



**IEEE**

**Ottawa  
Section**



**IEEE Ottawa Robotics Competition  
Compétition de robotique d'Ottawa d'IEEE**

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# Competition Rules for Lego Challenges

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### **Disclaimer**

It is your responsibility to read and understand this document on a regular basis because we may update it from time to time.

## **The Competition**

The **IEEE Ottawa Robotics Competition (ORC)** encourages students from Grades 5 to 12 to develop an early interest in science, technology, and engineering. The competition aims to promote engineering design concepts and principles within a teamwork-based environment by challenging students in a fun and instructive approach.

In teams, your team will design and build an autonomous robot using **LEGO® MINDSTORMS kits** to compete in a full-day event filled with exciting challenges. Your team will have to document your progress while preparing for the competition and show us how much you know about your robot. Your team will be awarded points based on the **Technical Component** and their performance in **Challenges**.



## Participation Rules

As a participant of the IEEE Ottawa Robotics Competition, it is important that you show **respect** to your teammates, your supervisors, the volunteers organizing the event, and to all other attendees of any ORC event. Our goal is to allow you to **have fun** at ORC where everyone can benefit and grow together as a community, while being **professional** when going to any ORC event.

**Have fun and help each other out—it's all about participating!**

## Team Requirements

### Your IEEE ORC team must:

1. Have 2 to 7 students in Grades 5 to 12.
2. Have **one** official registered supervisor<sup>1</sup>.
3. Use either NXT or EV3 LEGO® MINDSTORMS kit (education version is preferred, but any other version is accepted).
4. Have **one** team captain and **one** assistant captain who will be responsible for approaching judges (with their supervisor) for any questions and/or clarifications about the rules (competition day only).
5. Have teachers, supervisors, mentors, parents, etc., who act in an advisory role *only*<sup>2</sup>. Your team must do the work!
6. Enter **only one robot per challenge**.
7. Compete in a **maximum** of two challenges.

**Important note for teams in two challenges:** Your team is expected to show up when it is your team's turn for a challenge. For that reason, you must have two robots if you wish to compete in two challenges.

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<sup>1</sup> An institution or community group is limited to registering [up to 8 teams](#) for fairness. A supervisor must be at least 18 years of age.

<sup>2</sup> You do not have to have a mentor, but your team must do the work.

## The Challenges

The Challenges will be done in a tournament-style competition with a round robin followed by playoffs. The exception to this rule is the da Vinci Challenge where judging is based on the final piece of art produced.

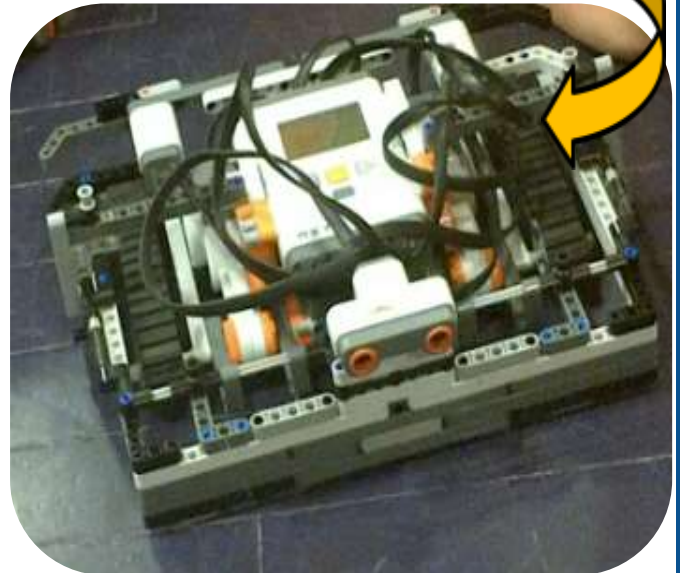
The challenges for 2016 include:

- Carleton University Sumo Challenge
- Drag Race Challenge
- Da Vinci Challenge
- King of the Hill Challenge
- Project BLU Challenge
- uOttawa #defythemaze Challenge (Arduino)



## DRAG RACE

## CARLETON U. SUMO



## The Technical Component

Your team must complete the Technical Component, where your team gets to show how well you understand your robot to our judges. The Technical Component includes a report, display, and presentation. Your team will have no time to work on the Technical Component on competition day, so your team must obey the deadlines or presentation time that we assign. **Please note that your team must put effort into the Technical Component because this can change your final ranking.**

## **The Robots**

Your team must build and program a robot **before** competition day, but you will still be allowed to modify your programs on competition day. The conditions of the school will affect sensors, so your team should bring their laptops and programs in order to adjust your programs. Your team will be given practice time to calibrate your robots.

### **LEGO® MINDSTORMS Restrictions**

The following applies to **LEGO® MINDSTORMS EV3 or NXT** kits:

1. **Software:** Participants may use RoboLab v.2.5 or later, the LEGO MINDSTORMS NXT or EV3 v.1.0 or later, LeJOS, or RobotC in order to program their robots.
2. **Non-LEGO® and LEGO® pieces:** Your team can use any non-electronic Lego pieces from any Lego kit for robot construction. However, the LEGO® pieces must not be modified in any manner (i.e. not cut up, burned, etc.). Moreover, no glue, tape, or non-LEGO® rubber bands are allowed in the construction of your robot, except for holding the drawing utensils in the da Vinci Challenge and for decorating your robot.
3. **Motors and Sensors:** Each robot may use **a maximum** number of the following motor and sensors (determined by part name and not by mode):
  - 3 motors (medium and/or large)
  - 2 touch sensors
  - 1 ultrasonic sensor **or** 1 infrared sensor  
(in proximity mode only—the infrared beacon may not be used)
  - 1 sound sensor
  - 2 colour sensors **or** 2 light sensors **or** 1 of each type
4. **Programming Brick:** Only one NXT MINDSTORMS brick or EV3 MINDSTORMS brick may be used for robot construction.



5. **Robot Dimensions and Weight:** Maximum robot dimensions are 1 ft × 1 ft (30.48 cm × 30.48 cm) and the maximum robot weight is 2 lbs (908 g), unless otherwise specified in the challenge rules. Judges will check your robot to make sure it meets our requirements throughout the day. If your robot changes dimensions while competing, judges may double check to see whether your robot still meets the requirements. This check does not apply when a part of robot falls off unintentionally while competing. For example, if parts were to fall off since two robots crashed into each other, judges will not double check dimensions.
  
6. **Remote Control:** Forms of remote control, such as Bluetooth, are not allowed, unless otherwise stated in a challenge. A robot must be autonomous and rely only on its original programming. Any actions your team may purposely do, like: clapping hands, issuing voice commands, Bluetooth, infrared remote, waving objects, etc., that causes a robot to begin behaving differently after the program has started is considered to be human interference and is not allowed.
  
7. **Projectiles:** Projectiles in any shape or form are not allowed. Robots must not intentionally shoot out/up objects or put any objects down in the competition arena/area during a match.

If there are any exceptions or additions to the restrictions, they will be listed in each challenge. If you have any questions, please email us at [orcinfo@ieeeottawa.ca](mailto:orcinfo@ieeeottawa.ca).

**Please do not assume anything!**  
**Ask questions when something is not clear!**  
**When in doubt, please ask!**

## Grading Scheme

- ★ One of the goals of the IEEE Ottawa Robotics Competition is to emphasize *all aspects* of engineering, including: the **fun and creative** building part and the **invaluable accomplishments** that come along with producing detailed technical work.

Therefore, your final mark and rank for the competition will be based on your team's performance during the challenge and the Technical Component. The marks will be split as shown.



Figure 1: IEEE ORC 2016 Overall Grading Scheme for Lego Challenges.

## Awards

All participating teams will receive certificates recognizing their participation in the IEEE Ottawa Robotics Competition.

### **Awards Categories**

**Awards** will be presented to the **1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> place teams for each Challenge**. The top 3 ranking teams are based on **both your team's performance in a challenge and your Technical Component mark**.

Judges will also be on the lookout to present two Special Awards:

- ★ **Spirit Award**
  - Presented to the team that shows the best overall team spirit
- ★ **Most Innovative Award**
  - Presented to the team with the most innovative robot design

**So make sure to showcase your enthusiasm and creativity!**

## **Distribution of Prizes**

In order to maximize the distribution of the 1<sup>st</sup> place prizes of LEGO® MINDSTORMS kits, a winning team can only receive one (1) kit. In the event that a team wins on multiple 1<sup>st</sup> place honours, the second LEGO® kit will be given to the team with the next highest score.

**The Head Judge/Appeals Coordinator will review all scores and allocate prizes.**

## **IEEE ORC 2016 Events & Deadlines**

<b>Date</b>	<b>Event</b>
<b>Mon, Dec 14<sup>th</sup></b>	<b>Registration Opens</b>
<b>Wed, Feb 17<sup>th</sup></b>	<b>Workshop #1—9 am to 3 pm</b>
<b>Sat, Feb 20<sup>th</sup></b>	<b>Workshop #2—10 am to 3 pm</b>
<b>Thurs, Apr 28<sup>th</sup></b>	<b>Workshop #3—9 am to 3 pm</b>
<b>Fri, Apr 29<sup>th</sup></b>	<b>Registration closes at 10 pm</b>
<b>Sat, Apr 30<sup>th</sup></b>	<b>Workshop #4—10 am to 3 pm</b>
<b>Fri, May 18<sup>th</sup> at 10 pm</b>	<b>Due date for reports. Please send them to orcrcpts@gmail.com</b>
<b>Sat, May 28<sup>th</sup></b>	<b>Competition Day at LDHSS (149 Berrigan Dr.)</b>