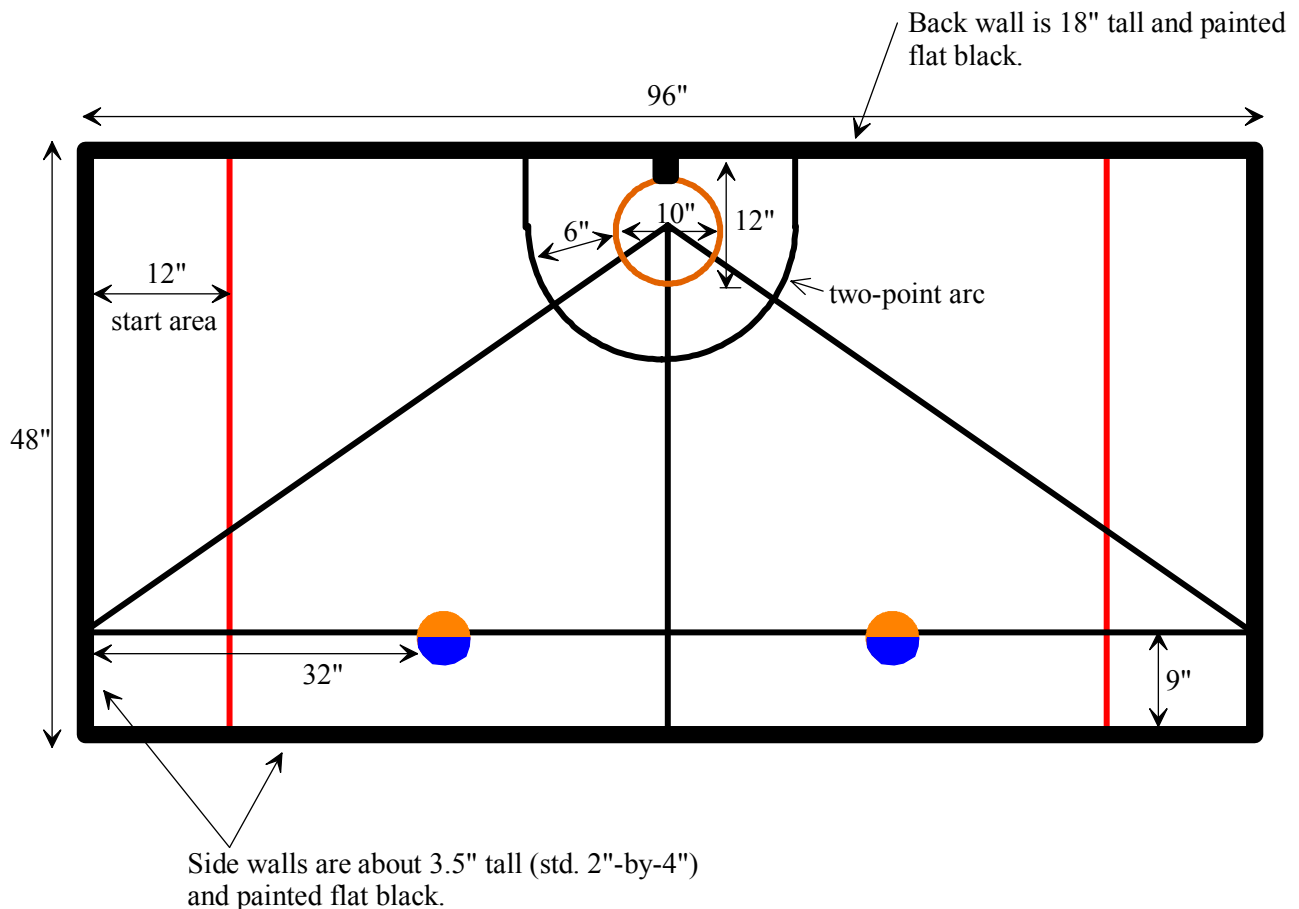


MICS 2008 Robot Basketball Contest

The MICS 2008 robot contest will consist of a double-elimination one-on-one robot basketball tournament. A robot scores 2 points if it shoots a basket while outside the two-point arc. A basket shot from on or within the two-point arc (including a dunk) scores one point. The robot with the most points at the end of a 2 minute match is declared the winner.

The court will be made from a 4'x8' sheet of particle board that is painted white (cut into two 48" x 48" sections for portability). The back wall is 18" tall, and the remaining walls are standard 2"-by-4" lumber so they are about 3.5" tall. All walls are painted flat black. Red lines 3/4"-wide and 12" from each side mark the "start areas" for each robot. A "standard" (~10" diameter Nerfoop) Nerf basketball hoop is positioned 9" high along the middle of the back wall. Three 3/4"-wide black lines radiate from the center of the hoop as shown.



Rules:

1. The objective of the contest is to design an autonomous robot that can score points by picking up foam balls (4" diameter Nerf basketballs) and shooting or dunking the balls into a single, netless, basketball hoop (10" diameter Nerfoop; 9" off the ground) in a head-to-head basketball competition against another robot. A robot scores 2 points if it shoots a basket while completely outside the two-point arc. A basket shot from on or within the two-point arc (including a dunk) scores one point. The robot with the most points earned during the 2-minute match will be declared the winner.

- a. In the event of a tie, the robot scoring the most 2-point shots will be declared the winner. In the event that each robot scored the same number of points and the same number of 2-point shots, the robot that scored the first point will be declared the winner.

- b. Matches ending with a 0-to-0 score after regulation play will be followed by a 1 minute overtime period. For the overtime period, robots are returned to their start areas and balls repositioned in their initial positions. If neither robot scores any points during the overtime period, a one-minute solo-round overtime period will determine the winner. Each robot will have a one-minute period during which they should attempt to score more points than the opponent does during its solo round. As in other rounds, the robot scoring the most points wins. If, however, both robots score the same number of points, the robot scoring the most 2-point baskets wins. If, however, both robots score the same number of points and the same number of 2-point baskets, the robot scoring 'earliest' wins. In addition, since only one robot is competing during the solo round, the ball that would normally be placed by the competing team on the playing field will be positioned at the center of the opponents red line. During the solo round, the competing team may choose to place their robot on either side of the field.
2. At the start of a match or overtime period, each team is given one ball which they can place anywhere within their half of the field (anywhere within the approximately 4' by 4' section) and may be placed within the grasp of the robot itself. Two additional balls will be located 32" from each side of the field along the black line that's 9" from the front edge of the court (see above diagram). Robots may start anywhere within their 12"-by-48" start area as long as they are entirely behind the red line. During the match, a robot returning to its start area can be repositioned by the human competitor and "reprogrammed" by pushing buttons, etc. The robot can be mechanically altered if desired (fixing loose parts, adding/removing appendages) – all contest rules still apply. No ball can be touched or moved by either the robot or human during this aspect of the contest. The human competitor may point their robot at balls anywhere on the field, but balls cannot be "handed" to the robot even if they reside within the start area.
3. The four foam balls used in the competition are the standard Nerf basketballs included with the Nerf hoop. Ours are blue and orange with diameters of approximately 4". A robot that permanently deforms or scars a ball in any way will be declared the loser of the match, i.e., the opposing team will be declared the winner. A robot may shoot or dunk the same ball more than once.
4. Any ball that is ejected from the field of play will be repositioned by the judge at the earliest convenient time. The ball will be positioned at the intersection of the lined dividing the two contestant areas and the perpendicular line that is 9" off of the back wall.
5. The maximum size of the robot at the start of the competition is 10" by 10" by 18" (vertical). That is, at the start the robot should fit within a box with inside dimensions 10" by 10" by 18"(vertical). After the 5-second delay at the start of a match, the robot can assume a maximum size of 18" by 18" by 18". The robot is not permitted to exceed 18" by 18" by 18" in overall dimension at any time during the match.
6. A robot may touch the hoop rim in the process of scoring. The rim may not be deflected more than about an inch, and the robot may not deflect the rim for more than 3 consecutive seconds. The rim shall not be permanently deformed in any way. Failure to observe these rules will result in a match loss for the offending robot, and a match win for the opposing robot.
7. A robot, or any robot part, may not be present in the imaginary cylindrical volume defined by the outer rim of the hoop for a time period of more than 4 consecutive seconds. This cylindrical volume extends from the floor to the ceiling. Simply stated, this means that no part of the robot may be directly over or under the hoop for more than 4 consecutive seconds. However, a robot may block or enter the hoop area for multiple time periods of 4 or less consecutive seconds. For example, a robot could block the opening of the hoop for up to 4 seconds, then completely leave the

hoop area, then return to block the hoop area for up to another 4 seconds. This process may be repeated. Exceeding the 4-consecutive-second limit at any time will result in a loss of all points earned up to that time by the offending robot. The only exception to the 4-second rule is the case where two opposing robots are locked in contact with each other within this cylindrical volume of the hoop for a duration exceeding 4 seconds, and there will be no penalty applied in this case.

8. Each robot must be fully autonomous, except for repositioning and reprogramming within the start area by the human competitor. No radio-controlled (R/C) equipment of any type is allowed. There can be no physical wire tether connecting the robot to an external device or computer. It is **not** permissible for the robot to communicate wirelessly via IR, Bluetooth, Wi-Fi, etc. to another external computers.

9. A robot which, as determined by the judges, intentionally damages or threatens to damage the opponent's robot or the playing field in any fashion will be disqualified immediately. The robot cannot contain any flammable or explosive devices of any kind. The robot may not fire any projectile (other than the foam balls). Once a robot is disqualified, the robot shall not be permitted to engage in any additional matches. The ruling of the judges is final. (A robot may interfere or block another robot.)

10. Robot appendages (for example arms, grippers, etc.) may not become disconnected from the robot at any time during the competition. (The only exception will be the case of a robot breaking off a piece of an opposing robot. In this case the opposing robot is not penalized.) A robot may be declared the loser in a match if it is determined by the judges that loose robot parts have interfered with the opposing robot.

11. In order to receive 2 points for a shot, the ball must be launched when the entire robot is at least 6 inches away from the rim as defined by the outer edge of the black 2-point arc on the playing field. That is, all parts of the robot must be outside the volume defined by the 2-point arc until the ball is released by the robot. The volume is defined by the outer edge of the 2-point arc and extends from the floor to the ceiling. The ball can proceed directly into the hoop, or can use the backboard (and will not affect shot score.) If a ball is shot (released) when any part of the robot is within the 2-point zone, then the score will be 2 points. The 2-point arc will be flat black paint on the white playing surface.

12. If both robots in a match are motionless (or hopelessly stuck) for more than 15 seconds, the judges may, with the consent of both teams, allow the human competitors to retrieve their robot to their starting area. Robots returned to the starting area may be aimed or reprogrammed by pushing a button, etc. as if the robot returned under its own power. If in the process of retrieving a robot, the robot drops a ball, the ball will remain on the playing field where it fails.

13. One of the two teams will be selected randomly by the judge to first place their robot in the starting area on either the right side or the left side of the arena. The starting side (either right or left) will also be randomly determined. The opposing team will place their robot once the first team has finished placement of their robot. Each team has a maximum of one minute to position the robot in the starting area. When both robots are positioned, contestants will place a finger on the "start" button of their robots. The judge will say "ready, set, go" before the buttons are pushed. After the word "go," robots should remain motionless for 5 seconds while human contestants exit the playing area. During the 5-second delay, a robot may move early (a "*false start*"), or a contestant may alert the judge that its robot failed to start (a "*no start*"). In either case the judge will halt the match, and warn the contestant. The match will be restarted with the robots being reset to their same positions. If a contestant receives two warnings of any kind in a match, it loses that match.

14. Robots may be reprogrammed or physically modified between trials during the contest. This is encouraged. Switches and settings on the robot may also be manipulated to adjust the computer software algorithms whenever the robot is inside the starting area. For example, you may have one software program for play against a dunking robot, and another program for play against a shooting robot.

15. Robots may undergo physical transformations, reprogramming, and reconfigurations between rounds. Repairs are clearly allowed. Alterations and changes must not result in a delay to the start of a match.

16. Any robot that violates the spirit of the contest rules, in the judgment of the organizers, will be eliminated from competition. If you have any questions about the appropriateness of your design please contact the conference organizers prior to registration.