

LEGO® *MINDSTORMS®* *COMPETITIONS*

FIRST LEGO LEAGUE and WORLD ROBOT OLYMPIAD



**FIRST
LEGO®
LEAGUE**



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	 FIRST LEGO LEAGUE	 WRO™ World Robot Olympiad
Cost*	US\$225 national registration, US\$75 challenge materials, US\$150-\$200 local	US\$150 national registration, US\$80 challenge mat, US\$150 local
Website	www.firstlegoleague.org	http://www.wroboto.org
Participants	29,000 teams worldwide	22,000+ teams worldwide
Age*	9-14 (North America) 9-16 (Elsewhere)	Under 12 (Elementary) 13-15 (Junior High) 16-19 (Senior High) 10-19 (Football)
Requirements	Students must complete all three components: Robot, Project, Core Values	Students select between Regular category, Open category, or Football
No. of Members*	2-10	2-3
Robots	LEGO MINDSTORMS and LEGO elements only Autonomous	NXT, EV3, LEGO elements and HiTechnic Color, IRSeeker, Compass sensors Autonomous
Season Dates	September-January	January-September Can participate via video

- Note: There is regional variation for costs and requirements (age/number of team members) in FIRST LEGO League. All cost numbers are approximate. Check with your local organizer for more accurate and up-to-date numbers

	 FIRST LEGO LEAGUE	Robot Game	 WRO™ World Robot Olympiad	Regular Category
Robot Design	<ul style="list-style-type: none"> Robot typically consists of a base/chassis with multiple attachments which can be added/removed in the base area during the game Robot is pre-built Robot size restrictions exist Robot and code can be modified by team at any time. 		<ul style="list-style-type: none"> Robot is a single drivable unit usually with motorized mechanisms to complete missions Robot is pre-designed, but must be built in a 150 min period during the contest. Robot size restrictions exist Modifications to code & robot are permitted only at specific times 	
Mission Objects	<ul style="list-style-type: none"> 15-20 diverse missions requiring a variety of robot actions ranging in difficulty Missions change each year All mission models and objects are usually fixed position and orientation (there have been some randomized missions) In some years, there is a joint collaborate or competitive mission that spans two robot game tables 		<ul style="list-style-type: none"> Missions are different for each age group Missions generally revolve around recognition and movement of multiple similarly-sized cube-like objects The direction/configuration/orientation/combination of mission models changes in every round. 	



Photo credits: Droids Robotics and www.wroboto.org





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Robot Game



Regular Category

Sensor Usage

- Any LEGO-brand sensor listed in the rules
- Easier missions can be solved without sensors. However, use of sensors enhances the robot's performance and team's success.

- Any LEGO-brand sensor listed in the rules and the HiTechnic Color Sensor
- Sensors play a critical role in the robot game at all levels

Programming

- Pre-programmed. Modifications allowed.
- Beginners can still participate and accomplish tasks with basic programming skills. However, advanced programming skills can be beneficial to a team's success.

- Pre-programmed, but will have to be modified for the "surprise element"
- Complex programs may be needed for successful completion of tasks

Robot Run

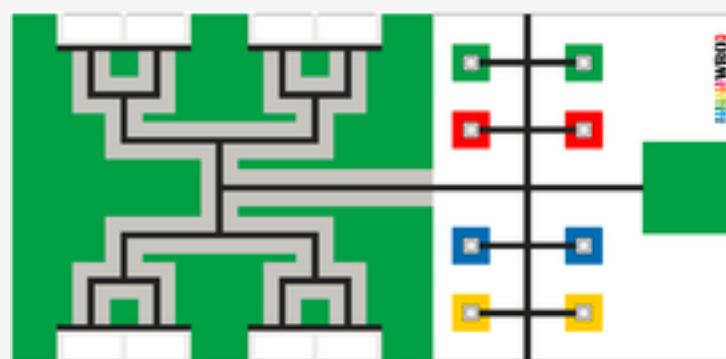
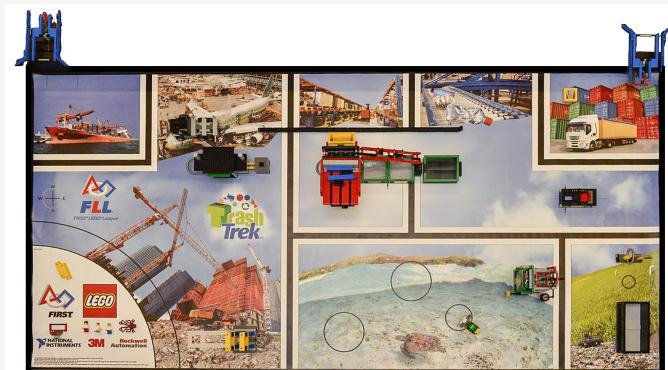
- Autonomous 2.5 min run.
- Teams may grab and rerun missions (with penalty)
- In the base area, teams can touch their robot and change attachments without penalty.

- Autonomous 2 min run.
- The robot run stops as soon as a team member touches the robot

Element of Surprise

- No surprise rules
- Changes may not be required in the pre-constructed and pre-programmed robots

- Surprise rule is announced on the day of the challenge.
- This may call for a change in construction and/or programming



	 FIRST LEGO LEAGUE Project	 WRO™ Open Category
Overview	<ul style="list-style-type: none"> Project is a required component of the Challenge Project topic is theme-based 	<ul style="list-style-type: none"> Open category is optional and teams elect to participate in the program Project topic is theme-based
Judging Criteria	<ul style="list-style-type: none"> Emphasis on real-world problem, innovative solution, and sharing solution 	<ul style="list-style-type: none"> The project includes a booth, a presentation, a video and a prototype Emphasis on the innovative prototype
Robotics Prototype	<ul style="list-style-type: none"> Technical solutions are not required Solutions vary from educational campaigns to mock-ups Prototypes of any type are not required 	<ul style="list-style-type: none"> Pre-assembled and pre-programmed prototype made with LEGO MINDSTORMS is required May be mixed with non-LEGO elements Sensors can be incorporated
Presentation	<ul style="list-style-type: none"> Creativity of presentation is integral (often includes props and costumes) 	<ul style="list-style-type: none"> Presentations are more technical (sometimes in national costumes)



Photo Credit: Razorback Open and www.wroboto.org



Football

2017 rules:
<http://wro2017.org>

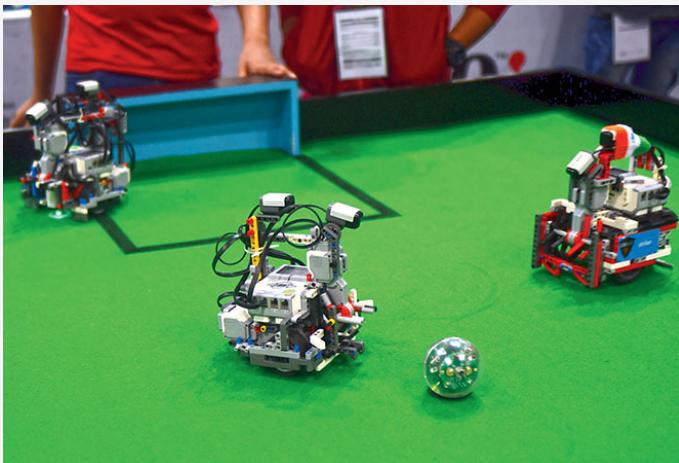


Photo Credit: www.highlandmirror.com

- Autonomous LEGO MINDSTORMS robot
- All components must be LEGO-branded except for one HiTechnic IRSeeker V2 sensor, one HiTechnic Color Sensor and one HiTechnic Compass sensor per robot. Only one ultrasonic sensor is permitted.
- Ties and tape are permitted to secure wires. Non-LEGO elements can be used to construct a handle for the robot
- Pre-designed robots must be assembled from scratch at the competition
- WRO football involves 2v2 robots playing soccer with an IR ball
- Games are two 5 min halves with 5 mins between halves for repairs and reprogramming
- There are size (22cm height, 22 cm diameter circle) and weight restrictions (1kg) for your robot
- Outside specified assembly, programming, maintenance and testing times it is not allowed to modify or exchange the robot.