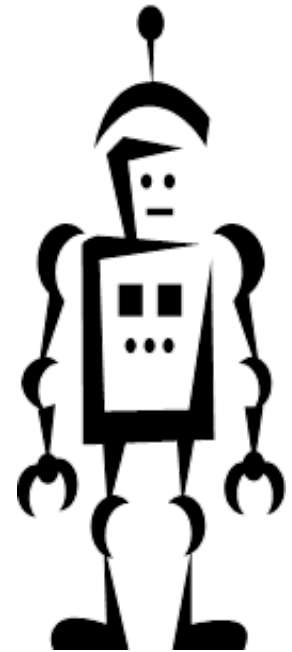
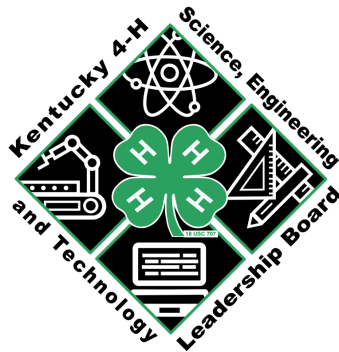
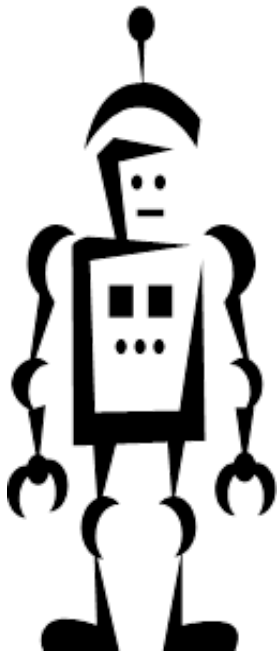


2019 Kentucky 4-H Robotics Challenge Guidelines

Friday, 23 August 2019
Cloverville, Kentucky State Fair



University of Kentucky
College of Agriculture,
Food and Environment
4-H Science, Engineering and
Technology



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2019 4-H Robotics Challenge

General Rules

Team Size

Teams may be between three (3) and five (5) members.

Age

Kentucky 4-H Age

Registration

All members of the team must be present to register for the event.

Teams should bring one of the following: a robot driving base found in LEGO MINDSTORM Education NXT Base Set, or; a robot driving base found in the LEGO MINDSTORM Education EV3 Core Set instructions. Robots can be modified by using any standard LEGO parts by the challenge start time. The robot MUST fit within a 7"X 7" square. Before the challenge begins the Judge will check size of the robot.

Supervision

One adult coach/mentor per county is required to be at the event. The adult coach/mentor is not to be considered a team member. **The team coach/mentor may be consulted with but WILL NOT BE ALLOWED TO BUILD OR PROGRAM ANY EQUIPMENT AT ANY TIME DURING THE KENTUCKY 4-H ROBOTICS CHALLENGE. Any coach/mentor observed to be assisting their team in the building or programming of the team's equipment may subject their team to disqualification from the event.**

Pit

Each team will have a "Pit Area" to work in. Each team will need to bring any equipment that is needed. Including, but not limited to: power cords, laptops, and/or LEGO parts. Only team members are allowed in the "Pit Area." Tables and chairs will be provided.

Contest Etiquette

Competitors and audience members are expected to remain polite, sportsmanlike, and considerate at all times. Good cheers, encouragement, and applause for all competitors are very much appreciated. Remember this is a 4-H event and 4-H appropriate behavior IS expected from EVERYONE.

Building

Teams will start either with their robot driving base found in LEGO MINDSTORM Education NXT Base Set or; a robot driving base found in the LEGO MINDSTORM Education EV3 Core Set instructions. Teams can modify their robot with any standard LEGO part once the tournament begins.

Programming

Teams will program their robots for challenges when the competition starts. It is encouraged the teams practice programming before competition.

Remotes

Controlling a robot using Bluetooth or any other means of remote control is strictly prohibited and will result in disqualification.

SumoBot Challenge

Philosophy

Teams will design and build a robot to simulate Sumo wrestling contests. The SumoBot Challenge features two robots trying to push each other out of a ring. The competitions are non-destructive, friendly, and encourage learning.

Overview

Two self-controlled (or previously programmed) robots are placed in a ring. The robots try to avoid falling out or avoid being pushed out by the opponent robot. The first robot that touches the outside line of the ring loses the round. The first robot to win two rounds, wins the match. Different robots compete one-on-one against each other throughout the contest. The robot that wins the most matches wins the contest.

Robot Dimensions

SumoBots may be 7" or less in width, 7" or less in depth and 10" or less in height. As soon as movement is allowed in a match, the robot may twist, fall, or expand without size limits.

Harmless

At all times, robot behavior must be non-offensive, non-destructive, and non-harmful to humans, robots, and the facilities. The Judges may require safety changes or other modifications to meet the harmlessness requirement.

Contest Bracket /Double Elimination

The contest brackets will be set up by the Competition Coordinators and published before the matches begin. The bracket will allow losing SumoBots a second chance to become the winner. Upon losing two matches, the SumoBot is out of the contest.

The Match

Player responsibilities for the match:

- Place the SumoBot in the ring as directed by the Judge. SumoBots must start the match back to back.
- Press the start button on the SumoBot when directed by the Judge. After 3 seconds the SumoBot may begin moving.
- Move back behind lines on SumoBot Ring.
- Catch any SumoBot that is out of the ring and turn it off.
- Place the SumoBot back in designated Pit Area between matches.

Simple Functions

Robot must be able to perform the following:

- Move forward and backward.
- Turn in all directions.
- Detect other robots.
- Detect the difference in color between the white SumoBot ring and black "out of bounds" ring.

Basic Rules

Participants agree to the following basic rules:

- One match will consist of three rounds, within a total of 3 minutes per round. The team who wins two rounds wins the match and advances in the bracket.
- The match will be stopped, and a rematch will ensue when it is apparent that neither SumoBot is making any progress for duration of about 4 seconds as determined by the Judge.
- A player has 1 minute to correct/repair a problem between rounds. **IF REPAIRS CANNOT BE MADE WITHIN THE 1 MINUTE PERIOD, THE PLAYER/TEAM WILL FORFEIT THE ROUND.**

Search and Rescue Maze Challenge

Philosophy

Teams will design and program a robot that can be applied to a real-world situation. One robot will be in the maze at a time and will have three minutes to complete the challenge.

Scenario

After a natural disaster, your engineering team has been asked to design a robot to enter an unstable building and recover an important piece of refrigeration equipment needed for further relief efforts. This equipment will be used to help carry perishable supplies to other victims of the natural disaster. It is extremely important your team is able to bring this equipment out of the building intact as quickly as possible, because the longer it is without power, the less useful it is.

Course Dimensions and Preparation

The maze will be constructed in a 4' x 8' area with approximately 10" between the walls of the maze. Corners may be either 90 degrees or 45 degrees (or a combination of both). Robots must be able to navigate through the maze and recover an item approximately 1.5" in diameter and 3" to 4" long. There will be a practice maze identical to the Challenge maze for teams to utilize.

- The maze will have a separate entrance and exit with the equipment to recover located in a "room" inside the maze.
- The robot must enter the maze, recover the equipment and exit the maze with the equipment to complete the challenge.
- If the robot does not complete the challenge, the team will be scored on the distance progress the robot has made.
- Points will be given if the robot has recovered the equipment but has not exited the maze.
- Teams recovering the equipment will receive a recovery points only if the equipment remains with the robot as they exit the maze or at the end of three minutes.
- In the event multiple teams complete the challenge, teams will be ranked by the quickest time to complete the challenge.

Robot Design and Dimensions

Robots would benefit from being able to perform the following:

- Move forward and backward.
- Turn in all directions.
- Detect and follow multiple colored lines (black, red, green, blue).
- Detect walls.
- Implements required to complete these tasks may be added to the robot.

Basic Rules, Procedures, and Guidelines

Participants agree to the following basic rules:

- Teams must design and build a robot that is capable of completing multiple tasks.
- Each team will have a total of three minutes to complete the challenge course.
- The robot must start at the entrance and end exit of the maze.

Scoring Guidelines

- The highest score a team can achieve is 30 points.
- In the result of a tie, the team who completed the course in the shortest amount of time wins.
- Programming the robot to complete the following tasks will result in the following point values:
 - Following line to the recovery area: 5 points

- Successful recovery of the equipment: 10 points
- Following line to the exit: 5 points
- Successfully exiting the maze: 10 points
- For each 12" (or major fraction thereof: >6") traveled in the maze: .5 point (if not completing the maze within the 3:00 time period). For example; If a robot travels 48" in the maze, the team would receive 2 points (48" traveled X .5 points for each 12" = 2 points). If a robot traveled 42" in the maze, the team would receive 1.5 points)
- Dropping the recovered equipment: -10 points
- Touching or picking up the robot while in the maze: -1 point for each instance (maximum of -10 points)
- No penalty points will be given for hitting or touching maze walls unless the robot is touched or picked up.

Clipmobile Challenge

Philosophy

Teams will plan and design a vehicle to maximize its ability to coast, based on considering the effects of friction. Teams also will consider constraints of capacity, efficiency, complexity, and costs in the design.

Overview

Teams will be challenged to design and build a vehicle that will roll freely down a ramp and travel the longest possible distance while carrying a payload (box of paper clips) from the top of the ramp until the vehicle stops rolling. The vehicle must contain at least five different types of parts but needs to be designed to use the least total number of parts.

Procedure and Guidelines:

- Teams will receive a budget of \$45.00 (play money) to spend on materials for the vehicle.
- Teams will purchase a sample bag of materials at the reduced cost of \$10.00 for planning and design. This will leave a total working budget of \$35.00.
- For every dollar (\$1) under budget, one extra point will be added. For every dollar (\$1) over budget, two points will be subtracted.
- Teams cannot return any materials purchased but get dollar points for supplies in inventory at half the value of new ones. Materials broken or unusable will not have any credit value.
- Teams will be allowed 15 minutes design time. During this time, teams may use the sample bag materials to plan, but no tools may be used, or building be done during the design time.
- Based on their design plan, each team will create a Materials Order Form (MOF) of all the supplies they wish to order (purchase) for building their Clipmobile
- Once started building, teams will have 30 minutes to construct, test and present their Clipmobile to the Judges for initial evaluation and competitive run.
- After the initial competitive run, teams will have two additional 10-minute periods to refine their Clipmobile design and re-run their design. Performance points will be based on the best of the three competitive runs.
- Tools (small hand saw, drill, scissors, safety glasses, etc.) will be provided for supervised use. Coach and/or mentor will be encouraged to help with tool use.

The following will be judging criteria for the finished Clipmobile:

Capacity – carry a box of paper clips:	(Yes) 10 points; (No) 0 points
Performance – roll down ramp and coast:	+1 point per inch – maximum 96 points
Complexity – various types of parts used:	+2 points for each type of part
Efficiency – least overall number of parts:	-1 point for each part used
Budget / cost – cost of production:	+1 point for each dollar under \$35.00 -2 points for each dollar over \$35.00
Capital – dollars left from \$45.00	+1 point for each dollar still in cash
Inventory value – value of supplies left	+1 point for each dollar of value

The winning team will be the team with the highest Overall Team Score based on the judging criteria listed above.

Challenge Scoring and Awards

Teams will be awarded points for each of the events according to the following scale:

Placing	Points
1 st	20
2 nd	18
3 rd	16
4 th	14
5 th	12
6 th	10
7 th	8
8 th	6
9 th	4
10 th	2

In the event of a tie for 1st – 3rd overall team award, tiebreaker events will be as follows:

- 1st Tiebreaker – Clipmobile Ranking
- 2nd Tiebreaker – Search and Rescue Maze Ranking
- 3rd Tiebreaker – SumoBot Ranking
- 4th Tiebreaker – Coin Flip

Awards will be given for the overall top three teams:

- 1st Overall - \$200.00
- 2nd Overall - \$150.00
- 3rd Overall - \$100.00

Individual challenge awards:

All members on the 1st place team in each challenge will receive a \$10.00 gift card from a variety of shopping places (iTunes, Amazon, Google Play, etc)