

# 2019 OVERVIEW Rules, Deadlines and Rubrics



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## 2019 OIYRC Challenge

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### Challenge Overview:

For the 2019 OIYRC Robotic Challenge, teams will design and fabricate a “sorting” robot. You will be supplied with a sorting box and nine electrical wires which will differ by colour and length.

The judge will randomly choose one of the electrical wires and give it to the robot operator. The robot operator will place the wire into the robot and press a cycle start button to initiate the robotic operation. The robot will autonomously determine the object’s colour (i.e., green, red, yellow) and length (short, medium, or long) and place it into its correct corresponding location. This random process will be repeated until all nine electrical wires are placed into their correct location within the sorting box.

Skillful design and programming will ensure the robot can efficiently complete the repetitive task on its own without the assistance of the team members

### Team Guidelines:

- Teams may represent a school, a club or youth group.
- Teams will have at least four (4) youth members.
- Teachers and adult mentors (upon availability) may only act in an advisory role.
- A team field trip to a sponsor manufacturing facility or mentor facility is encouraged (upon availability).

**Team Deadlines:** submitted to [jane@workforcedevelopment.ca](mailto:jane@workforcedevelopment.ca)

- **October 18<sup>th</sup> 2019** Team name, Participating student names
- **October 18<sup>th</sup> 2019** Team photo (JPG file), Photo release forms, Media form
- **November 13<sup>th</sup> 2019** Written report, Video
- **November 20<sup>th</sup> 2019** Teams present at Goff Hall

**Each team (minimum of 5 members) MUST be at the challenge with a functioning robot in order to keep the Mindstorm EV3 kit.**

The kits are generously provided by our sponsors. Each team will be provided with the name of their sponsor. Teams are expected to learn about their sponsor and proudly exhibit their sponsor’s name on their display. All teams will be provided with a mentor (upon availability) to advise and assist the team throughout the process. These mentors volunteer their time to provide mentoring. Mentors may also provide opportunities for plant tours to view robots in an industrial environment.

All questions regarding submission procedures sent to [jane@workforcedevelopment.ca](mailto:jane@workforcedevelopment.ca)

All questions regarding technical support (i.e., the robot and/or the challenge) should be directed to [graaake@ldcsb.ca](mailto:graaake@ldcsb.ca)



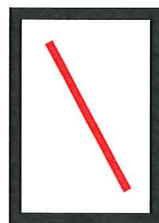
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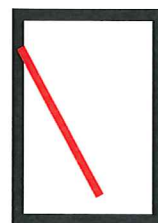
### Challenge Rules:

1. Only the Lego Mindstorms EV3 Kit provided may be used to build the robot. The use of extra materials or parts are not allowed to be used in the fabrication of the robot.
2. The use of adhesives (e.g., glue, tape, etc.) is NOT permitted in this challenge. No Lego parts may be cut, drilled or otherwise modified.
3. The objects will be manually loaded into the robot. A Cycle Start button (i.e., a touch sensor) must be incorporated into the robot design which will be manually pressed to indicate the part has been loaded and is ready to sort.
4. All wires must be loaded into the robot using the exact same procedure. When the robot operator is placing the wire into the robot, he/she may NOT manipulate the object in any way which will assist the robot in determining the object's length; the robot must determine if the wire's length is "long", "medium", or "short" on its own. For example, the robot operator may not strategically orient the "long" wires in a unique position, angle, or location which is different than the orientation of the "short" wires. In this example, the operator is determining the length of the object, not the robot.
5. The objects are considered "correctly sorted" if they are placed in their correct corresponding box by length and colour as indicated on the sorting box.
6. The objects are considered within the box provided it is NOT touching any box border line. The judge will have final ruling on any such instance.

Example:



"Within the Box"  
(Object does not touch a border line)



"Outside the Box"  
(Object touches a border line)

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7. Optional: The robot may use the supplied black Lego case which contained Lego bricks in its design.



For example, the sorting box may be placed beside the case. The case could then be used as a "wall" for the ultrasonic sensor to measure from or for a touch sensor to "bump" if desired.

8. The provided objects to be sorted (i.e., electrical wires) must be made as straight as possible before loading into the robot. They may not be bent, rolled, or folded to make them shorter or smaller.
9. The robot must start in the exact same position/location (called a "Home Position") at the start of each cycle.
10. If the operator must assist the robot through a cycle, that cycle will not be counted. Thus, the object will be removed from the scoring tally. The remaining objects to be sorted can be cycled.
11. No part of the robot may remain in contact with the object once it is placed. If robot contact is present, no points will be allotted for that placement.
12. The entire assembly process should be autonomous except for the loading of the objects and pressing the "Cycle Start" button.
13. **Operation Scoring Calculation:** Points for successfully delivered objects will be as follows:

**+2 Points for Correctly determining Length.** Each object is correctly placed in a correct (long, medium, or short) size box (even if the colour is incorrect).

**+2 Points for Placement Accuracy.** Each object is placed within a box and not touching a border line (even if the incorrect colour/size of wire is the box.)

**+1 Point for Correctly determining Colour.** Each object was correctly placed in a correct colour box.

Thus, each object correctly placed into its corresponding box will score five points. A maximum score of 45 points can be achieved.

14. The sorting box may be taped down to the desk/table using clear tape if desired.

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15. A safety gate/door used to protect the robot operator while loading a wire within the robot must be incorporated into the robot design. The safety gate/door must make use of the Gyro Sensor and it must disable the Cycle Start button (Touch Sensor). This feature will score 3 points if it functions appropriately.
16. Additional operational points may be awarded for supplementary features incorporated into the robot design. Each supplementary feature will score 1 point with a maximum of 2 points total. These supplementary points are at the discretion of the judges. Some examples may include:
  - A Counter: Sorted objects are counted by the EV3 visually on its screen or by sound
  - An Indicator Light: A light on the EV3 indicates the robot is ready to receive another object
17. The sorting process will be timed; the robot will be judged for its time efficiency. The team with the highest score will be awarded Platinum Level achievement. In the event of a tied score, the most efficient robot (i.e., with the fastest time to complete the task) will be awarded Platinum Level.
18. The team must document their project from start to finish in a written report and presentation. In addition, they must submit a final maximum 10 minute video outlining the struggles and achievements encountered in the process. The final functioning robot should be shown completing the task. Refer to the written report, video, and presentation rubrics provided for judging criteria. Instructions for submitting the written report and the final video are provided in the information packaged included in the Lego kit. The written report and final video must be submitted by **Wednesday, November 13, 2019**.
19. Each team must be present at Goff Hall for the Challenge on **November 20, 2019** (minimum of 5 team members can attend). Teams to be in contact with their mentor (upon availability). Any team that misses the event will be required to return the Lego Mindstorms EV3 Kit in its entirety.
20. **Overall Scoring Calculation:** The final overall score will be as follows:

Challenge Component	Possible Score
Operation	/50
Presentation	/30
Video	/10
Written Report	/10
<b>Final Score</b>	<b>/100</b>



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### OPERATION RUBRIC:

Bronze Level	Silver Level	Gold Level
Total points awarded for sorted objects (1-18 points)  _____ Points	Total points awarded for sorted objects (19-36 points)  _____ Points	Total points awarded for sorted objects (37-45 points)  _____ Points
Safety gate/door is installed which uses the Gyro Sensor to disable the Cycle Start button. (3 Points for this feature)  _____ Points	Safety gate/door is installed which uses the Gyro Sensor to disable the Cycle Start button. (3 Points for this feature)  _____ Points	Safety gate/door is installed which uses the Gyro Sensor to disable the Cycle Start button. (3 Points for this feature)  _____ Points
Additional supplementary robot feature #1 (e.g., counter)  _____ (Brief Description)  Additional supplementary robot feature #2 (e.g., ready light)  _____ (Brief Description)  _____ Points (Max 2)	Additional supplementary robot feature #1 (e.g., counter)  _____ (Brief Description)  Additional supplementary robot feature #2 (e.g., ready light)  _____ (Brief Description)  _____ Points (Max 2)	Additional supplementary robot feature #1 (e.g., counter)  _____ (Brief Description)  Additional supplementary robot feature #2 (e.g., ready light)  _____ (Brief Description)  _____ Points (Max 2)
Time taken to assemble all objects without human assistance  Time: _____	Time taken to sort all objects without human assistance  Time: _____	Time taken to sort all objects without human assistance  Time: _____
<u>Total Score</u>  _____  (Maximum 23)	<u>Total Score</u>  _____  (Maximum 41 )	<u>Total Score</u>  _____  (Maximum 50)

**Instructions to Judges:** Record **Team Name** at top of sheet

1. Evaluate robot operation using criteria stated above.
2. Time the operation using a stop watch, record the time on the sheet.
3. Circle **(Bronze)** or **(Silver)** or **(Gold)** at top of page
4. Write any special remarks below:
5. Thank Team for their effort, move to next table

**Operation Final Score = \_\_\_\_\_ / 50**

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### PRESENTATION RUBRIC:

	Bronze Level	Silver Level	Gold Level
<b>Oral Presentation</b>	Default level. Presentation is made but lacks preparation and direction. Important details are missing Time runs over 5 minute limit.	Well prepared presentation is well organized and includes: -introduction of team members -sponsor info and mentor info (upon availability) -clear explanation of robot operation	Presentation is polished and smooth. Three or more team members participate in the presentation.
<b>/20</b>	<b>2 4 6 8 10</b>	<b>12 14 16</b>	<b>17 18 19 20</b>
<b>Robot Display</b>	Robot kit is present in its entirety. Table is organized with minimal information or display	Display is well designed with poster and graphics. Sponsor name and logo is identified	As in silver level plus photos used to 'tell the story' behind the project
<b>/10</b>	<b>1 2 3 4 5</b>	<b>6 7 8</b>	<b>9 10</b>

### Instructions to Judges:

1. Write **Team Name** at top of sheet
2. Evaluate team report against the stated criteria
3. Underline each achieved criteria
4. Identify the resulting scoring level
5. Circle **B** (Bronze) or **S** (Silver) or **G** (Gold) at top of page
6. Calculate Presentation Final Score.
7. Write any special remarks below:
8. Thank Team for effort, move to next table

**Presentation Final Score = \_\_\_\_ /30**



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### VIDEO RUBRIC:

	Bronze Level	Silver Level	Gold Level
<b>Video Submission</b>	Video includes two of the following: -complete team -operation of robot -simple to follow -no gimmicks -only necessary info -under ten minutes	Video is clear and includes four of the following: -complete team -operation of robot -simple to follow -no gimmicks -only necessary info -under ten minutes	Video is clear and includes all of the following: -complete team -operation of robot -simple to follow -no gimmicks -only necessary info -under ten minutes
<b>/10</b>	<b>1 2 3 4 5</b>	<b>6 7 8</b>	<b>9 10</b>

### Instructions to Judges:

1. Write **Team Name** at top of sheet
2. Evaluate team report against the stated criteria
3. Underline each achieved criteria
4. Identify the resulting scoring level
5. Circle **B** (Bronze) or **S** (Silver) or **G** (Gold) at top of page
6. Calculate Video Final Score
7. Write any special remarks below:

**Video Final Score = \_\_\_\_\_ /10**

## 2019 OIYRC Challenge

### WRITTEN REPORT RUBRIC:

	Bronze Level	Silver Level	Gold Level
<b>Written Report</b>	Basic written report only	Detailed written report Including: -mentor profile (upon availability) -sponsor information -concept diagrams -program script	As in silver level with superior report detail and professional formatting. Report is well organized and attractive.
<b>/10</b>	<b>1 2 3 4 5</b>	<b>6 7 8</b>	<b>9 10</b>

#### Instructions to Judges:

1. Write **Team Name** at top of sheet
2. Evaluate team report against the stated criteria
3. Underline each achieved criteria
4. Identify the resulting scoring level
5. Circle **B** (Bronze) or **S** (Silver) or **G** (Gold) at top of page
6. Calculate Written Report Final Score
7. Write any special remarks below

**Written Report Final Score = \_\_\_\_\_/10**