NATIONAL ROBOTICS COMPETITION

CoderZ Coding Challenge 2022

Primary, Secondary

GENERAL RULES

Version: 25 May 2022

Main Organiser:

Science Centre Singapore

Co-Organiser:

DUCK LEARNING
opportunities in education

Sponsored by:

Ministry of Education
SINGAPORE

amazon

NRC 2022 CODERZ CODING CHALLENGE
CHALLENGE BOOKLET CHANGE LOG

Version	Release Date	Description
1.0	25 May 2022	Official Challenge Booklet release

Table of Contents

1. General Information

1.1. National Robotics Competition (NRC) 2022

National Robotics Competition (NRC) has been an ongoing competition organised annually by Science Centre Singapore for the past 23 years with support from the Ministry of Education, various partners and sponsors. NRC has attracted more than 60,000 team members and 240,000 supporters to date.

NRC spurs students' interest and innovation in Science, Technology, Engineering and Mathematics (STEM). Students will be able to put their knowledge to practice and engage in hands-on STEM learning. With NRC as a stage for students to develop kinaesthetic learning and collaboration, it encourages students to develop problem solving skills, entrepreneurial skills, creative thinking skills and team spirit among the team members. This is in line with Science Centre Singapore's mission "To promote interest, learning and creativity in science and technology, through imaginative and enjoyable experience and contribute to the nation's development of its human resource.

NRC 2022 tournaments comprise of:

- WRO® RoboMission (previously known as WRO® Regular Category)
- WRO® Future Innovators (Previously known as WRO® Open Category)
- WRO® Future Engineers
- NRC WeDo
- NRC Preschool (New)
- CoderZ Coding Challenge

In 2022, NRC will include a new NRC Preschool category, for age group 5-6.

Registration for these category challenges will be via https://www.gevme.com/NRC2022. Competition registration opens from **1st May to 31st July 2022.**

1.2. Introduction to CoderZ Coding Challenge

Robotics is a wonderful platform for learning 21st century skills. Solving robotic challenges encourages innovation and develops creativity and problem-solving skills in students. Because robotics crosses multiple curricular subjects, students must learn and apply their knowledge of science, technology, engineering, math, and computer programming.

The most rewarding part of designing robots is that students have fun. They work together as a team, discovering their own solutions. Students thrive in this supportive and immersive environment, and learning occurs as naturally as breathing air.

In this challenge, teams will be using the CoderZ platform. CoderZ is a powerful, award-winning online platform through which students learn valuable STEM skills such as coding, robotics, and physical computing. CoderZ is highly flexible and designed for use in the classroom or through a wide range of remote learning environments.

1.3. Focus Areas

Every NRC category has a special focus on learning with robots. In the NRC CoderZ Coding Challenge category, students will focus on developing in the following areas:

- Recognizing patterns and their impact on code
- Writing code using repeat loops
- Facilitating motion planning
- Comparing and refining algorithms for a route
- Computational thinking, creative problem-solving skills, teamwork, communication

In partnership with Amazon as part of the Amazon Cyber Robotics Challenge, team members can create a free CoderZ account to practice coding on the Amazon Cyber Robotics Challenge platform in preparation for the competition. Refer to **4. Competition Material** for more information.

1.4. Age-appropriate Missions

The missions are designed with a growing difficulty and complexity from Primary to Secondary age group. The rising complexity is seen in the:

- Technical complexity of the missions.
- Randomness of the game elements.
- Variety of game elements.
- Required accuracy of the solutions to the missions.
- Overall complexity in the combination of the elements mentioned before.

When participating in NRC CoderZ Coding League for multiple seasons, the teams can grow and develop with the challenges, solving increasingly complex missions as they get older.

1.5. Learning is Most Important

NRC wants to inspire students around the world for STEM related subjects and we want the students to develop their skills through playful learning in our competitions. This is why the following aspects are key for all our competition programs:

- Teachers, parents, or other adults can help, guide and inspire the team, but are not allowed to build the codes/finish the challenges .
- On a competition day, Teams respect the final decision judges take and work with other teams and judges on a fair competition.

2. Team and Age Groups definitions

2.1. Team Definition

A team consists of six (6) team members. One (1) team member is not considered a team. Prior to the day of competition, team members not in groups of 6 will be reassigned to teams (6 pax). A student may only participate in one team.

The age groups in CoderZ Coding Competition are:

- Primary: students 8-12 years old (in season 2022: born years 2010-2014)
- Secondary: students 13-16 years old (in season 2022: born years 2006-2009)

The maximum age reflects the age that the team member turns in the calendar year of the competition, not his/her age at the competition day. It is strictly enforced that student cannot be older than specified age group for the respective competition category. If all members of a team are younger than required, then the team must participate in the corresponding age group category. Team members are not confined to school-going students. Anyone can participate in the corresponding age groups.

3. Responsibilities and team's own work

A team should play fair and be respectful towards teams, coaches, judges and competition organizers. By competing in NRC, teams and coaches accept the WRO® Guiding Principles that can be found at: https://wro-association.org/wp-content/uploads/2021/08/WRO-Guiding-Principles-and-Ethics-Code-2022.pdf.

The coding challenges may be done only by the team. This applies to the day of the competition and the preparation.

A team is not allowed to communicate in any way with people outside of the competition area while the competition is running. If communication is necessary, a judge may allow team members to communicate with others under supervision of a judge.

Team members are not allowed to use mobile phones or any other communication device during the competition.

4. Competition Material

All coding and competition related materials will be presented to team members on the day of the challenge.

An account to CoderZ League will be given to each team member a few days before the actual competition day. The login details for each team member will be emailed to the respective Teacher/Parent in charge (email is based on the registration details given).

Team members do not need to submit any physical materials for the challenge.

Additional pre-competition resources:
In partnership with Amazon as part of the Amazon Cyber Robotics Challenge, team members can create a free CoderZ account to practice coding on the Amazon Cyber Robotics Challenge platform in preparation for the competition.

1) go to gocoderz.com
2) scroll down and click on “Amazon Cyber Robotics Challenge”
3) scroll down and click on “Create Individual Student Account”

Account creation with class code (for teachers): https://tinyurl.com/CoderZResources

The solution videos can be found at the following link: https://bit.ly/CoderZACRCSolution

5. Regulations

Each team member must be logged in to the CoderZ League platform during the day of the challenge. Each student will require a computer for himself/herself on the day of the challenge. Team members will be required to join our Zoom call and be online throughout the day.

6. Computer Requirements

Each team member will require a computer. Specifications of the computer can be found in Annex A.

7. Format and Procedures

7.1. Competition Format

NRC 2022 will follow the gameplay of Coderz League, Preliminary Stage.

Teams will be invited to join a Recap of CoderZ on the morning of the respective day of competition. Teams will be given access to the Competition Packs later in the day of the competition.

Teams will have till 5:00 PM to attempt as many Missions and Challenges to gain points for their team. Teams do not need to submit any physical materials for the challenge.

7.2. Competition Procedure

7.3. Competition Schedule and Format

Competition Schedule for 5th September 2022 – Monday (Primary) and the 6th September 2022 – Tuesday (Secondary).

Time	Activity
8:00 AM – 9:30 AM	Opening Ceremony (Team members to attend the via a zoom link. Teams to remain in the zoom call for the whole day)
9:30 AM – 10:30 AM	**Recap of CoderZ I** (in breakout rooms)
10:30 AM – 10:45 AM	Break
10:45 AM – 12:00 PM	**Recap of CoderZ II**
12:00 PM – 1:00 PM	Lunch Break
1:00 PM – 4:00 PM	**CoderZ Coding Challenge**
4:00 PM – 5:00 PM	Score Tabulation + Photo taking

7.4. Recap of CoderZ

Team members will be given time to practise coding blocks prior to Coding Challenge. Team members will be able to ask trainers for help if needed throughout the day (including during the challenge).

7.5. Challenges

Missions and Challenges are accessed via the CoderZ League platform. Teams must code their virtual robots (Figure1) to accomplish a series of tasks. Teams have unlimited attempts at the Missions and Challenges. The highest score will be recorded.

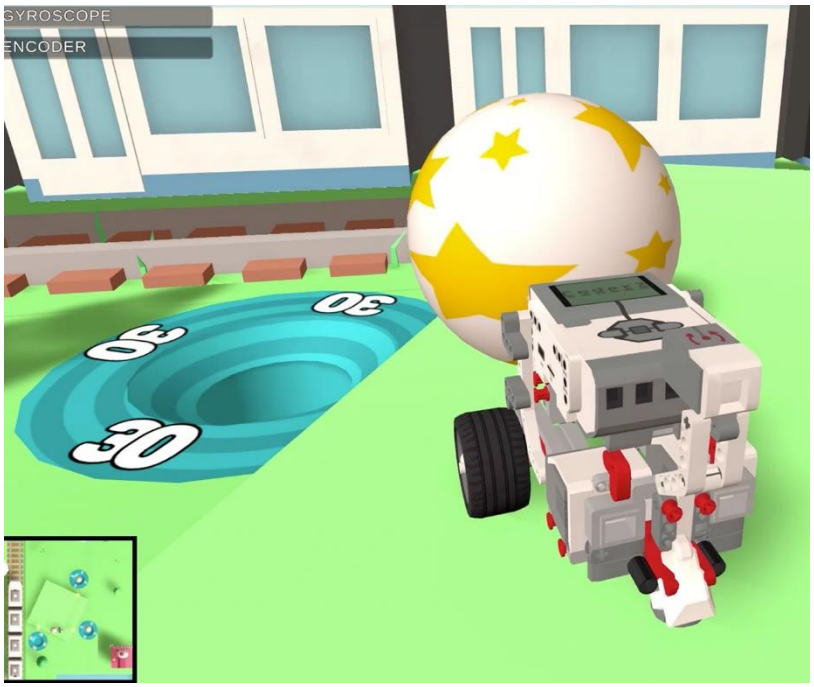

Figure 1. Example of virtual robot environment

Coding is done via a block-based interface for both the Primary Category and Secondary Category (Figure 2).

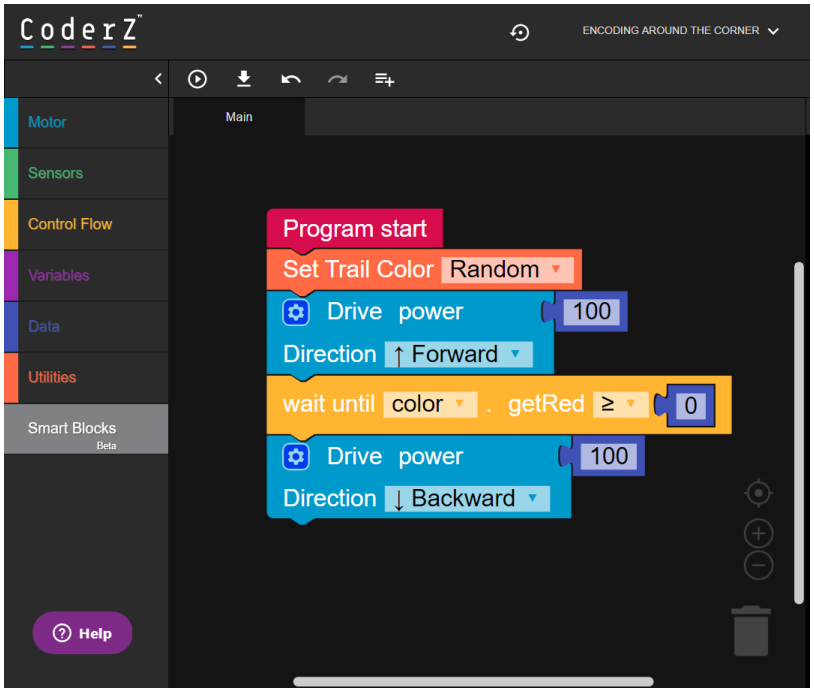

Figure 2: Example of Block-based Interphase

It is not compulsory for each team member to attempt all the challenges. Points are awarded according to number of completed Missions and Challenges. The number of Missions vary according to the challenges (Figure 3).

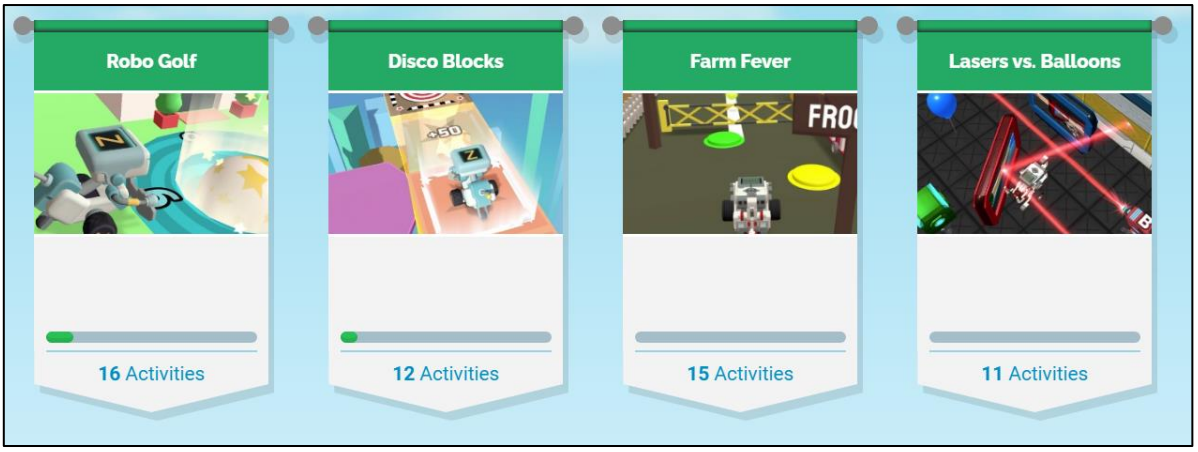

Figure 3: Example of Missions and Challenges

7.6. Judging Criteria

Scoring is based on strategy and code quality. This will be represented by the points that you get. Scores are calculated by the CoderZ scoring system based on time taken for virtual robots to complete the Missions and number of Missions completed. Scores will be totalled as a team at 5:00 PM.

Team scores can be viewed anytime during the competition (Figure 4). At the end of the competition, the top 3 scoring teams of each category will be recognized.

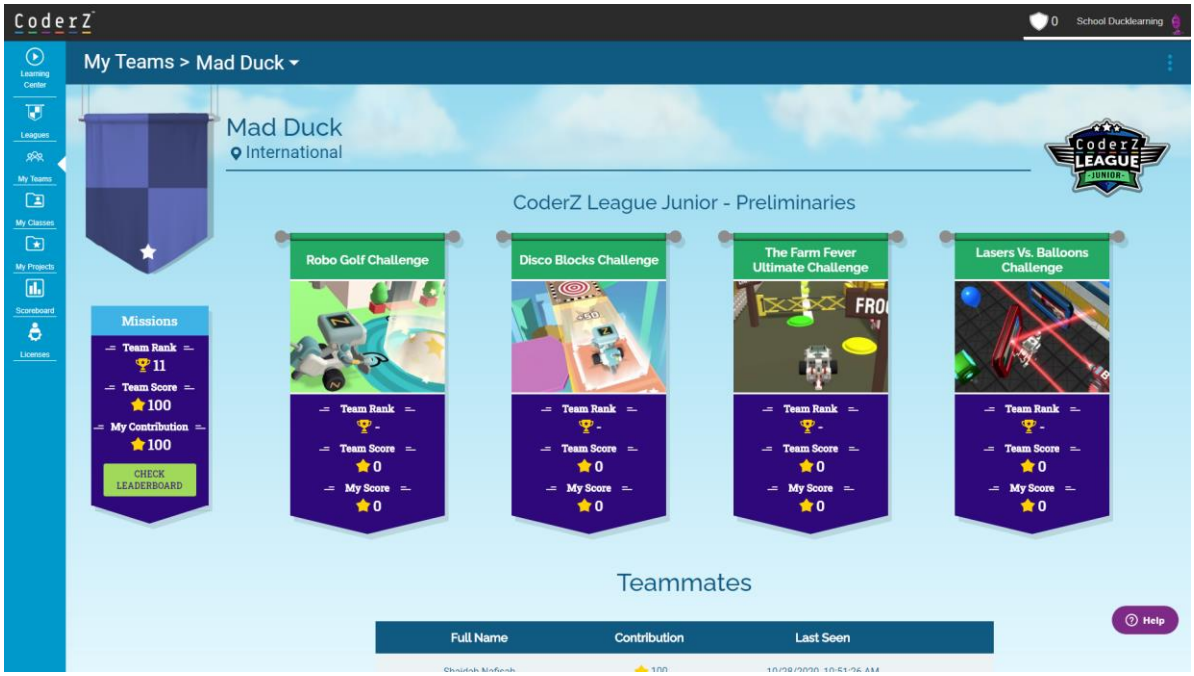

Figure 4 Scoring page

8. Awards

Tournaments	Category	Rank/Team of 6
NRC 2022 CODERZ CODING CHALLENGE	Primary School Category	1st
		2nd
		3rd
	Secondary School Category	1st
		2nd
		3rd

Annex A

Minimum Requirements for CoderZ Coding Challenge

OS

- Windows 7 and up
- OS X 10.9 Mavericks and Up
- Chrome OS (Chromebooks)
- Ubuntu 16 and up

Browser

- Latest Chrome browser (64 bit)

CPU

- i5 or similar
- Recommended 64 Bit architecture

RAM

- 4 GB minimum
- Recommended 8 GB for Windows/OS X

Screen Resolution

- 1280 pixels (width) or more

Internet Connectivity

- High Speed / broadband connection (15Mbps)
- Wired connections may help reduce load times

White lists

- The following two domains should be white listed in both email servers and firewalls for optimal performance of CoderZ:
    - CoderzWorld.com
    - GoCoderz.com
    - Zoom