

The 2024 Annual Engineering Robotics Competition

Competition Rules

Saturday November 30, 2024| 9:00 am to 4:00 pm

Gear up for an exciting competition where your team's SumoBot will battle it out in an epic arena!

Each team will design an autonomous SumoBot with one mission: to outlast and eliminate the competition in intense head-to-head matches. Eight SumoBots will enter the ring simultaneously. The challenge? Be the last robot standing as the arena shrinks around you!

Every team should bring a trifold poster on the day of the event. Your poster should showcase your robot's design and highlight your team's soft skills, giving a behind-the-scenes look at your journey to becoming champions (More details in the Poster Rubric)

Are you ready to dominate the arena and claim victory?

Let the battles begin! 🚀 🏆

Tournament Structure

The tournament will be conducted as follows:

Preliminary Rounds

- Each team will compete in an “N” number of matches (N is determined on the day of the competition as the detailed schedule is released), against 7 other teams.
- The scores of this round will be calculated based on the average of Cumulative Point Score for all “N” Matches.

Playoffs Rounds

- The top sixteen scoring teams from the preliminary rounds advance to the playoffs.
- Qualifying Teams will be seeded into two batches
- The teams of each batch will compete against each other
- The top eight scoring team from this will move on to the Quarter-finals.

Quarter-Finals

- In this round, 8 teams will be competing against each other.
- The top 4 scoring teams will move on to the Semi-finals.

Semi-Finals

- The arena will be bisected using white tape 4” wide (see image below)
- In this round, 4 teams will be competing against each other.
- The top 2 scoring teams will move on to the Finals.

Finals

- The arena will be further bisected using white tape 4" wide (see image below)
- In this round, 2 teams will be competing against each other.

A visual description of the tournament structure (following the preliminary rounds) is depicted in Figure 1.

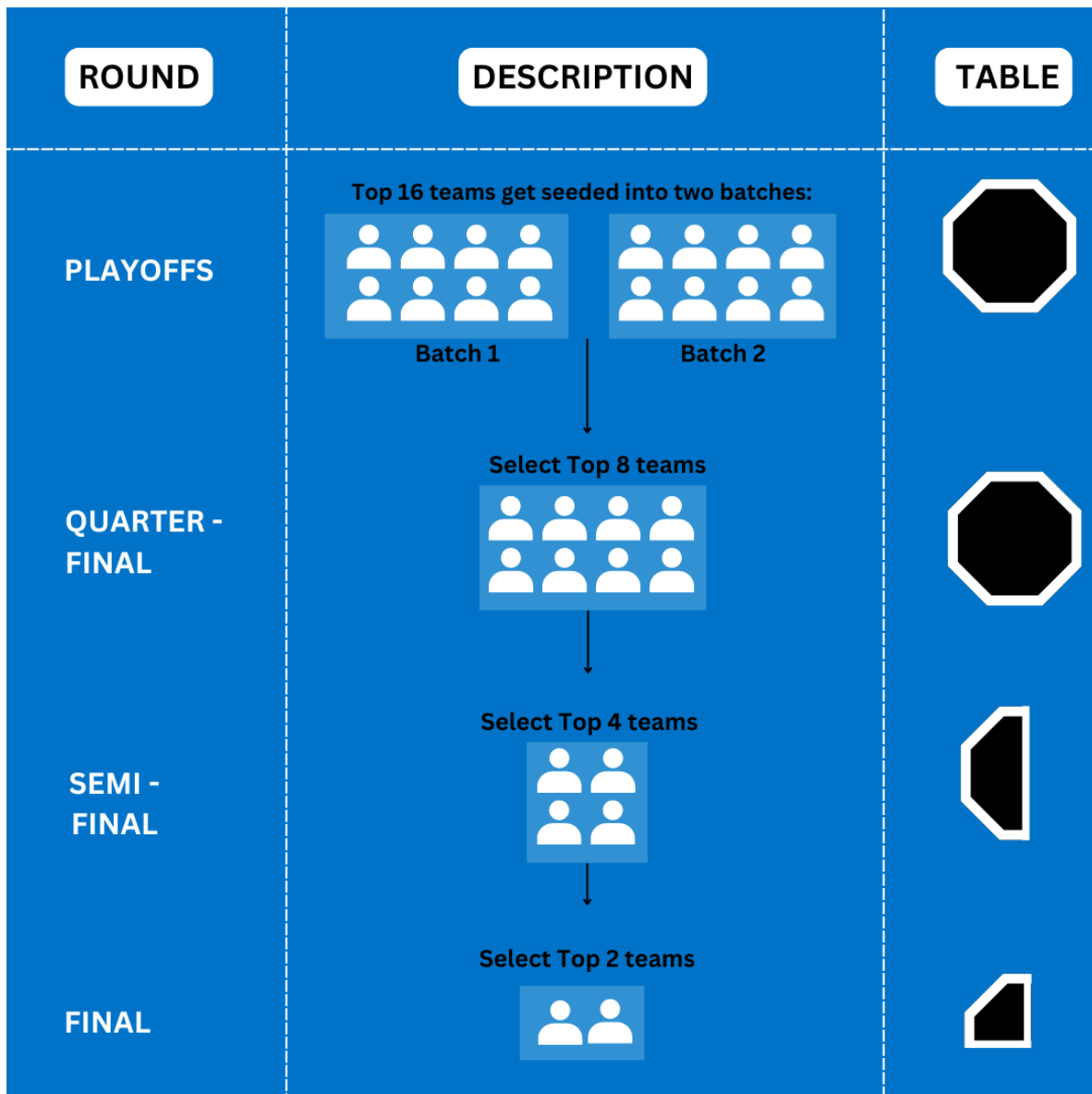


Figure 1: Tournament Structure

Tournament Score

The score is calculated based on the following formula

$$\text{Team Score} = \text{Average of Cumulative Point Score for all Matches in Preliminary Rounds} + \text{Match Score from all other rounds}$$

During the matches, judges will be floating around to check and grade the teams for their Poster design (Poster Rubric attached below). These posters will be placed on each team's table and there is no need for the team to be there during grading. The Poster design Rubric is attached below.

Note: In the event of a tie in the preliminary and playoffs matches, the advantage will be given based on the higher score from the most recent match both SumoBots participated in. In the event of a tie in the final rounds, a re-match will occur and the average score of the tied teams will be considered as the tie-breaking score.

Tournament Rules

1. **The referee's word is final** on all competition matters including but not limited to the rules and the results of matches.
2. SumoBots are to act autonomously, i.e., with no human control or interference during a match.
3. At the start of a match, each SumoBot must fit into a 20 cm x 20 cm square, with no height limitation. SumoBots 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. Parts of the SumoBots may extend outside this area after a match has started, however they must start in the configuration that they were measured in. Failure to meet the criteria will result in either a penalty or disqualification at the referee's discretion.
4. Matches start on the command of the referee and last a maximum of 2 minutes.
5. Each SumoBot must have a 5 second delay after the operator pushes start before their SumoBot starts to move.
6. The SumoBots will be placed in the eight corners of the octagon competition area with their front ends facing towards the center of the table.
7. A SumoBot is eliminated if:
 - a. It falls off the table.
 - b. It is immobilized, e.g., flipped over, flipped onto its side, caught on an edge of the table and cannot move, etc.

Note: If the SumoBot is eliminated, it loses the rank score points but still keeps the score of eliminating others before they were eliminated.

8. Points for each match are awarded as follows:

- 1st Place: 12 points
- 2nd Place: 9 points
- 3rd Place: 6 points
- 4th Place: 5 points
- 5th Place: 4 points
- 6th Place: 3 points
- 7th Place: 2 points
- 8th Place: 1 point

Note: the N in the N^{th} Place denotes the order in which your robot is ranked relative to the match. For example, if you're in the 8th place, this means that your robot was the first to be knocked out, and hence got only 1 point.

9. If a SumoBot is unable to start a match for any reason it will receive zero points for that match.
10. In the event that there is more than one SumoBot surviving at the end of a match, each team will receive points for the place corresponding to the number of tied teams. For example, if there are two SumoBots remaining at the end of the match, then they will both be awarded 2nd place and 9 points each. In a 3-way tie, the three teams will be awarded 3rd place and 6 points each, and so on.
11. Teams will be awarded 3 points for each SumoBot they eliminate during a match. The awarding of these points is at the discretion of the referee. The purpose of these bonus points is to encourage teams to actively seek-out and engage other SumoBots.

Arena

Figure 2 shows an eight-sided Sumo ring. The Sumo ring is an octagon that is approximately 96" from edge-to-edge, with each edge 40-41" in length. The table is painted black with a 1 ½ - 2" white stripes denoting the edge of the table. In the middle of the competition area is a square hole that is 18" from edge-to-edge. The border of the hole is marked by a 4" white stripe.

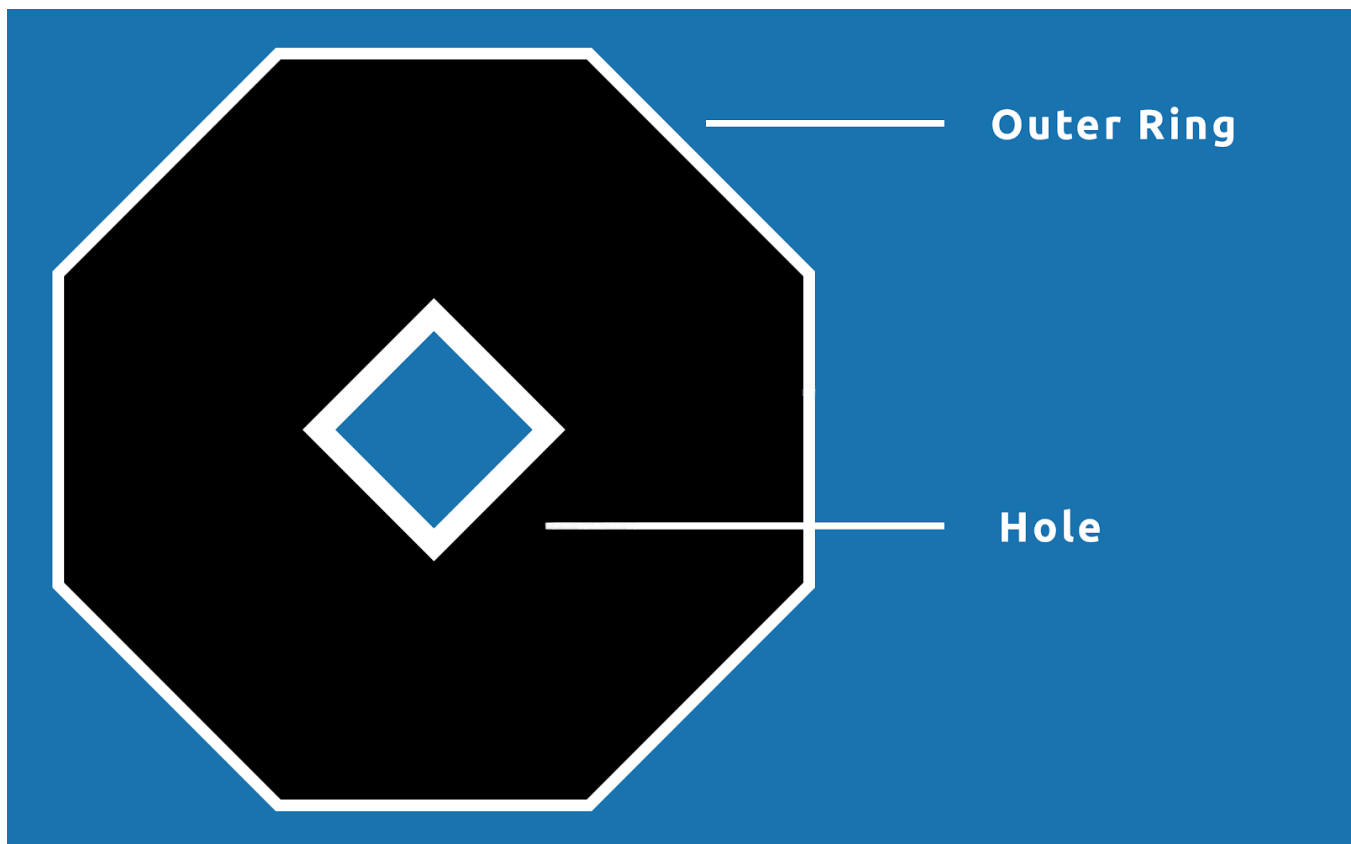


Figure 2: Competition Table

Engineering Design Rules

The following rules govern the design, build, and coding of the SumoBot. Any infractions will result in point deductions, match disqualification, or competition disqualification at the discretion of the referees or tournament committee.

1. Teachers are NOT allowed to build, program, or in any other way do work on the SumoBot. Teachers are there to be a guide to the students of the team.
2. SumoBots are to act autonomously, i.e., with no human control or interference during a match. Neither the Bluetooth nor the WIFI functionality of the brick may be used.
3. The SumoBots may be programmed using languages or IDEs other than the Mindstorms NXT, EV3, or SPIKE software.
4. The number of sensors is limited to four, the number of motors is limited to three, and tracks (e.g. instead of wheels) are not permitted.
5. SumoBots may use various forms of detection to locate the opponents' SumoBots. They may also incorporate stealth technology to avoid detection by the opponents' SumoBots. Signals may be used to try to confuse the opponents' detectors.
6. Only Lego materials are allowed in the design of the robot.
7. The rubric of the poster can be found below.

Poster Rubric

The Rubric for the poster can be found here:

[Poster Guidelines and Rubric | Robotics Competition | F2024](#)

Please note that bringing in a poster on the day of the competition is mandatory in order to participate in the competition.

Awards

Awards will be given for the following merits:

1st, 2nd, 3rd:

Three awards are given based on the overall score calculated.

Best Poster Design:

Recognizes the team that creates the most effective and visually engaging poster to showcase their robot's design, features, and development process. This award celebrates a poster that clearly communicates the team's journey, including the challenges they faced, the solutions they implemented, and the lessons learned. The winning poster should be well-organized, with distinct sections for team introduction, hardware and software design, and achievements, all presented in a cohesive and visually appealing manner. The poster should be informative yet concise, with visuals that enhance the understanding of the robot's unique aspects. This award is determined by judges.

Best Engineering Design Award

Recognizes a team that demonstrates exceptional engineering principles through a robot that is not only mechanically robust and reliable but also efficient in its design and performance. The winning design will showcase creative problem-solving, effective use of materials, and advanced programming, all contributing to a robot that stands out in its ability to tackle competition challenges. This award is determined by judges.

Best Novel Design Award

Given to a team that demonstrates exceptional engineering skills and creativity in designing and building their robot. This award recognizes teams that have gone above and beyond in developing a robot that is not only effective in

completing missions but also exhibits innovative and thoughtful design elements. This award is determined by judges.

Referee's award for Sportsmanship Award

Given to the team that embodies the true spirit of fair play and respect throughout the event. This award is given to the team that consistently demonstrates positive behavior, whether in victory or defeat, and shows genuine support for other teams. The recipients of this award are those who maintain a cooperative and gracious attitude, helping others, following the rules, and setting a positive example for everyone involved in the competition. This award is determined by referees.

Women in Engineering Award

This award is given to a team that exemplifies the promotion of diversity and inclusion in engineering, with women playing key roles in the design, development, and presentation of their robot. The award highlights the importance of empowering women in STEM fields and acknowledges the positive impact they have on their team's success and on the broader engineering community. This award is determined by the referees and judges.

Best Coach/Mentor Award

This award recognizes an individual who has gone above and beyond in guiding, inspiring, and supporting their team, fostering a learning environment where students can thrive both technically and personally. The winning coach or mentor demonstrates exceptional dedication, patience, and encouragement, helping their team overcome challenges and achieve their goals. The organizing committee will decide on this award.