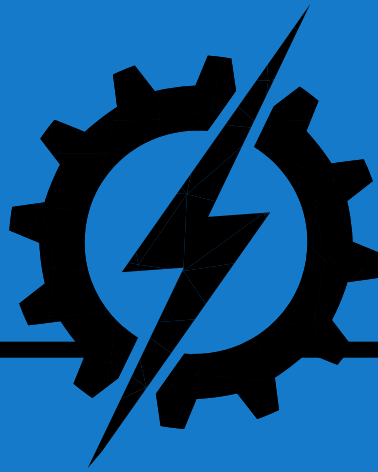
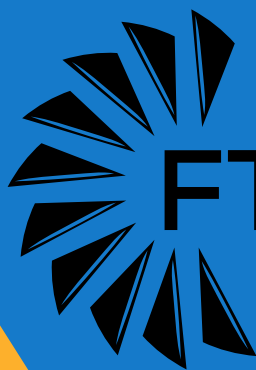




THE CRC ROBOTICS
SENIOR COMPETITION COMPLETE
RULEBOOK

M**DU****EL**
2026



presented by

FTAI AVIATION

A program of

**AEST
EAST**

Version 1.1

Participating Teams

Team Number	School / Organization Name	TAG	Division	Prog. Division	Status
1	LaurenHill Academy	LHA	1		
2	West Island College	WIC	2		
3	Vanier College	VANIER	1		
4	Antoine de Saint-Exupéry	ST-EX	2		
5	Rosemount Technology Center	RTC	2		
6	St. George's School of Montreal	St. G's	2		
7	John Abbott College	JAC	2		
8	Collège Montmorency	MOMO	2		
9	Marianopolis College	MARI	1		
10	Collège Sainte-Anne de Lachine	CSAL	2		
11	Monseigneur-Richard	ESMR	2		
12	Curé-Antoine-Labelle	CAL	2		
13	Cégep André-Laurendeau	AL	1		
14	Collège Sainte-Marcelline	MARCY	1		
15	Collège Citoyen	CITOYEN	2		
16	Lower Canada College	LCC	1		
17	Collège Saint-Sacrement	CSS	1		
18	Royal West Academy	RWA	1		
19	Bishop's College School	BCS	2		
20	Collège André-Grasset	AG	1		
21	Collège de Bois-de-Boulogne	BdeB	1		
22	Jules-Verne	JV	2		
23	Dawson College	DAWSON	1		
24	Cégep Limoilou	LIMO	2		
25	École secondaire de La Seigneurie	SGN	2		Rookie
26	Cégep de Victoriaville	VICTO	1		
27	WIBCA	WIBCA	2		
28	College Jean-de-Brébeuf	BREB	1		Rookie

Table of Contents

Participating Teams	1
Table of Contents	2
0. Changelog	4
1. Game	5
1.1. Definitions	5
1.2. Game Officials	5
1.3. Teams	6
1.4. Playing Field	6
1.5. Game Pieces	7
1.6. Repair Stations	9
1.7. Engines	10
1.8. Spare Parts Zone	11
1.9. Scoring Points	11
1.10. Heat Progress	12
1.11. Requirements and Penalties	12
1.12. Pilot and Co-Pilot	15
1.13. Challenges	15
1.14. Tournament Progress	16
1.15. Time-outs	16
2. Robot	18
2.1. Minimum required equipment	18
2.2. Transmission and Controls	19
2.3. Dimensions	21
2.4. Power Circuit and Motorization	23
2.5. Pneumatics	25
2.6. Alternative Power and Energy Systems	25
2.7. Certifications	26
2.8. The Evaluation Process	27
2.9. Evaluation Form for Robot Design	29
2.10. Evaluation Form for Robot Construction	31
2.11. Robot Certification Form	33
3. Kiosk	34
3.1. Installation and dismantling	34
3.2. Constraints for certification	35
3.3. Kiosk aesthetics and provisions	36
3.4. Kiosk Certification Form	39

3.5. Safety Equipment Checklist	40
4. Programming	41
4.1. Scope	41
4.2. Rules	41
4.3. Evaluations	42
4.4. Preliminary Problems	43
4.5. Main Challenge	43
5. Video	47
5.1. Artificial Intelligence (AI) Use	47
5.2. Format	47
5.3. Required Content	47
5.4. Submission	48
5.5. Video Evaluation Form	49
6. Tutorial	51
6.1. Artificial Intelligence (AI) Use	51
6.2. Requirements	51
6.3. Submission	52
6.4. Tutorial Evaluation Form	53
7. Website	54
7.1. Artificial Intelligence (AI) Use	54
7.2. Technical Requirements	54
7.3. Website Content	55
7.4. Submission	56
7.5. Website Design Evaluation Form	58
7.6. Website Content Evaluation Form	59

0. Changelog

This section is not meant to replace reading the rulebook in its entirety.

Version history:

2025-10-20 **v0.1** Preliminary Release

2025-10-27 **v1.0** Kickoff Release

2025-11-03 **v1.1** Post-Kickoff Release

Adjusted nominal GP lengths to reflect actual dimensions (+.125 in).

Added AI guidelines for the robot presentations.

Added rules governing robot transportation and cart usage.

Precision on PCB rules.

Precision on the definition of carrying a GP.

Precision on the wire colour requirements to reflect the diagram.

Negligeable dimension change to the robot size limits, added inches reference.

Date TBD **v1.2** Inclusion of answers given to Discord and email questions

1. Game

The game component requires robots to score the greatest number of points while working in teams. It is the main component of the CRC Robotics Competition, giving each school an equal opportunity to demonstrate their robot design, robot construction and strategic playing skills.

CRC Robotics reserves the right to modify all values outlined in the following subsections at any time throughout the season. All teams will be promptly notified if a modification is made. All the visual renderings in this document are not to scale. Please refer to the technical drawings for the field dimensions.

1.1. Definitions

The following terms are frequently used to keep this section of the rulebook as concise as possible. Bold characters may be used when referencing them.

- **GP:** Game piece.
- **Robot part:** A part or assembly that gets separated from the robot and does not touch it.
- **Carrying a game piece:** A game piece is considered carried when it is lifted off the Playing Field and in contact with a robot, mechanism, or another carried GP.
- **Heat:** 5-minute match.

1.2. Game Officials

Game Officials on or around the Playing Field, have full authority to judge all aspects of the **heat**. Game officials reserve the right to:

- Remove robots that are inactive or broken.
- Prevent robots, robot extensions and dropped robot parts from negatively blocking other robots or being a nuisance to the game.
- Prevent robots from damaging the Playing Field, GPs and other robots.
- Prevent robots from violating the air space on the edges of the Playing Field.
- Determine the final scores and penalties for each robot.

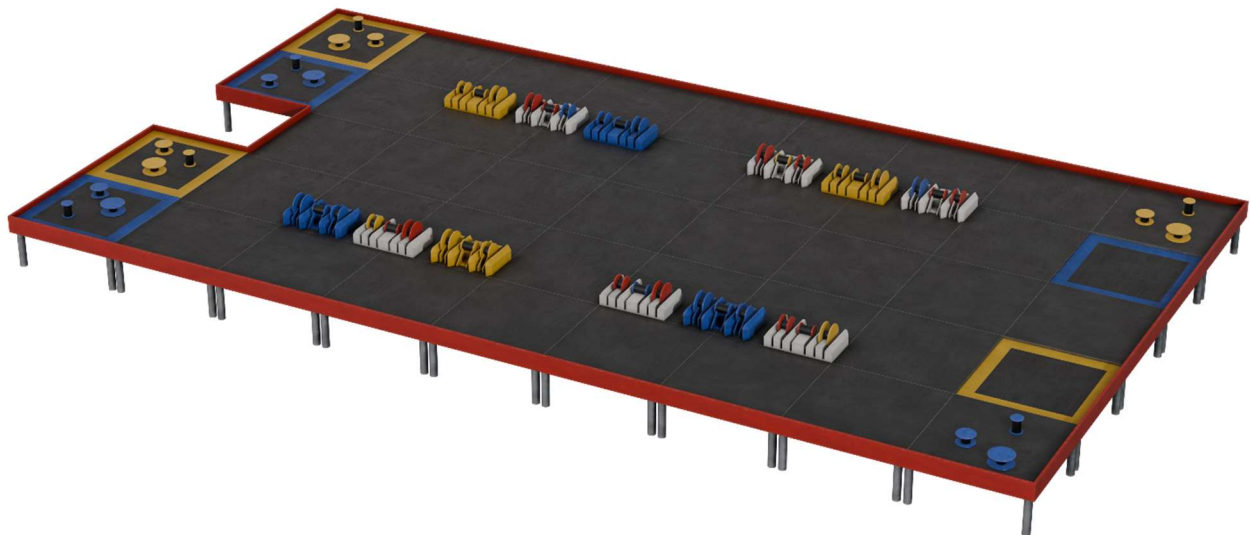
1.3. Teams

Two teams, blue and yellow, composed of two robots each, play against each other during each **heat**. For this section of the rulebook, “**team**” will be exclusively used to refer to **teams** of partnering robots.

Robots will change partners between **heats** based on the schedule provided by the CRC; partners are assigned at random and will not be changed once the schedule is released.

1.4. Playing Field

- The Playing Field is a rectangle of 8 tiles by 5 tiles.
- The starting zones are on slightly elevated tiles one end of the field.
- There is a border on the perimeter of the Playing Field.
- The Playing Field is built and assembled within reasonable tolerances. Larger elements tend to vary in size by a bigger order of magnitude. The Playing Field is made of plywood tiles and naturally has irregularities, bumps and dents.
- The image below shows a visual rendering of the Playing Field.



1.5. Game Pieces

Below is an overview of the GPs. For details such a dimensions and part numbers, see the technical packet. One example of each GP type will be included in the participant kit.

- A robot may only **carry** GPs of its **team's** color and red GPs.
- There are 3 **types** of GPs: the **Fan**, the **Core** and the **Turbine**.
- Each GP **type** can be either blue, yellow or red.
- Red GPs represent unserviceable engine parts.
- A robot may only **carry** a maximum of 1 GP at any given time.
- A total of 7 blue, 7 yellow and 4 red GPs of each **type** will be available during the heat.
- GPs are subject to wear, which may alter some of their physical properties. Each robot's design should account for this variability to progress in the Competition.
- GPs are built within reasonable tolerances. The GPs are fabricated and assembled manually, resulting in slight variations between GPs of the same type.
- Should GPs be considered intentionally damaged by a robot, that robot will face a penalty.
- All GPs are spools made by 2 wooden discs and an ABS tube in between them. The diameter of the wooden discs and the length of the tube vary depending on the GP **type**.
- Below is a rendering of a blue **Fan**, a red **Core** and a yellow **Turbine**.



- The Fan has a diameter of 10 inches and a **nominal** length of 4.125 inches.
- The Core has a diameter of 5 inches and a **nominal** length of 6.125 inches.
- The Turbine has a diameter of 7.5 inches and a **nominal** length of 4.125 inches.

1.5.1. Putting GPs into Play

- All the GPs start the **heat** in **Engines, Repair Stations, Starting Zones** or the **Playing Field floor**.
- One GP of each type starts the **heat** in the **Starting Zone** corresponding to its color. Robots may start the **heat** with up to one GP picked amongst them. The unpicked GPs are disposed on the **Starting Zone** by the Pilot.
- It is not permitted to intentionally remove GPs from the Playing Field.
- GPs that leave the **Playing Field**, regardless of reason, will be considered out of play and can no longer be retrieved or used by a robot. Should it be deemed safe and possible, Game Officials may return out of play GPs.

1.6. Repair Stations

- Each **team** has access to three **Repair Stations** of their colour.
- A robot may only interact with their **team's Repair Stations**.
- Each GP **type** must be placed in the proper position in the **Repair Stations**.
- Only red GPs may be inserted in the **Repair Stations**.
- GPs can only be loaded from the ramped side of the **Repair Stations**.
- Putting a GP in a **Repair Station** slot dislodges the GP present in it, making that GP fall at the back of the **Repair Station**.
- Robots must dislodge GPs present in **Repair Stations** by replacing them with GPs of the same **type**.
- GPs placed in the incorrect **Repair Station** position shall not be considered in the calculated score.
- If a GP is incorrectly placed in an **Repair Station** and no robot is touching it or attempting to place it, a Game Official shall remove the incorrect GP from the **Repair Station** and put back the dislodged GP.



- The following image shows a visual rendering of a yellow **Repair Station**.

1.7. Engines

- There are six **Engines** on the Playing Field.
- Each **Engine** contains 1 **Fan**, 1 **Core** and 1 **Turbine**, regardless of their colour.
- Each GP **type** must be placed in the proper position in the **Engines**.
- GPs can only be loaded from the ramped side of the **Engines**.
- Putting a GP in an **Engine** slot dislodges the GP present in that **Engine** slot, making that GP fall at the back of the **Engine**.
- Robots must dislodge GPs present in **Engines** by replacing them with GPs of the same **type**.
- GPs placed in the incorrect **Engine** position shall not be considered in the calculated score.
- If a GP is incorrectly placed in an **Engine** and no robot is touching it or attempting to place it, a Game Official shall remove the incorrect GP from the **Engine** and put back the dislodged GP.
- The following image represents a visual rendering of an **Engine**.



1.8. Spare Parts Zone

- Each team has access to a single recessed tile on the Playing Field in which they can stack GPs of their colour.
- If a GP present in a **Spare Parts Zone** is not of the **Zone's** colour, it will be placed outside of the **Zone** by a Game Official.
- The **team** with the highest freestanding stack made entirely of GPs in the **Spare Parts Zone** at the end of the Heat gets a 60% bonus to their **heat** score. In the event of a non-zero tie, each team gets a 30% bonus instead. This bonus is additive to the most GPs bonus.
- The **team** with the most GPs of their colour in the **Spare Parts Zone** gets a 40% bonus to their **heat** score. In the event of a non-zero tie, each team gets a 20% bonus instead. This bonus is additive to the highest stack bonus.
- Robots are not allowed to enter the **Spare Parts Zone** of the other **team's** colour.
- Robots can add in and retrieve GPs from the **Spare Parts Zone** of their colour throughout the **heat**.

1.9. Scoring Points

The score is tallied at the end of the **heat** and reflects the placement of the GPs once they stopped moving.

1.9.1. Placing GPs in Engines

GPs placed in an **Engine** gives points in the following manner:

- If an **Engine** contains 1 GP of a **team's** color, that **team** receives 50 points.
- If an **Engine** contains 2 GPs of a **team's** color, that **team** receives 100 points.
- If an **Engine** contains 3 GPs of a **team's** color, that **team** receives 250 points.

1.9.2. Placing red GPs in Repair Stations

- Each team receives 30 points per red GP placed in a **Repair Station** of their colour.

1.9.3. Placing GPs in a Spare Parts Zone

- Each team receives 40 points per GP of their colour placed in their **Spare Parts Zone**.

1.10. Heat Progress

- All **heats** are 5 minutes in duration. Estimated time and scores might appear on the screens near the Playing Field. The remaining time until the end of a **heat** is controlled by a Game Official.
- When the **heat** time is over, all robots and robot parts must stop moving. GPs will be considered only when they stop moving, even if that occurs after the **heat** time is over.
- All the points generated by a **team** due to the motion of their robots after the heat ends will be canceled.
- Following the end of the **heat** signal, **team** members are not allowed to enter the field, touch any robot, touch the GPs or a field element before they are cleared to do so by a Game Official. It is essential that the configuration of the GPs, at the end of the **heat**, remains intact for scoring purposes. **Teams** must give back the GPs on board of their robot before leaving the Playing Field.

1.11. Requirements and Penalties

The minimum score that can be awarded for any given **heat** is 0 points. If a penalty would give a robot a negative score, the final score awarded to the robot for that **heat** will be 0.

1.11.1. Robot Activity

A robot is activated by leaving its starting zone **and** actively contributing to its team's score. Only activated robots will benefit from their team's score.

A robot that is not activated or is absent from the **heat** will be considered inactive and will receive a score of 0 for the **heat**; the teammate of an inactive robot will have its score multiplied by 150% to compensate for the disadvantage of playing alone.

1.11.2. Broken Robot

If an activated robot stops moving or participating after leaving its starting zone and contributing to the score, it will be considered a broken robot. A Game Official can determine a robot to be broken. Broken robots will be removed from the Playing Field after 30 seconds if they are blocking play. A broken robot gets a 10% penalty to its score for each 30 seconds (rounded upwards) elapsed.

1.11.3. Requesting a Game Official's Intervention

During a **heat**, if a robot is considered broken or if a pilot judges that its robot needs assistance on the Playing Field, they may ask a Game Official to assist their robot. The assisted robot will be liable to an assistance penalty of 20% of its total score for the **heat**. The Game Officials reserve the right not to assist the robot even if asked to do so by the pilot.

1.11.4. Right of Way

Robots shall not block access to more than one **Engine** or **Repair Station** at a time.

Robots cannot trap other robots. If a robot has no way of reasonably moving out of its position due to any obstructions, the trapped robot must be provided the reasonable ability to exit its trapped position.

1.11.5. Robot Safety

Game officials retain all rights to decide that a robot's components or behaviour presents a risk of injury or damage. The robot in question will be met with a warning at first, or if the action is deemed of a severe enough risk, be disqualified from the **heat**, or the tournament.

If a robot or **robot part** poses a safety concern during the **heat** or at any time during the tournament, that robot will be decertified and will no longer be permitted to play until the highlighted issues are fixed and the robot is recertified.

If liquid leaks from a robot during a **heat**, the robot that is leaking will be immediately removed, decertified, and given a score of 0 for the **heat**. The offending team is responsible for the cleanup and containment required.

1.11.6. False Declarations

False Declarations are any statement, action or intent which disguises, misrepresents or falsely presents information to any Game Official. False Declarations shall result in the disqualification of the robot from up to its next 3 eligible **heats**.

1.11.7. Unsportsmanlike Conduct

We trust that all participants will provide clear intentions and respect the rules, the Game Officials, and other competitors. However, certain actions may occur that require penalties. These have a series of escalating consequences, depending on the severity of the issue. The number of points deducted from the offending school's overall score will be proportional to the severity of the action. Penalties can range from point deductions to disqualification and barring from the tournament. Some examples of unsportsmanlike behaviour include:

- A deliberate attempt to disable or damage another robot.
- A deliberate attempt to hit another robot in any way.
- Inappropriate behaviour directed at a Game Official, a volunteer, another participant, or the public.

1.11.8. GP Handling

Any instance of a robot throwing a GP out of the Playing Field will result in a 40% penalty of the robot's total score for the heat for each GP affected.

Robots **carrying** more than 1 GP will be subject to a 20% assistance penalty. Additional GPs shall be removed by a Game Official before the robot is allowed to continue.

GPs cannot be thrown. Any instance of a robot shooting a GP across the Playing Field Floor or in the air will get a score of 0 for the **heat** and that robot will be decertified.

1.11.9. Junk

Any discarded robot parts left on the field after a heat will be collected following the robots leaving the field. These parts will be transferred to the CRC Hub between heat blocks where they may be collected. Participants may only collect Junk pieces from the CRC hub; any attempt to collect junk prior to its release will result in a penalty.

If the robot part blocks another robot or their access to a GP, a field element, or poses a safety concern, it will be immediately removed by a game official. It is the responsibility of the team to pick up their dropped robot parts before exiting the Playing Field area.

1.11.10. Playing Field Access

Game officials always control access to the Playing Field. At no point during a heat do participants have permission to access the Playing Field.

Game officials will grant access to participants at the beginning and the end of each heat to allow the loading and unloading of the robot.

Accessing the Playing Field without permission may result in a penalty to the offending team.

1.11.11. Practice Area(s)

Teams are only permitted to practice driving their robot in designated practice area(s).

The practice area shall contain a minimum of one example of each field component that robots may interact with. Teams are responsible for bringing their own GP(s) to the practice area.

For the purposes of practice, game officials may grant access to the Playing Field during periods in which there are no heats. There is no guarantee of Playing Field access during the competition.

1.12. Pilot and Co-Pilot

Each pilot and robot must be in the designated area before the end of the **heat** preceding their own to be permitted to play. It is the team's responsibility to ensure they are on time, even if the schedule is altered. If a team's robot or pilot is not ready to start, the **heat** will start regardless.

Pilots and co-pilots must remain seated in their provided seats for the entirety of the **heat**. Pilot's or co-pilot's wishing to move their provided seat are permitted to do so, within the designated area before the heat begins. Pilots and co-pilots are not allowed to sit in front of the playing field stairs, no matter how great the view is.

For the duration of a heat, team members may not cross Playing Field boundaries, nor interact with any field element, robot or GP.

Observers may not interact or guide the pilot, or co-pilot in any way once a heat has begun. Offenders shall be met with an initial warning before being banned from the Playing Field area.

1.13. Challenges

If a team wishes to challenge a ruling, their pilot must bring video evidence to the Team Resources CRC official within 15 minutes of the end of the concerned **heat**. Approaching the CRC scoring table or a game official directly will result in dismissal of any related challenge.

A team judged by CRC officials to be abusing its ability to challenge Playing Field rulings may lose its privilege to do so.

1.14. Tournament Progress

The tournament consists of 5 rounds. The teams with the best cumulative scores for a round progress in the tournament. Starting with the knock-out round, robots play in pools formed by the tournament bracket and their cumulative round score is compared with other robots of their pool to determine if they progress further in the bracket. Once eliminated, robots must stay available and ready to play until the end of the following round, in case they are asked to replace a robot unable to play a heat.

- a. **Preliminary Round:** These heats are played by all robots. The robots with the highest cumulative score advance directly to the semi-finals or quarter finals. A robot's cumulative score for the preliminary round determines initial seeding in the bracket.
- b. **Knock-Out Round:** Played by all the robots not advancing to the semi-finals or quarter finals. The best cumulative scores of each pool advance to the quarterfinals.
- c. **Quarterfinals:** Played only by robots that haven't been eliminated in the knock-out round. The best cumulative scores of each pool advance to the semi-finals.
- d. **Semi-Finals:** Played only by robots that haven't been eliminated in previous rounds. The best cumulative scores of each pool advance to the finals.
- e. **Finals:** Played only by the best scoring robots from the semi-finals. The cumulative scores determine the ranking for this round.

The schedule for the various rounds will be published at the beginning of the Competition. Some exceptional circumstances could prompt the CRC to create a Wildcard round to give a fair chance to every robot.

1.15. Time-outs

Playing multiple **heats** can wear down robots over time. Time-outs may be used should a robot be deemed to not be ready at the start of a **heat**.

- Starting at the **quarterfinal round**, each robot accumulates 5 minutes per **round** to their time-out **time bank**.
- Unused time-out **time bank** carries over to subsequent **heats**.
- Time-out requests must be clearly communicated to a game official by the robot's driver before the **heat** begins.
- During a time-out, the **time bank** of all the robots that are not ready to play counts down until the robot is ready to play, the **time-out period** finishes, or the **time bank** is emptied.
- If a robot is not ready to play and their **time bank** is empty or the **time-out period** is over, that robot will forfeit the **heat** and the **heat** will begin without it.

- The **time-out period** before each Quarterfinal heat is limited to 2 minutes per heat regardless of how many robots are using it.
- The **time-out period** before each Semifinal heat is limited to 3 minutes per heat regardless of how many robots are using it.
- The **time-out period** before each Final heat is limited to 15 minutes per heat regardless of how many robots are using it.

1.15.1. Time-out Toolbox

Each team advancing to the **quarterfinal round** and beyond must prepare and bring a **time-out toolbox** to be permitted to work on their robot around the field.

- The **time-out toolbox** is the box that the kit materials were delivered in at kickoff. Should a replacement box be required, it may be purchased at Canadian Tire. The SKU is: #142-9648-8. The usage of this box in its unmodified state is mandatory.
- Only one **time-out toolbox** is permitted per team.
- All materials and tools must fit within the closed volume of the **time-out toolbox**. Overpacking of the **time-out toolbox** in any way will not be permitted. The lid must close completely without being being forced in place.
- The **time-out toolbox** must be brought to the designated area at the beginning of the **Quarterfinal Round**.
- The **time-out toolbox** must contain all materials and tools necessary for the repair of the robot.
- The **time-out toolbox** must be clearly identified to your team and team number similarly to the robot identification requirements to the satisfaction of the game official.

2. Robot

This section outlines the robot design and construction constraints on which robots will be evaluated at the Competition. Non-compliance with the following rules will cause robots to fail certification. Uncertified robots are not allowed to compete. Refer to the Wiki for tips and suggestions. The evaluation rubrics used by the judges to evaluate the robot design and robot construction as well as the Robot Certification Form may be found at the end of this section.

In order to maintain an acceptable level for high school and college students, the use of other components or accessories and their legality for use in competition must be done with the approval of CRC Robotics. When in doubt, you can contact us.

2.1. Minimum required equipment

All robots are required to use the following in an unmodified fashion:

- a. **CRCvolt:** A battery case that must be securely attached to your robot's frame. Integrating the 30 Amp self-reset fuse, the robot's 12V, 7.5 Ah lead-acid or Nickel-Cadmium sealed battery must be secured into the CRCvolt during all robot operations. Solely the terminals connecting to the battery may be modified, provided all modifications are adequate to the wiring (10 AWG) and current (30 A) requirements. Robots are allowed a single CRCvolt and battery combination.
- b. **CRCstop:** Emergency stop button in a case. The CRCstop must be securely attached to the robot and should not move when pressed or manipulated. It must be placed to be easily accessible by the game officials in case of a problem on the Playing Field. Contains a PTC fuse to protect the CRCduino and the CRCsignal. The slots on both sides must be easily accessible and visible to add and remove the certification plates.
- c. **CRCsignal:** A light module that must be placed on your robot at its highest unextended point in a spot that is clearly visible by the crowd and the game officials. The CRCsignal must be visible when viewed from any angle. It must correctly display the colour of the team you are on.
- d. **CRCduino:** CRC's Arduino-based microcontroller that must be used to control each output and actuation made by the robot. All servos, motor controllers, relays and actuators must be wired directly in the PWM and/or DIO ports of the CRCduino (inter connection PCBs are not allowed).
- e. **CRCconnect:** The CRCconnect communicates remotely with the CRCduino to drive the robot. No other remote communications are permitted with any robot component. The CRCconnect can only be used with the integrated gaming controller or with a USB similar unmodified gaming controller plugged in the CRCconnect.

- f. **Identification:** Each team must either use both pairs of vinyl numbers provided or numbers with similar or greater visibility, and install them on a contrasting background, on 2 opposite sides from the robot. They must also have their TAG or full school name visibly and legibly written next to or under the numbers on both sides of the robot.
- g. **Robot colour:** Robots cannot be prominently blue, yellow or pink.

2.2. Transmission and Controls

2.2.1. Other Transmitters

It is forbidden to use any transmission methods or any method disrupting other robots in any way.

2.2.2. Other Microcontrollers

Onboard control systems other than the CRCduino, such as Arduino and Raspberry Pi, are only permitted if no motor, servo, any actuator type or motor is connected to them. Relays may be controlled a system other than the CRCduino if their sole purpose is to control LED lights.

Additionally, if the chosen model or its components can communicate wirelessly, that function must be disabled physically or in the configuration of the microcontroller. A technical data sheet of any microcontroller used other than the CRCduino will be required at certification, as well as proof of deactivation of the wireless communication, when applicable.

In the event that wireless communication is enabled on a robot at any point following its initial certification and before the competition has ended, even by mistake, for testing or demonstration purposes, that robot will face **False Declaration sanctions**.

Sensors can be connected to an onboard control system other than the CRCduino. They must be powered by the CRCduino's 5V output or the robot's 12V Power Distribution.

2.2.3. Onboard Cameras

Cameras may be attached to robots, but the live transmission of images is prohibited during the heats. If the camera is transmitting information to the robot, it must be powered by the robot's 12V battery. A camera can have its own battery only if it feeds no signal to the robot. Camera usage must be approved by a game official before each heat.

2.2.4. Low-Voltage Sensors

Usage of any onboard sensors to give feedback to the CRCduino or other microcontrollers is allowed.

2.2.5. Low-Voltage Servos

All servo motors rated for 6 VDC or less are allowed, whether they have continuous rotation or partial rotation.

Examples of legal continuous rotation servos: VEX EDR 3-wire motors, VEX EDR 2-wire 393 motors, VEX EDR 2-wire 269 motors, POWER HD 1501MG, FEETECH FS0403 and HITEC HSR-1425CR.

Examples of legal partial-rotation servos: VEX EDR 3-wire servo, POWER HD DSP33, FEETECH FT5313M and HITEC HS-625MG.

2.2.6. External Motor Controllers

External motor controllers are permitted when they are used to control low-voltage servo motors that are not equipped with an internal motor controller. For reference, the following are some examples of legal servos: VEX EDR 2-wire 393 motors and VEX EDR 2-wire 269 motors. Low-voltage servo controllers must be powered through a 5V robot controller port.

2.2.7. Printed Circuit Boards and Custom Components

Custom printed circuits boards (PCBs) are allowed if they are equipped only with the following components: [connectors, resistors, filtering capacitors (max 0.1 μ F), LED, diode, potentiometer, DIP switch, MOSFET, transistor] and if the width of their traces is sufficient for the amperage going through them. The standard to follow is a **minimum trace width of 0.020 in/A for traces up to 1 inch of length** in a **1oz Cu PCB**.

You must **email the schematics** of your PCB, the **list of components** used in it and their **data sheets** on the video and website **submission day at the latest** in order to certify your PCB and the components on it. No component generating a mechanical movement (motor, servo, motor controller) can be plugged on the PCB or microcontrollers other than the CRCduino.

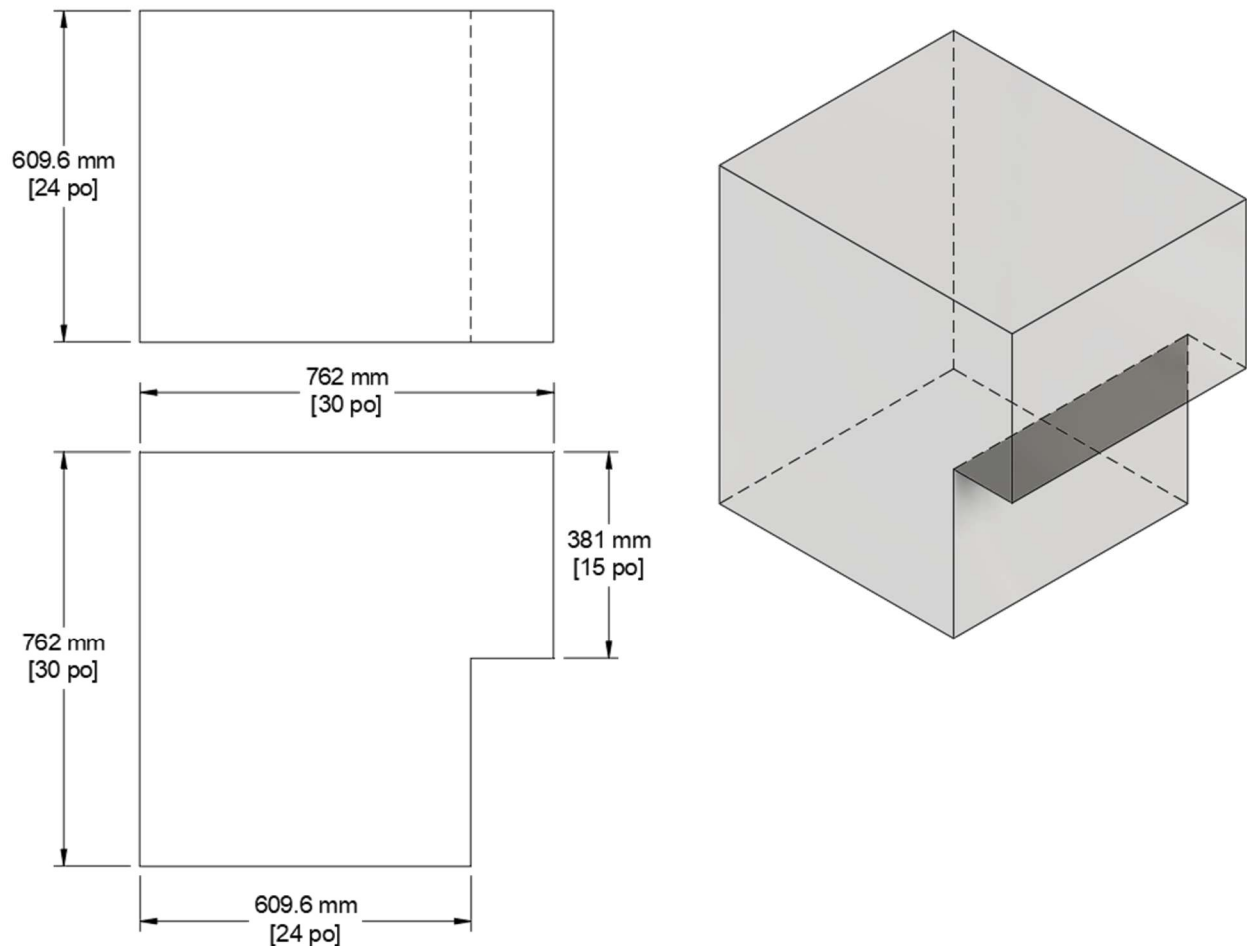
Other custom components are not permitted.

2.3. Dimensions

2.3.1. Initial Size Limits

Robot dimensions are limited to an initial dimension limit at the beginning of each heat. Two prisms that are on top of each other and having 3 vertical faces coplanar. The lower prism is 609.6 mm x 609.6 mm x 381 mm (length x width x height). The higher prism is 762 mm x 609.6 mm x 381 mm (length x width x height). For reference, the dimensions of the lower prism are 24 in x 24 in x 15 in and the higher prism is 30 in x 24 in x 15 in. **Please note that the door leading from the Kiosk Area to the Playing Field Area is 30 inches wide.**

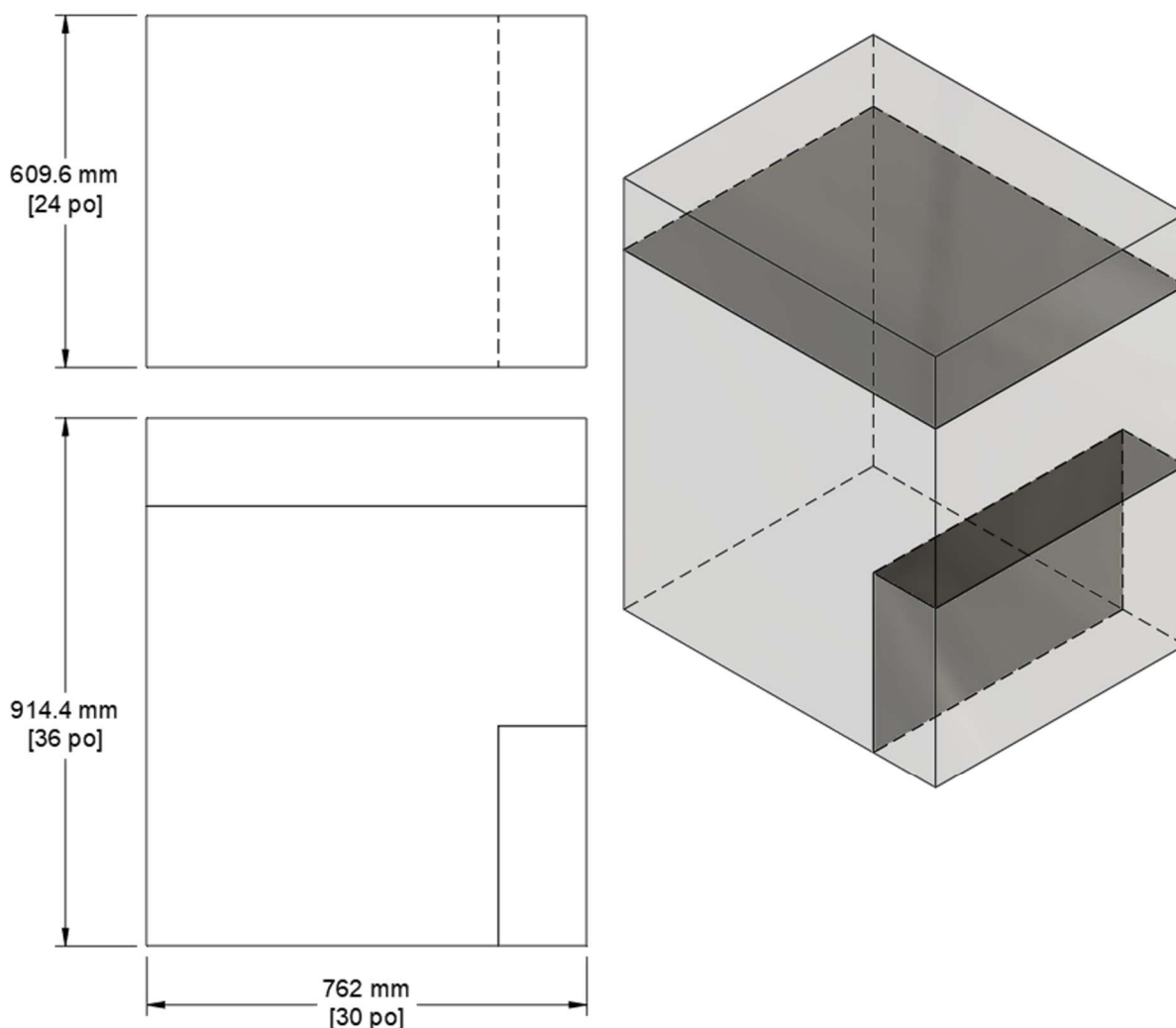
The following image shows a visual rendering of the Initial Size Limits.



2.3.2. Extension Constraints

After the heat begins, robots can extend their dimensions beyond the **Initial Size Limits** to 762 mm x 609.6 mm x 914.4 mm (length x width x height). For reference, these dimensions are 30 in x 24 in x 36 in.

The following image shows a visual rendering of the Extended Size Limits.



2.3.3. Moving Parts

Moving parts and mechanisms are only allowed if they cannot extend beyond the allowed dimensions. A physical limit must be present if a mechanism could extend beyond the allowed dimensions.

2.3.4. Robot transportation

Transporting the robot to and from the Playing Field Area must be done in accordance with the signage and instructions provided by the CRC on site. Additionally, any transportation equipment used must not exceed 30" x 30" and be deemed structurally and functionally safe by the CRC. The use of transportation carts failing to meet the expectations will not be allowed. Carts can be pre-certified by email at info.crc@sciencetech.ca.

2.4. Power Circuit and Motorization

2.4.1. Power Motors

Only the following power motors can be used as part of the power circuit, with any or no gearbox attached:

Motor Type	Part Number
RS5XX* Motor	We suggest a VersaPlanetary or Banebots P6S gearbox
goBilda Motor	Modern Robotics/MATRIX 12VDC Motor**
Car Power Seat Motor	Princess Auto SKU: 9102179

* "XX" can be any 2-digit number

** Legal replacement: RobotZone 12VDC Motor for heavy-duty planetary gearbox

2.4.2. Power Motor Count

The maximum number of power motors allowed on the robot is 8.

2.4.3. Power Motor Modifications

Any modification to the electrical components of the power motors is prohibited. Modifications may only be made to the mechanical components of the power motors, if desired. Therefore, the gearbox can be changed or removed completely.

2.4.4. Power Servos

Servos powered by the 12V power circuit are prohibited.

2.4.5. Power Motor Controller

Power motors may only be controlled with relays, switches, and/or one of these motor controllers: Vex Victor SPX, Talon SRX or GoBilda. Motor controllers must be rated for the appropriate current and deemed reliable at their function.

2.4.6. Capacitors

The use of capacitors is not permitted.

2.4.7. Voltage Converters

The use of voltage converters, or any alternative means of voltage modification is not permitted.

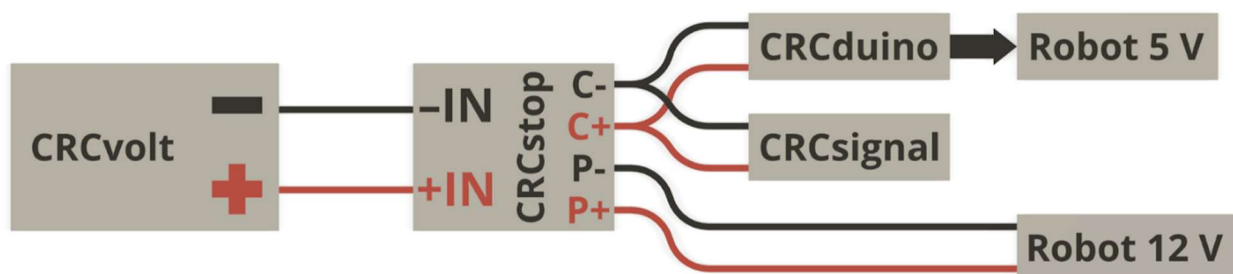
2.4.8. Power Distribution

The **power distribution** is connected to the CRCstop module and allows multiple connections to the power circuit. Each team is responsible for selecting their style and capacity of **power distribution** elements. These elements must be minimally rated for the current passing through them.

2.4.9. Wiring Schematic

The power circuit must adhere to the following schematic. Specifically, the C output of the CRCstop must be used exclusively for the CRCduino and CRCsignal. The P output of the CRCstop must be used for all the other 12V components of the robot.

Wiring the 12V incorrectly may result in permanent damage to expensive electronics components, such as the CRCduino, CRCvolt, CRCstop, CRCsignal, and motor controllers.



2.4.10. Wiring

The use of an adequate wire gauge and colour is mandatory in the power section of the robot to pass technical certification. The wires used in the power section of the robot must be red for +12V and black for 0V. We provide this table of minimum wire gauge requirements. Power distribution means any wire distributing power to more than one element.

Robot circuit component	Required wire
CRCvolt to CRCstop	10 AWG (6 mm ²)
CRCstop to power distribution	10 AWG (6 mm ²)
Power distribution to a motor	14 AWG (2,5 mm ²)
CRCstop to CRCduino	18 AWG (0,75 mm ²)
CRCstop to CRCsignal	18 AWG (0,75 mm ²)

2.5. Pneumatics

The use of pneumatic systems is not permitted.

2.6. Alternative Power and Energy Systems

2.6.1. Gravitational Energy

There is no restriction regarding the use of gravity.

2.6.2. Single Decompression Springs

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 without human intervention, will be deemed illegal.

2.6.3. Proper Spring Usage

If spring systems are used, they must either be in relaxed states at the beginning of the heat, or any force exerted onto the spring must originate from a robot component connected to the robots' batteries. Springs can only be energized on the Playing Field or designated practice areas to avoid injuries. Spring systems that function through oscillation are also allowed, given they conform to the above rules.

Spring-loaded mechanisms that release their energy all at once, like a catapult, must not present any pinch points or crushing hazards in the trajectory of the released moving robot part or parts.

2.6.4. Fans

Fans may only be used to cool down motors or electrical components that can potentially overheat. They must draw their energy from the 12V power circuit or the CRCduino.

2.6.5. Lights

The use of lights is permitted; however, they must draw their energy from the 12V power circuit or the CRCduino. Lighting that is considered a nuisance by game officials will be permanently disconnected without warning.

2.6.6. Lasers

The use of lasers of any type is prohibited.

2.7. Certifications

2.7.1. Certification

Robots be required to pass a safety inspection (on-site, at the Competition) to be judged and have access to the Playing Field. During the certification, the electrical power circuit will be inspected for its integrity. If parts are protected inside boxes, the boxes will need to be opened during certification. Should any part of the circuit be inaccessible, the robot will not be certified. Refer to the certification criteria at the end of this section.

2.7.2. Recertification

All modifications, to the form, fit or function of a robot shall require recertification. All robots advancing to the final round of the game will undergo recertification before the first heat of the round.

2.8. The Evaluation Process

All evaluations shall comprise two stages: the Preliminaries and the Finals.

The Preliminaries:

- All registered teams are divided into pools. The number of teams per pool is dependent on the number of registered teams.
- The judges of each pool evaluate and rank the teams' robots. Judges are participating mentors or qualified CRC volunteers. Judges are never assigned to pools containing their current or past teams.
- Each pool is evaluated by different judges. Judges of all pools follow the same judging criteria for each category.
- The top teams in each pool will qualify for the Finals. The number of qualifiers per pool is dependent on the number of registered teams.

The Finals:

- Finalists are the top teams from each pool in the Preliminaries.
- There are no pools in the Finals. All finalists are evaluated by the same judges.
- Judges evaluate and rank the finalists' work. Judges are field experts and did not judge in the Preliminaries. Judges in the Finals follow the same judging criteria used in the Preliminaries.
- Based on the ranking provided by the judges, the top three teams in each division will receive awards.

2.8.1. The Evaluation Criteria

Evaluations are divided into three criteria. Each criterion is scored on 4 or 6. Presentation is worth 40% of the score for each component. Refer to the rubrics below for the criteria relevant to each evaluation.

2.8.2. Schedule

The timeframes for the preliminary evaluations will be provided to the teams on the first day of the Competition. The teams that advance to the final round will be provided with their time frame after the preliminary round.

2.8.3. Presentations

The preliminary presentations will take place at the Kiosk of each team. Final presentations will take place in a closed room at the host school, except for Kiosk.

2.8.4. AI Usage Proportion

The robots design, construction and all presentations must contain no more than 20% of AI use in all aspects.

2.8.5. AI Usage Documentation

All AI usage in the making of the robot and both presentations must be clearly documented and included in both presentations.

2.8.6. Language

The presentation can be done in French and/or English.

2.8.7. Visual Support

Visual support is permitted. CRC Robotics does not guarantee the presence of electrical outlets for the presentation.

2.8.8. Structure

The presentations must abide by the following structure:

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

2.9. Evaluation Form for Robot Design

Robot Design (Robots are not permitted in the presentation area)					
	Beginning (1)	Developing (2)	Accomplished (3-4)	Exemplary (5-6)	Score /6
Design Intent	The design has some link to the intended purpose but lacks clarity or completeness.	The design aligns with the purpose, but some elements could be refined.	The design is well thought out, with a clear intent and good functionality.	The design is exceptionally purposeful, with each element clearly serving its intended function.	
Efficiency	The design lacks efficiency, with excessive complexity or wasted resources in the structure and layout.	The design is moderately efficient, but some elements could be streamlined or optimized for better use of space or materials.	The design is efficient, with a thoughtful use of materials, components, and layout that minimizes waste.	The design is highly efficient, achieving maximum functionality with minimal complexity, resource use, and waste.	
Originality	The design shows minor attempts at creativity, but remains largely conventional.	The design incorporates some creative elements, though it's still somewhat conventional.	The design has creative elements that distinguish it from more common designs.	The design is highly innovative and unique, offering a fresh and original concept.	

Robot Design Presentation					
	Beginning (1)	Developing (2)	Accomplished (3)	Exemplary (4)	Score /4
Clarity	The presentation is unclear, with key concepts difficult to understand and explanations vague or confusing.	The presentation communicates the basic ideas, but some parts are unclear or lack sufficient detail.	The presentation is clear and understandable, with minor areas that could be better explained.	The presentation is exceptionally clear, with all concepts well-articulated and easy to understand.	
Organization	The presentation is poorly organized, making it difficult to follow the flow of ideas.	The presentation has a general structure, but the flow of ideas is sometimes disjointed or lacks a smooth progression.	The presentation is well-organized, with a logical progression of ideas, though some transitions could be smoother	The presentation is extremely well-organized, with a logical and engaging flow of ideas that enhances understanding.	
Response to questions	Struggles to answer questions effectively, with responses lacking depth or relevance to the questions asked.	Answers questions with basic understanding, though responses may be incomplete or somewhat unclear.	Responds to questions with clear, thoughtful answers that demonstrate good understanding of the topic.	Provides detailed, insightful answers to questions, demonstrating a deep understanding and ability to think on the spot.	

2.10. Evaluation Form for Robot Construction

Robot Construction					
	Beginning (1)	Developing (2)	Accomplished (3-4)	Exemplary (5-6)	Score /6
Structural Integrity	The robot is unstable and parts are poorly attached. It frequently falls apart or breaks.	The robot is somewhat stable, but some parts are loosely attached or fragile.	The robot is stable, with securely attached parts. It withstands normal use without issues.	The robot is highly durable, extremely stable, and can withstand rough use or stress without damage.	
Component Integration	Components (e.g., motors, sensors) are poorly placed or connected, leading to malfunction or misalignment.	Some components are connected, but they may not be well-integrated, causing occasional malfunctions or misalignment.	Components are well-placed, connected, and integrated, with only minor issues.	Components are flawlessly integrated, well-placed, and function perfectly together.	
Maintenance & Repair	The robot is difficult to maintain and repair. Parts are hard to access.	Some components are accessible, but maintenance is time-consuming or requires special tools.	Most parts are easy to access and maintain with standard tools. Repairs are straightforward.	The robot is designed for easy maintenance, with all parts accessible, and repairs are simple with common tools.	

Robot Construction Presentation					
	Beginning (1)	Developing (2)	Accomplished (3)	Exemplary (4)	Score /4
Clarity	The presentation is unclear, with key concepts difficult to understand and explanations vague or confusing.	The presentation communicates the basic ideas, but some parts are unclear or lack sufficient detail.	The presentation is clear and understandable, with minor areas that could be better explained.	The presentation is exceptionally clear, with all concepts well-articulated and easy to understand.	
Organization	The presentation is poorly organized, making it difficult to follow the flow of ideas.	The presentation has a general structure, but the flow of ideas is sometimes disjointed or lacks a smooth progression.	The presentation is well-organized, with a logical progression of ideas, though some transitions could be smoother	The presentation is extremely well-organized, with a logical and engaging flow of ideas that enhances understanding.	
Response to questions	Struggles to answer questions effectively, with responses lacking depth or relevance to the questions asked.	Answers questions with basic understanding, though responses may be incomplete or somewhat unclear.	Responds to questions with clear, thoughtful answers that demonstrate good understanding of the topic.	Provides detailed, insightful answers to questions, demonstrating a deep understanding and ability to think on the spot.	

2.11. Robot Certification Form

Team: _____

Component	Item	Certification		
		Pass	Fail	N/A
Electricity	Accessible Circuit			
	CRCvolt			
	CRCstop			
	Wiring gauge and color (Black 0V / Red 12V)			
Motor Count	RS5xx Motors (Banebots / VersaPlanetary)			
	GoBilda Motors			
	5V Servos			
	Integrity of the Motors			
Electronics	Speed Controller			
	Other Electronic Devices			
	CRCduino			
Robot	Dimensions of the Robot			
	Visibility and size of CRCsignal, School Name and Team Number			
	Robot Safety (electric circuit, exposed screw, sharp edge, dangerous mechanism, etc.)			

Notes:

CRC Robotics Signature

Team Signature

3. Kiosk

The Kiosk component requires the creation of a themed kiosk and presentation to visitors and judges. This component gives each school an equal opportunity to showcase their school, their team and their robot.

3.1. Installation and dismantling

3.1.1. Setup Safety

If CRC Robotics deems that there is a risk of accident either with the Kiosk or with the construction methodology (e.g. unsafe ladder, tools, etc.), CRC Robotics will stop the building process until a safe approach can be agreed upon.

3.1.2. Space Usage

All teams must ensure that the assembly and disassembly of their Kiosks do not negatively impact other teams in any way.

3.1.3. Competition Readiness

To have the best experience possible for all teams, Kiosk must arrive at the competition in a completed but disassembled state. Only minor tweaks will be permitted. Major construction or modification will result in a penalty.

3.1.4. Paint Touch-ups

Paint touch-ups must be done outside of the host school. Any paint spills will result in a \$200 fine. Any cleaning costs incurred by the host school will be invoiced to the offending team. Repeat offenders may be subject to further penalties.

3.1.5. Assembly Time Limit

Scheduled arrival times, sent by email to all teams, indicate the assigned arrival time. The kiosk must be fully assembled and ready for judging within 6 hours of the team's scheduled arrival time.

3.1.6. Dismantling Time

Kiosks may not be dismantled until instructed to do so by CRC Robotics.

3.1.7. Dismantling

A team's kiosk area must be cleared and cleaned by the designated time. on the takedown night of the Competition. No damage can be done to the area. Any team leaving debris behind 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.

3.2. Constraints for certification

Each kiosk will be required to pass a safety inspection at the end of their setup time to be judged. Refer to the certification form at the end of this section and the following points for details.

3.2.1. General

- a) **Identification:** A clear and obvious identification of the team number and full school name must be prominently displayed at the entrance of the kiosk. Both numbers provided in the participant kit or a signage of equivalent visibility and size must be used on a contrasting background.
- b) **Respect for Neighbors:** The surrounding kiosk areas must be respected; otherwise, the team at fault will be penalized for any behavior that has a negative impact on other kiosks (e.g. loud music, extending beyond the kiosk footprint).
- c) **Space Provided:** A 12'4" (depth) by 12' (width) space is available to each team.

3.2.2. Electrical Work Conformity

All electrical work within the kiosk must adhere to Québec's building safety standards. Wires must not be exposed (protected), need to be grounded, and anchored to avoid tripping or accidental disconnection.

3.2.3. Structural Integrity

- a) The walls and internal structures of the kiosk must be stable and adequately secured.
- b) All structures should be able to withstand reasonable pressure or force without risk of falling or collapsing.
- c) It is not permitted to have any livable space floor higher than a 300 mm distance from the ground.

3.2.4. Safety Equipment

Each Kiosk must be equipped with at least:

- One complete first aid kit (see First Aid Kit Requirements Certification Form).
- 3 pairs of safety glasses.
- 3 pairs of work or mechanic's gloves.

It is each teams' responsibility to ensure proper safety gear is worn when necessary.

3.2.5. Access

There must be clear access for the robot and team members within the kiosk. The space must be easily maneuverable without hitting things or risking injury.

3.3. Kiosk aesthetics and provisions

3.3.1. Material Provided

- a) 1 electrical outlet will be provided with 2 plugs (120V, 15A total).
- b) 1 folding table (Optional);
- c) 2 school chairs (Optional);

3.3.2. Visual Appeal

The outside walls of Kiosks, except the facade, will not be judged.

3.3.3. Bilingualism

The information displayed and available in the interior or on the exterior of the kiosk must be bilingual.

3.3.4. Multiple Teams per School

Schools with multiple teams will have their Kiosk spaces adjacent to each other.

3.3.5. Language

The presentation for the evaluation can be conducted in the team's language of preference

3.3.6. Presentations

Preliminary and Final presentations will take place at the kiosk of the evaluated team.

3.3.7. Kiosk Evaluation Form

Kiosk Construction					
	Beginning (1)	Developing (2)	Accomplished (3-4)	Exemplary (5-6)	Score /6
Theme Alignment	The kiosk poorly reflects the chosen theme, with little to no visible connection.	The kiosk somewhat reflects the theme but lacks cohesion or clear design elements.	The kiosk reflects the theme well, with consistent design elements that align with the theme.	The kiosk strongly and creatively embodies the theme, with cohesive and immersive design elements that enhance the overall concept.	
Structural Design & Stability	The kiosk is unstable, with weak construction, and may not support the intended use.	The kiosk is somewhat stable but may have issues with durability or sturdiness under prolonged use.	The kiosk is stable and well-constructed, holding up under normal use.	The kiosk is highly durable, exceptionally well-constructed, and can withstand heavy use and environmental factors.	
User Accessibility & Functionality	The kiosk is difficult to use or navigate, with poor placement of interactive elements or restricted access.	The kiosk has some accessible elements, but the layout or functionality is confusing or inconvenient.	The kiosk is user-friendly, with well-placed interactive elements and clear, functional access points.	The kiosk is highly accessible and intuitive, with seamless functionality, clear user paths, and well-placed interactive features.	

Presentation					
	Beginning (1)	Developing (2)	Accomplished (3)	Exemplary (4)	Score /4
Clarity	The presentation is unclear, with key concepts difficult to understand and explanations vague or confusing.	The presentation communicates the basic ideas, but some parts are unclear or lack sufficient detail.	The presentation is clear and understandable, with minor areas that could be better explained.	The presentation is exceptionally clear, with all concepts well-articulated and easy to understand.	
Organization	The presentation is poorly organized, making it difficult to follow the flow of ideas.	The presentation has a general structure, but the flow of ideas is sometimes disjointed or lacks a smooth progression.	The presentation is well-organized, with a logical progression of ideas, though some transitions could be smoother	The presentation is extremely well-organized, with a logical and engaging flow of ideas that enhances understanding.	
Response to questions	Struggles to answer questions effectively, with responses lacking depth or relevance to the questions asked.	Answers questions with basic understanding, though responses may be incomplete or somewhat unclear.	Responds to questions with clear, thoughtful answers that demonstrate good understanding of the topic.	Provides detailed, insightful answers to questions, demonstrating a deep understanding and ability to think on the spot.	

3.4. Kiosk Certification Form

Team: _____

Time: _____

Component	Item	Certification	
		Pass	Fail
General	Team identification clarity and sizing		
	Respect neighboring kiosks (sound, paint, etc.)		
	Space does not exceed 12' wide x 12'4" deep		
Wiring	Protected		
	Grounded		
	Anchored		
Structural Integrity	Walls		
	Roof		
	Floor		
	Floor no higher than 300 mm		
	Proper fastening / anchoring (Accessories, equipment, shelves, objects, etc.)		
Safety	Required safety equipment		
	Safe tool storage		
	Maneuverability inside kiosk		
	Safe public access (for all ages)		

Notes:

CRC Robotics Signature

Team Signature

3.5. Safety Equipment Checklist

At the competition, the following items with their respective quantities are mandatory at the moment of kiosk construction.

Item	Quantity Necessary	Pass	Fail
Fire Extinguisher	1		
Safety Glasses (With peripheral protection)	3 minimum		
Safety Gloves	3 pairs		
Sterile Adhesive Bandages	25		
Sterile Gauze Pads 3"x3"	12		
Sterile Abdominal Pad 5"x9"	1		
Stretch Bandage 2"x 2 yards	1		
Sterile Compress Dressing with ties 4"x4"	2		
Triangular Bandage 40"x40"x56"	2		
Adhesive Tape	2.3m roll		
Antiseptic Wound Cleansing Towelettes	25		
Clean Examination Gloves (non-latex)	4 pairs		
Bandage scissors (blunt angled tip)	1 pair		
Splinter Tweezers (Fine tip)	1		
Hand Sanitizer OR Skin Cleansing Towelettes	6 uses		

Notes:

CRC Robotics Signature

Team Signature

4. Programming

As the game is generally played with remote-controlled robots and not automated ones, there is a separate competition dedicated to programming. This Programming component allows teams to develop and demonstrate their programming skills. Teams are evaluated on their performance in solving programming-related problems.

4.1. Scope

4.1.1. Goal

The Programming component is primarily a learning experience. Simply based on analysis and problem-solving through programming, it will allow participants to learn how to solve simple and complex situations using a computer. The objective is not to test the participants' knowledge of a programming language, but rather to test their knowledge of the principles and techniques required to design and implement a program in the best possible way.

4.1.2. Challenge

Participants will face several individual programming problems that will be solved separately from one another. However, participants will have to score as many points as possible in the overall challenge according to a certain arrangement of the problems solved. See sections 4.4 and 4.5 for more information.

4.2. Rules

4.2.1. Final Score

A team's score in the overall challenge determines the team's ranking in the Programming component of the Competition. The scores from the preliminary portion and the main challenge will be combined to determine the overall score. The points repartition for the preliminary problems is a percentage of the main challenge. See section **4.4.2** for more information.

4.2.2. Tie-breaker Logic

The submission time of the final completed problem will be used to determine placement during ties. The team with the earliest submission time will be placed higher.

4.2.3. Player Limit and Having Multiple Teams

Teams shall not be permitted to have more than 4 team members present at the in-person events. However, teams may register multiple sub teams should they have an abundance of willing participants. Sub-teams must work independently during the main challenge and only the best total score will count for the overall team.

4.2.4. Unsportsmanlike Conduct

Any team caught cheating or exhibiting unsportsmanlike conduct is subject to disqualification. Examples of cheating or unsportsmanlike conduct include, but are not limited to, any attempt to:

- Use artificial intelligence tools to write code segments.
- Mislead another team.
- Copy the solutions of another team.
- Have more than 4 active participants in a sub-team.
- Use a solution or part of a solution belonging to someone who is not a part of that team.

4.3. Evaluations

4.3.1. Languages

The competition will be held **exclusively in Python**. It is permitted to use the math, matplotlib, NumPy, random and panda libraries. Unless clearly stated otherwise in the problem description, it is prohibited to import any other library for problem solving.

4.3.2. Evaluation

A judge will perform the evaluation. Template files will be provided for every problem, allowing teams to test their solutions directly by writing in a predetermined function.

For preliminary problems (see Section **4.4**), the solution shall be evaluated, with test cases of increasing difficulty, so that the reliability of the code can be verified by a Judge. On request, judges provide the teams feedback, to help them better prepare for the main challenge.

For the main challenge problems (see Section **4.5**), the evaluation will be done automatically based on a set of predetermined test cases unknown by the participants.

4.3.3. Execution Limit

There will be a time limit of 60 seconds for the execution of the code for any given challenge. Any code taking longer than the time limit will receive a score of 0 for that problem.

4.3.4. Partial Points

Should solely the output format of a team's solution not match the requirements in the problems description, a team may receive half of the points associated with a problem. In addition, the answers must be clearly defined in the solutions output. However, any bonuses (see Section 4.5) resulting from the completion of the problem will not be valid. The decision to award partial points is entirely at the discretion of the judges.

4.4. Preliminary Problems

4.4.1. Schedule

Four preliminary problems of increasing difficulty and a special problem will be given leading up to the Competition. A two week's delay will be allowed for the completion of each one of the preliminary problems. The special preliminary problem has a 2-month delay for its completion. The schedule for the preliminary problems is as follows:

Date the problem will be provided	Submission Deadline
October 31st, 2025	November 14 th , 2025
November 21st, 2025	December 5 th , 2025
January 9 th , 2026	January 23 rd , 2026
January 30 th , 2026	February 13 th , 2026
December 12th, 2025	February 13th, 2026

4.4.2. Relating to the Main Challenge

Preliminary problems serve primarily as a learning experience and stepping stone towards the main challenge. Feedback will therefore be provided to all participating teams upon request. Every preliminary problem shall be 2% of the total value of the main challenge's problems (outside of any multipliers), with the exception of the **special problem**, which is worth double (4%). These points are not a part of the specified format in Section 4.5, but are a part of a team's total programming score.

4.5. Main Challenge

4.5.1. Schedule

The programming challenge shall be divided into three 3-hour programming blocks where participants are tasked with solving different problems from one block to another. These blocks shall henceforth be referred to as Block A, Block B and Block C. The detailed schedule of the programming challenge shall be provided at the beginning of the Competition.

4.5.2. Problems

The content of a problem is related to the category that encompasses it. Problems can be of varying difficulty, with more difficult problems awarding more points. However, problems given in Block A, are likely to be easier than those given in Block B. Block C will be comprised of a single problem, where different thresholds will account for 60% of the points while the rest will be awarded in comparison to the other teams.

4.5.3. Categories and Points Multipliers

The problems in Block A and Block B are subjects to multipliers. Block C is not.

Problems shall be separated into several categories, **granting a bonus multiplier upon completion of the category**. Categories group problems with a similar theme, requiring a similar solution, or use of similar concepts.

Completion of at least one problem in each category **shall multiply the points of the hardest problem completed in each category**. The same is true for at least two successful problems in each category, which will multiply the points of the two most difficult problems successfully completed in each category.

All multipliers are 1.5x/150% and are completely independent from one another. Thus, the overall multiplier and the category multiplier can **both apply** to the same problem, giving it a **2.25x/225% multiplier**. See rule **4.5.6** for a scoring example.

4.5.4. Blocks A and B

Certain categories and their related problems shall be provided in Block A while the rest shall be provided in Block B. During Block B, it will not be possible to go back and complete problems from Block A.

For Block B, no information about the number of categories or the number of problems shall be provided until the problems are received at the beginning of the block. It is possible, however, that some of the problems in Block A will be useful in solving problems in Block B.

However, for Block A, the categories shall always contain 2 to 5 problems and shall be as follows:

- Two-dimensional problems
- Data sorting
- Video games
- Text processing

4.5.5. Block C

Block C will be comprised of a single problem. The maximum score of Block C will be the sum of the value of the problems from the Block A. There will be 3 thresholds of increasing difficulty, each giving 20% of the maximum score. If a team reaches the 3 thresholds, they will have at least 60% of the maximum score.

The remaining 40% of the points is going to be proportional to the ranking relative to the other teams. The best team will receive full points and points will gradually go down until the score given to the last team. In case of a tie between multiple teams, the teams will all get the scoring of the position that they share. The scoring compared to other teams is

$$40\% * \text{Block_A_Total} * (\text{nbr_teams} + 1 - \text{Ranking}) / \text{nbr_teams}$$

4.5.6. Scoring Example

Below is an example of how a team could perform in the main challenge. The categories in Block B have been named Special A, Special B and Special C for now. It is important to mention that the number of categories in Block B, the number of problems for each category presented, the points assigned to each problem and the difficulty of each problem are for illustrative purposes only and are in no way an accurate representation of what will be presented at the Competition. For the example, the number total of team in the competition is set at 20, but the scoring only shows 4 schools.

Example:

	BLOCK A												
	Two-dimensions			Data Sorting			Video Games				Text Processing		
	2D1	2D2	2D3	DS1	DS2	DS3	VG1	VG2	VG3	VG4	TP1	TP2	TP3
Points	20	65	40	15	35	80	10	25	25	40	20	30	40
School 1													
School 2													
School 3													
School 4													
	BLOCK B												
	Special A			Special B						Special C			
	SA1	SA2	SA3	SB1	SB2	SB3	SB4	SB5	SB6	SC1	SC2		
Points	35	20	50	40	60	25	20	15	20	90	75		
School 1													
School 2													
School 3													
School 4													
	Thresholds			Problem	Score Block C			Total of Block A		445			
	T1	T2	T3	Position	T score		P score	Total	Number of teams		20		
School 1				1	267		178	445					
School 2				4	267		151,3	418,3					
School 3				4	267		151,3	418,3					
School 4				14	178		62,3	240,3					
	2D	DS	VG	TP	SA	SB	SC	Block C	Total				
School 1	236,25	135	57,5	85	30	315	112,5	445	1416,25	1st place			
School 2	97,5	67,5	62,5	90	72,5	42,5	315	418,3	1165,8	3rd place			
School 3	117,5	62,5	180	30	112,5	135	135	418,3	1190,8	2nd place			
School 4	187,5	195	70	70	80	145	37,5	240,3	1025,3	4th place			

Explanation:

The category bonus in (TP) is not obtained for school 1 because the problem TP3 was attributed partial points per rule 4.3.4. Since one problem in each category has been completed, a bonus is applied to the highest tiered problem in each relevant category. A multiplier of 2.25 attributed when both the overall bonus and the category bonus are applied on the same problem ($1.5 \times 1.5 = 2.25$).

The schools 1, 2 and 3 have the problem with the most points from each category multiplied by 1.5 because they have solved a problem in each category. For the category 2D, the schools 1 and 4 have a 1.5 multiplier for all problems of the category since all the problems of the category are completed successfully. Other category multipliers are also achieved by various schools.

For Block C, school 1 gets all the points equivalent to the total of Block A since they have all the thresholds ($3 \times 20\%$ of the score) and they have first place (40% of the score). Schools 2 and 3 tied for 4th position and got all the thresholds for a total of $3 \times 20\% + 17/20 \times 40\%$. School 4 has 2 of the 3 thresholds so $2 \times 20\% + 7/20 \times 40\%$.

5. Video

The following section outlines the rules specific to the video component. The evaluation rubric used by the judges to evaluate the video may be found at the end of this section.

5.1. Artificial Intelligence (AI) Use

AI is a powerful tool when used well. However, it can also become a substitute for creativity, and heavy reliance on it has been shown to diminish creative thinking and problem-solving abilities. For this reason, we encourage our participants to use it judiciously and provide the following rules to do so.

5.1.1. AI usage proportion

The submitted video must contain no more than 20% of AI use in all aspects. For example, AI can only be used for 20% of the text, 20% of the music, 20% of the visual content, etc.

5.1.1. AI usage documentation

All AI usage in the video and its production must be documented and detailed in the video description. For example: "We used AI to generate the dialogue for Francis, the good prince, who speaks for 41 seconds in total in the video. We also used AI to make the elevator music that plays for 34 seconds. The painting in the background of Elisa's workshop has been generated with ChatGPT and printed to make the decor." A video found to have used undocumented AI shall be considered as not submitted.

5.2. Format

5.2.1. Run-time

The submitted video must be no more than 5 minutes long, not including end credits.

5.2.2. Stylization/Style

The video submitted must have a fictional narrative or journalistic/documentary style.

5.3. Required Content

5.3.1. CRC Robotics Competition Description

The video must reference or describe the CRC Robotics Competition or an aspect of this year's game.

5.3.2. Bilingualism

Both the English and French languages must be equally represented in the video, either through dialogue and/or subtitles. YouTube's closed-captioning tool is not permitted.

5.3.3. Video Description Content

The video description on YouTube must mention the date and location of this year's CRC Robotics Competition and show a hyperlink to the following URL: www.robo-crc.ca

5.3.4. Copyright Law Adhesion

If the video is themed around an existing work, it must be clearly mentioned and credited. It is the responsibility of each team to ensure that the video does not violate YouTube's Copyrighted Content policy.

5.3.5. Forbidden Content

No vulgar, offensive, violent or inappropriate content is permitted. When in doubt, contact CRC Robotics.

5.3.6. Asset Reuse

The reuse of content or assets from a previous submission is prohibited. Any attempt to submit a video containing the same content or assets from a previous submission may be subject to a penalty determined by CRC Robotics.

5.4. Submission

5.4.1. Deadline and Submission Platform

The video must be uploaded to YouTube in order to be judged. Refer to the Season Calendar in the admin packet for the date on which to submit the video. The specific URL pointing to the video's YouTube page must be provided at the time of submission. Video upload must be done by the deadline. A team that does not submit a video will receive a score of zero in the video component. A team that submits a video up to 24 hours following the deadline will be evaluated; however, this team will not be able to rank within the "Top 3" for the video component in their division. Submissions received more than 24 hours after the deadline may not be judged.

5.4.2. Privacy Settings

The video's privacy setting must be either "Unlisted" or "Public" when submitted. The video's privacy setting must be switched to "Public" no later than the first day of the Competition. Refer to the Season Calendar in the admin packet for the exact time and date.

5.5. Video Evaluation Form

Video Narrative					
	Beginning (1)	Developing (2)	Accomplished (3)	Exemplary (4-5)	Score /5
Narrative Flow	The video lacks a clear structure or story. Transitions between ideas are abrupt or confusing, making it hard to follow.	The narrative is somewhat clear but may have disjointed parts, causing occasional confusion or loss of interest.	The narrative is clear and well-organized, with smooth transitions and a logical progression of ideas.	The narrative is highly engaging, cohesive, and flows smoothly from beginning to end, with seamless transitions and a strong sense of direction.	
Originality	The video lacks creativity and presents ideas that are common or predictable, with minimal original content.	The video shows some creativity but relies on common ideas or techniques without pushing boundaries.	The video is creative, incorporating original ideas or perspectives that make it stand out.	The video is exceptionally creative and original, showcasing unique ideas, innovative techniques, or a fresh approach to the subject.	
Clarity	The video is difficult to understand, with unclear visuals, poor audio quality, or a confusing presentation of ideas.	The video is somewhat clear, but occasional issues with visuals, audio, or explanations make parts hard to understand.	The video is clear, with good visuals, clear audio, and an easy-to-follow presentation of ideas.	The video is exceptionally clear, with high-quality visuals and audio, and a presentation that is easy to understand and follow throughout.	

Video Technical					
	Beginning (1)	Developing (2)	Accomplished (3)	Exemplary (4-5)	Score /5
Cinematography	The shots are poorly composed, shaky, or out of focus, making it difficult to view the video properly. Lighting is inadequate.	The shots are somewhat composed but lack consistency or creativity. Lighting is uneven or distracting in some scenes.	The shots are well-composed with good focus, and lighting is appropriate. There's an attempt to use creative camera angles.	The cinematography is excellent, with creative and well-composed shots, steady camera work, and effective use of lighting that enhances the mood and narrative.	
Editing	The video is poorly edited, with choppy cuts, inconsistent pacing, and visible mistakes that detract from the story.	Editing is functional but inconsistent, with some awkward transitions or pacing issues that disrupt the flow.	Editing is smooth, with good pacing and clean transitions that support the narrative. There are few noticeable errors.	The editing is seamless and highly polished, with perfect pacing and transitions that enhance the flow and storytelling of the film.	
Sound Quality	The sound is unclear, with poor volume balance, background noise, or distorted audio that makes it hard to understand.	The sound is mostly clear but may have occasional issues with volume, background noise, or inconsistency in audio levels.	The sound is clear and well-balanced, with minimal background noise or volume issues. Dialogue and effects are easy to hear.	The sound quality is exceptional, with clear, balanced audio, no background noise, and perfectly synchronized sound effects and dialogue.	

6. Tutorial

To promote the sharing of knowledge and to encourage a spirit of cooperation between the CRC Robotics Competition teams, the CRC Robotics Organizing Committee selects the team with the best tutorial each year. The evaluation rubric used by the judges to evaluate the tutorial may be found at the end of this section.

6.1. Artificial Intelligence (AI) Use

AI is a powerful tool when used well. However, it can also become a substitute for creativity, and heavy reliance on it has been shown to diminish creative thinking and problem-solving abilities. For this reason, we encourage our participants to use it judiciously and provide the following rules to do so.

6.1.1. AI usage proportion

The submitted tutorial must contain no more than 20% of AI use in all aspects. For example, AI can only be used for 20% of the text, 20% of the music, 20% of the visual content, etc.

6.1.2. AI usage documentation

All AI usage in the video and its production must be documented and detailed in the tutorial description. For example: "We used AI to generate the dialogue for Francis, the good prince, who speaks for 32 seconds in total in the tutorial. We also used AI to make the elevator music that plays for 27 seconds. The painting in the background of Elisa's workshop has been generated with ChatGPT and printed to make the decor." A tutorial found to have used undocumented AI shall be considered as not submitted.

6.2. Requirements

The Tutorial must demonstrate knowledge directly related to any component of the Competition. Although it is strongly encouraged to cover new subjects, it is acceptable to cover a tutorial topic previously explored.

6.2.1. Format

Tutorials must be in video format and cannot be longer than 3 minutes, excluding end credits.

6.2.2. Structure

The Tutorial can be structured in one or more of the following ways:

- A theoretical and simplified explanation of a common system (e.g. internal functioning of CRCduino).
- A step-by-step explanation to achieve a specific task.
- A practical demonstration of a complex system to perform a specific task.

6.2.3. Asset Reuse

The reuse of content or assets from a previous submission is prohibited. Any attempt to submit a tutorial containing the same content or assets from a previous submission may be subject to a penalty determined by CRC Robotics.

6.2.4. Bilingualism

Both the English and French languages must be equally represented in the tutorial. The dialogue must be accessible in both languages. YouTube's closed-captioning tool is not permitted.

6.3. Submission

6.3.1. Deadline and Submission Platform

The Tutorial must be uploaded to YouTube in order to be judged. Refer to the Season Calendar in the admin packet for the date on which to submit the video. The specific URL pointing to the tutorial's YouTube page must be provided at the time of submission. Upload must be done by the deadline. A team that submits a tutorial up to 24 hours following the deadline will be evaluated; however, this team will not be able to rank within the "Top 3" for the tutorial component in their division. Submissions received more than 24 hours after the deadline will not be judged.

6.3.2. Privacy Settings

The Tutorial's privacy setting must be either "Unlisted" or "Public" when submitted. The tutorial's privacy setting must be switched to "Public" no later than the first day of the Competition. Refer to the Season Calendar in the admin packet for the exact time and date.

6.3.3. Multiple Submissions

A team can submit multiple Tutorials. If a team submits multiple tutorials, one will be chosen at random to be evaluated.

6.4. Tutorial Evaluation Form

Tutorial Technical					
	Beginning (1)	Developing (2)	Accomplished (3)	Exemplary (4-5)	Score /5
Content Accuracy & Depth	Information is mostly inaccurate, incomplete, or lacks technical detail. Critical concepts are missing or poorly explained.	Some accurate information is presented, but there are gaps in technical detail or important concepts.	Information is accurate and complete, covering most key technical details effectively.	The content is highly accurate, comprehensive, and provides in-depth technical detail, covering all relevant concepts thoroughly.	
Clarity of Explanation	Instructions are confusing, vague, or disorganized, making it difficult to follow the tutorial.	Instructions are somewhat clear, but parts of the tutorial are difficult to understand or follow.	Instructions are clear and well-organized, with only minor areas of confusion.	Instructions are exceptionally clear, well-organized, and easy to follow, guiding the user smoothly through complex tasks.	
Engagement & Practical Application	The tutorial is unengaging, with little to no interactive elements or practical examples. Users struggle to apply what they learn.	The tutorial includes some examples or exercises but lacks consistent practical application or engagement.	The tutorial engages users with relevant examples and exercises that encourage practical application of the material.	The tutorial is highly engaging, with hands-on examples, interactive elements, and strong focus on real-world application of the concepts.	

7. Website

The following section outlines the rules and regulations of the website content and design components. The evaluation rubrics used by the judges to evaluate the website design and the website content may be found at the end of this section.

7.1. Artificial Intelligence (AI) Use

AI is a powerful tool when used well. However, it can also become a substitute for creativity, and heavy reliance on it has been shown to diminish creative thinking and problem-solving abilities. For this reason, we encourage our participants to use it judiciously and provide the following rules to do so.

7.1.1. AI Usage Proportion

The submitted website must contain no more than 20% of AI use in all aspects. For example, AI can only be used for 20% of the text, 20% of the website programming, 20% of the visual content, etc.

7.1.2. AI Usage Documentation

All AI usage in the website and its production must be documented and detailed in an easy to access page of the website. For example: "We used AI to generate the first three paragraphs of the "Our Theme" journalism page. We also used AI to program the minigame in "The Game" page. The technical drawings assets in the website have been generated with ChatGPT." A website found to have used undocumented AI shall be considered as not submitted.

7.2. Technical Requirements

7.2.1. Compatibility

The website must be functional in the mobile and desktop version of Google Chrome, Firefox and Safari.

7.2.2. Quality Assurance

The website should be **tested prior to submission**. Any bugs found during evaluation will negatively affect the team's score in the website design component. Bugs include, but are not limited to, malformed links, missing images or actions that cause an error.

7.2.3. HTML Standards Adhesion

The website should validate against HTML5 Standards (<http://www.w3.org/TR/html5/>) with little to no errors.

7.2.4. CSS Standards Adhesion

The website should validate against CSS 3.0 (<https://www.w3.org/standards/techs/css#stds> & <https://jigsaw.w3.org/css-validator/>) or better with little to no errors.

7.3. Website Content

7.3.1. Bilingualism

The website content must be fully bilingual. When the locale is changed to French, no English content should be displayed. When the locale is changed to English, no French content should be displayed.

7.3.2. Team Roster

The website must minimally contain a browsable roster of every student, teacher and mentor on the team, which includes each member's:

- Name
- Picture (optional)
- Contribution
- Descriptive content (optional)

7.3.3. CRC Robotics Competition Description

The website must contain a page referencing or describing the CRC Robotics Competition with a hyperlink to CRC's website: <https://robo-crc.ca/>.

7.3.4. Game Description

The website must explain the game rules in enough detail such that the game can be understood from an outsider's perspective.

7.3.5. Progress in Each Component

The website should include details relating to:

- The design and construction of the robot.
- Prototype plans and drawings.
- The latest version of the robot at time of submission.
- Photos of the robot, at various stages of construction.
- Progress in each component of the CRC Robotics Competition.
- Roadblocks encountered and the process of overcoming them.
- The team's video and tutorial.

7.3.6. Copyright Law Adhesion

If the website is themed around an existing work, it must be clearly mentioned and credited.

7.3.7. Asset Reuse

The reuse of content or assets from a previous submission is prohibited. Any attempt to submit a website containing the same content or assets from a previous submission may be subject to a penalty determined by CRC Robotics.

7.3.8. Forbidden Content

No vulgar, offensive, violent or inappropriate content is tolerated. When in doubt, contact CRC Robotics.

7.4. Submission

7.4.1. Online Accessibility

The website must be publicly accessible and hosted on the server provided by CRC Robotics, using the account credentials provided in the Competition Pamphlet available in your Participant Kit. If you have misplaced your credentials or they do not function, please email info.crc@sciencetech.ca.

7.4.2. Post-Submission Changes

Once submitted, changes cannot be made to the website. Should changes be discovered past the submission date, the website will be considered as not submitted.

7.4.3. Deadline and Submission Platform

Refer to the Season Calendar in the admin packet for the exact date on which to submit the website. The specific URL pointing to the website must be provided at the time of submission. A team that does not submit a website will receive a score of zero in the website design and website content components. A team that submits a website up to 24 hours following the deadline will be evaluated; however, this team will not be able to rank within the "Top 3" for the website design or website content components in their division. Submissions received more than 24 hours after the deadline may not be judged.

7.4.4. Website Visibility

The entirety of the website must be made visible to the public and, preferably, discoverable by search engines no later than the first day of the Competition. Refer to the Season Calendar in the admin packet for the exact time and date. No points will be deducted if the website is not discoverable by search engines.

7.5. Website Design Evaluation Form

	Beginning (1)	Developing (2)	Accomplished (3)	Exemplary (4-5)	Score /5
Visual Appeal	The design is unattractive, cluttered, or inconsistent, with poor use of color, typography, or images. It detracts from the user's experience.	The design is somewhat appealing but lacks consistency in color, fonts, or imagery. It may look unprofessional or outdated.	The design is visually appealing, with good use of color, typography, and images. The layout is clean and professional.	The design is highly polished, visually striking, and cohesive, with excellent use of colors, fonts, and images that create a strong, professional aesthetic.	
Navigation & Usability	The website is difficult to navigate, with unclear menus, broken links, or a confusing structure that frustrates users.	The website has basic navigation but may have usability issues, such as unclear labels or a non-intuitive structure.	The website is easy to navigate, with clear menus and a logical structure that users can follow with minimal effort.	The website offers seamless navigation, with intuitive menus, clear labels, and a highly user-friendly structure that enhances the overall experience.	
Responsiveness & Compatibility	The website is not responsive and does not display well on different devices or browsers. It is hard to use on mobile devices or tablets.	The website is somewhat responsive but may have layout issues or slower performance on certain devices or browsers.	The website is responsive, with smooth performance and appropriate layout adjustments on different devices and browsers.	The website is fully responsive and performs exceptionally well on all devices and browsers, with perfect layout adjustments and fast loading times across platforms.	

7.6. Website Content Evaluation Form

	Beginning (1)	Developing (2)	Accomplished (3)	Exemplary (4-5)	Score /5
Relevance & Accuracy	The content is irrelevant or inaccurate, with outdated or incorrect information that does not meet the needs of the audience.	The content is somewhat relevant but may contain minor inaccuracies or outdated information. It only partially meets the audience's needs.	The content is accurate and relevant, meeting the needs of the audience with up-to-date information.	The content is highly accurate, thoroughly researched, and perfectly aligned with the audience's needs, offering valuable, up-to-date insights.	
Organization & Structure	The content is poorly organized, with no clear structure. It is difficult for users to navigate or find information.	The content is somewhat organized but lacks a logical flow, making it hard to follow in some places.	The content is well-organized, with a clear structure that helps users easily navigate and find information.	The content is exceptionally well-structured, with a logical, intuitive flow that enhances user navigation and makes finding information effortless.	
Engagement & Readability	The content is unengaging and difficult to read due to complex language, jargon, poor formatting or poor grammar.	The content is somewhat engaging but may have readability issues, such as long paragraphs or difficult language.	The content is engaging and easy to read, with clear language, proper formatting, and appropriate tone for the audience.	The content is highly engaging and reader-friendly, with concise, clear language, excellent formatting, and a tone that captivates the audience.	