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2015



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



13th Annual Competition – May 23, 2015 | 13^e Compétition annuelle – le 23 mai 2015

COMPETITION RULES

Last Revised: January 11th, 2015

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1.0 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, students will design and build an autonomous robot using **LEGO® MINDSTORMS kits** to compete in a full day event filled with exciting challenges. Students will have to document their designs in a report, a display, and a presentation to be delivered on the day of the event. Teams will be awarded points based on the **Technical Component** (report, display, and presentation) and their performance in **Challenges**.

See [Section 6.0](#) for more information on the events happening for IEEE ORC 2015.



2.0 PARTICIPATION RULES

As a participant of the IEEE Ottawa Robotics Competition, it is important to demonstrate respect to your teammates, your supervisor(s), the volunteers organizing the event, and to all other attendees of any ORC event. Our goal is to establish a fun, friendly competition within a safe environment where everyone can benefit and grow together as a community while maintaining professional conduct when attending any ORC event.

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

2.1 Team Registration

The IEEE Ottawa Robotics Competition welcomes and encourages both new and experienced competitors alike to participate in our events. **All schools and community groups are welcome to compete in our event so long as they meet the requirements for each registered team.** If you have any questions or concerns, please contact us at: orcinfo@ieeeottawa.ca.

A single registered IEEE ORC team must have:

1. A team made up of between 2 to 7 students enrolled in Grades 5 to 12.
2. A team requires only one official registered supervisor per team¹.
3. NXT or EV3 LEGO® MINDSTORMS kit (education version is preferred, but home versions are accepted)
4. A team must appoint a team captain and an assistant captain who will be responsible for approaching judges (with their supervisor) on any questions, clarifications, discrepancies about the rules during the day of the competition.
5. Anyone who works with the team (teachers, supervisors, mentors, parents, etc.) can *only* act in an advisory role.

¹ An institution or community group is limited to registering up to 6 teams to allow fairness for new participating teams. Furthermore, each institution or community group can register only up to a maximum of 2 official supervisors and 1 mentor (optional).

6. Each team is allowed to enter only one robot per challenge.
7. Each team is allowed to compete in a maximum of two challenges.

2.2 The Challenges

The Challenges will be done in a tournament-style competition with a round robin followed by playoffs. The exception to this rule are subjective challenges such as the da Vinci Challenge where judging is based on the final piece of art produced. Please follow the links for more details on each Challenge.

The **LEGO® Challenges** for 2015 include:

- Carleton University Sumo Challenge
- Drag Race Challenge
- Da Vinci Challenge
- King of the Hill Challenge

We will also be introducing two **NEW Challenges**:

- Mini-Mystery Building LEGO® Challenge
- Arduino Pilot Project Challenge

Information for these Challenges will be added to the website soon.

2.3 The Technical Component

The Technical Component of the competition is meant to document the design process of the teams based on their work leading up to the day of the competition. The Technical Component is made up of three individual parts: a report, a poster or PowerPoint Presentation display, and a presentation to be delivered on the day of the event. Each team must also email a soft copy of their report by **May 16th, 2015** to orcrpts@gmail.com. Also, there will be no time to work on the presentation or display on the day of the competition as they **must** be ready for the judges at the scheduled time on competition day. **Please note that the technical component is essential in determining the winner for each event as it can change your final rank.** For more details on the technical portion of the competition, please visit our website.

2.4 Registration Fees and Deadlines

The registration fees for 2015 are **\$12.50 for each registered student**.

Each student will be provided a lunch and a t-shirt on the day of the competition. The official supervisor (and mentor) for that team will also be provided a free lunch. A separate form will be sent out for the lunch and t-shirt orders closer to competition day.

Please note that teams must confirm their attendance on or prior to **April 15th, 2015**. **No additional changes can be made after this date and registration fees are non-negotiable after this point.**²

Invoices will be sent out to the supervisor by **May 1st, 2015** with further instructions. All registration fees are due by **May 15th, 2015**. We accept cheques as the official form of payment for both registration and kit fees. Sample cheques will be provided.

3.0 THE ROBOTS

The robot must be built and programmed before the competition day, but teams will still be allowed to modify their programs on the day of the competition. Venue conditions will affect sensors so teams are encouraged to bring their laptops in order to adjust their programs and are given some practice time to calibrate their robots (light, sound, and colour sensors).

3.1 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 Education NXT v.1.0 or later, LeJOS, or RobotC in order to program their robots. All other programs used must be declared to the IEEE. See [Section 3.2](#) for more information on Software available.

² Please note that registration fees are separate from the costs of the subsidized LEGO® MINDSTORMS EV3 Kits. See [Section 3.3](#) for more information on kit purchases from IEEE ORC.

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2. **Non-LEGO® and LEGO® pieces:** No glue, tape, or non-LEGO® rubber bands are allowed in the construction of the robot, except for holding the drawing utensils in the da Vinci Challenge. *Any LEGO® pieces can be used for robot construction.*
3. **Sensors:** Each robot may only use **up to** 3 motors, 2 touch sensors, 1 light sensor, 1 ultrasonic sensor, 1 infrared sensor (in proximity mode only – the remote beacon may not be used), 1 sound sensor, and 1 colour sensor.
4. **Programming Brick:** Only one NXT MINDSTORMS brick or EV3 MINDSTORMS brick may be used for construction per robot.
5. **Robot Dimensions and Weight:** Maximum robot dimensions are 1 ft x 1 ft (30.5 cm x 30.5 cm) and the maximum robot weight is 2 lbs (908 g) unless otherwise specified in the challenge rules. Robots will be inspected for size and weight restrictions prior to the competition at inspection stations. Judges reserve the right to check sizes and weights of robots throughout the day.

3.2 LEGO® MINDSTORMS Software

The official and latest EV3 LEGO® MINDSTORMS Home Edition Software can be downloaded for FREE from the official LEGO® website:

- [\[EV3 – Home Edition\]](#) – The NXT Intelligent Brick can also be programmed using the EV3 Home Edition Software. However, not all Software features are supported by the NXT Intelligent Brick.

The official EV3 and NXT LEGO® MINDSTORMS Site License version allows the user to install and run the software program on all computers located at the address of the purchasing institution. Schools or community groups who would like to purchase the Site License can purchase them through various distributors:

- [\[Find Your Local Distributer\]](#)
- [\[EV3 – Site License from Spectrum Nasco\]](#)
- [\[NXT – Site License from Spectrum Nasco\]](#)

3.3 Purchasing Kits and Pick-Up Dates

New LEGO® MINDSTORMS EV3 kits are available for purchase from IEEE ORC for a subsidized fee to registered teams lacking a kit.

In order to have the kits ready by an estimated date of **February 18th, 2015**, the deadline for registering a team needing to purchase a kit is **February 4th, 2015**. Please indicate that the registered team will need a kit via the official registration form.

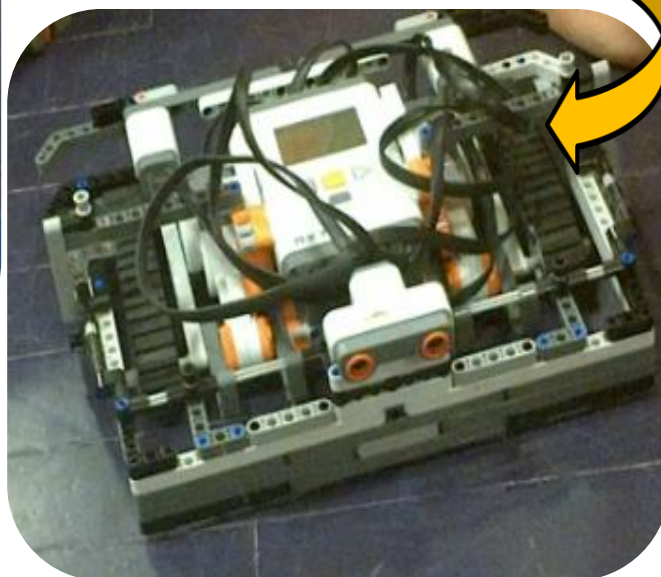
Note that in order to accommodate as many new teams as possible, there will be a limit of 2 teams per school or organization allowed for the subsidized fee.

There will be two (2) pickup dates for the kits that will be finalized once the final order has been made. Those who have ordered kits must have a cheque paid and addressed 'to the order of IEEE Ottawa Section', with the memo line being 'ORC Invoice #', ready when picking up the kit. The cheque must also either have the team supervisor's name or the institution's name on it.



DRAG RACE

SUMO





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4.0 GRADING SCHEME

One of the goals of the IEEE Ottawa Robotics Competition is to emphasize *all aspects* of engineering:

- ★ the **fun and creative** building part and
- ★ the **invaluable accomplishments** that come along with producing detailed technical work.

Therefore, the overall Grading Scheme **for all Challenges** will be equally split:

50% for Competition and 50% for the Technical Component.

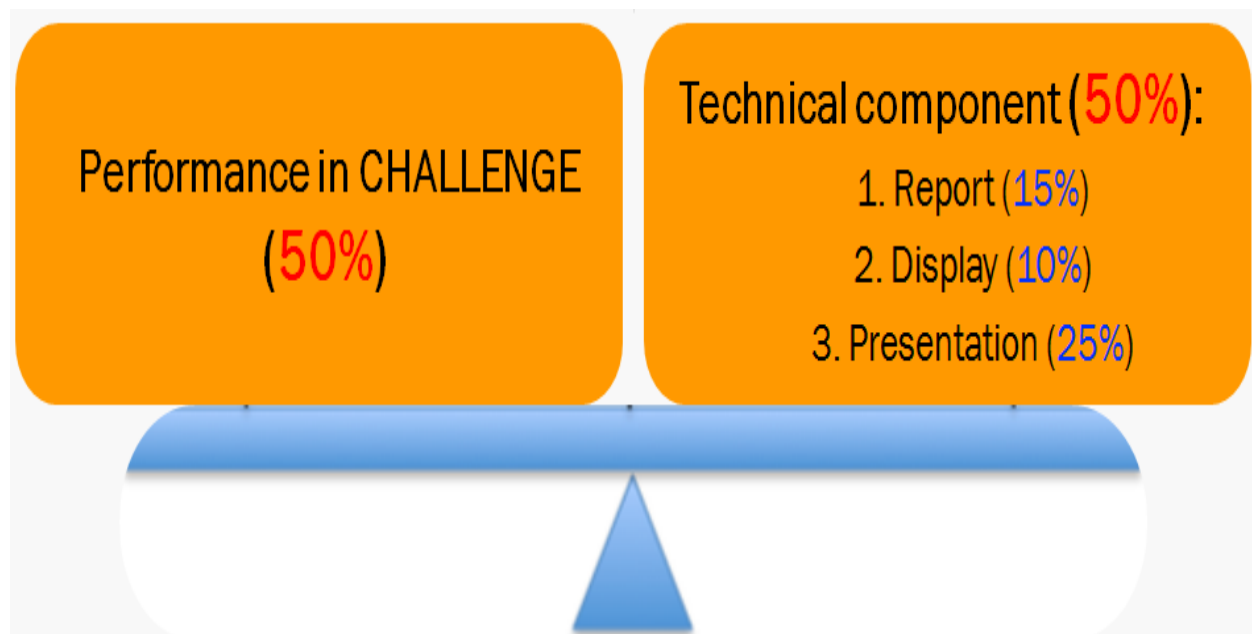


Figure 1: IEEE ORC 2015 Overall Grading Scheme.

Please note that the weights of the **competition** (performance-based) and the **technical component** (report, display, and presentation) ***will be the same for all teams registered in any challenge.*** For this reason, please make sure to put in effort for both components of the competition.



5.0 AWARDS

All participating teams will receive certificates recognizing their participation in the 13th Annual IEEE Ottawa Robotics Competition.

5.1 Awards Category

Awards will be presented to the **1st, 2nd, 3rd place teams for each Challenge**. The top 3 ranking teams will also receive a **trophy** that can be put on display.

Please note that **the ranking of each team per Challenge is a combination** of the challenge performance and the technical component marks. See [Section 4.0](#) for the Grading Scheme.

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!

5.2 Distribution of Prizes

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

EXAMPLE: for challenges 1 and 2, team A comes in first for both.

Table 2: Example of Distribution of 1st Place Prizes.

Challenge	Challenge 1: Sumo	Challenge 2: Da Vinci
1 st Place	Team A	Team A
2 nd Place	Team B	Team C

Of teams B or C, the team with the highest overall score between the two teams will receive the second LEGO® kit.

However, if team B has the highest score, and should this team (B) already have a 1st place position and a kit from another challenge, the second team (C in this example) would then receive the kit.

The head judge will review all scores and allocate prizes accordingly.

6.0 IEEE ORC 2015 EVENTS

6.1 Timeline

2015 Calendar	Event
Mon, Jan 12th	Registration Opens
Mon, Feb 2nd	Last day to order LEGO Mindstorms Kits from IEEE ORC
Wed, Feb 18th	Workshop #1 / (Estimated) Kit pickup day
Wed, Apr 15th	Last day to finalize team registration
Wed, Apr 29th	Workshop #2
Fri, May 1st	Invoices are sent out to the supervisor/teacher
Fri, May 15th	Due Date: Payment for registered teams
Sat, May 16th	Due Date: Reports must be sent to orcrpts@gmail.com
Sat, May 23rd	Competition Day!

6.2 Competition Day

Come join us again for the 13th Annual IEEE Ottawa Robotics Competition! This year, we will be featuring a full day of activities with exciting robot challenges. Friendly competition is encouraged and presentations will be ongoing throughout the day. Lunch is provided for participants and awards will be presented at the closing ceremony.

WHERE: Longfields-Davidson Heights Secondary School
149 Berrigan Drive, Ottawa, ON, K2J 5C6

WHEN: Saturday, May 23rd, 2015
The schedule will be posted closer to the day of the event.

WHO: Everyone is invited! The event is entirely free for spectators.

6.3 Workshops

Similar to previous years, we will be offering workshops again to help students with their preparation for the competition. Students will have the chance to try out their robots with our challenge arenas and be able to ask questions to a mentor! This is a great time for your team to come and practice so make sure to register early!

WHERE: SITE Hall 2060/2061, University of Ottawa
800 King Edward Avenue, Ottawa, ON, K1N 6N5

WHEN: Workshop #1 – Wednesday, Feb 18th, 2015
Workshop #2 – Wednesday, April 29th, 2015

WHAT: Bring a packed lunch, your robots, and your enthusiasm!