16th Annual CRC Robotics Competition

Full Rule Book

Welcome to the CRC Robotics Competition

On behalf of the Educational Alliance for Science and Technology and the CRC Robotics Organizing Committee, welcome and congratulations to all the participants on joining your school's robotics team and embarking on the CRC Robotics journey!

Take it from some of the current leaders of the CRC Robotics Organizing Committee who were former student participants in the CRC: you will remember this unparalleled experience for many years to come. In fact, many of the over five-thousand CRC Robotics Competition alumni will tell you that participating in the CRC was the most memorable, useful, important, and fun part of their high school and CEGEP lives.

This is now our 16th competition and we are very excited about the game this year. Thanks to the help of our great volunteers, we have much more to show off this time around! They have made it possible to improve aspects of the competition that we could not have advanced otherwise.

We wish to welcome and thank the many teachers, parents, mentors, and volunteers for embarking on this journey and for all the hard work you will put into enriching your students' lives throughout this activity.

We also wish to thank the Director General of Vanier College, Mr. Mr. John McMahon, and his team for their warm welcome and for the time and energy they've put in towards the success of this event.

In addition, we wish to acknowledge all of our partners without whom the CRC could not exist.

Good luck to all and see you at Loops 2017 from February 16th to 18th , 2017 at Vanier College !

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Goals, Objectives, and Roles

Our non-profit organization has set up this competition with the following goals in mind:

1) To set up a student-oriented and student-directed activity.
2) To create a project that integrates robotics, science, math, multimedia, language arts, public speaking, and computers.
3) To develop a hands-on approach to help our students link the classroom to the workplace.
4) To help to encourage girls to head into fields involving science and technology.
5) To put into practice the education reform and its cross-curricular competencies.
6) To provide a positive and rewarding experience to help reduce the dropout rate among young men.
7) To foster and build teamwork and communication skills.
8) To promote the idea of working together to accomplish a common goal.
9) To instil the concept that achieving team goals is more important than winning.

In this competition there are three different types of people: students, teachers, and mentors. We have laid out the following roles for each:

1) Students are to do all of the planning and building. They should be creating the strategies, designing the critical paths, and controlling all aspects of the team. Any work done on the robot, video, website, and kiosk must be done entirely by the students.
2) Teachers are available to provide the support that students may need. They should not be directing the students, but instead, acting as an advisor. If a student has a question, the teacher may point the student towards the answer or show the student how to find the solution. If a student is unsure of how to accomplish a specific task, the teacher may demonstrate, but any pieces attached to the robot are to be touched only by the students. However, we do realize that there may be times when an educator must step in for academic reasons. We believe that every teacher is a professional that can differentiate between teaching and doing.
3) Mentors are outside professionals who may be consulted during the course of this activity. Their job is to help with questions which exceed both the students' and teachers' knowledge. An engineer would have more practical experience; however, the engineer may not direct the students as he/she is acting only as an advisor.

We value the participation of your school but please keep in mind that this is the student's project. Let them show you what they are made of and develop their own skills.

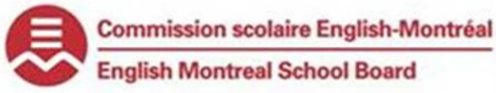
Loops 2017 – Participating Schools

Welcome and good luck to all!

Bishop's College School
Cégep de Lévis-Lauzon
Cégep Saint-Laurent
Cégep Vanier College
Centennial Regional High School
College Citoyen
Collège de Bois-de-Boulogne
Collège Laval
Collège Montmorency
Collège Notre-Dame 1
Collège Notre-Dame 2
Collège Sainte-Marcelline
Dawson College
École secondaire Curé-Antoine-Labelle
École secondaire Jules-Verne
John Abbott College
Lake of Two Mountains High School
LaurenHill Academy
Laval Senior Academy
Macdonald High School
Marianopolis College
Riverdale High School
Royal West Academy
Selwyn House School
St. George's School of Montreal 1
St. George's School of Montreal 2
West Island College

CRC Robotics Partners

CRC Robotics would like to express a hearty thank-you to our partners!



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Loops 2017 - Game Rules

1. Goal:

1.1 Two teams of two robots are competing to score the largest amount of points. The score of a team is maximized by:

- Minimizing the number of playing pieces (Spools), in contact with the floor, on their side of the field.
- Maximizing the number of playing pieces, in contact with the floor, on the other side of the field.

2. Teams:

2.1. There are 2 teams of 2 robots each: a yellow team and a blue team. The robots on the yellow team will start the game on the yellow side of the playing field. Robots of the blue team will start on the blue side of the field. Robots on one side of the field may not cross to the other side during the game.

2.2. A robot's partners will change from heat to heat.

2.3. Each team of robots will attempt to score as many points for their team as possible.

3. Playing Pieces:

3.1. The playing pieces are spools. The game starts with:

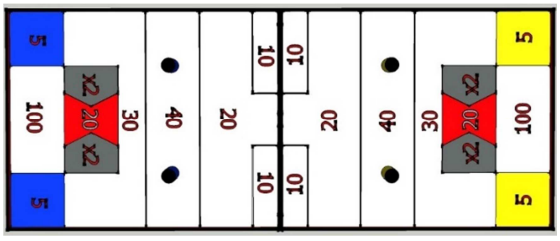
- 2 spools preloaded on each robot.
- 24 spools on each side of the field. The spools, on each side of the field, are found in 2 vertical dispensers. Each vertical dispenser contains 12 spools.

4. Playing Field:

4.1. The playing field is a large rectangle.

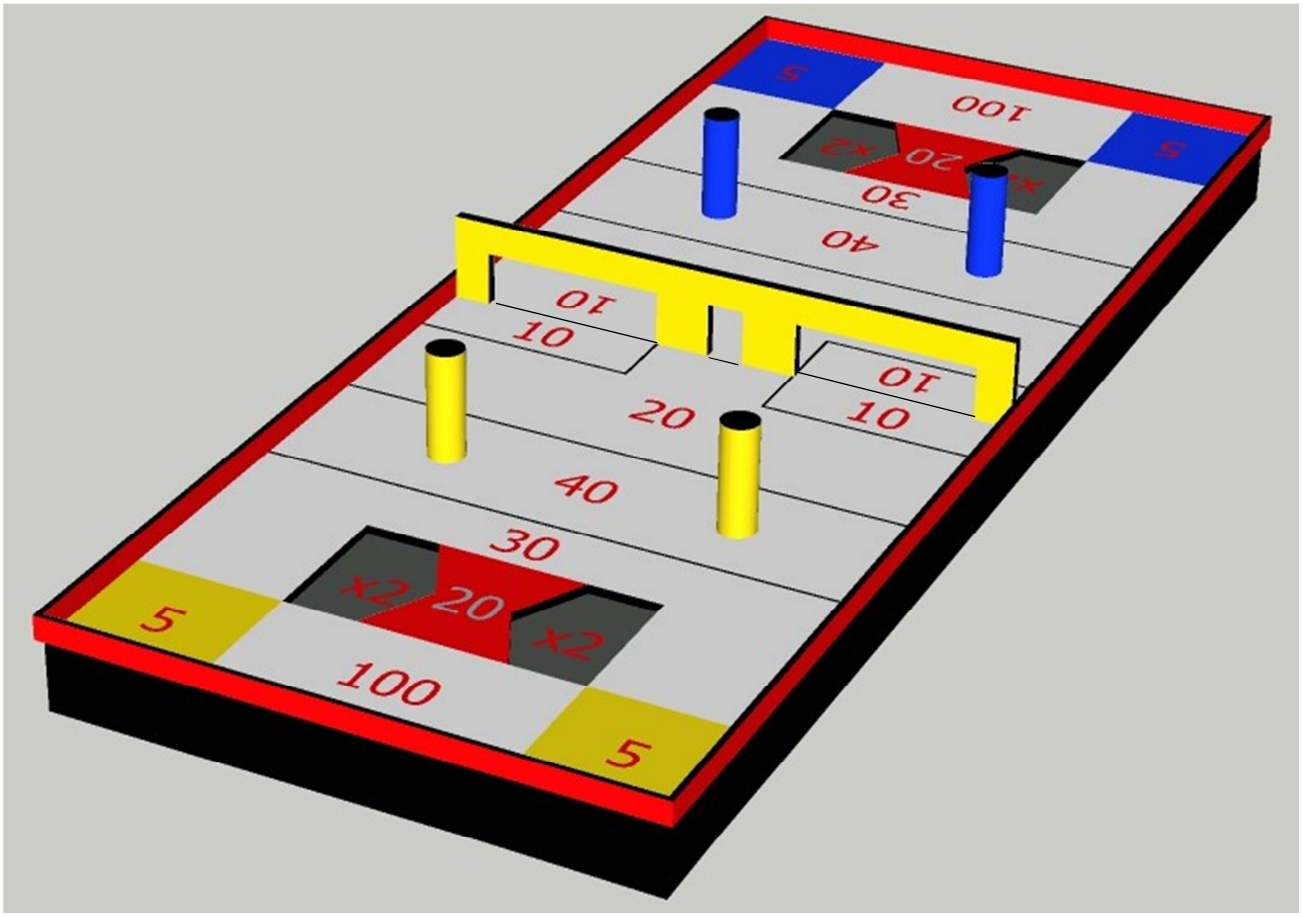
4.2. The floor on each side of the playing field is divided into zones, each zone assigns a number of points to a spool, at rest, in contact with zone floor. On each side of the playing field there are (see field diagram):

- 2 zones of 5 points.
- 2 zones of 10 points.
- 2 zones of 20 points.
- 1 zone of 30 points.
- 1 zone of 40 points.
- 1 zone of 100 points.
- 2 zones of x2 multipliers.



4.3 If a spool is at rest on the line separating two zones, it will be assigned the highest number of points of the two zones (for example: if a part of a spool, at rest, is over the line separating the zones of 5 and of 100 points, then the spool will be assigned 100 points). Spools that are stacked over other spools will be assigned the same highest number of the spool(s) that are in contact with the field floor (in a specific zone).

Diagram of the Playing Field:



Isometric projection

Not to scale

5. On Deck:

5.1. Each school's spotter, driver, and robot participating in the next heat must be in the On Deck Circle when the buzzer sounds to end the previous heat. If not, a penalty is assessed to the offending school.

5.2. If a robot, driver, or spotter of a school is not ready to start, the heat will start without the school in question.

5.3. All robots must be labelled with the school's name and number, which must be clearly visible to the crowd. Adding the robot's name is optional.

6. Starting Play:

6.1. The drivers and spotters must remain seated during the entire game in their **designated seats provided by the CRC**, which are placed within the designated areas surrounding the playing field. Once the heat has begun, the drivers and spotters may not interfere with any items on the field during the heat, including contact with the robot(s) or the playing pieces. They are also responsible for taking all necessary safety precautions.

6.2. Robots are to be brought to their designated starting bay. If robots arrive after a heat begins, they will not be permitted to participate in that heat.

6.3. Each robot may be preloaded with two spools once they are on the playing field. The pieces will be on the playing field.

7. In Play:

7.1. Time is called by the head referee.

7.2. Robots may not move in the x2 zone. If a robot wheel(s) accidentally falls in the x2 zone, the team must withdraw the robot that fell, with or without assistance form the other robot, from the x2 zone.

7.3. Any intervention from a referee to assist your robot will come at a cost of 20% of that robot's points for the heat per action. Actions include (but not limited to): withdrawing from the x2 zone, putting a robot on the field if it tips over on the field, if a robot is stuck on a spool or if a team forgets to turn on their kill switch. Team members may not enter the field at any moment of the heat. If a team takes too long to ask for help, the referee will prompt them.

7.4. To minimize the number of spools on their side of the playing field and to maximize them on the other side, robots of the same team can move the spools through the openings in the wall separating both sides of the field or throw them over the wall.

7.5. Robots on one side of the field may not violate, with any part of their robots, the air space of the other side of the field nor the air space of the wall (or its continuity) separating both sides of the field. If a spool is thrown while the robot is in violation of the airspace, the spool will be put in the opposing team's dispenser, increasing their number of playable spools.

7.6. Robots may not damage the playing field, the game pieces, or other robots in any way.

7.7. The initial total number of “playable” spools (spools that can be removed from both dispensers on one side of the field without penalty) is 12.

7.8. The last robot that came in contact (intentionally or unintentionally) with a piece that left the field, is considered responsible for placing that piece out of the field.

7.9. For every piece a team puts out of the field, the opposing team’s total of spools that can be removed from their dispensers will be increased by one. The number of remaining spools a team can remove will be displayed on a screen on each side of the field.

7.10. Teams may not place spools on the edges (contour) of the field nor on the wall separating both sides of the field.

7.11. All the spools on one side of the playing field can be moved by the robots on the same side, except the spools that are, at rest, completely in the 100 points zone. If a part of the spool is over the contour line of the 100 points zone, then this spool can be moved by the robots.

7.12. A spool is considered “on the robot” if it is in contact with only the robot (and no longer the playing field). A maximum of 2 spools are allowed on a robot at any given moment of the heat. A 100 points penalty will affect the robot (not the team) for every extra spool on it, at any given moment of the heat.

7.13. The referees on the playing field have full authority to judge all aspects of the game. In particular, the referees will:

- Prevent robots from violating the air space of the wall and of the other field.
- Prevent robots from coming in contact with a spool completely located within the 100 points zone (see scoring section).
- Ensure that the numbers displayed on the screens are updated. Their ruling overrides whatever is displayed on the screens.

8. End of Play:

8.1. All heats are 5 minutes in duration. When the heat time is over, all robots must stop moving. If at that moment a spool was still moving, it will be assigned the points of the zone where it will come to a stop, even if that occurs after the heat time is over.

8.2. The heat will come to a sudden end (before the 5 minutes duration) if a team manages to clear their side of the field (excluding the x2 zone) and their robots from spools, for a minimum of 30 seconds, provided that a minimum of 12 spools have been removed from their dispensers. The 30 seconds countdown will start, upon the signal of the referee, when the last spool is cleared. The countdown will be canceled if a spool re-enters the cleared side within 30 seconds after the countdown starts. A display screen, on the field, will show the countdown. Please note that if a spool is completely in the 100 points zone, then this spool cannot be moved and that side of the field cannot be cleared.

8.3. Following the buzzer signalling the end of play, nobody may enter the playing field until the head referee indicates that they may.

9. Scoring:

9.1. **Sharing robot**: In order to share points with its teammate, a robot must contribute to the score by taking a spool from the dispenser or by putting a spool in enemy territory. The robot will be defined as a sharing robot and will be able to score the team's points.

9.2. **Inactive robot**: If a robot does not make it fully out of the starting zone during the heat for whatever reason or if it is simply absent, it will be deemed an inactive robot. Given the nature of the game, a robot teaming up with an inactive robot will see its score multiplied by 1.5 to compensate for the disadvantage.

9.3. **Broken robot:** Note that if a robot makes it out of the starting zone and stops moving, it will not be deemed inactive as it will be defending some zone. Therefore, there will not be any bonus. However, if the incident that stops the robot happens before the team meet the sharing requirements, the broken robot will not share points and its partner will not see its score multiplied by 1.5.

9.4. The final score for each team is assessed at the end of the heat, although an estimated score will appear on the display as the heat is in progress.

9.5. If a spool is at rest on the line separating two zones, it will be assigned the highest number of points of the two zones (for example: if a part of a spool, at rest, is over the line separating the zones of 5 and of 100 points, then the spool will be assigned 100 points).

9.6. Spools that are stacked over other spools will be assigned the same highest number of the spool(s) that are in contact with the field floor (in a specific zone).

9.7. If a spool is at rest on the line separating the two sides of the field, it will count as if it's on both sides of the field. This spool will be assigned the points of the zone where it is found (10 or 20) and its score will count for both teams (This rule will make a difference in the score when one team has the game multiplier.)

9.8. The points assigned to a spool found on one side of the playing field will be awarded to the team on the other side of the playing field.

9.9. No points are assigned to the spools in the dispensers, on the robots and in the x2 zone.

9.10. Removing spools from the dispensers

9.10.1. For each spool that a team removes from the dispenser, the team is awarded 50 points.

9.10.2. A screen on each side of the field will indicate, in real time, the remaining amount of spools that a team can remove from the dispensers.

9.10.3. A spool is considered removed from the dispenser when it is no longer in contact with it.

9.10.4. If a spool is removed by a team from the dispenser and left on the field floor, in a specific zone, of their side of the field, then the points assigned to the spool will be awarded to the opposing team.

9.10.5. If a team removes from the dispensers, for example, 14 spools instead of 12, then the screen on their side of the field will indicate "-2". If at the end of the game the screen still indicates "-2", then the 2 highest scoring spools of that team will be canceled from their score. Canceling these spools also cancels, from the score, all the points the extra spools have generated. Specifically, this cancels the points generated by removing them from the dispenser (50 points each), as well as the points generated from the location of the spools on the field floor. Please note that the number of spools a team is allowed to remove from the dispensers may change during the game. The number may become negative if a team over-withdraws spools from their dispensers, however, it may become zero or positive as the game is played.

9.11. The x2 zone and the game multiplier.

9.11.1. At the end of the heat, the team having the first highest number of spools in the x2 zone (the x2 zone is a pit with a recessed floor), on the other side of the field, will be awarded the game multiplier. The game multiplier will double to total score of that team.

9.11.2. If a spool is in the x2 zone on one side of the field, then it cannot be removed by the robots playing on the same side of the field.

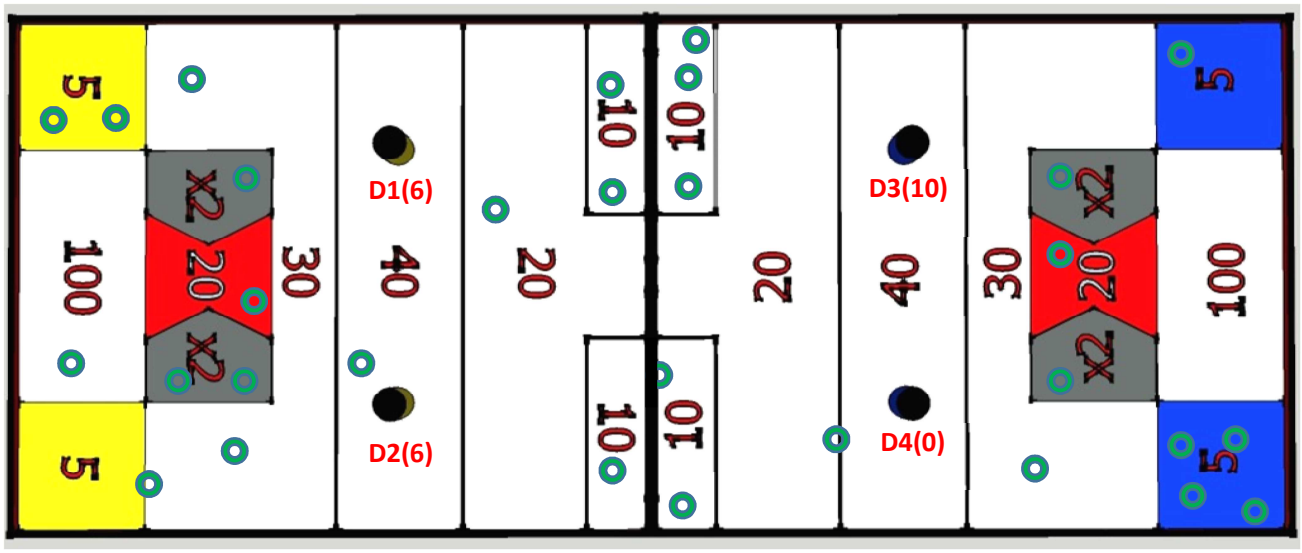
9.11.3. Robots may not place, intentionally or unintentionally, a spool in the x2 zone on their side of the field. Every spool placed by a team in their own x2 zone will be considered as "out of the field" (see the In play section), be removed by the referee from the x2 zone and will increase by one the number of spools that the opposing team can remove from their dispensers.

9.11.4. Spools placed by a team in the x2 zone on the other side of the field will increase the chances of that team in obtaining the game multiplier. However, no points are awarded for those playing pieces (as specified in **Erreur ! Source du renvoi introuvable.**) and will not grant the team the right to remove extra playing pieces from their dispensers.

10. Scoring examples

The following are scoring examples. They constitute an integral part of the rules and a reference for scoring disputes. The images below show the positions of spools (in green) on both sides of the field (top view) at the end of a game.

Scoring example 1:



D1, D2, D3 and D4 are respectively the four dispensers.
The number in parenthesis next to each dispenser indicates the number of spools removed from the dispenser.

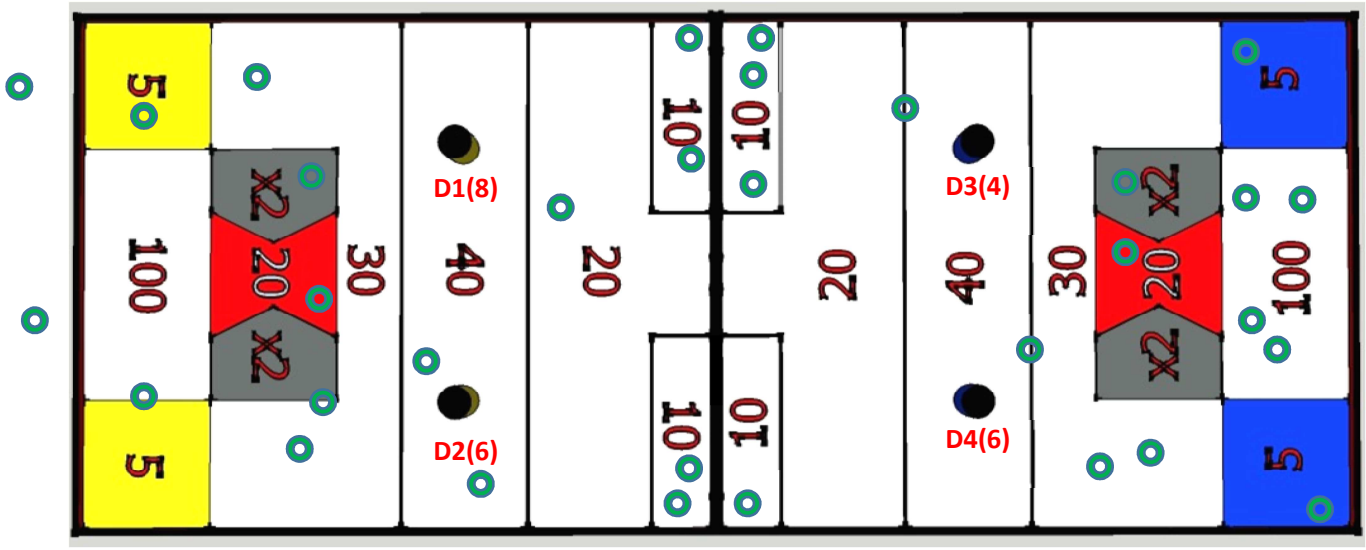
The table below shows the detailed scoring of every team depending on the given spools distribution.

	Points assigned per spool	Yellow team		Blue team	
		Number of spools	Points	Number of spools	Points
Spools removed from the dispensers	50	12	600	10	500
5-points zone	5	5	25	2	10
10-points zone	10	5	50	4	40
20-points zone	20	1	20	2	40
30-points zone	30	1	30	3	90
40-points zone	40	1	40	1	40
100-points zone	100	0	0	1	100
Total			765		820
Multiplier		No	X1	yes	X2
Team score			765		1640

Note that:

- The spools found on the lines separating two zones are assigned the highest number of points of these two zones.
- The spool found on the line separating the two sides of the field, in the 10 points zone, is assigned 10 points and counts for both teams. This particular spool is more valuable for the blue team because they have the multiplier. It actually counts for 20 points for the blue team and only 10 points for the yellow team.

Scoring example 2



D1, D2, D3 and D4 are respectively the four dispensers.
The number in parenthesis next to each dispenser indicates the number of spools removed from the dispenser.

	Points assigned per spool	Yellow team		Blue team	
		Number of spools	Points	Number of spools	Points
Spools removed from the dispensers	50	14	700	10	500
5-points zone	5	2	10	1	5
10-points zone	10	4	40	4	40
20-points zone	20	1	20	2	40
30-points zone	30	2	60	3	90
40-points zone	40	2	80	2	80
100-points zone	100	4	400	1	100
Total			1310		855
Multiplier		yes	X2	no	X1
Team score			2620		855

Note that:

- In this example the yellow team was able to remove 14 spools from their dispensers because the blue team caused 2 spools to leave the field.
- In this example the yellow team got the game multiplier because they placed a spool in the x2 zone first. The blue team placed only one spool in the x2 zone after the yellow team. The other spool on the edge of the x2 zone and the 30 points zone counts for 30 points and not for the multiplier.

The yellow team could have moved the spool on the line separating the 100 points and 5 points zones because the spool is not completely in the 100 points zone.

11. Preliminary Round Cumulative Score:

After all the preliminary heats have been completed, each robot will cast out their two lowest scoring heats. The total of all other heats and the score of the skills competition will be added to determine each robot's final score for the preliminary rounds.

12. Playoff and Repechage Rounds Structure:

The schedule of Playoff and Repechage Rounds will be published at a later date.

13. Contact:

13.1. Bumping and blocking may occur as robots attempt to acquire points. However, it is not permitted to intentionally hit other robots. If the referee sees that you have intentionally hit another robot, you will receive a penalty during the heat in which the incident occurred.

13.2. Our referees are experts in calling and assessing penalties and have the final word at all times on the playing field.

14. Penalties:

14.1. Sometimes it may be advantageous to take a penalty to improve the school's score during that heat. This strategy is acceptable as long as the penalty isn't taken at the expense of others (see Unsportsmanlike Conduct Penalties).

14.2. Junk Penalty: Various items may be placed on or around the playing field by a robot with the condition that they are removed from the playing field by the robot before the end of the heat. If items are no longer in contact with the robot by the end of the heat, the robot that released these items will be liable to an individual penalty of 4% of the total score for each item left on or around the playing field. Liquid counts as many items of junk.

14.3. Unsportsmanlike Conduct Penalties: While we trust that all participants will have good intentions, it may happen that certain conduct may occur that requires sanctions, especially during the heat of battle. (To avoid such penalties, remain courteous.)

These penalties have a series of escalating consequences depending on the seriousness of the issue. Some examples of the types of behaviour that signal a lapse of sportsmanship are:

- A deliberate attempt to disable another robot.
- A deliberate attempt to ram another robot.
- Inappropriate behaviour directed at an official, another competitor, or a spectator.

An unsportsmanlike conduct penalty is taken from the individual school's final total score and cannot be removed as one of the two lowest heat scores on the preliminary ranking.

Robot Safety, Power, Motors and Control Rules

15. Size:

15.1. Robots are limited to a 92cm x 92cm footprint (Length x Width) at the beginning of a game with no height limit. The maximum footprint size once the game has started is 122cm x 122cm. These dimensions will be verified upon certification.

15.2. The extra 30 cm of expansion may not be used for blocking opponents.

15.3. A robot may not have moving parts which extend beyond the maximum dimensions.

15.4. Robots that do not comply with the rules on dimensions will not be allowed to compete.

16. Certification:

16.1. All robots must be certified before the first heat to ensure that the construction and safety rules have been respected.

16.2. Schools may make as many modifications as they would like between heats. However, each modification requires a new certification of the robot. If a robot has not been re-certified after a modification, all of the points received from the heats since the last certification will be canceled.

16.3. Any robot that is deemed dangerous runs the risk of being disqualified if the necessary safety measures have not been put in place.

16.4. The official certification sheet can be found in the appendix of this rule book.

17. Electronics:

17.1. The robot must have an easily identifiable and easily visible ON/OFF kill switch, clearly showing the OFF position. **It also must be easily accessible for a referee.**

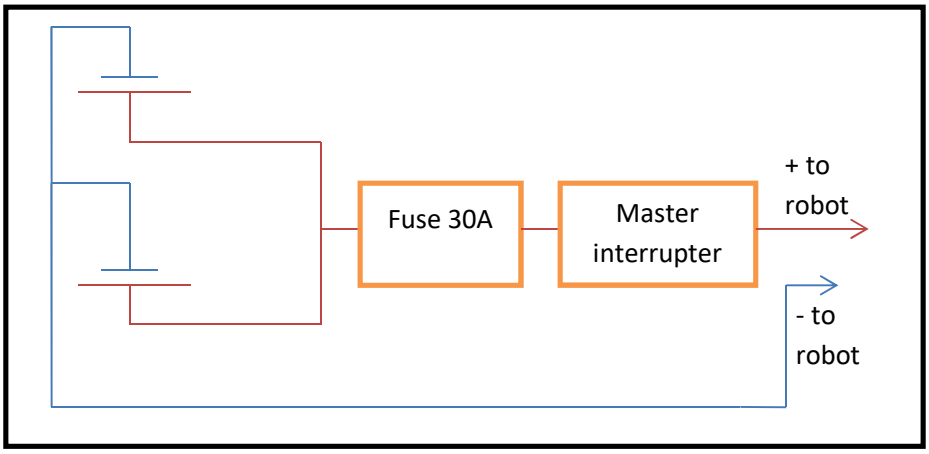
17.2. The kill switch is provided by the CRC, no other kill switch will be accepted.

17.3. The robot must have a fuse (with reset or single usage) between the Makita batteries and the robot.

17.4. The robot must have a fuse to limit the total output of all batteries to 30A.

17.5. The 12V circuit must get its energy from two Makita batteries connected in parallel. You may purchase backup batteries; however, they must be identical to the 12V Makita batteries provided in the starter kit. You may not use more than 2 Makita 12V batteries.

17.6. Here is a schematic of the minimum safety requirements for the 12V circuit of the robot:



17.7. The VEX interface can have an unlimited number of VEX batteries connected in parallel; however, note that it is not recommended to have more than one.

17.8. The addition of capacitors to the main circuit of the robot is permitted. The role of the capacitor is to reduce the magnetic field emitted by the motor. However, no electrolytic capacitors are permitted for this task. The capacitor may not be used to accumulate charge. If your capacitor is polarised (if it contains only one direction for connection), it is considered illegal.

17.9. The electric circuit must be inspected for its integrity and must be easily accessible for certification. If parts are protected inside boxes, the boxes will need to be opened during certification.

17.10. All replacement batteries must be identical to the ones provided in the kit.

17.11. The 12V batteries on the robot have to be inserted in the socket of the drills.

18. Pneumatics:

18.1. If the robot uses any pneumatics, your robot must also have an easily identifiable and easily visible ON/OFF pneumatic kill switch. All the actuators/valves must be at the ambient pressure when it is OFF.

18.2. In a similar fashion to the protection of the electronics system with a fuse, the pneumatic system must be equipped with a suppression value that can be controlled to release any measure of pressure greater than 90 psi.

18.3. The pneumatic system of the robot must be divided in two parts. Their maximal pressures are :

Tank section : 90 psi
Low pressure section (actuators/valves) : 55 psi

18.4. All pneumatic pieces (actuators, valves, cylinders, tanks, switches, etc.) must be original and unmodified. All the serial numbers must be visible for certification.

18.5. Each actuator/cylinder must be controlled by only one valve.

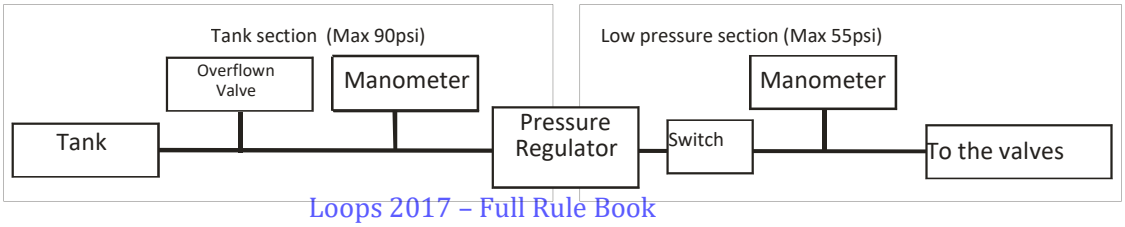
18.6. All the valves must be controlled by the VEX microcontroller. It is possible to add relays ou power modules to control the valves but they must be controlled by the VEX microcontroller.

18.7. The valves must have a maximal input hole of 1/8” or 3mm.

18.8. The tubes between the valves and the actuators/cylinders must have a maximal diameter of 3/16” or 5 mm.

18.9. You may plug several tanks in series or in parallel but their pressure cannot be above 90 psi.

18.10. There must be 2 nanometers installed, one in each section.



18.11. Failure to respect these rules will cause the robot to fail the certification process.

19. Alternative Power Sources:

19.1. All energy used by the robots must come from the batteries and must respect rule 17. The use of pneumatic systems is legal (see Pneumatics Rules 18). There is no restriction with regards to gravity.

19.2. Any battery compatible with the transmitter may be used to power it.

19.3. If spring systems are used, they must be in relaxed states or compressed or stretched by the same batteries and motors used during the heat before the heat begins.

19.4. The use of springs that store energy and consequently release energy in an oscillating manner is permitted on the condition that they conform to the rule above.

19.5. A spring that, after having started the heat in a compressed or stretched state, releases its energy during the heat, but cannot return to its original state will be deemed illegal.

19.5.1. A legal example: the motor is unable to lift an arm without human interference. In this case, schools may add a pre-stretched spring to help it. When the motor moves, it adds energy to the spring system and then releases it. This case is permitted as it can be compared to the use of a counter-weight.

19.5.2. An illegal example: A loaded spring system is used to shoot an arm out at the beginning of the heat but is unable to draw it back in. This case is not permitted.

20. Motors:

No major modifications may be made to the motors.

21. 12V Motors:

21.1. **No motors other than the ones provided in the starter kit or motors exactly identical to them are permitted.**

21.2. It is forbidden to use more than the given amount of 12V motors of each type, which are provided in the starter kit (maximum of 2 drills, 2 Banebots, and 2 black motors per robot).

21.3. It is permitted to change the ratio of the gear boxes of the Banebots motors and the gear boxes may be removed completely. The gear box provided can be used as a reference.

22. VEX Motors and Servo Motors:

22.1. Only the VEX motors (3-wire, 2-wire 393, and 2-wire 269) are allowed.

22.2. Non-VEX servo motors (5 volts) are allowed only if they do a partial rotation.

22.3. There is no limit to the number of VEX motors or servo motors that you may use. **Caution**: There is a limit to how much current the VEX CPU can handle safely.

23. Other Power Systems:

23.1. Solenoids and muscle wires are permitted as long as they are not used for motion as they are considered linear motors. An example of a motionless use is the activation of a switch. If these are deemed to be used for motion, they will be considered illegal.

23.2. Cooling fans are permitted only in situations where they cool the motors or electrical components that can potentially overheat. Fans cannot be used for any other function.

23.3. All other systems (i.e. a flash light) must be adapted to draw their energy from the batteries provided. Blinding lights or other components deemed distracting by our judges at the certification must be disconnected.

23.4. Lasers are **prohibited**.

24. Motor Controller:

24.1. The auxiliary motors can be controlled with relays, interrupts, switches, and control interfaces (VEX Pro Spike Blue, Sabertooth, Jaguar, Victor, Talon, etc.)

25. Robot Transmissions / Control:

25.1. Only Wi-Fi transmissions from the VEX transmitter are allowed to control the robot. The VEX CPU must send all control signals.

25.2. The robot must be controlled by a single controller.

25.3. It is permitted to use the VEX interface for other control systems. It is also possible to use sensors and/or microprocessors to improve control as long as the VEX interface is the main controller.

25.4. It is forbidden to use any other transmitter (RF, Wi-Fi, etc.) to increase the number of channels or to disrupt those of the other competitors.

25.5. You may attach a camera to your robot, but the images may not be transmitted live.

Overall Ranking

Given that the ultimate objective of participating in the CRC Robotics Competition is to learn how build a functional robot, we like to reward as many teams as possible with awards. The overall ranking in the competition follows the regulations below. With a goal to make the competition as fair as possible to teams with less experience, the CRC committee has introduced a two-division system for certain elements of the competition.

1. For each component of the competition, the number of points equal to the total number of teams can be given for a first place ranking. The score given for other ranks can be calculated using the following formula: Total Number of Teams – Rank + 1.
    a. Journalism, the robot design, the robot construction, the programming competition, the website, the kiosk, the video, programming competition, and the school spirit awards follow the formula mentioned above.
    b. The game counts for double value of the formula mentioned above.
2. In the case of a tie, the teams receive the same score for that category.
3. The total number of points for all the components determines the overall ranking.
4. For the website, journalism, and the video, no submission results in a score of zero.
5. For the school spirit award, teams that do not receive any votes will receive a score of zero.
6. Each component of the competition has a separate ranking.
7. **Teams will be divided between division 1 and 2 for the following components: journalism, website, kiosk, video robot design, and robot construction.**
    a. THIS YEAR ONLY, the procedure to determine the divisions of each team will be based on the past three years (see the email from the beginning of the year for more details). From next year and on, the overall results of a team at the competition will determine their next year's division.
    b. The top half of the overall ranking will go in division 1. If there is an odd number of schools, the median school will be in division 2.
    c. The divisions should change every year.
    d. New teams automatically go to the bottom of division 2.
    e. A division 2 team can win the overall ranking award.
    f. The best division 1 and 2 teams will receive separate prizes for the components based on the overall ranking for each component.
    g. **Teams will know their division at the kickoff. However, if a team registers afterwards, these divisions can be moved. Either way : give it your all!**

Example 1: 5 div. 1 and 0 div. 2 teams. Points for the website and the game - Case with ties for points.

Team	Game	Website
A	1st (10 points)	2nd (4 points)
B	3rd (6 points)	2nd (4 points)
C	2nd (8 points)	1st (5 points)
D	4th (4 points)	4th (2 points)
E	5th (2 points)	4th (2 points)

Example 2: Division 1 and 2 ranking for journalism (8 teams).

Team (division)	Points for final ranking
A (1)	8
B (1)	7
C (2)	6
D (2)	5
E (1)	4
F (1)	3
G (2)	2
H (2)	1

Distribution of awards: Top 3 division 1 (A, B, E) and Top 3 division 2 (C, D, G)

Programming Competition

In an effort to encourage competitors to program their robot, the Programming Competition will once again take place this year and will remain **independent of the main game.**

The following rules pertain to the Programming Competition:

P-1. **Programming has its own ranking that counts towards the overall score of the competition.** A team that does not participate in the Programming Competition will be given a score of zero.

P-2. The rules for the Programming Competition override the rules of the regular game is cases where the rules are contradictory.

P-3. The Programming Competition will take place in the kiosk area on the Friday.

P-4. The robot used in the Programming Competition **will be provided** by the CRC. The CRC will publish robot-construction plans enabling teams to construct robots, for practice purposes, similar to that of the competition. You could also make arrangements with the CRC to borrow one of these robots during the building season. Priority will be given to teams that only have one microcontroller.

P-5. There will be one robot per path at the competition. The wiring diagram is in the annex.

Goal:

P-6. Each team must prepare a program that guides the robot through a maximum of two of the three possible paths of the competition (even if a team can complete all three paths, only their best two scores will count towards their final score).

P-7. There are three possible paths that a robot can take (represented by yellow strips in the figure):

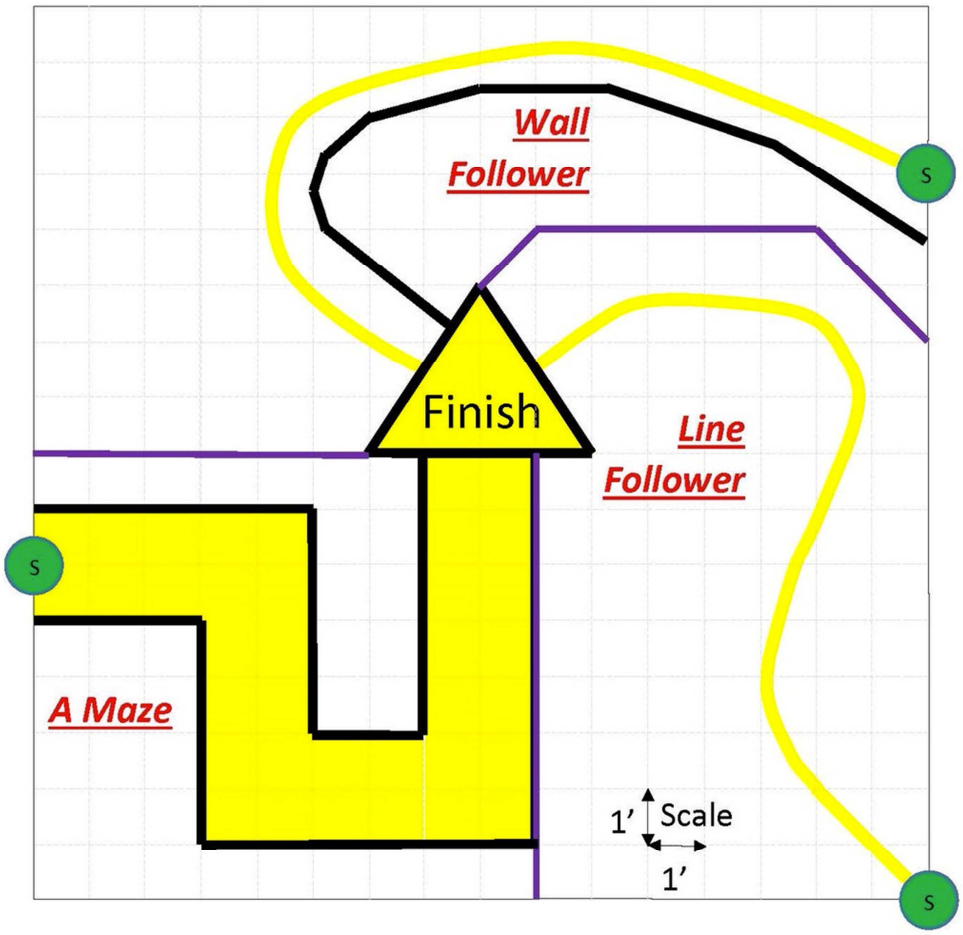
- A line follower: where the robot must follow a white line using optical sensors.
- A wall follower: where the robot must move alongside a wall using an ultrasonic range finder.
- A Maze: where the robot must navigate its way through a maze following a sequence of commands.

P-8. For each path, the robot begins at the green starting point and must move following the designated yellow path. Each robot has an arm holding a spool. The greater the length of the path traveled by the robot the more points that robot accumulates. The robot ends its path when the bumper switch mounted on the robot hits one of the sides of the Finish zone (triple arrow). The bumper switch would activate the arm which will move to put the spool inside the end-zone triangle.

P-9. The robot's program will be triggered by the competition switch. Make sure to make a competition program in EasyC and that you place your code in the "Autonomous" part of the code.

Playing Field:

P-10. The Programming Competition will occur at a designated region within the kiosk area.



Legend

S : Starting point of the robot path

: The path the programmed robot must follow (there are 3 different paths)

Finish : Finish point (triple arrow) of each robot path

: The Maze walls (about 6 inches high), the wall the robot must follow.

: Zone separator

Programming Play:

P-11. Setting up

P-11.1. Four CRC referees will manage the programming competition. One central referee and one referee for each of the three possible paths.

P-11.2. The team wishing to compete should approach the central referee specifying the paths they wish to complete. Each competing team must have with them: A computer and the USB cable needed to upload their prepared program to the Cortex on the provided robot. The central referee will verify that the team has the necessary equipment. A team without the necessary equipment (computer and USB cable) will not be allowed to compete. The central referee will direct the team to the referees supervising the selected paths.

P-11.3. For each selected path, the designated referee will direct the team to the provided robot. The team will get a maximum of five minutes to upload their prepared program to the Cortex then the first of the three series of trials for that path will begin.

P-11.4. The shape and dimensions of the actual Maze on the competition field will be identical to those on the figure. The shape of the other two paths may differ slightly on the actual competition field from those on the figure. However, the length of all paths will be 18 feet on the actual competition field.

P-12. During Play:

P-12.1. To begin a series of trials on a given path, the team must place the robot in the start zone, with the Cortex On, then move away from the robot. The referee will turn on the robot with the competition switch and start the timing of that trial.

P-12.2. A maximum of five minutes is allowed for each series of trials. A trial ends when the robot completes the path (spool dropped in the Finish zone), or when it stop for more than 10 seconds or when it moves away from its path. A robot is considered away from its path when it no longer follows the line (in the line follower path); when it hits the walls of the maze repeatedly (in the A Maze path) or when it moves abnormally away from the wall (in the wall follower path). The designated referee judging the path has complete authority in deciding whether or not to stop the trial.

P-12.3. When all three series of trials are completed on a given path, the designated referee will transmit the result (score and time) of the best of the three trials to the central referee. The best of the three trials is taken under consideration for the scoring. The best trial is the one that gives the robot maximum points in the shortest time.

P-12.4. A team may choose to restart an attempt during a series trial. The best trial from the series of trials will give the score for the given series of trials. The timer will not be stopped in between trials which should be completed within the 5 minutes.

P-13. End of Play:

P-13.1. Each trial will last a maximum of 5 minutes.

P-13.2. A judge will indicate the end of the trial.

P-13.3. Only tasks completed between the beginning and the end of the trial will count towards the final score.

P-14. Scoring:

P-14.1. Each path gives a maximum of 20 points to a robot. There are 18 points for the distance traveled. Each path is 18 feet long. Each traveled foot awards one point to the robot. Fractions of a foot are not considered (for example: if a robot travels 6.5 feet then the robot is awarded only 6 points). An extra 2 points are awarded for placing the spool in the Finish zone.

P-14.2. Each try on a path the robot takes is timed. The timing starts when the Competition Switch is switched on and it ends when the spool the robot is carrying falls in the Finish zone. Robots must complete a given path in the shortest time possible. The time is only taken under consideration if the spool falls in the Finish zone.

P-14.3. The final score of a team is calculated by adding the scores of the two best trials (each best trial on a given path). The duration of a team is calculated by adding the durations of the two best trials.

P-14.4. The team with the highest score wins. If two teams have identical scores, then the shortest duration decides the winner.

P-14.5. Each robot that successfully completes at least one task will receive points that count towards the overall ranking in the competition.

P-14.6. The table below show a scoring example of all six trials of 2 teams in the programming competition. Team A wins for having the highest score.

					Selected	
	Path	Trial	Score	Time	Score	Time
Team A	1	1	20	52s		
		2	12	300s		
		3	20	41s	20	41s
	2	1	13	300s		
		2	18	300s		
		3	20	72s	20	72s
				Total	40	113s

					Selected	
	Path	Trial	Score	Time	Score	Time
Team B	1	1	0	300s		
		2	5	300s		
		3	13	300s	13	300s
	3	1	20	64s	20	64s
		2	3	300s		
		3	7	300s		
				Total	33	364s

Skills Competition

In an effort to evaluate each robot on an individual basis, we have decided to introduce the skills competition. This competition will count towards 30% of the preliminary score. This year, three skills will be evaluated.

S-1. A robot that participates in the Skills Competition must be certified and conform to the rules related to the robot.

S-2. The rules for the Skills Competition override the rules of the regular game in cases where the rules are contradictory.

S-3. The Skills Competition will take place on the Friday on a first-come first-served basis.

S-4. The Skills Competition will be held from 9am to 7pm. A more precise schedule will be handed out.

S-5. The robot used in the Skills Competition must be the same robot as the one used in the main competition without specific changes for the skills.

S-6. Each robot will be allowed two runs for each skill.

S-7. The Skills Competition will be held in the kiosk area and will be judged by CRC officials.

S-8. Not participating in one of the skills will impart a zero score for that specific skill.

S-9. A driver may control the robot for the Skills Competition.

Skills:

S-10. Skill 1: The robot must empty the charger preloaded with 6 spools as fast as possible, and pick up the last spool after taking it out. The last spool will be coloured differently and it has to be lifted from ground for the timer to be stopped.

S-11. Skill 2: The robot must get a spool as close as possible to a target while staying behind a line positioned at 10 feet from that target. The shortest 3 out of 4 measured distances will be added to form the total distance (in millimeters). The smaller the total distance is the higher the ranking of the robot. The minimum distance from the target is 10 feet. Distances are measured from the center of the spool to the center of the target. The target is the letter X on the ground.

S-12. Skill 3: The robot must be as quick as possible on an obstacle course. The obstacles will be piles of spools. A time penalty of 0,5 seconds per moved spool will be added to the race time. The shorter the time is the higher the ranking of the robot.

Playing Field:

S-13. The playing for the Skills Competition is actually a part of the old CRC playing field. Its surface texture differs slightly from that of the actual playing field.

Requirements and Judging Criteria for the Robot (concept and construction), Kiosk, Video, Web Design, and Web Journalism components

In accordance with the CRC's goal to create a project where science, math, multimedia, language, arts, and computers are integrated, the robot is only one of the four main components of the competition.

As the world requires people to acquire more diverse skills rather than to be singularly specialized, the CRC wishes to give students with varied interests an opportunity to develop and discover their skills through the creation of a video, a website, and a kiosk.

The following are the rules and requirements, as well as the judging criteria, for the video, website, online journal, and kiosk components.

Note: Any components not received by the due date will be given a late penalty of 20% that will be deducted from the total score of each component received within 24 hours of the deadline.

A component received more than 24 hours after the deadline <u>will not be judged.</u>

Robot and kiosk judging scheme

In an effort to have the best and most equitable evaluation possible, the robots (concept and construction) and the kiosks will be evaluated on a new scheme.

The new scheme is divided in two steps: the preliminaries and the finals.

Preliminaries :

The objective behind the preliminaries is to sort who gets to pass to the final evaluation. 50% of the teams will move on to the final evaluation.

Forming the pools

- Teams will be split in three groups (A,B and C)
- The teams for each pool will be picked based on the preceding year's standings in order to have the most homogeneous groups as possible.
- Teams that have not participated in the past year will be split randomly.

Preliminary jury

- Each group will have a jury for a total of three juries.
    - Each jury will be composed of mentors and a CRC member that will act as moderator.
- The jury from group A will evaluate group B, the jury from group B will evaluate group C and the jury from group C will evaluate group A.

Roles of the jury

- Each jury has to determine which teams pass to the final evaluation round.
    - 50% of the teams get to the final round.
    - In case of a reasonable doubt on the last place to send to the finals, a jury can, at its discretion send an extra team to the finals and let the final jury decide on its ranking.
- Teams that don't make it to the finals will be ranked by the preliminary jury.
    - The following table shows an example of the ranks obtained by the non-finalists for 18 teams :

Group A	Group B	Group C
Finalist	Finalist	Finalist
Finalist	Finalist	Finalist
Finalist	Finalist	Finalist
10th	10th	10th
13th	13th	13th
16th	16th	16th

Schedule and presentations

- The schedule of the presentations will be announced later.
    - For kiosks, there will be no schedule given, only time intervals during which the judges may visit the kiosks. This measure is necessary given the nature of that component of the competition.
- Preliminary presentations will take place in the kiosk of the evaluated team.
- The presentations will have the following structure :

Length	Action
5min	The team presents the robot/kiosk (without the judges interrupting).
5min	The judges ask their questions to the evaluated team.
5min	The judges give feedback, rank teams, discuss and move towards the next team.

- Visual support is permitted.

Finals :

Final jury

- For the robots, there will be 5 engineers for the concept and 5 engineers for the construction.
- For the kiosks, the jury will be composed of teachers from the host school.

Role of the jury

- The role of the jury will be to rank the finalist teams to have a final and definitive ranking.

Schedule and presentations

- The exact schedule of the presentations will be handed out on the Friday morning when the kiosk open.
    - For kiosks, there will be no schedule given, only time intervals during which the judges may visit the kiosks. This measure is necessary given the nature of that component of the competition. Furthermore, a team may receive more than one visit during the final judging phase.
- The final evaluations of the kiosk will take place in the kiosks.
- The final presentations of the robots will take place in a room to be announced.
- The presentations will have the following structure :

Length	Action
5min	The team presents the robot/kiosk (without the judges interrupting).
5min	The judges ask their questions to the evaluated team.
5min	The judges give feedback, rank teams, discuss and move towards the next team.

- Visual support is permitted.

Video Competition Requirements

The purpose of the video component is to give each team an equal opportunity to showcase their filming and editing skills as well as their story-telling and acting talents. Specifically, this aspect of the competition allows each team to create an exceptional video encompassing their team, their school, and their robot as well as describing the steps that were taken to build the robot and the problems that were encountered and solved along the way. Equally importantly, it is an aspect that can uncover each student's creative side.

V-1. Required Format:

V-1.1. The video must be no less than 4 minutes long and no more than 5 minutes long. If the video does not meet these requirements, it will not be considered when discussing the Top 3 award winners.

V-1.2. The video must be played on YouTube and it is each school's responsibility to ensure that YouTube does not mute the soundtrack used during the video due to copyright infringement or any other reasons. If the video does not meet these requirements, it will not be considered when discussing the Top 3 award winners.

V-1.3. The video may have a fictional storyline or be of a journalistic or documentary style. If a fictional storyline is chosen, ensure the storyline is related to the construction of the robot, school description, etc.

V-2. Required Content:

V-2.1. An explanation of the game.

V-2.2. A description of your school including the school location and type of school.

V-2.3. Explanation of the different steps involved in the construction of the school's robot.

V-2.4. The English and French languages must be equally present during the video either through dialogue, commentary, or subtitles. If the video does not meet these requirements, it will not be able to be a finalist.

V-3. Important Remarks and Suggestions:

V-3.1. Develop a theme or a storyline that is consistent throughout the entire video.

V-3.2. Try to make it as entertaining as possible to a general audience that not familiar with robotics and the CRC.

V-3.3. A 5-minute video usually requires an abundance of raw footage and planning. Start **planning** and **filming now**!

V-3.4. Work closely with all of the other groups (Robot, Web Design, Journalism, and Kiosk) since all components are interrelated.

V-3.5. The production of the video is your entire responsibility. For optimal results, please refer to the evaluation form.

V-3.6. Do not use profanity, violence, or inappropriate material in your videos. Be mindful of sensitive material. If a video is deemed to have inappropriate content, it will not be shown at the competition, even if it ranked well otherwise.

V-4. Due Date:

V-4.1. Your video must be uploaded to YouTube **on or before February 2nd, 2017**.

V-4.2. The URL must be submitted using the following submission form **online before 11:59 p.m. on February 2nd, 2017** http://robo-crc.ca/submit.

V-4.3. Please follow all other submission instructions and requirements as described on the submission page above.

V-4.4. You may select the option on YouTube to make your video private (non-searchable) and submit that private URL on the form using the link above; however, your video must be made public for the above deadline so that other teams view your video once the competition has begun.

V-4.5. **Please submit your Video Permission Form as soon as possible if necessary.**

V-4.6. If your school does not allow you to upload your video onto YouTube, please notify us as soon as possible.

V-4.7. If you are unable to upload your video onto YouTube, you must send an explanation to michael@robo-crc.ca before January 31st at 11:59 p.m. and we will do our best to accommodate your team based on your explanation.

V-4.8. If your video is not uploaded to YouTube before the deadline and we do not receive an explanation before February 1st, then your video may not be judged.

Video Judging Rubric

Rubric Context:

Given a *familiarity* with the rulebook and given a band grading schema of the form:

1 Unacceptable / Missing

2 Below Average

3 Average

4 Above Average

5 Excellent

Video Judging Rubric:

1 Does the video follow the minimum requirements: is between 4 and 5 minutes long, has no copyright claims, and is fully bilingual? **[Y/N]**

2 Rate the description of the school and the team, the explanation of the game, and the explanation of the steps involved in building the robot. **[1-5]**

3 Rate the quality of the picture, sound, and editing from a technical standpoint. **[1-5]**

4 Rate the quality of the acting and narration. **[1-5]**

5 Rate the video's entertainment value and the integration of entertainment and information in a logical and clear way. **[1-5]**

6 Rate the level of creativity in camera shots and angles, in editing, and in choice of music. **[1-5]**

7 Rate the strength, creativity, originality, and engagement of a central theme and storyline and the consistency with which it is maintained throughout the film. **[1-5]**

Web Design and Web Journalism Contests

A web site is an essential communication tool in almost all disciplines. The web site component of the competition is an opportunity for each team to design a fully bilingual site showcasing the team and its members, mentors, and teachers as well as the situations encountered throughout the preparation for the competition. Each team must also describe their robot and explain the game in their own words.

As was done last year, the web site is split into two separate components: a web journalism contest, which rewards the language arts and a web design contest, which recognizes the technical merit and visual design. Remember that those designing the site will have to work closely with those creating content for the site.

Due Date: The web site must be submitted **no later than 11:59 p.m. on February 2nd, 2017**.

Be sure to follow the submission instructions here: http://robo-crc.ca/submit

Judging will commence immediately after the submission deadline.

Web Journalism Contest Requirements

The purpose of the journalism component is to give each team an opportunity to showcase their written communication talent. Specifically, this component of the competition allows each team to document the entire process that was taken to arrive at the competition with a functional robot, from design to testing to building. Remember, when writing content for a website, it must be written as if it is for someone who knows nothing at all about the competition, the team, or the process. It must be explained in as much detail as possible and should include images, schematics, and other aspects that can be helpful in informing and engaging an audience.

We respect the privacy of students. Students who do not wish to put their name, photograph, or any personal information on their team's web site *maybe omit it with no penalty*.

Required Content:

J-1. The website must be fully bilingual. If the website does not meet these requirements, it will not be considered when discussing the Top 3 award winners.

J-2. Each team member's:

a. name,

b. picture (if they choose), and

c. sub-team(s).

J-3. Each teacher and mentor's:

a. name,

b. picture (if they choose), and

c. area(s) in which they provided help.

J-4. An explanation of the game in your own words.

J-5. A description of:

a. your school,

b. your school's location, and

c. your school's type (e.g., high-school, CÉGEP, vocational training institute, etc).

J-6. Description of the robot, including:

a. the steps in the conception and construction of the robot,

b. the problems that were encountered along the way,

c. the solutions to the aforementioned problems,

d. conception and prototype plans and drawings,

e. final design plans and drawings,

f. photos of your robot, and

g. **a tutorial (see the section on tutorials in the Annex)**

J-7. Student experiences, especially:

a. what your team learned,

b. what the team enjoyed regarding the preparation for the competition,

c. what concepts or aspects the team struggled with, and

d. the sacrifices made for the team.

J-8. The website must not use copyrighted material which you do not have permission to use.

Web Journalism Judging Rubric

Rubric Context:

Given a *familiarity* with the rulebook and given a band grading schema of the form:

1 Unacceptable / Missing

2 Below Average

3 Average

4 Above Average

5 Excellent

Web Journalism Judging Rubric:

1. Is the web site fully bilingual? **[Y/N]**
2. Rate the quality of the language used. **[1-5]**
3. Rate the creativity, originality, and engagement of the content. **[1-5]**
4. Rate the description of the school, including the identification of all team members, sub-teams, teachers, and mentors as well as their contributions. **[1-5]**
5. Rate the quantity and quality of the students' experiences. **[1-5]**
6. Rate the description of the game. **[1-5]**
7. Rate the description of the steps involved in building the robot, including diagrams, plans, photographs, etc. **[1-5]**

Website Design Contest Technical / Design Requirements

The purpose of the technical / design award is to reward a website's technical merit, good design, and favourable user experience. How would they find information they're looking for easily? How would you impress your users and make them want to tell others about your website? Remember that your beautiful design will require great content.

We strongly recommend that you visit the Resources section of the CRC website for more information, examples, and tutorials for creating your first website even if you're completely new to website design.

Judges may view your website in *any major browser*.

W-1. The website should look professional and your design's colour scheme, font choice, and layout should be balanced, pleasant, and interesting. Please consult the Resources section of the CRC website for examples and explanations of good and bad designs.

W-2. The pages and menus should be organized in a way that helps the user easily find all of the required information.

W-3. The content on each individual page should be clearly organized.

W-4. You should include some aspect of social interaction such as surveys, a Twitter feed, a Facebook page, a YouTube channel, a puzzle or game, etc.

W-5. Your website should be bug-free (no script errors, no broken links or broken images, etc).

W-6. The website should validate against *any one* of the following HTML standards you choose with as few errors as possible (warnings will be ignored):

- a HTML5 (http://www.w3.org/TR/html5/)
- b HTML 4.01 Transitional () **or**
- c XHTML 1.0 Transitional (http://www.w3.org/TR/xhtml1/).

W-7. Your website should also validate against CSS 1.0 or better with as few errors as possible (http://www.w3.org/TR/REC-CSS1/).

Web Design Judging Rubric

Rubric Context:

Given a *familiarity* with the rulebook and given a band grading schema of the form:

1 Unacceptable / Missing

2 Below Average

3 Average

4 Above Average

5 Excellent

Web Design Judging Rubric:

1. The overall design, choice, and combination of colours, fonts, and layout are appealing and conducive to a pleasant user experience. **[1-5]**
2. The site structure, page structure, and menu design makes finding information easy. **[1-5]**
3. There is an aspect of user / social interaction. **[1-5]**
4. There are no uncaught exceptions, broken links, or broken images. **[1-5]**
5. The site's code is well-formed and validated. **[1-5]**

Because we would like to reward technical merit, in a case where two sites have comparable ranks, the site that employed the fewest pre-made modules will receive the higher rank.

Kiosk - Rules and Requirements

The kiosk component requires the organization of an information kiosk and presentation of accomplishments to visitors and judges. This component gives each school an equal opportunity to showcase their school, their team, and their robot while also developing presentation and art skills.

Remember that the kiosk is also the school's only functional pit area for repairs, maintenance, and modifications to the robot during the competition. The kiosk is not intended as a central lounge for team members. One part of the kiosk must be organized as a functional pit area that can be used to work on the robot and to store materials and tools while the rest of the kiosk will be a showcase for other schools and the public to visit. We recommend that you plan for a restricted area of your kiosk for pit only.

K-1. Format:

K-1.1. Space given: 12 feet by 12 feet squared and 4 foot high separators to the left and right of the square.

K-1.2. Objects provided by the CRC: 1 2x5 foot table (if desired), 1 electrical outlet with 2 plugs, 120V, 15Amp.

K-2. Required Content:

K-2.1. Distinct and delineated pit area for robot maintenance, modifications, and repairs.

K-2.2. School and robot demonstration and presentation area (description of the robot including the steps taken during construction, the problems that were encountered along with the solutions to those problems, and the workings of the final version of the robot)

K-2.3. Fully bilingual reception and interaction with the public.

K-3. Rules and Requirements:

K-3.1. Only students are permitted to be in the pits and working on the robot. **Teachers and mentors may only provide advice and guidance from the sidelines; they may not be in the pit touching or working on the robot.** There will be referees present in the pits. Repeat offenders run the risk of being disqualified from the kiosk competition.

K-3.2. You are not permitted to have any liveable space on a second level due to safety concerns **including during set-up time**.

K-3.3. **Your kiosk will be required to pass a safety inspection in order to be judged. There is a safety checklist attached to the end of the rule book.**

K-3.4. Please respect the surrounding kiosk areas as you run the risk of being penalized for any behaviour that has a negative impact on other kiosks. (e.g. loud music, extending beyond your kiosk footprint, etc). The kiosk should be visually appealing all around (inside and outside), not only its facade if the outside walls can be seen from

neighbouring kiosks. You may be required to **paint or cover the outer sides and back of your kiosk** during certification if it is not already done so, so plan accordingly).

K-3.5. During construction, if any CRC officials feel that there is a risk of accident either with the kiosk or with the construction methodology (unsafe ladder, tools, etc), the CRC will consult the team and stop the building process until a safe approach or correction can be agreed upon.

K-3.6. If a school registers multiple teams, the kiosks might not be put together unless it is specifically requested. If the school decides to do one massive kiosk, judges will be informed to evaluate them separately without considering the other parts.

K-4. Suggestions:

K-4.1. Plan adequate space for tools, maintenance, and repair materials and adequate work space for the robot.

K-4.2. Remember that because the kiosk is also the pit area for the robot, there must be clear access for the robot and a few selected student team members from the school who will be coming in and out of the pit area, sometimes in a hurry or on short notice.

K-4.3. Make sure to have at least 1 bilingual student speaker for the school in the kiosk at all times giving presentations and answering questions from the public and the judges.

K-4.4. Make sure you bring lighting equipment to ensure adequate lighting in the pit area for safety measures and for aesthetics.

K-4.5. Create an attractive and aesthetic environment that entices and encourages the public to inquire about the school, team, and robot.

K-4.6. You may bring a television, DVD/Blu-ray, PC, laptop, or other audio-visual equipment remembering that the CRC only supplies each school with 2 power connections (bring adapters and extensions if necessary), but make sure to be respectful of other kiosks in terms of noise, visual pollution, and proper behaviour.

K-5. Due Date:

K-5.1. **The kiosk must be fully mounted and ready for judging by 5 PM Thursday night.**

K-5.2. **Kiosks may not be dismantled until instructed to do so on Saturday afternoon.**

K-5.3. Dismantle and clean your respective kiosk area and ensure that no damage was done to the area or property by 6:00 p.m. on Saturday night. Any team leaving any debris will be subject to a $200 fine as well as any cleaning costs incurred by the host school. Repeat offenders may be subject to further penalties.

Kiosk Judging Form

Scores :
1 = unsatisfied criterias
10 = exceptionnal

School: _____ Final Result = _____

Section A: Required Content (31 %)

The Kiosk must fulfill the following required content:

Inviting to the public (Approachable, welcoming…)	**(Worth 6% overall)**	1 2 3 4 5 6 7 8 9 10
Level of bilingualism (Use & quality of French and English…)	**(Worth 6% overall)**	1 2 3 4 5 6 7 8 9 10
Interaction with the public (Friendly, Polite, Cooperative…)	**(Worth 8% overall)**	1 2 3 4 5 6 7 8 9 10
Respect for others (Respect for other kiosks, noise & visual pollution kept to a minimum)	**(Worth 6% overall)**	1 2 3 4 5 6 7 8 9 10
Showcase/Description of your school and team	**(Worth 5% overall)**	1 2 3 4 5 6 7 8 9 10

Judges Comments: _____
_____
_____

Section B: Technical Aspects (31 %)

Technical aspects relate to organization, functionality, safety measures, and neatness. This section is not related to creativity, presentation, or aesthetics.

Kiosk design, layout, and practicality (Organization, plan, functionality…)	**(Worth 9% overall)**	1 2 3 4 5 6 7 8 9 10
Engineering and Construction of Kiosk (How well is the kiosk designed and physically built, how structurally sound is it…)	**(Worth 7% overall)**	1 2 3 4 5 6 7 8 9 10
Safety measures (Proper and safe layout of tools and materials)	**(Worth 5% overall)**	1 2 3 4 5 6 7 8 9 10
Security measures (Public safety, number of people inside the school's pit area…)	**(Worth 5% overall)**	1 2 3 4 5 6 7 8 9 10
Respect for the surroundings (Cleanliness and damage to area or property…)	**(Worth 5% overall)**	1 2 3 4 5 6 7 8 9 10

If any damage is done to the property or area, added penalties may be deducted from the kiosk component's total mark.

Judges Comments: _____
_____
_____

(end of the kiosk evaluation form)

Section C: Presentation (38 %)

The presentation section relates to the creative, aesthetic, and logical flow of the kiosk.

Creativity of presentation	**(Worth 10% overall)**	1 2 3 4 5 6 7 8 9 10
Visually attractive to the public	**(Worth 10% overall)**	1 2 3 4 5 6 7 8 9 10
Proper use of light and sound	**(Worth 10% overall)**	1 2 3 4 5 6 7 8 9 10
Organization of content and information	**(Worth 8% overall)**	1 2 3 4 5 6 7 8 9 10

(Does the information flow together in an easy to follow and logical manner?)

Judges Comments: _____
_____
_____
_____

Kiosk Certification Form

o.●.1. Electrical – Wiring & Outlets

	Acceptable	Unacceptable	Not Applicable
Wire Gauge			
Layout			
Protected			
Grounded			
Anchored			

o.●.2. Structural Integrity

Walls			
Roof			
Floor			

o.●.3. Safety

Tools properly stored			
Proper fastening / anchoring (Accessories, equipment, shelves, objects …)			
Public access			
Manoeuvrability inside kiosk (Ability to move around without hitting things)			
Safety equipment (**First Aid Kit**, goggles, gloves...)			

o.●.4. Aesthetics

Respects neighbouring kiosks (sound, paint /cover back and outer sides)		

_____ _____

CRC Signature Team Signature

Robot evaluation form - Concept

For the evaluation of the concept, the judges will evaluate the ideas behind the robot independently from the quality of their realisation. The judges will evaluate :

Bad<<< >>>Good

- The conception to play the game. Particularly :
  - The movement of the robot on the field
  - Its interaction with the playing pieces
  - The speed at which it accomplishes its tasks
  - Its stability and precision.

1	2	3	4	5
1	2	3	4	5
1	2	3	4	5
1	2	3	4	5

Notes (Strong/weak points):

_____
_____
_____
_____

- The flexibility of the concept. Particularly :
  - Its capacity to adapt to different game strategies.
  - Its capacity to be easily modified or repaired.

2	4	6	8	10
1	2	3	4	5

Notes (Strong/weak points):

_____
_____
_____

- The effort of creation involved in the concept. Particularly :
  - The originality of the concept (it is special, unpredictable)
  - The ingenuity of the concept (it brings intelligent solutions to problems)
  - The efficiency of the concept (it uses minimal ressources for a maximal output)

1	2	3	4	5
1	2	3	4	5

1	2	3	4	5

Notes (Strong/weak points):

_____
_____
_____
_____

- The presentation by the team
  - Clarity, originality and organisation.
  - Capacity to answer the questions and defend their decisions.

1	2	3	4	5
1	2	3	4	5

Notes (Strong/weak points):

_____
_____
_____

Final ranking : _____

Robot evaluation form - Construction.

For the construction part of the evaluation, the judges will evaluate the quality of execution or realisation of the ideas, independently of the quality of the ideas. The judges will evaluate:

Bad<<< >>>Good

- The structure of the robot. Particularly :
  - The nature and pertinence of the materials used. | 1 | 2 | 3 | 4 | 5 |
  - The linkage between the pieces. | 1 | 2 | 3 | 4 | 5 |
  - The precision of the construction and assembly. | 1 | 2 | 3 | 4 | 5 |
  - The stability of the structure of the robot. | 1 | 2 | 3 | 4 | 5 |
  - The impact strength (capacity to survive impacts). | 1 | 2 | 3 | 4 | 5 |

Notes (Strong/weak points):

_____
_____
_____

- The movement of the robot for the game. Particularly :
  - The stability and speed of the robot's movement on the field. | 1 | 2 | 3 | 4 | 5 |
  - The stability and speed of the robot's parts. | 1 | 2 | 3 | 4 | 5 |
  - Relevance in the choice of motors | 1 | 2 | 3 | 4 | 5 |
  - Relevance of the degrees of liberty and efficient guiding systems. | 1 | 2 | 3 | 4 | 5 |
  - Repeatability of the movements | 1 | 2 | 3 | 4 | 5 |

Notes (Strong/weak points):

_____
_____
_____

- Robot maintenance. Particularly :
  - Easy access to different parts of the robots. | 1 | 2 | 3 | 4 | 5 |
  - Easy access to the electrical circuit. | 1 | 2 | 3 | 4 | 5 |
  - Modifying and replacing parts is easy. | 1 | 2 | 3 | 4 | 5 |

Notes (Strong/weak points):

_____
_____

- The construction matches the concept | 1 | 2 | 3 | 4 | 5 |
- The esthetics of the construction. | 1 | 2 | 3 | 4 | 5 |

Notes (Strong/weak points):

_____
_____

- The presentation by the team
  - Clarity, originality and organisation. | 1 | 2 | 3 | 4 | 5 |
  - Capacity to answer the questions and defend their decisions | 1 | 2 | 3 | 4 | 5 |

Notes (Strong/weak points):

_____
_____

Final ranking : _____

Certification : _____

Équipe : _____

Appendix A – Robot Certification Form

Robotique CRC Robotics

1) **Electricity**
   a) **Accessible circuit :** _____
   b) **Batteries in parallel:** _____
   c) **Visible Master Kill Switch:** _____
   d) **30 A fuse or equivalent :** _____
   e) **Capacitors :** _____
2) **Moteurs**
   a) **Banebot :** _____
   b) **Auxiliary :** _____
   c) **Drills :** _____
   d) **VEX Motors :** _____
   e) **Motors integrity :** _____
3) **Electronics**
   a) **Speed Controler :** _____
   b) **Other electronic devices :** _____
4) **Pneumatics**
   a) **Presence of pneumatics :** _____
   b) **Master kill switch :** _____
   c) **Pressure valve :** _____
   d) **Number of cylinders :** _____
5) **Robot**
   a) **Dimention of the robot :** _____
   b) **School visibility :** _____
   c) **Robot safety (Ekectric circuit, exposed screws, sharp edge, dangerous mechanism) :**
      _____
   d) **Note :**_____
      _____
      _____
      _____

_____ _____

CRC Signature Team's signature

Appendix B – Specification for the Tutorial

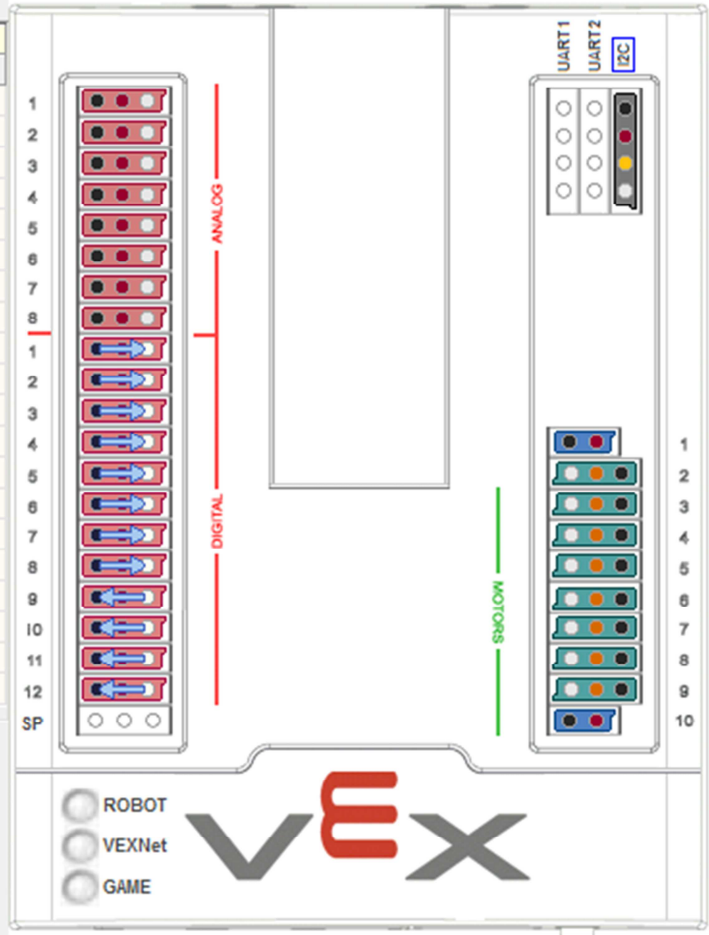
In order to promote the sharing of knowledge and to encourage a spirit of cooperation between the CRC teams, the organizing committee has decided to introduce an honorific prize for the team who writes the best tutorial. The specifications below will help you to better meet our expectations.

1. Each team must provide a tutorial on their website.
2. The teams can demonstrate their mechanical, electrical, or programming talents.
    a. A tutorial on the construction of the kiosk counts as a mechanical tutorial.
    b. A tutorial on the programming of websites or robots counts as a programming tutorial.
3. The tutorials can take many forms:
    a. A theoretical explanation on a common system (ex: internal functioning of DC motors, principles of mechanical gears, etc).
    b. A step-by-step explanation to achieve a task.
    c. A practical description of a complex system to perform a given task (e.g. a ball shooter, a robotic arm, a steering system, an electrical system, etc).
4. A team cannot resubmit a tutorial from a previous year.
5. Although teams are encouraged to explain something that has not yet been covered, it is not officially forbidden to cover a subject already presented on the CRC website; however, Rule 4 must still be respected.
6. Any media format can be used for a tutorial: images, text, video, word document, PDF, etc.
7. All tutorials of adequate quality will be added to the CRC website permanently. The team will be credited for the article.
    a. If a team submits multiple tutorials, one will be chosen at random to be evaluated, but all of them may be added to the CRC website.
8. The award for the best tutorial will be judged by the CRC organizing committee.
9. As this is an honorific prize, this prize does not count in the overall competition standings.
10. The tutorial does not directly play a role in the scoring of the competition. However, a good tutorial can have a positive influence on your score and rank for journalism.

Appendix C – Controller configuration for the programming competition

Controller Configuration

ANALOG & DIGITAL	
#	Description
1	Line tracker gauche/left
2	Line tracker centre/center
3	Line tracker droite/right
4	
5	
6	
7	
8	
1	Encoder gauche/left channel A
2	Encoder gauche/left channel B
3	
4	Encoder droit/right channel A
5	Encoder droit/right channel B
6	
7	Bumper switch
8	Ultrasonic Out
9	Ultrasonic In
10	
11	
12	



INTEGRATED MOTOR ENCODERS		
I2C #	Motor Port #	Description
1	1	
2	2	
3	3	
4	4	
5	5	
6	6	
7	7	
8	8	
9	9	
10	10	

MOTORS		
#	Motor Type	Description
1	n/a	
2	n/a	Roue gauche/Left wheel
3	n/a	
4	n/a	
5	n/a	Bras/Arm
6	n/a	
7	n/a	
8	n/a	
9	n/a	Roue droite/Right wheel
10	n/a	

Motor Type Information
n/a - Motor Type is not provided
Standard - Motor Module without Integrated Encoder
Small IME - 269 with Integrated Encoder
Big IME - 393 with Integrated Encoder
Big IME HS - 393 High Speed Gearing with Integrated Encoder

Left-Click to set Digital I/O | Restore Defaults | OK | Cancel | Help