LEGO® MINDSTORMS® COMPETITIONS

FIRST LEGO LEAGUE and WORLD ROBOT OLYMPIAD

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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, 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 and dates. There are some international-level opportunities available for a smaller number of qualifying teams.

	FIRST LEGO LEAGUE Robot Game	WRO World Robot Olympiad Regular Category
Robot Design	• 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.	• 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	• 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 collaborative or competitive mission that spans two robot game tables	• 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.

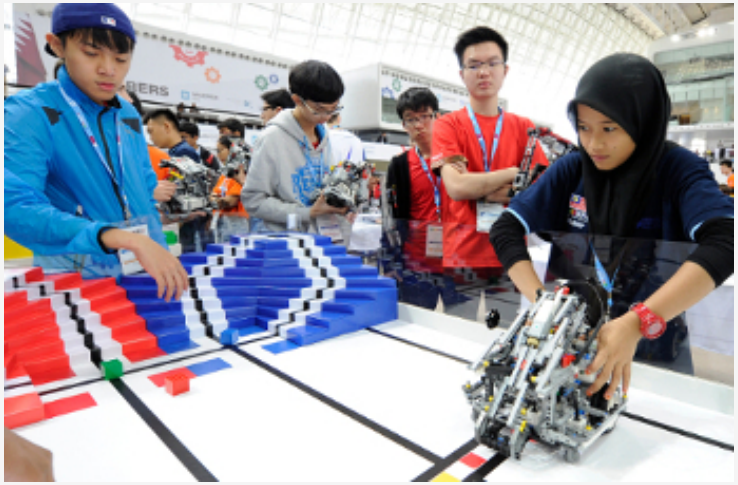
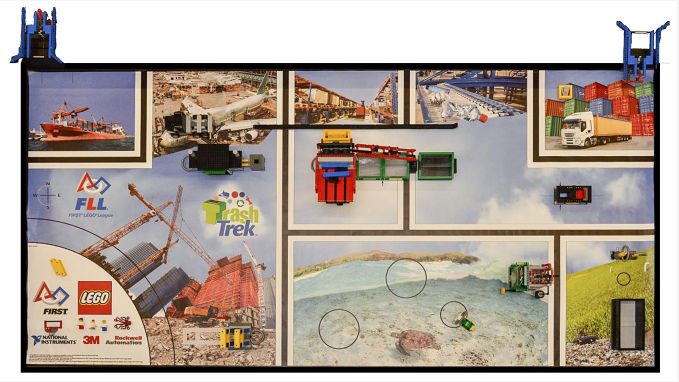
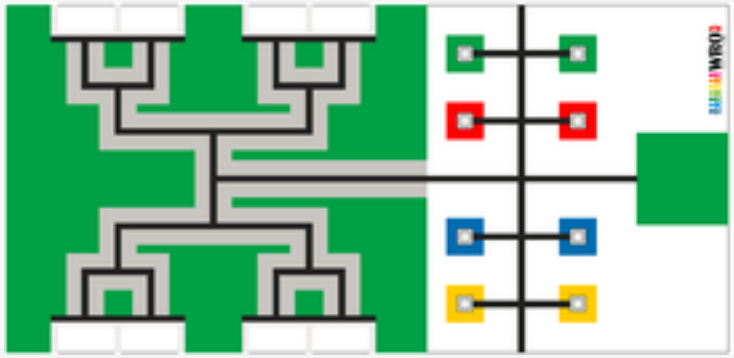


Photo credits: Droids Robotics and www.wroboto.org

	FIRST LEGO League Robot Game	WRO World Robot Olympiad 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 World Robot Olympiad Open Category
Overview	• Project is a required component of the Challenge • Project topic is theme-based	• Open category is optional and teams elect to participate in the program • Project topic is theme-based
Judging Criteria	• Emphasis on real-world problem, innovative solution, and sharing solution	• The project includes a booth, a presentation, a video and a prototype • Emphasis on the innovative prototype
Robotics Prototype	• Technical solutions are not required • Solutions vary from educational campaigns to mock-ups • Prototypes of any type are not required	• Pre-assembled and pre-programmed prototype made with LEGO MINDSTORMS is required • May be mixed with non-LEGO elements • Sensors can be incorporated
Presentation	• Creativity of presentation is integral (often includes props and costumes)	• Presentations are more technical (sometimes in national costumes)

Photo Credit: Razorback Open and www.wroboto.org

WRO™
World Robot Olympiad

Football

2017 rules:
http://wro2017.org

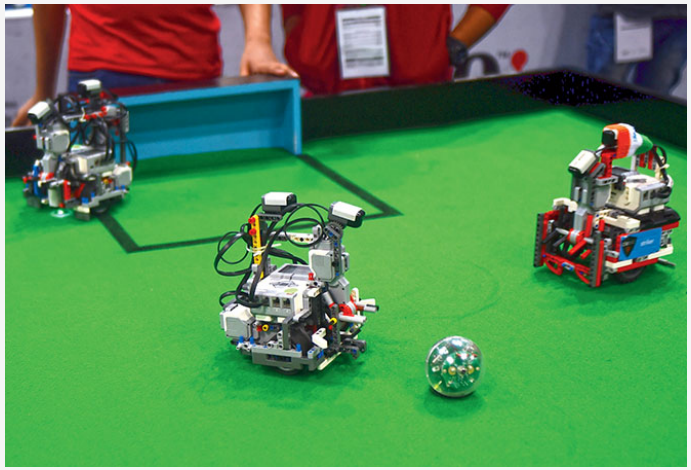


Photo Credit: www.highlandmirror.com

- 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.