9th Annual 2014

Challenge Overview:

For the 2014 Challenge, each team is to design and fabricate a factory part supplying robot. The operator will manually load a single part (i.e., ¾"x ¾" 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.

Our goal this year is full participation from each team. Each team must also 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. Each team should take the time to learn about their sponsor. The sponsor's name should be proudly displayed by each team.

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. Please take the time to contact your mentors and learn from their experiences. Mentors may also provide opportunities for plant tours to view robots in an industrial environment.

All questions regarding the robot and/or challenge should be directed to both:

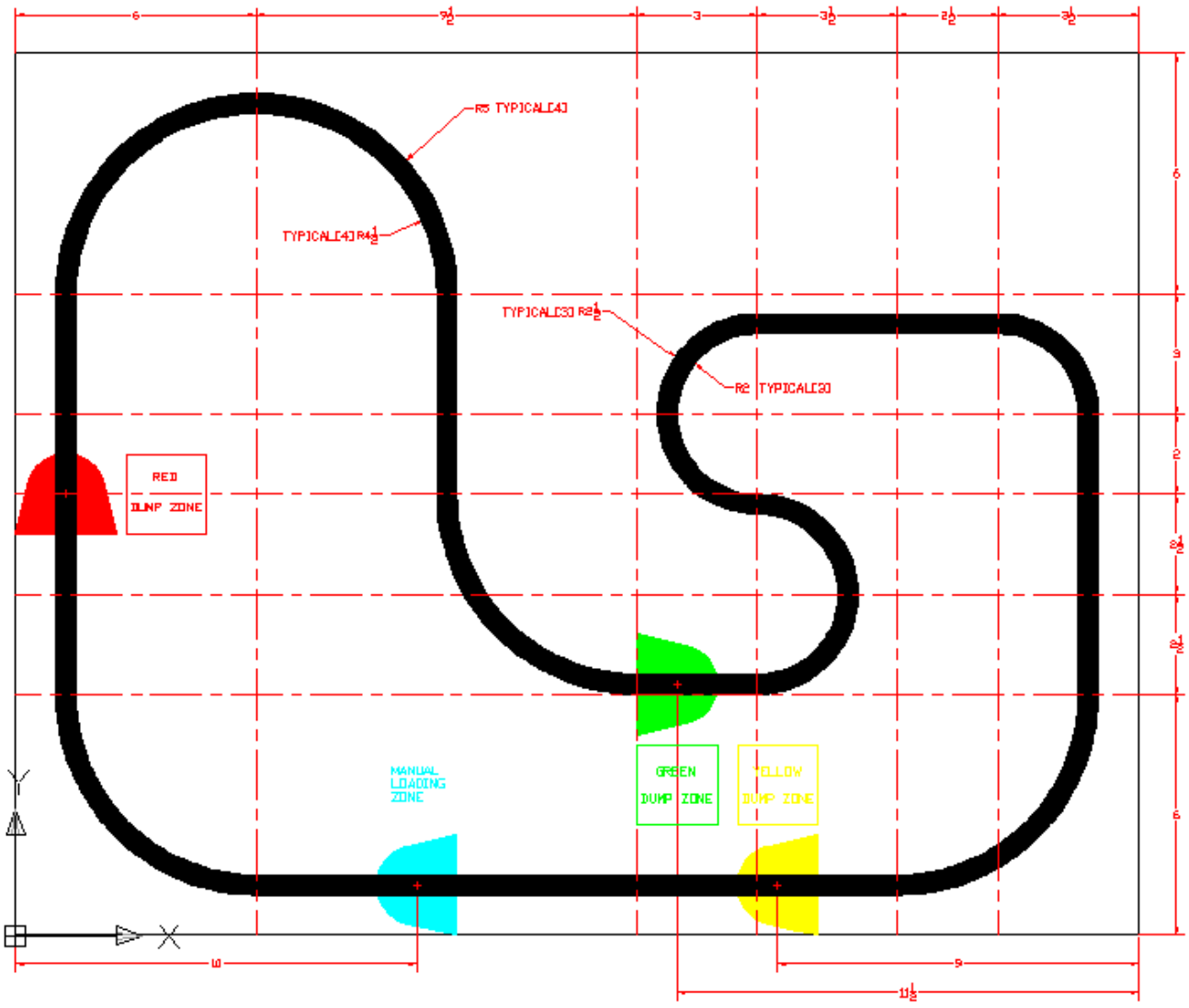
William Van Vliet: will@osgltd.ca
Glenn Raake: graake@office.ldcsb.on.ca

Teams

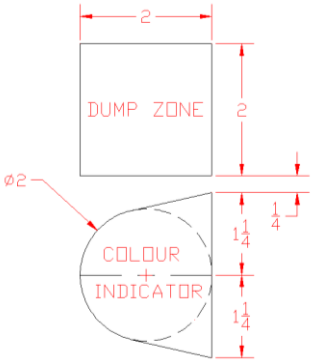
- Teams may represent a school, a club or youth group.
- Teams will have at least four (4) high school aged youth members. Teams will send their team name and participating student names to Jane Kempe jane@workforcedevelopment.ca by Friday, September 26, 2014.
- Teams will send a Team Photo to Jane Kempe jane@workforcedevelopment.ca by Wednesday, October 15, 2014.
- Teachers and adult mentors may only act in an advisory role.
- A team field trip to a sponsor manufacturing facility or mentor facility is strongly encouraged.

Challenge Rules:

1. Only the Lego Mindstorms EV3 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. Robots will be manually loaded with a single cube part at the blue coloured loading zone. A start button must be incorporated into the robot design which will be manually pressed to indicate a part has been loaded.
4. The entire process should be automated except for loading. Once the button has been pressed, the robot will scan the part colour, 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. Judges will specify the colour order of the coloured cubes to be inserted.
5. Robots may only travel in a one-way (clockwise) direction on the black line track.
6. 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".
7. 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 on the OIYRC website and must be submitted by Wednesday, November 19, 2014.
8. Each team must be present at Goff Hall for the Challenge on Tuesday, November 25, 2014 in order to keep the robot. Any team that misses the event will be required to return the kit in its entirety.
9. An obstacle safety interlock 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 pause (i.e., brake), sound a warning noise, and proceed only when the obstacle has been removed.
10. All robots will be timed to complete the task. Robots will also be judged on the "smoothness" of their movement and their time efficiency.
11. The track and dump zones will be drawn by each team on a white sheet of Bristol board using Crayola markers provided as depicted below. Teams must purchase their own sheet of white Bristol board.



NOTE: THE BLACK TRACK LINE IS ½" WIDE.



TYPICAL DIMENSIONS OF DUMP ZONE AND COLOUR INDICATOR. NOTE: ALL INDICATORS ARE CENTRED ON BLACK TRACK LINE IN LOCATIONS SPECIFIED.

Evaluation for Presentation:

Base/Bronze Level

- Must submit a basic written report by specified due date
- Must submit some form of video by specified due date
- Must provide an oral presentation of project to the judges
- Robot kit must be present in its entirety
- Must mention Sponsor and Mentor names

Silver Level

Achieves bronze level plus the following:

- Detailed written report includes
  - Mentor profile
  - Sponsor Information
  - Concept Diagrams
  - Program Script
- Video Submission
  - Clearly demonstrates successful robot operation
- Well prepared oral presentation includes
  - Introduction of team members
  - Sponsor and mentor info
  - Clear explanation of robot operation
- Well-designed display with poster and graphics
  - Sponsor and mentor are adequately recognized.

Gold Level

Achieves Silver level plus the following

- Superior detail in the written report
  - Professional, appealing format
  - Well organized
- Video presentation “tells the story” of the project
  - Video includes elements of all other presentation components
  - Video is well made and would function well as a promotion for the OIYRC
- Oral presentation is captivating and polished
  - Presentation includes 3 or more members of the team.
  - All team members are clearly engaged in the process
  - Tinkering with the robot is not necessary – everything goes smoothly
- Robot display table is set up very attractively
  - The display looks professional
  - Video presentation is worked into the display

Platinum awards:
Teams that score gold in both areas of judging (report/display/video and operation) will qualify for platinum level as follows:

For platinum award:

The team with the highest count of items from the following list will receive a platinum award:

1. Successfully delivers red cube to red dump zone AND green cube to green dump zone, AND yellow cube to yellow dump zone. Cubes must remain in their corresponding dump zone boxes (i.e., not pushed/bumped out) throughout the entire process.

2. Successfully completes task without human assistance.

3. Functioning safety system for detecting obstacles incorporated into the robot design as specified.

4. Robot movement and line tracking is smooth (i.e., not shaky or “jittery”).

5. The judges will time each process from when the start button is pressed until each item is delivered and the robot returns to the loading station. The total time to completely deliver the red, green, and yellow time will be calculated. One obstacle interruption will take place at some point during the judging. The obstacle interruption will be the same time duration for each team. The total time will be used to break any tie for platinum.

Team Name:_____

Written Rubric:

	Bronze Level	Silver Level	Gold Level
Written Report	Basic written report only	Detailed written report Including: -mentor profile -sponsor info -concept diagrams -program script	As in silver level with superior report detail and professional formatting. Report is well organized and attractive.
/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 Written Report Final Score
7. Write any special remarks below

Written Report Final Score = ___ /10

Team Name:_____

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
/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 Video Final Score
7. Write any special remarks below:

Video Final Score = ____ /10

Team Name:_____

Operation Rubric:

Bronze Level	Silver Level	Gold Level	Platinum
Successfully delivers red cube to red dump zone **(1) (2) (3)**	Successfully delivers red cube to red dump zone AND green cube to green dump zone **(4) (5)**	Successfully delivers red cube to red dump zone AND green cube to green dump zone AND yellow cube to yellow dump zone **(7) (8)**	Successfully delivers red cube to red dump zone AND green cube to green dump zone AND yellow cube to yellow dump zone
Functioning obstacle scanning safety system **Yes (1) / No (0)**	Functioning obstacle scanning safety system **Yes (1) / No (0)**	Functioning obstacle scanning safety system **Yes (1) / No (0)**	Functioning obstacle scanning safety system **Yes / No**
Robot movement is smooth **Yes (1) / No (0)**	Robot movement is smooth **Yes (1) / No (0)**	Robot movement is smooth **Yes (1) / No (0)**	Robot movement is smooth **Yes / No**
Time taken to deliver red cube and return without human assistance **Time: _____** **For Red Cycle**	Time taken to deliver green cube and return without human assistance **Time: _____** **For Green Cycle**	Time taken to deliver yellow cube and return without human assistance **Time: _____** **For Yellow Cycle**	Total time taken to deliver all three coloured cubes without human assistance **Time: _____** **Total Time Cycles**
Other Advanced EV3 Capabilities used: **(e.g., coloured light to specify when ready for reload)** -specify _____.	**Other Advanced EV3 Capabilities used:** **(e.g., coloured light to specify when ready for reload)** -specify _____.	**Other Advanced EV3 Capabilities used:** **(e.g., coloured light to specify when ready for reload)** -specify _____.	**Other Advanced EV3 Capabilities used:** **(e.g., coloured light to specify when ready for reload)** -specify _____.
1 2 3 4 5	**4 5 6 7**	**8 9 10**	

Operation Final Score = (Above Scoring Level) X 5

Instructions to Judges:

Write **Team Name** at top of sheet

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

Operation Final Score = ____ / 50

Team Name:_____

Oral Presentation:

	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 and mentor info -clear explanation of robot operation	Presentation is polished and smooth. Three or more team members participate in the presentation.
/20	**2 4 6 8 10**	**12 14 16**	**17 18 19 20**
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 = ___ /30