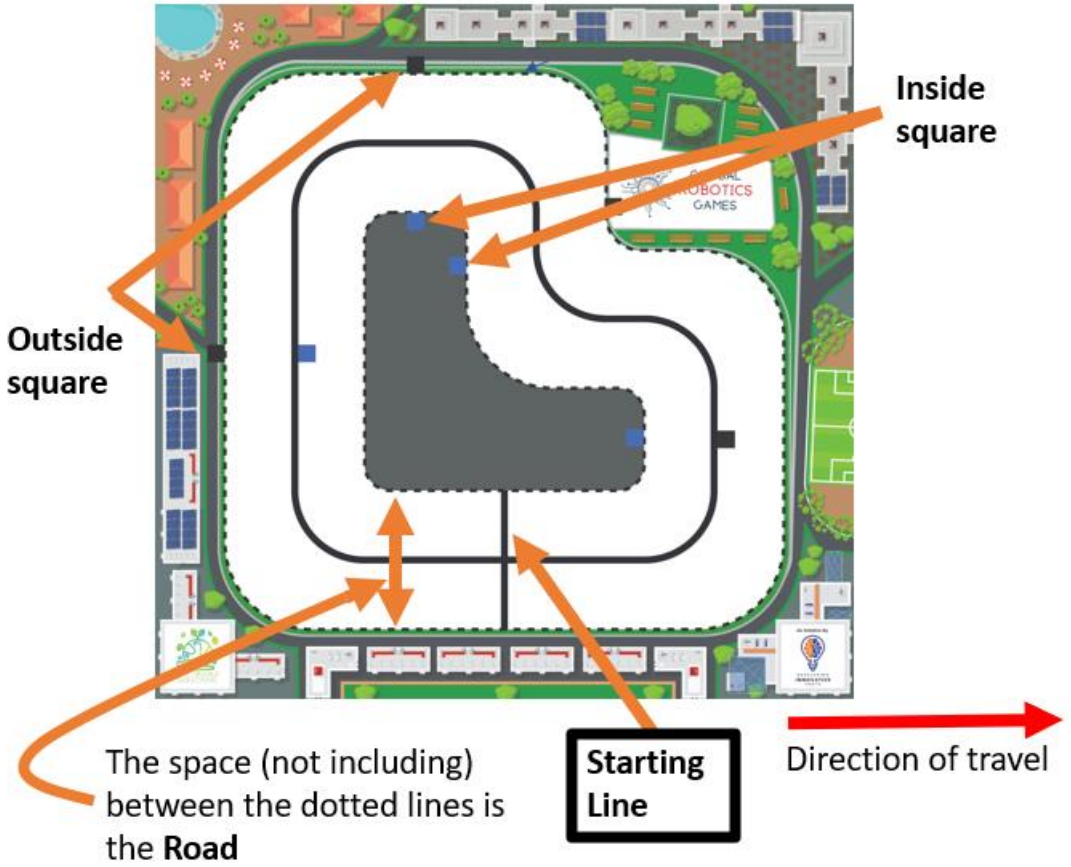
NRC AI Maker Series – Primary

Robot Missions:

Using Artificial Intelligence

1. Complete Rounds
2. Detect the Cards correctly



Organiser:

Sponsored by:

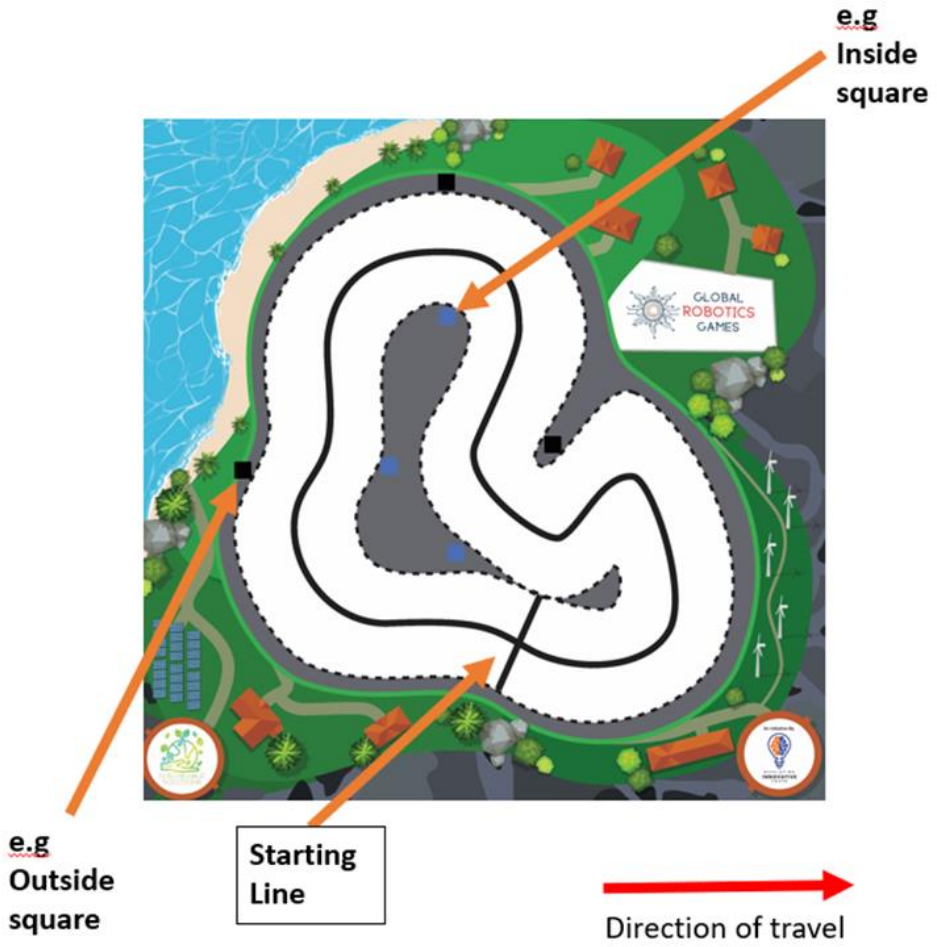
Supported by:

NRC AI Maker Series – Secondary

Robot Missions:

Using Artificial Intelligence

1. Complete Rounds
2. Detect the Cards correctly



Organiser:

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Supported by:

NRC AI Maker Series – Primary/Secondary

Technical Report and Robot Runs

- Teams will have to submit a Technical Report detailing their robot designs and codes.

- Robot Runs based on scores from solving missions

Organiser:
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NATIONAL ROBOTICS COMPETITION

Missions

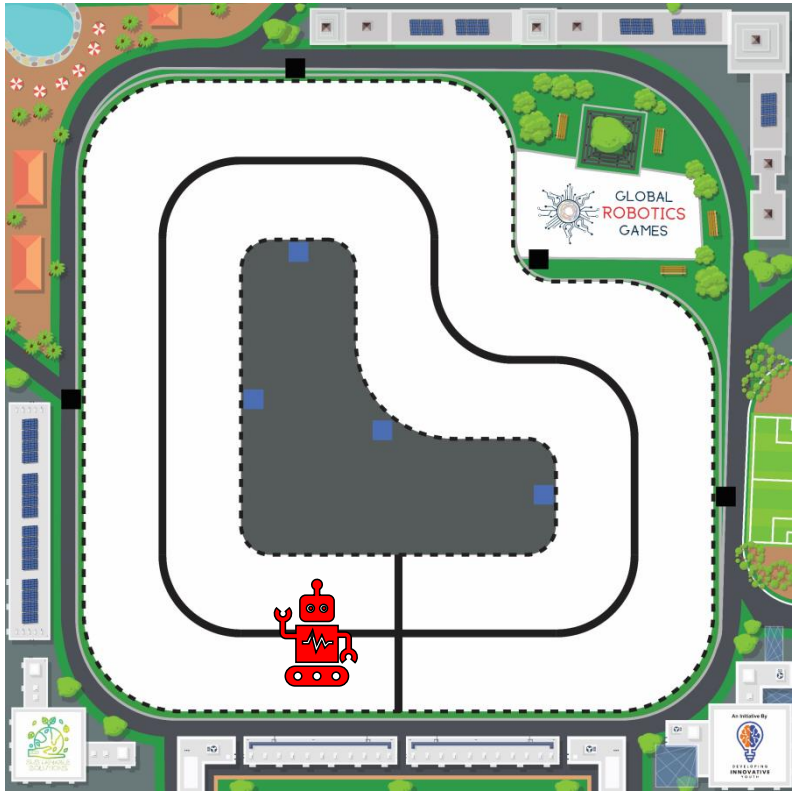
Organiser:

Sponsored by:

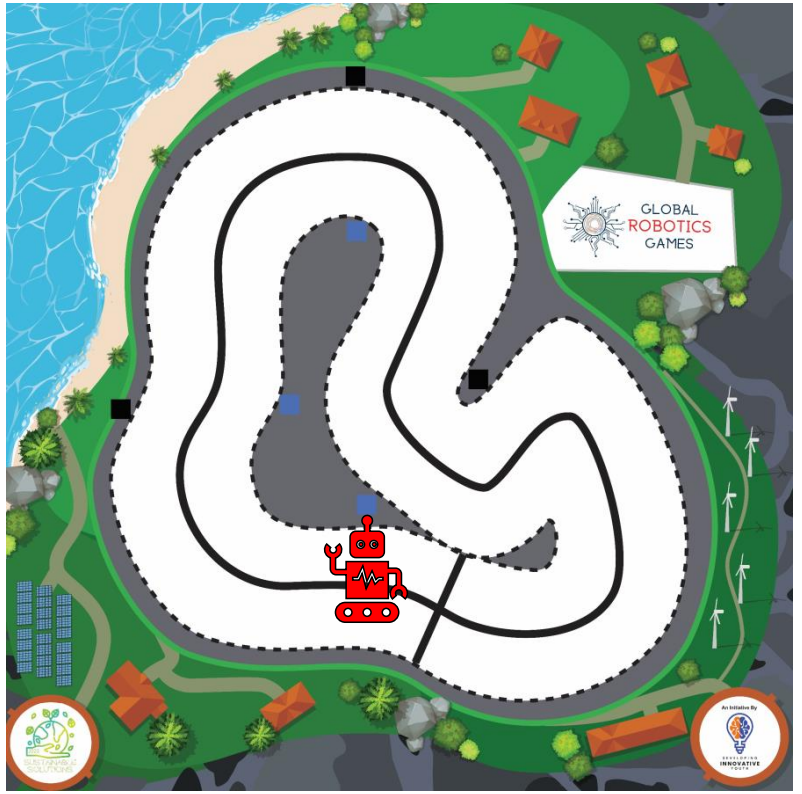
Supported by:

Missions: Road

Primary Category



Secondary Category



Direction of travel

Organiser:

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Supported by:

Mission (I) –

Task : Complete as many rounds of the Road as possible

- Robot must always travel in anti-clockwise direction
- Robot must always stay on the Road as shown by the dotted black lines on either end of the Road
- If a robot leaves the Road, the team will pick up their robot and place it on the left of the starting line and continue their attempt. That round will be counted as unsuccessful

Mission (I) –

Task : Complete as many rounds of the Road as possible

- The robot must be able to travel down the Road and detect the Solar-Panel and Cone cards with the assistance of an Artificial Intelligence model created by the team. <u>The robot is not allowed to use sensors directly to navigate its way around the Road.</u>
- Any team suspected of using any other means, except for an AI or ML model, may be stopped and asked to show their robot's codes, systems and AI or ML model to the Referees.
- Failing to prove that an AI or ML model is the only system used in helping to steer the robot, may result in disqualification.

Organiser:
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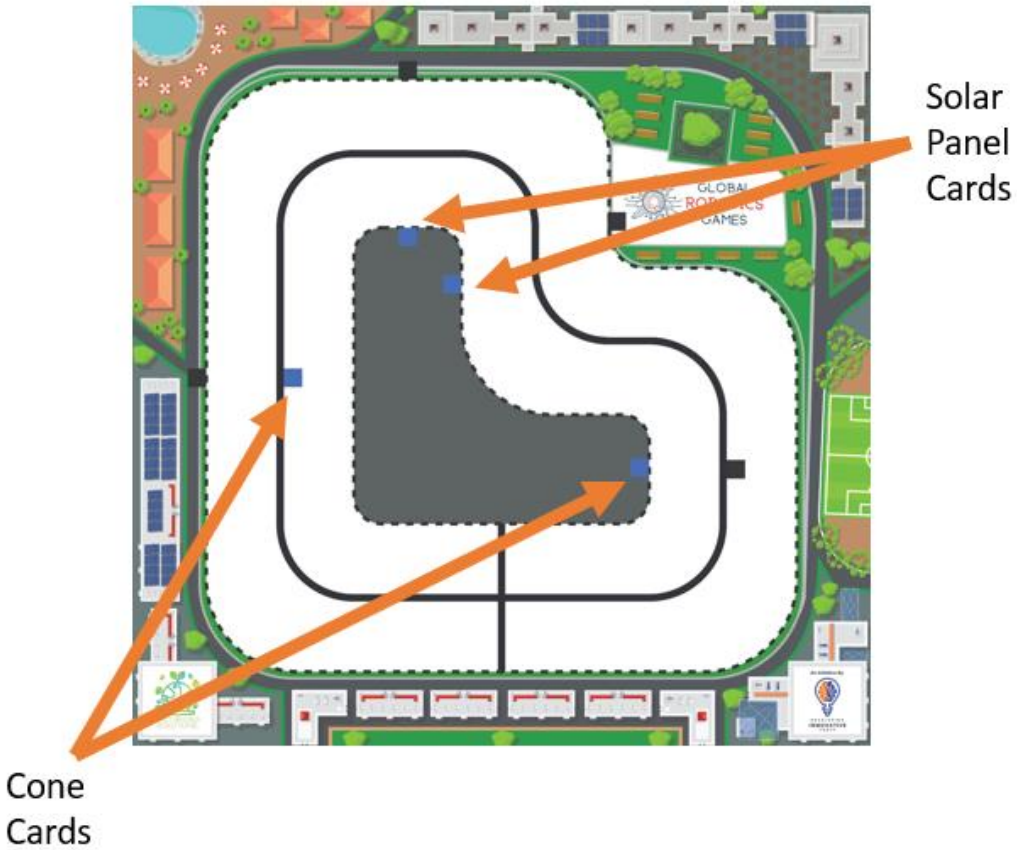
Supported by:

Mission (II) –

Task : Detect the card

- Robot must detect the card as it is travelling on the Road.
- Cards will be placed on the inner squares or outer squares
- Solar Panel and Cone cards will be randomly placed on the squares

e.g.



NATIONAL ROBOTICS COMPETITION

Game Rules

Organiser:

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Supported by:

Game Rules

Pre Robot Run

- Teams will place their robot completely on the left side of the Starting Line.
  - Referees will measure the width and length of the robot.
  - Robot must be within 250 mm x 250 mm in size only. Robot may be of any height.
- Teams must ensure that direction of travel must be anti-clockwise only.
- For each game-run, referees will choose Inside Squares or Outside Squares.
  - 2 X Solar-Panel cards and 2 X Cone cards will be randomly placed on the 4 squares.

Game Rules

During Robot Run

- The robot must be able to travel down the Road and detect the Solar-Panel and Cone cards with the assistance of an Artificial Intelligence model created by the team. The robot is not allowed to use sensors directly to navigate its way around the Road.
- Any team suspected of using any other means, except for an AI or ML model, may be stopped and asked to show their robot's codes, systems and AI or ML model to the Referees.
- Failing to prove that an AI or ML model is the only system used in helping to steer the robot, may result in disqualification.

Game Rules

During Robot Run

- Teams are allowed:
- To interrupt their robot, pick up their robot and place it behind the starting line if the robot has completely left the Road.
  - Only Referees can give the signal to the team to pick up their robots.
  - That attempt to complete a round will be considered incomplete.
- To stop their robot at any time.
  - Teams have to inform the Referee when choosing to stop their robot.
  - Robots will have to remain at that position on the playfield until the 2 minutes are over.

Game Rules

During Robot Run

- Teams are <u>not allowed:</u>
  - To touch their robot without the Referee's signal.
  - To touch any Solar-Panel cards or Cone cards during the match.

Game Rules

End of Robot Run

- A robot run will end if:
  - The 2 minutes mark is up (120 seconds).
  - The robot has completely left the game table.
  - The robot or team has violated the rules or regulations.
  - 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.

NATIONAL ROBOTICS COMPETITION

Robot Materials and Artificial Intelligence

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Robot Materials and Artificial Intelligence

- Robot may be build with any materials
- Robot may be fitted with any controller system
  - Must be autonomous in operations
  - More than one controller can be used
- Robot must be self-powered
- Number of motors is not restricted
- Number of cameras is not restricted
- You can pre-code and bring your robot
- And others…

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NATIONAL ROBOTICS COMPETITION

Scoring

Organiser:

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Supported by:

Scoring for Robot Runs

10. Scoring

Definitions for the scoring

"Completely" means that the robot and all of its parts are past the area/line of consideration. No projection of the robot falls in the area/line of consideration.

Tasks	Each	Total
1. Completing a round		
Robot started on the left of the Starting Line, it has successfully travelled on the Road only and completely passed the Starting Line.	**10**	
2. Detecting a card		
Robot has detected a Solar-Panel card and successfully shown green light for 1 second or beeped once.	**3**	
Robot has detected a Cone card and successfully shown a red light for 1 second or beeped twice.	**3**	
3. Technical Report		
3.1 Robot Design: 6 pictures of each side of robot are submitted		**20**
3.2 List of Sensors and Cameras is submitted		**20**
3.3 AI or ML model description is submitted		**20**

Example
Score sheet

Organiser:
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Technical Report

- Robot Design
  - 6 pictures of all sides
- List of Sensors and Cameras
- Artificial Intelligence
  - The process used in training the AI model to achieve these missions.
  - The software employed to create the AI model.
  - The programming language used in creating the AI model.
  - How was the robot programmed to react to the AI model?

NATIONAL ROBOTICS COMPETITION

Competition Format

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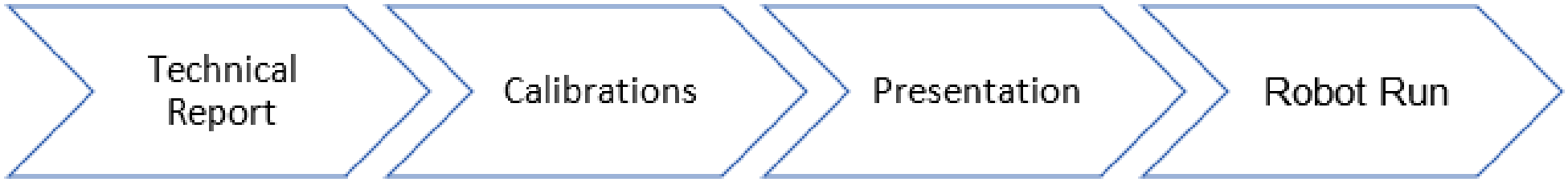
Competition Format



Organiser:

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Important Dates

	Dates	Time	Remarks
Trial playfield	Mid June onwards		Look out for NRC EDM
Technical Report Submission	18th August	2359	Online Submission Deadline for Technical Report
Onsite Calibrations	8th Sept	9am – 5pm	Time given to teams to calibrate and test out the playfield
Onsite Presentation			Informal Presentation for teams to present their technical report
Robot Run			2 x 2-minute robot run will be given for each team
Finals & Award Ceremony	9th Sept	9am – 5pm	

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NATIONAL ROBOTICS COMPETITION

GLOBAL ROBOTICS GAMES

Introduction

Organiser:

Science Centre Singapore

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SP Singapore Polytechnic

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WOW Learning

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:

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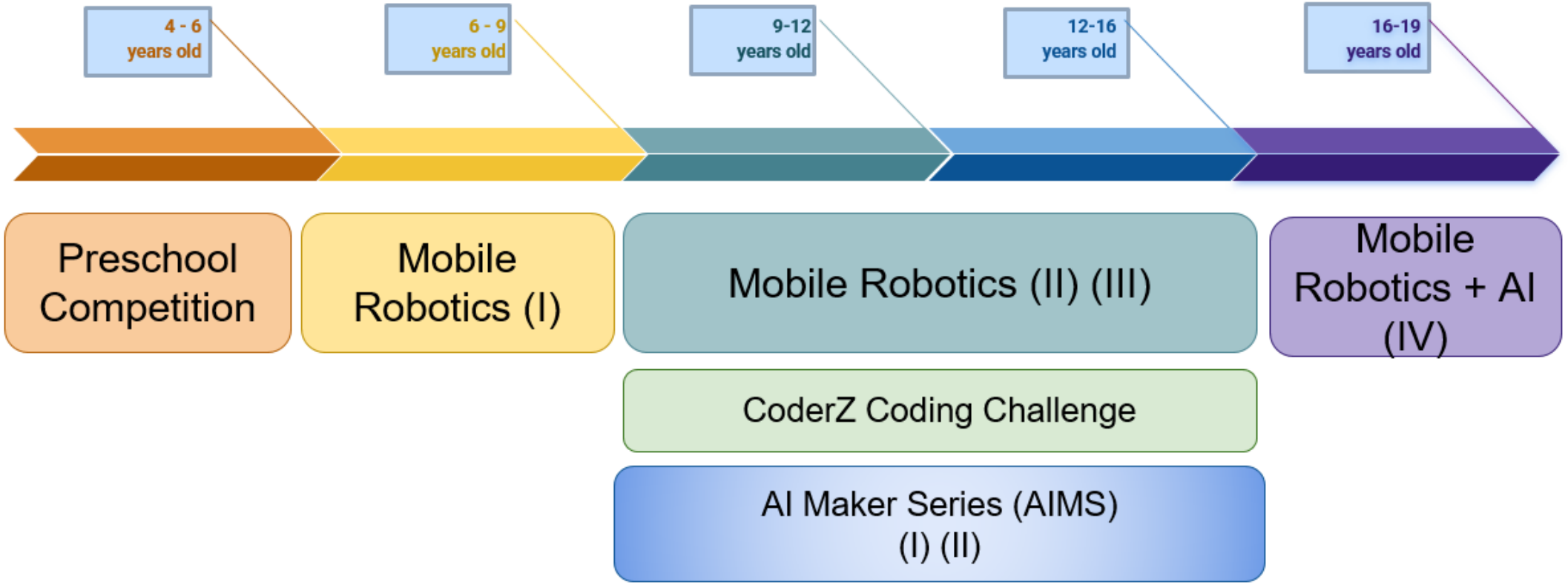
Supported by:

GRG Tournaments



Organiser:

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NATIONAL ROBOTICS COMPETITION

Contact us/Updates/FAQ

Organiser:

Sponsored by:

Supported by:

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:

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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 no preparatory classes from SCS for AIMS.

Organiser:

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Supported by:

Contact us/ Updates/ FAQ

Website

Social Media

Sign-up Link

For any queries

Email

NRC@science.edu.sg

Organiser:

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