OXFORD INVITATIONAL YOUTH ROBOTICS CHALLENGE

2024 OIYRC

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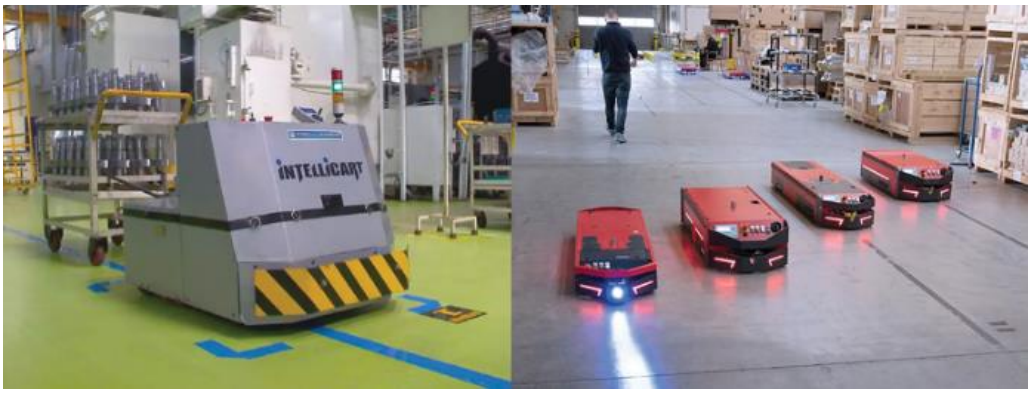


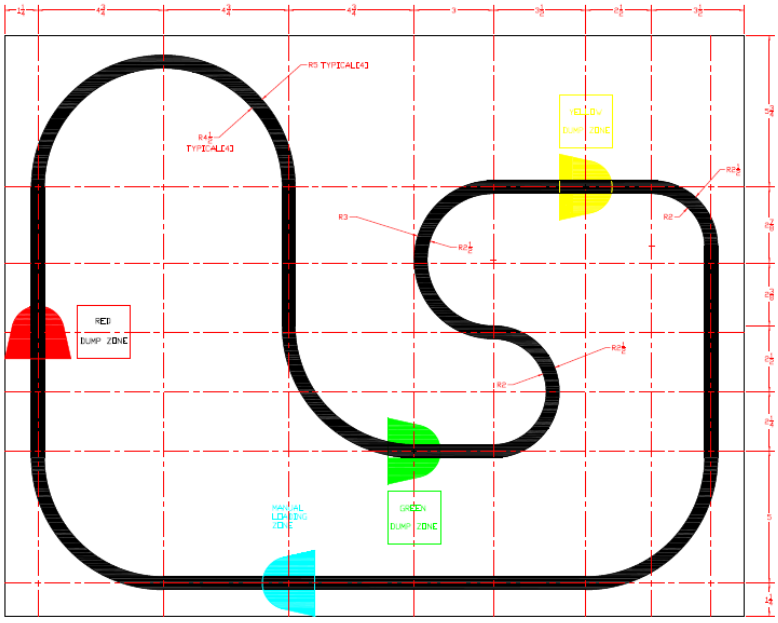
Source: https://www.techscience.com/iasc/v35n1/48167/html

Challenge Overview:

For the 2024 Challenge, each team must design and fabricate an industry part supplying robot. The operator will manually load a single part (i.e., 15mm X 15 mm coloured cube) into the robot's hopper at the blue loading zone. The operator will then push a button located on the robot to indicate a part has been loaded and is ready to deliver. The robot will scan the part colour, follow a black track line and successfully deliver the part to the correct corresponding colour dump zone. The robot must then return to the loading zone and wait for a new part to be loaded. Skillful design and programming will ensure the robot can *efficiently* complete the repetitive task on its own without the assistance of the team members.

Industry Floor Layout:

1. The industry floor will be drawn by each team on a sheet of white Bristol board measuring 28"x22" (not provided) using the provided Crayola markers. See the attached PDF appendices for the industry floor track and dump zones layout dimensions/details.



Teams & Deadlines

- Teams may represent a school, a club or youth group.
- Teams will have at least four (4) high school aged youth members.
- Teachers & adult mentors (upon availability) only act in an advisory role.
- A team field trip to a manufacturing facility is encouraged (upon availability).
- Up to 5 members must be present on challenge day at Goff Hall.

Team Deadlines emailed to jane@workforcedevelopment.ca

October 31, 2024

- Team name & student names
- Team photo & signed photo release forms
- Team media form

November 21, 2024

- Written Report
- Video uploaded on google drive

November 28, 2024

- Challenge Day

Challenge Rules:

1. Only the Lego Spike Kit and Expansion Kit provided may be used to build the robot. Uses of extra materials or parts are not allowed in the robot.

2. No use of glue, tape wire, etc. is allowed to be used in the project. No parts may be cut, drilled, or otherwise modified.

3. Teams must purchase their own sheet of white Bristol board and construct the industry floor layout as accurately as possible following the drawings provided (see attached PDF appendices.) The industry floor layout must be constructed within +/- ¼" (+/- 5mm) accuracy or else it will not be permitted; an alternate court within tolerance may be supplied by OIYRC.

4. Robots will be manually loaded with a single part at the blue coloured loading zone. A cycle-start button (i.e., on the Hub) should be incorporated into the robot design which will be manually pressed to indicate a part has been loaded. The judge will begin timing the entire robotic performance once the cycle-start button has initially been pressed.

5. Once the cycle-start button has been pressed, the robot will scan the part colour. The colour of the part must be displayed using the hub's light matrix to indicate its destination zone.

6. The robot will follow a black track line to the correct *corresponding* colour indicator, dump the part into the corresponding colour dump zone, and then continue to follow the black line back to the blue coloured loading zone and wait for a new part to be reloaded.

7. A new part will be loaded into the robot and the cycle-start button will be manually pressed to indicate a new part has been loaded. Judges will specify the colour order of the parts to be inserted. The entire process should be automated except for loading and pressing the cycle-start button.

8. Robots may only travel in a one-way (clockwise) direction on the black line track.

9. The part is considered "successfully delivered" as long as the part stays *within* the dump zone box (i.e., no part of the cube may be located outside of the box). The parts must remain *within* the dump zone box at all times (i.e., the robot may not push/bump) a part out of the dump zone box at any time during the delivery process. The robot must also return to the blue loading zone for the part to be considered "successfully delivered".

10. Robots must successfully deliver as many parts as possible within a 4-minute time duration. If all three (3) parts have been successfully delivered in less than 4-minutes, the timer will be stopped, and the time will be recorded.

11. The team with the highest overall score will be awarded Platinum Level achievement. In the event of a tied score, the most efficient robot (i.e., successfully completes the task in the least amount of time) will be awarded Platinum Level.

12. If the operator must intervene during a part delivery cycle (e.g., the robot travels off course), the part will be considered not successfully delivered; thus, a score of zero (0) will be awarded for that cycle. The operator will restart the robot at the loading station with a new coloured part. Any part which was not successfully delivered cannot be reloaded back into the robot.

13. An obstacle safety interlock (Distance Sensor) must be incorporated into the robot design. If an obstacle (i.e., judges hand) located anywhere on the black track line is detected by the robot, the robot will safely brake before it collides with the obstacle, sound a warning noise, and proceed only when the obstacle has been removed.

14. Robots will also be judged on the "smoothness" of their movement.

15. Teams may wish to add "additional robot features" (e.g., count the number of successful deliveries) which may earn up to four (4) extra points at the discretion of the judges. (new this year)

16. The team must document their project from start to finish in a written report. 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. Instructions for submitting the written report and the final video will be found in this package and also on the OIYRC website with a deadline of November 21, 2024.

17. Each team must be present at Goff Hall for the Challenge on November 28, 2024 in order to keep the Lego kit. **Any team that misses the event will be required to return the kit in its entirety.**

18. **Overall Scoring Calculation:** The final overall score will be as follows:

Challenge Component	**Possible Score**
Operation	/50
Presentation	/20
Video	/15
Written Report	/15
Final Score	**/100**

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

OIYRC's goal this year is full participation from each team. ***Each team MUST be at the challenge with a functioning robot in order to keep the Lego Spike 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.

Teams may 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 the submission of video, written report, etc. should be directed to Jane Kempe at jane@workforcedevelopment.ca

All questions regarding technical support (i.e. robot and/or challenge guideline/rules) should be emailed to: Glenn Raake graake@ldcsb.ca

OPERATION RUBRIC:

Bronze Level	Silver Level	Gold Level
Successfully delivers one (1) part to corresponding dump zone. **(10) Points** **Time: _____(Seconds)**	**Successfully delivers two (2) parts to corresponding dump zones.** **(20) Points** **Time: _____(Seconds)**	**Successfully delivers three (3) parts to corresponding dump zones.** **(35) Points** **Time: _____(Seconds)**
Robot line following movement is not smooth. -not smooth (1 Point) -somewhat smooth (2-3 Points) -smooth (4-5 Points) **(1) (2) (3) (4) (5)**	**Robot line following movement is not smooth.** -not smooth (1 Point) -somewhat smooth (2-3 Points) -smooth (4-5 Points) **(1) (2) (3) (4) (5)**	**Robot line following movement is not smooth.** -not smooth (1 Point) -somewhat smooth (2-3 Points) -smooth (4-5 Points) **(1) (2) (3) (4) (5)**
Functioning obstacle scanning safety system: -Brakes/Pauses (1 Point) -Sound (1 Point) -Resumes when obstacle removed (1 Point) **(1) (2) (3)**	**Functioning obstacle scanning safety system:** -Brakes/Pauses (1 Point) -Sound (1 Point) -Resumes when obstacle removed (1 Point) **(1) (2) (3)**	**Functioning obstacle scanning safety system:** -Brakes/Pauses (1 Point) -Sound (1 Point) -Resumes when obstacle removed (1 Point) **(1) (2) (3)**
Functional light matrix indicator: -Red (1 Point) -Green (1 Point) -Yellow (1 Point) **(1) (2) (3)**	**Functional light matrix indicator:** -Red (1 Point) -Green (1 Point) -Yellow (1 Point) **(1) (2) (3)**	**Functional light matrix indicator:** -Red (1 Point) -Green (1 Point) -Yellow (1 Point) **(1) (2) (3)**
Additional supplementary robot features _____ (Description) **(0) (1) (2) (3) (4)**	Additional supplementary robot features _____ (Description) **(0) (1) (2) (3) (4)**	Additional supplementary robot feature _____ (Description) **(0) (1) (2) (3) (4)**
Total Score _____ **(Maximum 25)**	**Total Score** _____ **(Maximum 35)**	**Total Score** _____ **(Maximum 50)**

Instructions to Judges:

Write **Team Name** at top of sheet

1. Evaluate robot operation using criteria stated above.
2. Time each operation using a stop watch, record the time on the sheet.
3. Identify the resulting scoring level and calculate Operation Final Score
4. Circle **B** (Bronze) or **S** (Silver) or **G** (Gold) at top of page
5. Write any special remarks below:
6. Thank Team for effort, move to next table

Operation Final Score = ____ / 50

PRESENTATION RUBRIC:

	Bronze Level	Silver Level	Gold Level
Oral Presentation	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 recognition and information -mentor profile (upon availability) -clear explanation of robot operation	Presentation is polished and smooth. Three or more team members participate in the presentation.
/10	**1 2 3 4 5**	**6 7 8**	**9 10**
Robot Display	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
/10	**1 2 3 4 5**	**6 7 8**	**9 10**

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 = ____ /20

VIDEO RUBRIC:

	Bronze Level	Silver Level	Gold Level
Video Submission	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
/15	**1 2 3 4 5**	**6 7 8 9 10**	**11 12 13 14 15**

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 = ____ /15

WRITTEN REPORT RUBRIC:

	Bronze Level	Silver Level	Gold Level
Written Report	Basic written report only	Detailed written report Including: -sponsor recognition and information -mentor profile (upon availability) -concept diagrams -program script	As in silver level with superior report detail and professional formatting. Report is well organized and attractive.
/15	**1 2 3 4 5**	**6 7 8 9 10**	**11 12 13 14 15**

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 = ___ /15