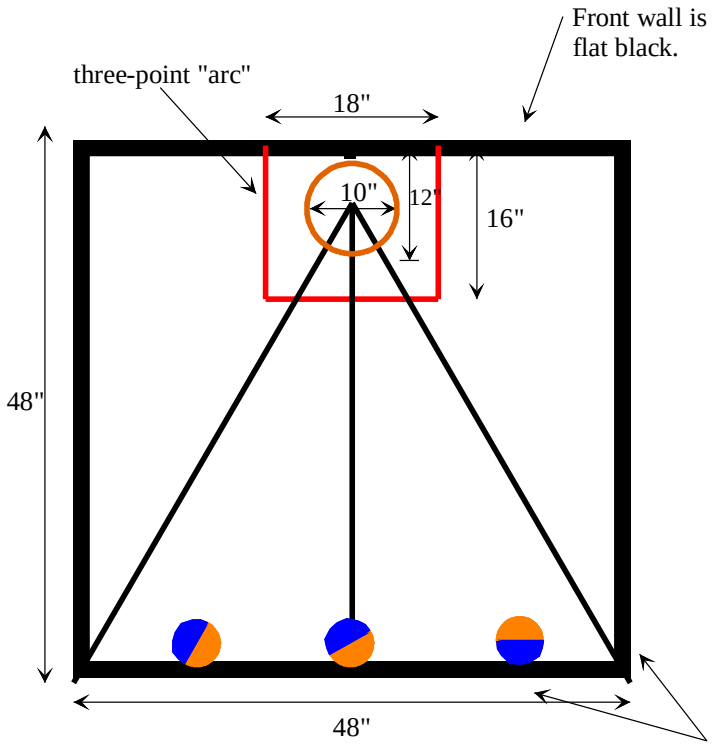
MICS 2025 Robotics Contest: Tilt-A-Hurl

The MICS 2025 robot contest will consist of a 3-point shot basketball tournament. A robot scores 3 points if it shoots a basket while entirely outside the three-point “arc.” A basket shot on or within the three-point arc (including a dunk) scores NO points. Except for the initial ball shot by the robot, all balls must touch the “back wall” before being shot again; otherwise, they score NO points. Only one robot will be on the court at a time trying to score as many points as it can in 2 minutes. Each robot will perform three 2-minute runs on the court. The sum of its best two runs will be used to decide winners with the third run being used as the primary tie-breaker (see below for secondary tie-breaker rules).

The court will be made from a 4’x4’ sheet of particle board that is painted white. The front 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. A “standard” (~10” diameter "NERF Nerfoop Mini Over the Door Basketball Hoop") Nerf basketball hoop is positioned 9” high along the middle of the back wall and parallel to the court floor. Three black lines (3/4”-wide black vinyl electrical tape) radiate from the center of the hoop as shown. The three-point “arc” will actually be an 18”-by-16” red rectangle (3/4”-wide red vinyl electrical tape). All walls will be perpendicular to the court-floor, but the front end of the court will be elevated 3.5” (hence the name: “tilt-a-hurl”) so balls will tend to roll toward the back wall.



Note: A small black wood block is used to attach the hoop to to the front wall. It extends down below the loop about an inch.

Official Rules:

1. The objective of the contest is to design an autonomous robot that can score points by picking up balls (4" diameter foam Nerf mini-basketballs) and shoot 3-point shots into a single, netless, basketball hoop (10" diameter NERF Nerfoop Mini Over the Door Basketball Hoop) that is 9" off the ground. A robot scores 3 points if it shoots a basket while completely outside the three-point arc. A basket shot from on or within the three-point arc (including a dunk) scores NO points, so a shot ball must not touch the robot within the three-point "arc." A robot is trying to earn as many points as it can during a 2-minute period.

2. Each robot will perform three 2-minute runs on the court. The sum of its best two runs will be used to decide places among all the robots. The lowest score of the three runs will be used as the primary tie-breaker. A secondary tie-breaker (only used to determine the top three places) will be a fourth run on the court, but the goal is to reach 6-points (two 3-pointers) in the least amount of time.

3. At the start of a 2-minute run, a robot must be touching the back wall and can be touching or holding one ball. Before the run starts, the team can position the remaining balls anywhere along the back wall, but not within the robot. A total of one to three balls can be on a court. Balls leaving the court during a 2-minute run will be returned to the back wall by a judge so as not to interfere with the robot.

4. If a robot starts by holding a ball, then this initial ball may be shot the first time without it touching the back wall. **All other balls (including the initially held ball) must be retrieved from the "back wall" (i.e., the balls must touch the back wall) before being shot again**; otherwise that ball scores NO points. (RATIONALE: This is a mobile robot competition, so we are trying to prevent a robot from parking in front of the basket and repeatedly shooting the same ball over and over without moving. Robots violating the sprit of this rule will be disqualified.)

5. The three foam balls used in the competition must be the standard **4" foam Nerf basketballs** included with the "NERF Nerfoop Mini Over the Door Basketball Hoop Set". NOTE: Our Nerf hoop used on the competition board is orange, and ours balls are blue and orange. If you buy green Nerf balls (or some other color), you may use your own balls if color is important to your robot (please mark your balls with a marker for identification). (WARNING: don't buy the 5" inflatable Nerf basketball set) A robot that permanently deforms or scarred a ball in any way will be disqualified.

6. A robot can start play holding one ball, but during the match it may carry any number of balls. A robot may shoot the same ball more than once, BUT between shots a ball must be retrieved from (touching) the back wall if it is to score again (see rule 4 above).

7. The maximum size of the robot at the start of each run is 18" by 18" by 24". Judges will check the size of each robot before the competition, and again if it is altered during the competition (see rule 10).

8. A robot must be fully autonomous, i.e., no remote control by another external computer or human.

9. A robot which, as determined by the judges, intentionally damages the playing field, hoop, or balls in any fashion will be disqualified immediately. Once a robot is disqualified, the robot shall not be permitted to engage in any additional runs. The ruling of the judges is final.

10. The first 2-minute run on the court(s) by all robots will be in random order. The second and third runs on the court(s) will follow the same random order as the first. Robots may undergo physical transformations, reprogramming, and reconfigurations between rounds. Repairs and changing of batteries are clearly allowed. **However**, alterations and changes may not result in a delay to the competition.

11. Any robot that violates the spirit of the contest rules, in the judgment of the organizers, will be eliminated from competition.