

# 2014 NRC - RULES AND REGULATIONS (Final Competition)

## General Guidelines

1. A school team should comprise of 2 or 3 students and 1 teacher.
2. A participant may only participate in ONE category.
3. All rules and regulations are subject to change without prior notice.

## Competition Categories & Age Groups

1. Regular Category

Category	Date of Birth	Event
Primary School	1 Jan 2002 – 31 Dec 2007	ROCKET
Lower Secondary	1 Jan 1999 – 31 Dec 2001	SPUTNIK
Upper Secondary	1 Jan 1995 – 31 Dec 1998	SPACE STATION

2. Open Category

Theme: Robots and Space

Category	Date of Birth
Primary School	1 Jan 2002 – 31 Dec 2007
Lower Secondary	1 Jan 1999 – 31 Dec 2001
Upper Secondary	1 Jan 1995 – 31 Dec 1998

3. GEN II Football

Date of Birth
1 Jan 1995 – 31 Dec 2004

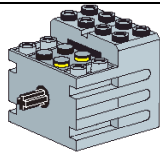
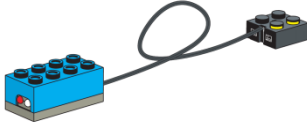


## General Rules – Regular Category




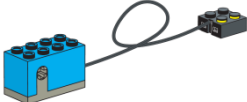
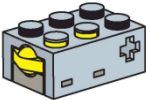







1. The competition rules of the 2014 National Robotics Competition are constituted by the organizing committee of the National Robotics Competition (“the tournament” for short in the following paragraphs), and they apply to the tournament.
2. **Additional surprise rules will be announced on the morning of the competition.**
3. Regulations on materials used:
  - (a) Except for special designations in competition rules, materials used by the teams to assemble their robots must be from 9797 LEGO® MINDSTORMS® Education Base Set, 9695 LEGO® MINDSTORMS® Education Resource Set, 9648 Education Resource Set, 9794 LMFS Team Challenge Set, 9649 Technology Resource Set, **45544 LEGO® MINDSTORMS® Education EV3 Core Set, and 45560 LEGO® MINDSTORMS® Education EV3 Expansion Set. The shape of materials used must be exactly the same. The colour may differ from the original.**
  - (b) Teams should prepare and bring all the equipment (software, portable computers, batteries, extension wires, etc.) that they need during the tournament. Teams should not use any flammable materials as part of their designs.
  - (c) Teams should bring enough spare parts. In the event of accidents or equipment malfunction, the organisers are not responsible for any maintenance and replacement of equipment.
  - (d) Mentors are not allowed to enter the quarantine area and give instruction or guidance to their teams during assembly time.
  - (e) Teams are allowed to bring only one RCX/ NXT/ EV3 controller into the quarantine area.
  - (f) Batteries used during the competition can be 6 pieces of AA batteries or lithium batteries of LEGO® MINDSTORMS® NXT/ EV3. Other power supply devices which are not authorised by the organisers are not allowed to be used.
  - (g) All the parts for the robot should be in the initial states (not pre-built) when the assembling time starts. For example, a tire cannot be put on a wheel until the assembling time begins.
  - (h) Contestants may not refer to any instruction sheets/guides in any form including written, illustrated or pictorial.

- (i) Teams are allowed to pre-program the robot or store the program in the laptop before the competition.
- (j) No screws, glues or tapes are to be used to fasten any components of the robot. Non-compliance with this rule may result in disqualification from the competition.
- (k) The control software must be either ROBOLAB, LEGO® MINDSTORMS® Education NXT / EV3 software or LabView. See table below for NRC eligible software for Regular Category :

Category	ROBOLAB	NXT Software	EV3 Software	LabView
Primary school - ROCKET	✓	✓	✓	✗
Lower Secondary - SPUTNIK	✓	✓	✓	✗
Upper Secondary - SPACE STATION	✓	✓	✓	✓

- (l) The motors and sensors for the robot are supplied by LEGO® MINDSTORMS® Education and HiTechnic. Any other products are not allowed. Modification of any original parts, for example, RCX/ NXT/ EV3 Intelligent Brick, motors, sensors, etc is not allowed. Violation of this rule may result in disqualification.
- (m) Please note that the EV3 Gyro sensor is not allowed in NRC Regular Category.
- (n) EV3 users may only use three (3) motor ports.
- (o) See table below for NRC eligible sensors and motors for Regular Category:

PID	Product Picture	Product Name
5225		9V Motor with Gear Reduction
9758		Light Sensor
9842		Interactive Servo Motor
9843		Touch Sensor

9844		Light Sensor
9845		Sound Sensor
9846		Ultrasonic Sensor
9891		Angle Sensor (9V)
9911		Touch Sensor and Leads
9694		NXT Colour Sensor
NCO1038		HiTechnic NXT Colour Sensor
45502		EV3 Large Motor
45503		EV3 Medium Motor
44504		EV3 Ultrasonic Sensor
44506		EV3 Colour Sensor
44507		EV3 Touch Sensor

4. Regulations concerning the robot:
- (a) The maximum dimensions of the robot before it starts the mission must be within 250mm X 250mm X 250mm. After the robot starts, the dimensions of the robot are not restricted.
  - (b) Except for special designations in competition rules, the amount of motors and sensors used during the competition are not restricted.
  - (c) Teams are allowed to use only one controller (RCX, NXT or EV3).
  - (d) Except for special designations in competition rules, any action or movement deemed as interference or assistance to the team while the robot is functioning is disallowed. Violation of this rule may result in disqualification from the competition.
  - (e) Use of radio communication, remote control and wire control systems to control the robot is not allowed. Violation of this rule may result in immediate disqualification of the team from the competition.
  - (f) If the robot uses the NXT/ EV3 Intelligent Brick as its controller, the Bluetooth™ and Wi-Fi function must be switched off.
5. Regulations on the competition event:
- (a) **The competition format for Regular Category is:**
    - i. 3 qualifying rounds (best score taken).**
    - ii. Top 16 Round 1**
    - iii. Top 16 Round 2**
  - (b) **Assembly time for this challenge is 150 minutes and will begin before qualifying round 1.**
  - (c) **Maintenance time for each subsequent round is as follows:**
    - i. For qualifying round 2, 45 minutes.**
    - ii. For qualifying round 3, 30 minutes.**
    - iii. For Top 16 Round 1, 30 minutes.**
    - iv. For Top 16 Round 2, 15 minutes.**
  - (d) Contestants can only start to assemble, program and test their robots after the announcement of the tournament. Teams must place robots in their designated inspection area when assembly or maintenance time ends, after which the judges

will assess if the robots conform to all regulations. Upon successful inspection the robots will be allowed to compete.

- (e) Scores are calculated by the judges after each match. The contestants must sign the score sheet after each match.
- (f) Contestants should take good care of their robots to avoid malfunction. If programs cannot be downloaded to the robot due to ill-safekeeping, accidental bumping, falling or other causes, assembly time or maintenance time will not be extended.
- (g) If a violation is found at the inspection, the judge will give the team 3 minutes to correct the violation **but the contestant is not allowed to add any parts, nor download any program**. If the violation is not corrected during the time given, teams will not be allowed to compete.
- (h) When assembly time is over, neither modification (for example, downloading programs, changing batteries) of robot, nor request for time-out is allowed. In the case of a robot breaking down accidentally, the contestant may be given maintenance time by the judges but the contestant is not allowed to add any parts, nor download any program.
- (i) The ranking of team is decided by their best score of a round. If competing teams acquire the same points, the ranking is decided by the time recorded. If teams still remain tied, rankings will be determined by consistency of performance by examining which team achieved the next highest score during previous rounds.

6. Regulations on the playing field:

- (a) Teams must assemble their robots in the area (each team has its own area) designated by the tournament. Only the contestants, NRC organising committee staff and special personnel are allowed to enter the competition area.
- (b) All models and playing fields are according to the standard provided by the tournament on the competition day.
- (c) As you build and program, keep in mind that our organizers make every effort to ensure that all fields are correct and identical, but you should always expect some variability, such as:
  - i. Variety in lighting conditions
  - ii. Judge's shadow on the field
  - iii. Judges will walk around the field during judging

- iv. Texture/bumps under the mat
  - v. Waviness in the mat itself – at many tournaments, it is possible for the mats to be rolled out in time to lose their waviness. Location and severity of waviness varies. It is very important to consider this while designing.
7. Regulations on behaviour:
- Behaviours listed below are prohibited and may result in disqualification:
- (a) Causing damage to the competition playing fields, models or robots of other teams.
  - (b) Bringing a cellular phone, camera, entertainment devices or a medium of wired/wireless communication device into the quarantine area.
  - (c) Using dangerous items or displaying behaviour that disrupt the competition.
  - (d) Using inappropriate words or behaving inappropriately towards other teams, audience, judges or the tournament.
  - (e) Creating situations which judges deem unacceptable or interfering.
8. The judges have the utmost authority during the tournament. Their decisions are final and shall not be changed. As such, they may not change their decision even after viewing the competition video.
9. When a team is considered disqualified by any judge, the robot of the team concerned must quit the match immediately, and the team will get no score for the match.
10. The tournament has the right to revoke the qualification of any team if the team violates the rules.
11. Any communication devices and methods are strictly restricted while the competition is in progress. Anyone who is outside the competition area is prohibited from talking or communicating with the contestants in the competition area. Violation of this rule may result in disqualification. However, under certain circumstances and with permission from the judges, an urgent message can be conveyed through a tournament staff.
12. If the competition is delayed due to electricity breakdown, unavailability of Playing Fields/models or difficulty in determining the scores, the judges may hold a return game, and the contestants shall not raise any objection.
13. The tournament has the right to photograph and videotape the event and the right to reproduce, modify and use the photographs and video tapes for various media.

14. If there is any inadequacy or alteration in the rules, the final decision shall be announced by the judges at the tournament. The judges have the utmost authority to amend the rules and regulations.
15. Penalty may be imposed on a team if there is any violation to the General Rules.



## **General Rules – Open Category**

1. The competition rules of the 2014 National Robotics Competition are constituted by the organizing committee of the National Robotics Competition (“the tournament” for short in the following paragraphs), and they apply to the tournament.
2. The competition will be categorised into 3 different age groups:
  - (a) Primary School (7 - 12 years old)
  - (b) Lower Secondary School (13 - 15 years old)
  - (c) Upper Secondary School (16 - 19 years old)
3. There is no restriction on the use of non-LEGO® materials. However, the final project must be operated or controlled by the RCX/ NXT/ EV3 Intelligent Brick.
4. Any programming languages are allowed to be used.
5. The robots may be pre-assembled and the software program may be pre-programmed.
6. The size of the whole project, including booth decorations, must not exceed  
2 meters (L) x 2 meters (W)
7. Teams must decorate the booth with at least one poster, with the minimum dimension of  
120cm x 90cm, introducing the project.
8. Each team will undergo the following:
  - (a) Test and assemble the final robot at a designated location.
  - (b) Decorate the booth with posters or anything that is related to the theme.
  - (c) Demonstrate the project to the judges.
  - (d) Participate in a ‘Question and Answer’ (Q & A) session with the judges.
9. A report (hard copy & soft copy in CD/DVD), summarizing the whole project, must be submitted to the registration counter on competition day. The description must be supported by pictures showing different angles of the robotic creation and examples of the program. The CD/DVD must include a video (maximum of 2 minutes) demonstrating the robot.

10. **A video (maximum of 2 minutes) demonstrating the robot must be submitted to the organizing committee of the National Robotics Competition through YOUTUBE and the YOUTUBE link (UNLISTED) is to be email to adrianchai@sasbadi.com latest by 19<sup>th</sup> September 2014. The title of your video must be in the following format:**

**NRC 2014\_State\_Level\_School Name**

**Replace the red colour text with your team's information. Sample title of the video:**

**NRC 2014\_Perak\_Primary\_SK Siputeh.**

### Judging Criteria – Open Category

CATEGORY	#	CRITERION	POINT
Project	Total Points:		50
	1	Creativity & Quality of Solution	(25)
		How original and creative is the project? Does the solution solve the problem well? Does the solution benefit society in a huge way or limited to just a small scope?	
	2	Research & Report	(15)
		Comprehensive research has been done and solutions are built upon this research.	
	3	Entertainment Value	(10)
		The project looks fun, awesome, and has great entertainment value.	
Programming	Total Points:		45
	1	Automation	(15)
		Routines are fully automated with the use of sensors as opposed to timing.	
	2	Good Logic	(15)
		Routines and demonstrations are easily repeatable without hassle.	
	3	Complexity	(15)
		Complex functions are performed with the use of multiple sensors and/or controllers to achieve meaningful outcomes.	

## Judging Criteria – Open Category

CATEGORY	#	CRITERION	POINT
<b>Engineering Design</b>	<b>Total Points:</b>		<b>45</b>
	1	Technical Understanding	(15)
		Team members are able to produce clear, precise, and convincing explanations about each step of the robot building and programming process.	
	2	Engineering Concepts	(10)
		Application of engineering knowledge evident such as proper use of gears, levers, and weight transfers.	
	3	Mechanical Efficiency	(10)
		Parts are used efficiently. Robot uses the simplest way to achieve its goals and does not look unnecessarily bulky.	
	4	Structural Stability	(5)
		Robot is strong, sturdy, and built in line with good engineering principles.	
	5	Aesthetics	(5)
		Robot has aesthetic appeal.	
<b>Presentation</b>	<b>Total Points:</b>		<b>40</b>
	1	Successful Demonstration	(15)
		Robot demonstration is successful. Evidence of pre-emptive measures taken to ensure successful demonstration. Clear that a lot of preparation and practice have taken place.	
	2	Communication & Reasoning Skills	(10)
		Ideas, concepts, and contents conveyed effectively, neatly, and convincingly. Presentation laid out in a logical and interesting fashion.	
	3	Quick Thinking	(5)
		Ability of participants to think on their feet and answer the judges' questions convincingly.	
	4	Posters and Decorations	(5)
		Amount of additional effort put in to decorate the booth and make it eye-catching.	
	5	Project Video	(5)
		How closely does the actual project match the project video? (0 marks given if video does not meet the video requirements as stated in the general rules).	

### Judging Criteria – Open Category

CATEGORY	#	CRITERION	POINT
Teamwork	Total Points:		20
	1	Unified Learning Outcome	(10)
		Every team member is able to display internalized knowledge about the subject matter of their project.	
	2	Inclusiveness	(5)
		Appropriate distribution of responsibilities with each member clearly knowledgeable about his or her individual role.	
	3	Team spirit	(5)
		Team members display positive energy, good cohesiveness, and value one another.	
Maximum Points :			200

## **Content Sample of the Project Documentation**

1. Acknowledgement.
2. Project Mission, Vision & Objective
3. Particulars of team members and mentor
4. Introduction about the project in detail
5. Synopsis of the project
  - (a) Background
  - (b) Robot functionality
  - (c) Uniqueness and interactive behavior
6. Designing and Building Process
  - (a) Concept and Implementation
  - (b) Brainstorming and solution to the problem
  - (c) Engineering and stability of the structures
  - (d) Pictures of the project (at each stage)
  - (e) Final model and pictures depicting different angles
  - (f) Related charts
7. Programming
  - (a) Concept
  - (b) Brainstorming and solution to problem
  - (c) Printed programming with explanations
8. Appendices
  - (a) Interviews (if any)
  - (b) Gantt chart
  - (c) Softcopy of the whole project must be burned in CD/DVD (e.g. report, programming, slide show, video clip and etc.)