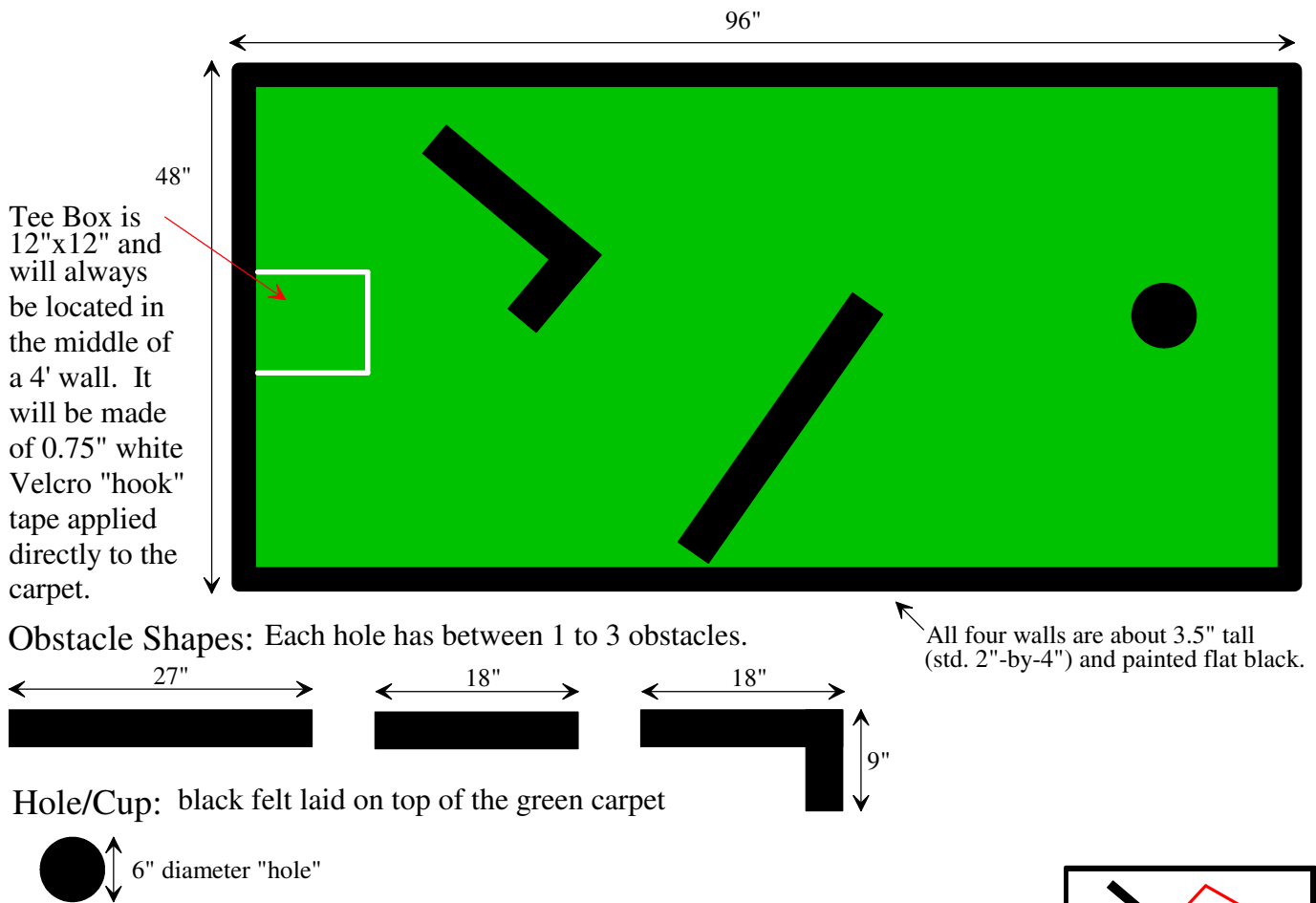


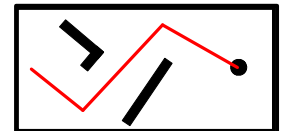
MICS 2017 Robotics Contest: **Improved Mini-Mini-Golf**

The MICS 2017 robot contest will consist of a 3-hole miniature golf course. Before playing a hole, the robot may “look” at (or even run upon) a scaled down (quarter-sized) map of the hole. The map will indicate the recommended robot route from tee to hole via a red line. The recommended route will have at most two turns. Immediately after looking at the map, a robot will play the corresponding hole by hitting a real golf ball (white in color). A robot’s score for the hole is the number of hits to move the golf ball from tee to the hole, plus any penalty strokes for illegal play (e.g., pushing the golf ball too far instead of hitting it). A robot’s total score over all three holes will determine its place. For the leaders, tiebreaker hole(s) will be played until ties are broken.

Each hole will be made from a 4’x8’ sheet of plywood that is covered with green indoor/outdoor carpet. To aid in transporting the plywood will be cut into two 4’ x 4’ pieces, but the plywood will be as level as possible. The hole will be completely enclosed by black 2”-by-4” lumber so they are about 3.5” tall. Obstacles on the course will be constructed out of 4”x 4” (or screwed together 2”x4”s) lumber. All walls and obstacles are painted flat black. Each hole has between 1 to 3 obstacles with NO straight-line route between the tee and hole.



The corresponding quarter-size map is 12"x24" and would look something like:



The recommended path is indicated by 0.75" red vinyl tape on a white (melamine) board. The walls and obstacles will be indicated by 0.75" black vinyl tape. The red tape will start in the middle of where the tee box would be located and end in the middle of the “hole”. The “hole” is a several pieces of black vinyl tape cut into a circle that’s 1.5” in diameter.

The indoor/outdoor carpet was bought at Menards. Details: Foss EcoFi Tee Time Indoor/Outdoor Carpet that's 6 foot Wide. Model Number: CA264860072M and Menards® SKU: 7675040 (<https://www.menards.com/main/p-1444430621408.htm>)

Each quarter-size map is centered on a 4' x 4' sheet of white (melamine) board. I purchased mine from Menards. Details: Dakota 1/2" x 4' x 4' Reversible Prefinished Panel
Model Number: 1_2x4x4White_White and Menards® SKU: 1361293
(<https://www.menards.com/main/building-materials/panel-products/specialty-panels/prefinished-panels/dakota-1-2-x-4-x-4-reversible-prefinished-panel/p-1444428181436-c-13335.htm>)

Photos of a sample robotics hole are at:

http://www.micsymposium.org/mics2017_Robotics/

NOTE: Velcro will be used to attached the obstacles to the carpet so they should not move much if pushed by the robot. (The rationale for this rule is to ensure that the obstacles stay consistent with the map for all robots.)

Additional Rules:

1. The objective of the contest is to design an **autonomous** robot that can play miniature golf after “looking at” (or even running upon) a map of the hole (as described above). A robot’s score for the hole is the number of hits to move a golf ball from the tee to touching the “hole”, plus any penalty strokes for illegal play. **The maximum score for a successfully completed hole is 15.** A robot’s total score over all three holes will determine its place. For the leaders, tiebreaker hole(s) will be played until ties are broken (starting again at the map for hole 1 and hole 1, etc.).
2. A robot is allowed 3 minutes to “look at” or run upon the map before playing the corresponding hole.
3. A robot is allowed a maximum of 3 minutes to play a hole. If they do not complete a hole in 3 minutes or their score on a hole reaches 16, then their score for that hole is 16.
4. A robot receives one stroke every time it hits the ball. A hit is defined to be anytime the ball goes from touching to not touching the robot. The ball will be a standard white golf ball.
5. A robot incurs a penalty stroke any time it continually pushes (or remains in contact with) the ball and the ball moves farther than 4 inches. If a robot pushes the ball farther than 4 inches it incurs a penalty for each increment of 4 inches and 1 stroke for a hit. For example, if a robot pushes the ball while remaining in contact with it for 10 inches, then the robots score will go up by 2 penalties and 1 hit. A robot can incur a penalty stroke any time the ball moves 4 inches while in contact with the robot -- even while positioning the ball for the next hit.
6. A human team member will be responsible for determining their robot’s score on each hole. A judge at each hole will validate a robot’s score, and correct higher if necessary. (Warning: The distances a ball is pushed will be a judgement call, but remember that the judge is always right by definition. Arguing with the judge could get you eliminated from the completion!)
7. At the start of a hole, a robot must be touching the carpet in at least one spot within the white tee box. A robot does not need to be entirely within the tee box. The team may point the robot in any direction, and must position the golf ball on the carpet so that it is within an inch of the robot. A robot may start with the golf ball touching the robot.
8. A hole is successfully completed when the golf ball touches any part of the “hole”/cup. If the robot is in contact with the ball when the hole is completed, an additional stroke is incurred.
9. The maximum size of the robot at the start of each hole is 12" by 12" by 18" (vertical), so at the start of a hole the robot should fit within a box with inside dimensions 12" by 12" by 18"(vertical). After the hole is started, 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 play of a hole. The gap between obstacles on the suggested robot route (i.e., red line on the map) will be at least 14 inches wide with the suggested route running down the middle of the gaps.
10. A robot must be fully autonomous, i.e., no remote control by another external computer or human.

11. A robot which, as determined by the judges, intentionally damages the playing field: carpet, hole, walls, obstacles, or balls in any fashion will be disqualified immediately. Once a robot is disqualified, the robot shall not be permitted to play any additional holes. The ruling of the judges is final.
12. Robots may NOT undergo physical transformations, reprogramming, or reconfigured between holes. Repairs and changing of batteries are clearly allowed, but may not result in a delay to the start of a hole.
13. Any robot that violates the spirit of the contest rules, in the judgment of the organizers, will be eliminated from competition.