

Robotics Contest

Contact:

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Ag Robotics Mission Challenge (Junior, Senior) This is a challenge based contest. Some known challenges will be released prior to the contest, and the remaining on contest day. Teams build and program their robot for known challenges prior to the contest. On contest day, the remaining unknown challenges will be revealed and teams will be given time to build and program the robot to account for the newly revealed challenges.

Mini-Sumo Robot: (Junior, Senior) Teams will design and build a self-propelled or sensing robot designed to force another robot outside a circle four (4) feet in diameter. This contest will be divided by age divisions (junior and senior) with a double elimination bracket configuration.

*Please note: Teams must bring their own robot kit (preferably the Lego Mindstorms NXT, EV3 or SPIKE) and any additional Lego pieces necessary for their contests. **It is also required that teams bring their own laptops/software. Please see game rules for specific equipment requirements***

Requirements: The contests are open to any 4-H member currently enrolled in the Robotics project. Teams may enter one or all of the contests. Teams may consist of 1-4 members.

Age Groups: Junior (8-13)
Senior (14 & up)

Judging

All of the contests are ranked based on the criteria in the rules and score sheets. Members are judged on their application of technological principles and concepts and their ability to solve difficult problems. During the judging for each contest, only the contest facilitator and judges/officials are permitted in the designated contest area. Leaders, other members, parents and additional competition attendees are prohibited from entering the designated area of the contest while judging is occurring. For all contests and special awards, the decisions of the judge(s) are final and binding.

Awards:

Awards will be given to each of the 2 age groups for each of the contests (Mini-Sumo and Agrobotics Mission Challenge).

2023 Contest Schedule		
12:30 pm	Check-In	
1:00 pm	Orientation Meeting	Rules, Mystery Challenges, Questions
1:30-1:40 pm	Sr. Team Coaches Meetings	Strategize with teams prior to build time
1:40-2:40 pm	Build Time	Tests on Mission Mat allowed, teamwork evaluation
2:40 pm	Mission Competition and Interview Judging	Two runs/Team, 5 minutes each, Interviews after matches have been completed, 5 mins/team Jr, 10 mins/team Sr
4:30 pm	SUMO Contest	

Mini-SUMO Robot Contest

The Mini-SUMO Robot Contest requires the member to build an autonomous self-propelled or sensing robot, designed to force another SUMO Robot outside a four (4) foot diameter circle. The competition circle will be a flat black, 4 foot in diameter, surrounded by a two-inch (2") wide (painted or taped) flat, white ring. When one Sumo causes the wheels of the other to fall off the competition surface, that sumo is declared the winner.

Rules

1. The SUMO can use sensing devices to govern the motion of the SUMO and can use sensors to detect the other SUMO and/or the edge of the white circle.
2. Sumos cannot exceed 3 Kilograms in weight.
3. Sumos cannot exceed a **maximum size** of 20cm x 20cm x 20cm at the start of the contest. They may have attachments however that upon the start of the contest extend beyond the 20x20x20 footprint.
4. The SUMO drive wheels **must** be non-destructive to the playing surface.
5. The SUMO may not have a remote off/on switch.
6. The contest will be run in a double elimination tournament format for each age group.
7. At the beginning of each competition, with the power switch in the "off" position, the SUMO handler(s) will position their SUMO with a wheel or track on the starting line as instructed by the judges. At the command of the judge/facilitator, the handler(s) will turn the power switch to the "on" position.
8. When one SUMO causes **the wheels** of the other SUMO to fall off the competition board surface, that SUMO bot is declared winner of that engagement.
9. If one SUMO is disabled by another, it is automatically eliminated from that round
10. If the SUMO match continues for 3 minutes without a winner, there will be an automatic re-match. If after 3 consecutive re-matches, no winner is determined, both SUMOs will be given 5 minutes to re-program/build for a final match up. If no winner is determined from that re-match, both SUMOs will go into the loser's bracket or be eliminated from the contest.
11. If both SUMOs leave the circle at the same time, a "non-contest" is declared and the two SUMOs are repositioned and the contest begins anew.
12. Decisions of the judges are final and binding.

Agrobotics Mission Challenge

Contest Description: This is a challenge based contest. Some known challenges will be released prior to the contest, and the remaining on contest day. Teams build and program their robot for known challenges prior to the contest. On contest day, the remaining unknown challenges will be revealed and teams will be given time to build and program the robot to account for the newly revealed challenges.

Known challenges are included in the game description with mat schematics and supply lists. Game challenges will be released no later than April 1.

1. CONTEST FORMAT/RULES OF PLAY:

- a. Teams must pre-build and program a robot prior to the competition.
- b. Teams will report to the designated location for check in and submit their robot and additional pieces/equipment for inspection.
- c. Each team will be directed to a team pit (one 6' or 8' table and chairs). Each pit will have access to electricity to power laptops and robot batteries.
- d. An orientation will be provided for all participants where show management will review the challenge, rules and scoring.
- e. The design of the game and designated number of challenges will be released in advance of the contest. There will be 3 to 4 additional unknown challenges revealed contest day, during orientation.
- f. Each team will have 1 hour for additional designing, building, programing, and testing of their robot.
- g. Teams will practice and compete on the same game table.
- h. If time permits, teams are allowed to make alterations to their robot design and/or program between matches. No more than 10 minutes will be allowed for adjustments between matches.
- i. Teams must report immediately to the playing field when called.
- j. The robot must perform challenges autonomously.
- k. Only registered contestants and contest officials will be allowed in the pit Robot Challenge areas.
- l. Teams that may experience any equipment malfunction(s) may not replace the equipment with supplies outside the contest area (from leaders, volunteers, county extension agents or contest officials). Instead, team members must work together and be creative in completing preparation without the malfunctioning equipment or visit with other teams to borrow the needed part.
- m. Depending on the challenges, contest officials may provide non-Lego items that can be incorporated into the design of the robot.
- n. Coaches will be permitted to meet with Jr teams during building time to strategize and troubleshoot. Coaches are not permitted to program or touch robots at any time. Coaches are not permitted to dictate to teams how to solve the missions. Sr. coaches will be allowed 10 minutes to meet with teams prior to build time. Coaches for Sr. teams are not permitted to assist after build time has started.
- o. No cell phones or other types of communication devices are allowed in the pit or contest areas. Exceptions include the approved items listed in the Participant Rules. During the Robot Challenge matches, contestants are not allowed to communicate with anyone outside of the contest (coaches, parents, siblings, etc).
- p. Each match has a 5 minute time limit.
- q. Teams will have two matches in which to earn points. The sum score of the two matches plus the interview score will determine team placing.

- r. Tie-breaker will be based on the total of the teamwork score.
- s. Teams must clean up their pit areas.
- 2. **MINIMUM CONSTRUCTION SKILLS AND PROFICIENCY:** Competitors must be capable of designing and building a functioning Lego Mindstorm robot that includes the use of:
 - a. Motors
 - b. Light/color sensor
 - c. Touch sensor
 - d. Ultrasonic sensor
 - e. Levers, arms, claws, etc.
 - f. Incorporating non-Lego parts into robot design and/or function
- 3. **MINIMUM PROGRAMMING SKILLS AND PROFICIENCY:** Competitors must be capable of programming a Lego Mindstorm robot in order for the robot to:
 - a. Move
 - b. Turn
 - c. Lift
 - d. Maneuver attachments effectively
 - e. Use sensors appropriately and effectively
- 4. **EQUIPMENT:** Each team must supply their own equipment for the challenge. Each team may only bring the supplies listed in the table below. Any extra equipment or item that does not meet specifications will be returned to the team coach. No infrared beacons (remote) or sensors allowed.

Lego® Mindstorm® NXT, EV3, Spike Prime, or Inventor building pieces (excludes brick, motors, and sensors)	Unlimited Quantity
Backup rechargeable batteries or sets of AA batteries	Unlimited Quantity
Lego® Mindstorm® NXT, EV3, Spike Prime, or Inventor brick/hub	1
Lego® Mindstorm® NXT, EV3, Spike Prime, or Inventor motors	3
Lego® Mindstorm® NXT, EV3, Spike Prime, or Inventor ultrasonic sensor	1
Lego® Mindstorm® NXT, EV3, Spike Prime, or Inventor touch sensor	1
Lego® Mindstorm® NXT, EV3, Spike Prime, or Inventor light or color sensor	1
Lego® Mindstorm® EV3 gyro sensor	1
Laptop computer or tablet with programming software (Lego® or non-Lego® is acceptable)	1 or 2
Power strip (3-prong, grounded)*	1
25 ft. (max) extension cord (3 prong, grounded)*	1
USB cable connection	1
Build Plans (paper or digital)	Unlimited Quantity
Plastic container or cardboard box for transporting robot to and from game area	1
Ruler or tape measure	1
Pencils and notepad with blank paper for design and note-taking purposes	Unlimited Quantity

** NO two-prong extension or power strip plugs allowed.

- 5. **BLUETOOTH AND INTERNET CONNECTIVITY:** Bluetooth connections can be made and utilized during Build Time. It is not allowed during the competition phase while the robot is on the playing field. No internet connectivity will be provided. Teams are advised to make sure their computers' operating system, software and robot firmware are up-to- date prior to the contest

- 6. SCORING:** Point values for each separate challenge may vary, depending on the level of challenge difficulty. Penalties will also depend upon challenge design, but examples may include: knocking over pieces, restricted human interaction with robot or game pieces, excessive retrievals, etc. Points will be awarded or deducted for each round of match play. Additionally, a teamwork score will be assessed by a panel of judges and added to the match scores to form the preliminary team score. The preliminary team score determines qualifiers for finals. After each match, the team captain will initial the score sheet, indicating agreement to the points awarded. Once signed, the match score is final and cannot be challenged. The contest tabulator will review the score sheet and will correct any mathematical inaccuracies.
- 7. RESULTS:** The contest results, as announced, will be final.