



Welcome to the 11th UOIT Engineering Robotics Competition


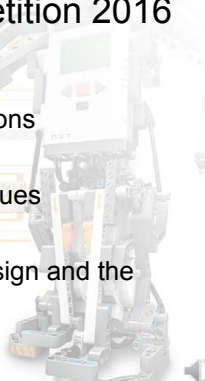
Faculty of Engineering and Applied Science
<http://roboticscomp.engineering.uoit.ca/>

1


UOIT Robot Competition 2016

- Program:
 - Welcome and Introductions
 - About UOIT and FEAS
 - Some Administrative Issues
 - About the Competition
 - Introduction to some design and the NXT/EV3






2

Sponsors





- Faculty of Engineering and Applied Science
- UOIT Women in Engineering

3

UOIT Robotics Competition Organizing Committee

- Dr. Mikael Eklund – Organizing Chair
 - Electrical Engineering Professor, Department of Engineering, Computer and Software Engineering
- Hoaxiang Lang
 - Mechatronic Engineering Professor, Department of Automotive, Manufacturing and Mechanical Engineering
- Cliff Chan – Logistics
 - Engineering Laboratory Specialist, Faculty of Engineering and Applied Science
- Joe Stokes – School Liaison Contacts
 - UOIT Admissions Officer, Registrars Office

4

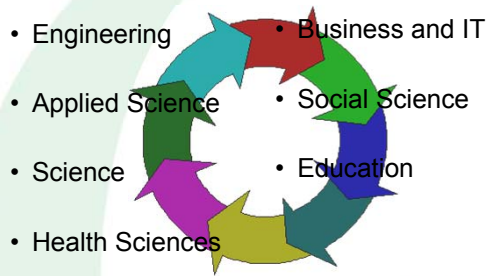
University of Ontario Institute of Technology

- Created by Ontario government June 27, 2002
- First new university in Ontario in almost 40 years
- Market-driven/career-oriented programs
- Strong focus on technology in education
- Laptop computer university
- Publicly funded
- Enrollment:
 - ~9,000 in 2016


Among its other scores, UOIT was ranked second overall for both the Active and Collaborative Learning, and Enriching Educational Experience categories, seventh for Student-Faculty Interaction and above the NSSE average in first-year students' evaluations of their entire educational experience and whether they would chose UOIT again if they could start over.




UOIT Program Areas




- Engineering
- Business and IT
- Applied Science
- Social Science
- Science
- Education
- Health Sciences

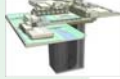


Why Engineering at UOIT?


State-of-the-art facilities



Automotive Centre of Excellence



Borehole thermal energy storage



Integrated Manufacturing Centre

Innovative undergraduate programs


- Automotive Engineering
- Electrical Engineering
- Manufacturing Engineering
- Mechanical Engineering
- Software Engineering
- Engineering and Management (for all programs)

Graduate programs in high-demand areas


- Mechanical Engineering
- Electrical and Computer Engineering
- Automotive Engineering

Award-winning faculty


Value-added research




Automotive Systems



Robotics and automation





Telecommunications



UOIT Open House

– November 19th from 10:00 – 3:00pm



 8

What we Need from You

- Complete payment and registration for each team
 - Next week, please
- Team Member Registrations
 - Online... soon
- Photo release forms
 - Please take hardcopies as needed
 - Available on the website





Workshops


- We are planning 2 workshops that will take place here at UOIT.
- Next week Oct 19 9:00 am -12:00 noon
 - Help and practice on track
- Saturday Nov 12 9:00 am -12:00 noon
 - Trials on track




 10

The Competition

- Saturday Nov 26th 11:30 – 4:30
 - UOIT/DC Main Gymnasium
 - Testing and setup will begin at 9:00 am
- Awards
 - Winner of the challenge
 - Finalists
 - Semifinalists
 - Engineering Award
- T-Shirts for 8 students and 1 for the teacher.
 - Make certain that you fill in the form
- SumoBots

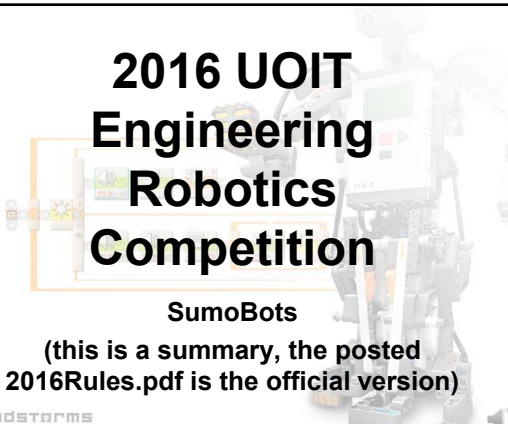



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2016 UOIT Engineering Robotics Competition

SumoBots

(this is a summary, the posted 2016Rules.pdf is the official version)





Goal

- Each team will design an autonomous Robot that will battle the opposition on a octagonal table in head-to-head competition
- with no restrictions on movement or prevention of contact between the Robots.
- Eight (8) Robots will compete at the same time.

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Goal, cont

- Each team is required to submit a short technical report documenting their design. This is due Friday November 19th by 5:00 pm and is to be submitted electronically.

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SumoBot Tournament Rules

- The referee's word is final on all competition matters including the rules and the results of races.
- Teachers are **NOT** allowed to build, program, or any other way do work on the SumoBot. Teachers are there to be a guide to the students of the team.
- Robots are to act autonomously, i.e., no human control or interference during a match, except as specifically allowed below.
- At the start of a match, each SumoBot must fit into a square 20 cm x 20 cm, with no height limitation. Robots will be measured before the tournament to ensure they comply with this rule. The referee has the discretion to re-measure a SumoBot before any match the SumoBot is participating in. Parts of the Robots may extend outside this area after a match has started.

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SumoBot Tournament Rules

- Races start on the command of the referee. Each SumoBot must have a 5 second delay after the operator pushes start before their SumoBot starts to move.
- The SumoBot will be placed in their assigned spot.
- A match is two minutes in length.

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SumoBot Tournament Rules

- Matches will run from the start until one of:
 - Only one sumoBot remains active,
 - 2 minutes have elapsed, or
 - the Referee determines that the no further progression will be possible for any SumoBot that has not yet been eliminated
- No SumoBot will be eliminated or removed from the match before the end of the match except by way of its own action or that of its competitors.

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SumoBot Tournament Rules

- SumoBot may not spray any material on the ring or on their opponents, or in any way deform the competition board.
- SumoBot are not allowed to use any flying components or projectiles.
- SumoBot may use various forms of detection to locate the opponents' SumoBot for the purpose of avoiding or attacking those opponents.
- They may also incorporate stealth technology to avoid detection by the opponents' SumoBot.
- Signals may be used to try to confuse the opponents' SumoBot's detectors

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SumoBot Tournament Rules

- The Bluetooth and WiFi functionality of the NXT/EV3 brick must not be used.
- The SumoBot may be programmed using languages or IDEs other than the Mindstorms NXT/EV3 software.
- ~~No additional parts other than those in one standard Lego Mindstorms NXT and EV3 kits are allowed.~~ The exception to this rule is that a team may use additional standard NXT/EV3 sensors (e.g., light sensor, bump sensor, etc.) beyond the number included in the standard kit. Furthermore, minor digressions from that rule that do not affect the performance in a significant may be allowed at the Referee's discretion.

SumoBot Tournament Structure

- Technical Report
 - Points count towards preliminary round
 - Points used for tiebreakers
 - Points used for lane choice in finals
- Preliminary round
 - Each team has same number of matches
 - Top 16 (or more) teams advance to playoffs
- Playoff round
 - Quarter-final round
 - Semi-final round
 - Final round

SumoBot Tournament Structure

- Technical Report will be receive up to 12 points.
- These points will be announced at the end of the preliminary round

SumoBot Tournament Structure

- For each race, points will be awarded as follows for the Robot that cross the Finish Line in order or who have progressed furthest towards the Finish Line at the end of the race:

- First (last one surviving) 12 points	Second 9 points
- Third 6 points	Fourth 5 points
- Fifth 4 point	Sixth 3 points
- Seventh 2 points	Eighth (first one eliminated) 1 points
- .
- Upto two points for disabling an oppnent

SumoBotTournament Structure

- Tiebreakers to advance from the preliminary round:
 - 1st: Technical Report score
 - 2nd: Head-to-head score in any rounds where they met
 - 3rd: A tie-breaking race
- Tie-breakers to advance in the final rounds
 - 1st: Technical Report score
 - 2nd: A tie-breaking race

Beginner's Workshop Agenda

- Design Process
- Beginners' Workshop
- Project Timeline
- Resources
- Questions

Design Process

Start with the end in mind.
Identify what you want the robot to do.
The design process determines how it will do it."

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Design Cycle

- Set Goals
- Brainstorm Solution
- Implement
- Evaluate
- Repeat

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Brainstorm

- As many ideas as possible
 - Sketches
 - Pictures
- Individual, Paired, Group
- Criteria = important features
- Concept selection

Think "No way", Say "Good idea"

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Implementation Tips

- Bite-size chunks
- Test often
 - Take time to save time!

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Design Process Key Points

"Brainstorm ideas before starting to build."

"Test often to save time."

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Tutorial – EV3 system setup

- <http://www.lego.com/en-us/mindstorms/downloads/download-software>
 - Google: lego ev3 software
- Install
- Check Firmware version (not necessary)

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Tutorial Part 1 – EV3 system

- <http://www.lego.com/en-us/mindstorms/learn-to-program>
 - Google: lego ev3 learn to program
- Programming environment
- Hello World
- Motor control
- Sensor
- Making it move

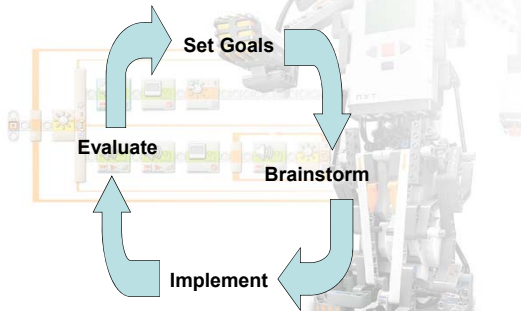
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Tutorial part 2 – EV3 Hardware

- See EV3 manual

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Tutorial Part 3 - Design



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Next Workshop

- November 12, 9 am to noon
 - Head-to-head practice Opportunity
 - Questions & Answers

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Project Timeline

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Sample Timeline

- Week 1:** Set goals / Brainstorm solutions / Familiarize
- Week 2:** Bite-sized chunks (Plan implementation)
- Week 3:** Build / Test
- Week 4:** Evaluate / Changes
- Week 5:** Finishing Touches

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Timeline – Take home message

“Look ahead.”

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Resources

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Resources

- 5 learning resources
- Posted on competition website
 - <http://roboticscomp.engineering.uoit.ca/>
 - Google **UOIT robotics**

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Fantastic Resources

1. Booklet
2. *Robot Educator* in LEGO MINDSTORMS Edu NXT
3. More Lego Tutorials
 - <http://www.legoengineering.com> → Learning Lab → Learning Sequences
4. Software Tutorials
 - http://www.ortop.org/NXT_Tutorial/

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Summary

- Design Process
 - “Brainstorm ideas before starting to build.”
 - “Test often to save time”
- Workshops
 - October 29
 - November 12
- Project Timeline
 - “Look ahead.”
- Resources

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Questions?

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