

West Side Robotics
LEGO ROBOT BOWLING RULES

Goal:

- The goal of the Lego Robot Bowling Competition is for a Lego Mindstorms Robot (RCX, NXT or EV3) to throw, shoot, bat, roll, toss, or kick a tennis ball to knock down six pins (500 ml water bottles). If the pins are knocked down, the highest point value will be awarded. If the ball just moves pins which are not knocked down, partial points will be awarded. We realize that there are many variations to the rules for Lego Robot Bowling; these will be the rules for this tournament and we ask that entrants read and be familiar with this particular rule set at the time of the tournament, in order to avoid surprises.

Team:

- A “team” is comprised of one or more students who have built a robot for this event. Each team should also have one adult present with the team.
- The robot must be an autonomous robot the team has constructed themselves prior to the tournament to the specifications below. This event is not a workshop where you may build robots after arrival. There will be limited time for adjustments and changes to the robots and their programming during the event. (There is a FREE workshop for help building and programming the robots in the morning prior to the event. See the website for more information on this workshop.)
- Only one team member may enter the bowling lane area to start the robot; other team members may watch from outside the bowling lane area.
- Each team/robot will be assigned a number on check-in and should have a unique name or identity to be easily recognized by spectators and officials when on the field and when scoring.
- (While this is an ideal “off-season” activity for First Lego League teams, entrants DO NOT have to be made up of FLL team members, and this is also an ideal activity for those with an interest in trying Lego robotics for the first time!)

Robot Construction:

- The bowling robot may only be comprised of official Lego parts, which cannot be held together by any means other than the standard Lego construction methods (no tape, glue, stickers, etc.). No homemade sensors, multiplexors, or modifications to Lego elements are allowed. No modification to Lego parts by gluing, cutting or melting is allowed.
- Up to FOUR motors with rotation sensors are allowed, and any other sensors manufactured by Lego may be used. No “made for Lego” third party sensors are permitted for this tournament.
- It is encouraged that robots be decorated or themed with Lego parts.
- There will be limited time and space for last minute design improvements and adjustments, however, the robots should be completed at the time of registration, and once check-in takes place, the robot or its programming may no longer be modified. Robot battery should also be sufficiently charged once the robot is checked in.

Robot Size:

- The robot may be of any size or dimension for this event, up to the 50 cm width of the bowling lane.

Programming:

- The robot must be pre-programmed to move into the “bowling zone” and release the ball in the direction of the pins. If another shot is to be taken, the robot must then return to the “no bowling zone” to be reloaded with another ball.
- The robot must be autonomous. No Bluetooth or other wireless control of the robot on the field is permitted.

Robot Restrictions:

- The robot is restricted from destructive action.

- Judges will have the discretion to disqualify any robot whose strategy is deemed to be too dangerous.

Player Restrictions:

- When teams are called to the bowling lane for their bout, teams are to present to the field promptly, and each team is to greet the other with a bow or handshake.
- Players are to behave in a respectful manner, and are not permitted to use profanity or insulting words or actions, or to have their robot use such words or actions. Unsportsmanlike behavior will not be tolerated. Such behavior will result in a violation or disqualification at the judge's discretion.
- Only one team member may enter the bowling lane area to start and retrieve the robot, and restart as needed.

Bowling Lane:

- For this competition, the robot will be loaded with a tennis ball and placed with at least one wheel on an area marked as "Home Base", which will be a 20 cm square. The robot will travel across a one meter "No Bowling Zone" into the one meter "Bowling Zone". These zones will be demarcated by a black 1" wide strip of electrical tape. Beyond that will be the one meter "Bowling Lane", and the robot may not cross the black strip into the Bowling Lane.
- The robot may take a shot, down the lane at the pins with the tennis ball it has carried, from anywhere within the Bowling Zone.
- The Bowling Lane lane will be 1 meter long by 0.5 meter wide and will be bounded by 2x4 rails.
- At the end of the bowling lane will be six partially filled water bottles in a triangular formation in three rows: one central bottle in front, two bottles in the next row, and three in the next row. The bottles will be placed on a mat with their placement clearly marked, each bottle 5 cm apart from its neighboring bottles.
- Each water bottle will be a typical 500 ml water bottle, approximately 20-21 cm in height, with a base diameter of approximately 6-6.5 cm. The exact shape and brand of the bottle is unknown. Bottles will be partially filled with water to weigh approximately 100 g.
- The area immediately around this lane, termed the "Bowling Lane Area", will be marked with tape or cones. Only one player from each team may enter the bowling lane area with the robot at the start of the match.

Start of Match:

- One player from each team will enter the bowling lane area with the robot.
- Upon the signal of the judge, the robot will be placed with at least one wheel resting on the marked "Home Base" area.
- When ready, without the need for a judge's start, the player will load a tennis ball on the robot and start the robot program.

Game:

- The robot must cross the No Bowling Zone into the Bowling Zone.
- It may release the ball by any means desired from anywhere within the Bowling Zone. The robot and ball may not be touched or retrieved from the Bowling Zone.
- Once a ball is released, the robot can return into the No Bowling Zone, where it can be retrieved by the player, and may be restarted from Home Base for another run for a total of three balls.
- The robot can be touched and modified by a human player only when in the No Bowling Zone. If the robot does not return from the Bowling Zone then another ball cannot be reloaded and another shot taken, and so is disqualified from further play.
- A ball can be manually loaded by a human player only when the robot is at Home Base.
- When a ball is released from the robot after leaving Home Base, it cannot be re-used, even if it was not released into the direction of the Bowling Lane. A ball that is dropped or falls cannot be retrieved for re-use.
- The robot cannot physically touch the Bowling Lane surface. Parts of the robot may hover above the Bowling Lane as long as it does not physically touch the surface. The black line demarcating

the limit of the Bowling Zone from the Bowling Lane is considered to be part of the Bowling Zone, and thus may be touched by the robot.

- A ball may roll, bounce, fly over, or in any other way travel down the bowling lane to the pins as long as it is from the action of the robot only.
- A ball that travels beyond the boundaries of the lane (over the 2X4 rails) will be considered a "gutter ball" and will gain no points.
- Each pin knocked over will be awarded 2 points. If all 6 pins are knocked down, then 20 points total will be awarded for that shot. Any pins that have been moved from their marked place on the mat but remaining standing and were not knocked down will be awarded 1 point each. The maximum score possible would be 60 points.
- The pins will be reset after each of the three shots.

Judging:

- The Judge will determine the final scoring, and has the discretion to disqualify any robot or team not meeting the requirements for competition.
- The judge's decision is final, and cannot be disputed once competitors leave the bowling lane earlier.

Championship:

- The overall points awarded will determine the overall championship winner. In the case of a tie, a tie-breaking round will be done.

Awards:

- Awards will be presented for champion and second-place.

Flexibility of Rules:

- As long as the concept and fundamentals of these rules are observed, flexibility will be allowed to encompass changes in the number of players or other rules changes as deemed necessary by the judges and officials.