



Rural Robotics Challenge

“Sumo Wrestling Robots”

April 30, 2016

Competition Rules & Events

v2.1

Competition Divisions.

Division I (small plastic robots or equivalent): 3rd – 5th grade

Division II (small plastic robots or equivalent): 6th – 8th grade

Division III (small plastic robots or equivalent): 9th – 12th grade

Division IV (medium-to-large metal-based robots or equivalent): 6th – 12th

Division V (non-standard or custom robots not fitting into Division I-IV): 6th – 12th

A student team can compete in Division II – III and Division IV-V if they register in both before April 16, 2016.

The Teams. Teams shall consist of two students. The grade of the oldest student on a team will determine the Competition Division. Robots can be shared across Divisions but not within a Division. Any student can use any valid robot for their match. (Example: A student can use a NXT for one match and an EV3 or Dash for another match). Robots can be modified and rebuilt between matches as long as the robot stays within the category size limits. Please have modified robots re-inspected. All robots must have the inspection sticker before competition.

The Robot (Divisions I, II & III). Each team in Division I - III shall have one NXT/EV3/VEXIQ or equivalent robot built only from standard parts available with the product. In addition, adhesive, tape, cardboard, wood, string, glue, or tie wraps are allowed. The starting robot size shall not exceed 14" x 14" x 14". The robot can expand after the competition meet starts. No more than four motors can be used. All sensors are allowed. The robot shall be controlled via any remote control device. No part of the robot shall be considered sharp and/or dangerous by the judge/referee. Robots are highly encouraged to have a covered body with decorations and sponsor ads from the SUMO Banner Ad sale.

The Robot (Division IV). Each team in Division IV shall have one NXT/EV3/VEXIQ or equivalent TETRIX/VEX EDR robot built only from standard parts available with the product. In addition, adhesive, tape, cardboard, wood, string, glue, or tie wraps are allowed. The starting robot size shall not exceed 18" x 18" x 18". One side of the robot can start with an extended 6" or less blade beyond the 18". The robot can expand after the competition match starts. There is no limit on the # of motors, servos, and sensors used. The robot shall be controlled via any remote control device. No part of the robot shall be considered sharp and/or dangerous by the judge/referee. Robots are highly encouraged to have a covered body with decorations and sponsor ads from the SUMO Banner Ad sale.

Robot Communication. All driver-controlled communication shall be from a remote device. All robots shall have a unique name so as to not cause any communication confusion.

Playfield. Division I – III game playfield shall be a 4 ft x 4 ft square mat for autonomous and 6 ft x 6 ft square mat for driver-controlled. Division IV and V game playfield shall be a 10 ft x 10 ft square mat. Both square playfields shall have a 1-1/2 to 2" white border. Each corner of the playfield shall have an object the robots can knock off the playfield. Each team will score when their colored object is knocked over or out of the playfield by either team. Opposite corners will have a red and blue object. The first red/blue object to be knocked off the playfield is 10 points to the team of that color.

and the second red/blue object is 20 points to the team of that color. If a white circle is used instead of a square then the circle diameter will be 2 ft more than the square length.

Game Strategy. In the **autonomous** competition the robot will run on its own with no driver control. In the **driver-control** competition the robot will be controlled by a cell phone, joystick enable from a laptop, or a remote device. Unless stated, the rules will be the same for both modes of competition. Each match shall be a running 2 minutes unless stopped by the referee due to loss of Bluetooth or remote control connection. At the beginning of the match and after any score the robots will be started in the center square facing opposite directions.

The goal is to disable your opponent by turning them over or by pushing them outside the field. One wheel off the mat and touching the floor is considered off. 20 points is scored when you disable your opponent on the mat, 30 points when you push your opponent off the mat, 10 points for your first corner object and 20 points for your 2nd corner object of the same color. The owner of the colored corner object gets the points. Any part assembly (one piece or several attached) that falls off your robot is -5 points. The referee will remove the part from the mat. The match will not stop when parts fall off. Robots turned over will be given a maximum of 10 seconds to right themselves.

Robots that are locked in a stalemate for more than 10 seconds, or at the referee discretion, shall be separated by the referee and restarted in the center square. When both robots are turned over or exit the playfield simultaneously the referee will decide which, if any, was first and points given accordingly. If no decision can be made the referee will restart the robots with no score given. Matches will not be stopped for dead batteries. Charge your batteries between matches.

Competition Events. There will be six (6) events and one optional event for each Division and competition category where each team member can earn ribbon awards.

Sprint Speed. The time it takes your robot to go 20 feet and have all wheels cross a line with one driver and return 20 feet and have all wheels cross the starting line with the other driver. Based on time, maximum points will be 100.

Figure-8 Obstacle Course. The time it takes your robot to go half of a figure-8 course with one driver and then the other half of a figure-8 course with the other driver. The straight distance of the figure-8 is 10 ft. The robot will start with the front wheels of the robot on a starting line and the first driver must pass all wheels across the half-way line before turning over control to the 2nd driver. The 2nd driver must bring the robot back with all wheels past the Starting Line. Based on time, maximum points will be 100.

Game – Tournament (Autonomous). Each team will participate in a single-elimination autonomous mode tournament against another team in their Division. Teams will be randomly seeded to see who competes against each other. Points will be assigned by standing. 1st-100, 2nd-95, 3rd-90, 4th-85, etc. All teams in the tournament will earn points. Only Division I, II, or III will compete in Autonomous.

Game – Tournament (Driver-Controlled). Each team will participate in a double-elimination driver-controlled mode tournament against another team in their Division. Teams will be randomly seeded to see who competes against each other. Points will be assigned by standing. 1st-100, 2nd-95, 3rd-90, 4th-85, etc. All teams in the tournament will earn points. All Divisions will compete in driver-control mode. Each tournament match must alternate drivers for the first minute of play. After one minute any driver can control the robot.

Math Problems. Each team will be given four math problems at least two weeks before competition day. These will be available for downloading on the MississippiRobotics.com website. The solutions to the problems are to be written up in a concise and through manner showing all work and turned in during Check-In. Judges will present a 5th math problem to each team at the competition judging. The team will be given 2 minutes to analyze the problem and then tell the judge all they know about the problem and how they would solve it. Points will be assigned based on the overall written presentation of all the problems and the verbal presentation of the judge's problem. Maximum points will be 100.

Science Demonstrations. College science students will demonstrate four science experiments. Competition students will be asked to watch each demonstration and answer questions about the experiment. 25 points can be awarded for watching each demonstration and answering questions about the demonstration. Maximum points will be 100 for all four science demonstrations.

Troubleshooting. The student teams are to determine the best and most likely answer to “how to fix” or “how to solve” a STEM-related problem. Each problem will have five answers that will range from worst to best possible answers. The students will pick one or more answer they feel are correct. Correct answers will receive positive points and incorrect answers will receive negative points. Each answer will have a positive or negative point value based on worst to best possible answer. The point values to all five questions will be totaled.

Award Determinations. Ribbon awards for 1st, 2nd, 3rd, and 4th places will be given for the Speed Race, Obstacle Course (Figure-8), SUMO Autonomous, SUMO Driver-Controlled, and Troubleshooting events. All these events combined is called the Robotics / Engineering / Technology category.

Metal awards will be given for 1st, 2nd, 3rd places in the Math and Science events, and 1st, 2nd, 3rd places in the Overall in the Robotics / Engineering / Technology category.

An Overall STEM metal will be given for the total points in all categories (the autonomous event will not be included)

All awards are determined and awarded based within each Division.

Guidelines and Suggestions.

1. This is a competition based on build and strategy. Team members should discuss the various possible methods for disabling their opponent and pushing them off the mat. Sometimes a defensive strategy works very well.
2. A robot with a front-end scrapper or with a rounded body should do well. Top heavy robots are easy to turn over and disable. A motor controlled or fixed extension arm to right your robot should work well. Be creative.
3. Tie down all of your wires using tie wraps or tape.
4. Tape parts that seem to fall off often.
5. Protect your wheels from being lifted.
6. There are several Bluetooth remote control apps available, some free and some paid. Select the best app for you. Different apps can be used for each event. Teams can change remote control apps at any time. Teams can switch cell phones or tablets or laptops for controlling at any time.
7. Robots can be modified in between matches and events as long as they stay within the required size. Any competing team and any referee/judge can challenge the size of a robot.
8. Teams are encouraged to have common t-shirts, banners, poster boards, novelty handouts for other teams, crazy hats, etc.