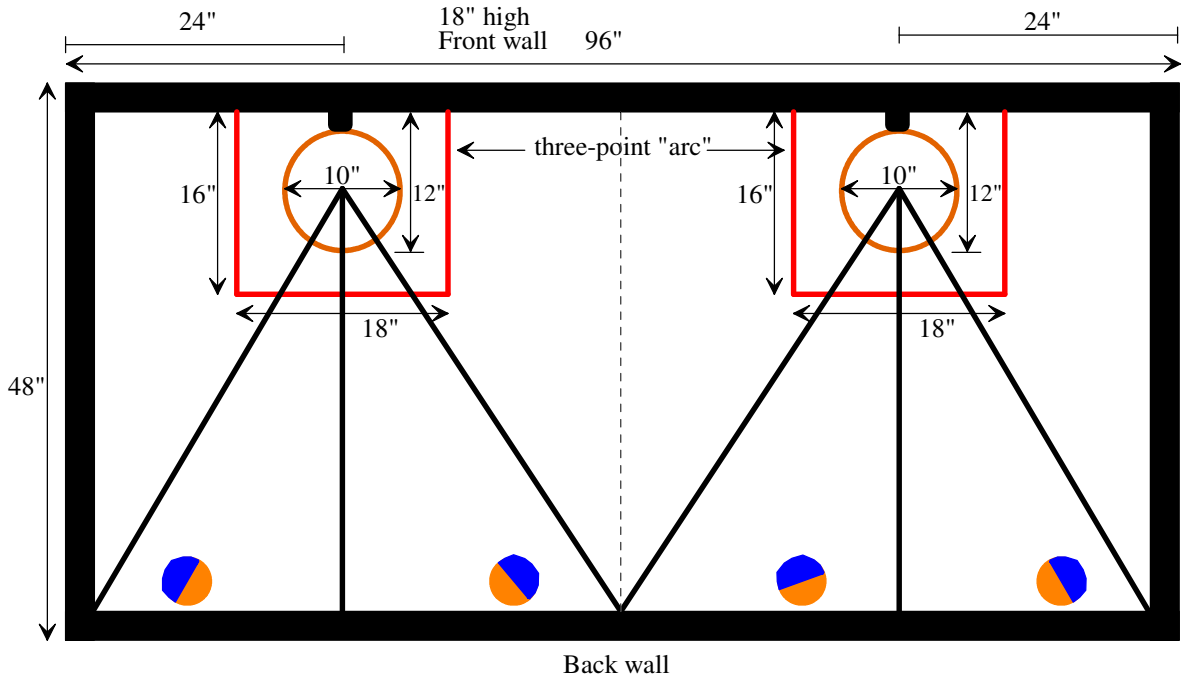
MICS 2019 Robotics Contest: Tilt-A-Hurl x 2

The MICS 2019 robot contest will consist of a 3-point shot basketball tournament. Two robots will be on the court at the same time with each robot trying to score as many points as it can in 2 minutes. The robot scoring the most 3-point shots wins the match. 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, and before shooting each ball the robot must touch at least one "supporting" wheel on the "back wall" for the shot to count.

The court will be made from a 4'x 8' sheet of plywood completely enclosed by black walls made of 2"-by-4" lumber (so they are about 3.5" tall). On top of the plywood will be a 0.25" white prefinished melamine panel (to aid in transporting the plywood and panel both may be cut into halves). The front wall is extended to a height of at least 18" tall and painted black. All walls are painted flat black. Two "standard" (~10" diameter Nerfoop) Nerf basketball hoops are positioned 9" high along the front 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.



Rules:

1. The objective of the contest is to design an autonomous mobile robot that can score points by picking up foam balls (4" diameter Nerf basketballs) and shoot 3-point shots into either, netless, Nerf basketball hoop (10" diameter and 9" height off the court). 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. Before shooting each ball, the robot must touch at least one "supporting" wheel on the "back wall" for the shot to count. (A "supporting wheel is a wheel that helps to holds up the robot -- for example it cannot be a wheel attached to an arm that reachs out and touches the wall.) Two robots will be on the court at the same time. Each robot is trying to earn as many points as it can during a 2-minute match. The robot scoring the most points wins the match.
2. Tie-breaker: In a match if both robots score the same number of 3-point shots, then the robot which scores the first 3-point shot wins the match.
3. At the start of a 2-minute match, a robot must have a supporting wheel touching the back wall, and the robot can be touching or holding one ball. Before the run starts, each team can position another ball anywhere along the back wall. A total of four balls will be on a court. Balls leaving the court during a 2-minute run will be returned to the back wall randomly by a judge so as not to interfere with the robots.

4. The foam balls used in the competition are the standard ~4" Nerf basketballs included with the Nerfoop hoop. Any color nerf balls and hoops might be used, so don't have your robot depend on a specific color. A robot can start play holding one ball, but during the match it may carry any number of balls. A robot that permanently deforms or scarred a ball in any way will be disqualified. A robot may shoot the same ball more than once, BUT between shots a robot must touch a supporting wheel on the back wall.
5. The maximum size of the robot at the start of each run is 12" by 12" by 18" (vertical). That is, at the start the robot should fit within a box with inside dimensions 12" by 12" by 18"(vertical). After the run starts, the robot can assume a maximum size of 12" by 18" by 18". The robot is not permitted to exceed 12" by 18" by 18" in overall dimension at any time during a run. Before the competition starts, all robots must be checked in **with the judges for measuring**.
6. A robot must be fully autonomous, i.e., no remote control by another external computer or human.
7. A robot which, as determined by the judges, intentionally damages the playing field, hoop, balls or opponent's robot in any fashion will be disqualified immediately. Once a robot is disqualified, the robot shall not be permitted to engage in any additional matches. Pushing on the opponent's robot is allowed.
8. Robots may NOT be reprogrammed or physically modified between matches. The robot must run the same program. The only allowed repair is changing batteries or those necessary to return a robot its original configuration, and these must not result in a delay of the competition.
9. Any robot that violates the spirit of the contest rules, in the judgment of the organizers, will be eliminated from competition. All decisions by the judges are final!
10. Matches are started using the following sequence of events:

    a) teams are randomly assigned starting sides of the court with one robot per side

    b) teams position their robots such that at least one wheel is touching the back wall

    c) teams position their two balls on their side of the court. The robot can be holding or touching only one ball.

    d) the judges says "Ready, Set, Go"

    e) teams start their robots immediately after the judge says "Go." Robots can start without delay.

NDSU Venue Requirements

Competitors must follow NDSU safety policies and procedures while participating in the robotics competition. Robots are subject to inspection by NDSU staff for safety purposes. Robots failing this inspection which cannot be modified in time for competition will be disqualified and must be removed to competitor's vehicle and not operated on the NDSU campus. Competition rules may be modified at any time to respond to any newly discovered hazard. To comply with safety requirements and best practices, the following are required:

1. Flying robots, defined as any robot that intentionally departs from the ground for an extended period of time as part of its operations, are not allowed.
2. Robots must be free of sharp exterior parts and other hazards. Robots' design, construction and operations will be considered when determining what constitutes a hazard.
3. Competitors, coaches and other personnel must posses and utilize safety goggles when in proximity to a robot that will be throwing the Nerf ball or presenting any alternate eye safety hazard. This includes testing, construction and other activities, in addition to when the robot is competing.
4. Robots that appear to present a risk of injury to individuals or damage to property, irrespective of meeting all other requirements, will be disallowed and must not be operated on the NDSU campus. The judgment of NDSU personnel is final on this matter. Robots can be altered and re-evaluated as necessary by NDSU personnel.
5. All competitors, spectators and coaches will be required to sign a waiver prior to participation.