A-MAZE-ing Challenge Rules

Goal

Design, build, & program a robot that can follow a raised wooden maze withoutfalling off, completing the maze before the time limit adds Bonus Points to your score.

Who Can Play

Teams entering this challenge compete in:

1. Elementary School (ES) 6-10
2. Middle School (MS) 11-14

Note: If fewer than 5 teams register in either division, the Event Director has the option to combine divisions

Requirements

Robot: Autonomous robot, any platform, ≤ USD 1,500

1. Pass **Check-In** by performing basic operational moves as needed in this challenge
2. **Check-in procedure** (physical, streaming events):
    1. The robot can move, without external sensors or remote control, the following
        1. forward any distance,
        2. Then make a turn in either direction of -45o or more,
        3. Then move forward any amount -
3. The robot is not allowed to use external sensors to assist it in following the maze; however, wheel encoders are allowed.
4. The volume of the robot must be ≤ 65030 cm3.

General Rules

1. The Event Director will establish the number of official runs allowed and the number of those official runs that will be counted for the aggregate score used to determine the Top 8 teams that will compete in the Tournament.
2. The robot has 2 minutes to complete the maze with the clock running backward from 120 seconds.
3. *(physical/streaming events)* Teams can practice as much as necessary by sharing the tracks with other teams needing to practice.
4. Should the track be needed to score an official run, practicing teams will yield the track.

Challenge Specific Rules

1. If the robot falls off the maze before reaching the finish line, and there is time remaining; return it to the start line and attempt to finish the maze.
2. A robot is considered to have fallen-off the maze when any part of the robot makes contact with the surface supporting the track.

Track: *All Challenge Dimensions are approximate.*

Physical events & Streaming events & Virtual events:

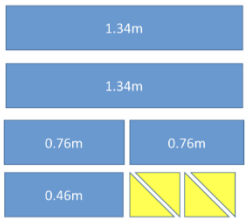
1. All a-MAZE-ing tracks will be as near in design as possible, and constructed of particle-board (or a similar locally procured material) that is 24 cm wide and 2 cm tall.
2. Various lengths based on the division with angled turns, in either direction, of -45o, -90o, and -135o
3. Regardless of the method used to join the pieces together, EVERY effort should be made to ensure tracks are as smooth and free of irregularities as possible. Lengths of track sections may vary
4. KG DIVISION HAS 3 STRAIGHTS AND 2 ANGLED TURNS FOR 400 POINTS POSSIBLE..
5. ES Division has 4 straights, and 3 angled turns for a total of 500 points possible
6. MS Division has 6 straights and 5 angled turns for a total of 800 points possible.
7. Depending on Event space and material available, both divisions might be run on the longer MS track. In that case, the ES Division Finish line will be located somewhere between the 3rd and 4th angled turn of the MS track.

TRACK DETAILS:

A) Material, track pattern, and assembling details:

1. Track material: particleboard, chipboard, low-density fiberboard
2. **DESIGN for your event:** There is NO one design...your choice, provided all 3 angled turns are provided

RoboRAVE ONLINE Elementary & Middle School
a-MAZE-ing Challenge Track Parts
These dimensions are good for all events
(Physical, Streaming, and/or Virtual)



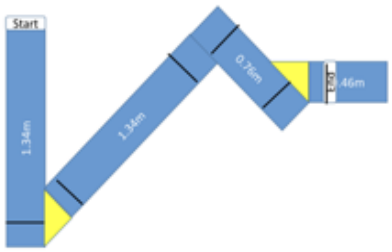
ES track uses the 1st 4 lengths of MS 5 length track
Lengths: Images shown - 2 long, 1 medium, 1 short
Width: 0.23 m

Triangles (Isosceles): make 4 for design options
Legs 0.23 m;
Hypotenuse 0.23 m*(approximate the square root 2)

version: 16 August 2021

template pieces for EXAMPLE 1
RoboRAVE Elementary School Design

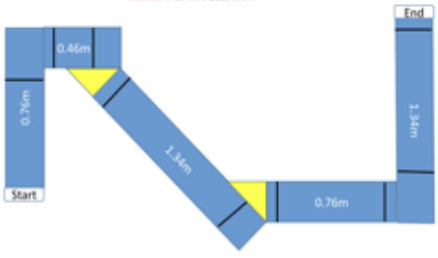
NOTE: the black lines indicate where the front wheels must be to SCORE the points for each section (turns, and distance)



version: 16 August 2021

template pieces for EXAMPLE 2
RoboRAVE International Middle School Design
used for a 17 MAY 2020 event

NOTE: the black lines indicate where the front wheels must be to SCORE the points for each section (turns, and distance)



version: 16 August 2021

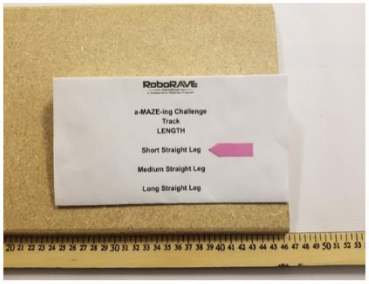
3. Angled turns - the hypotenuse is place against the straight leg the robot is turning from

(see figure)

Height: 2 cm

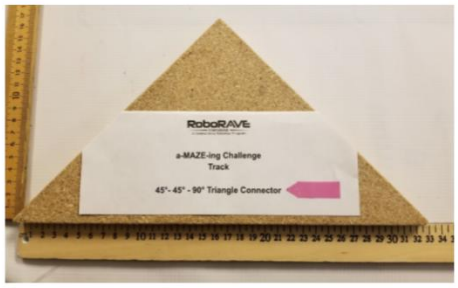
Width: 23 cm

Lengths: 46cm, 76cm, 134 cm

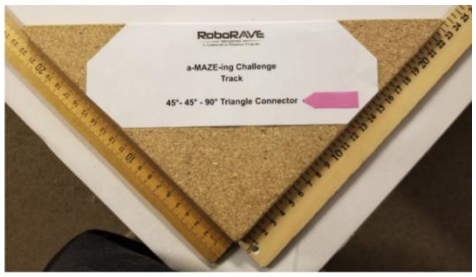


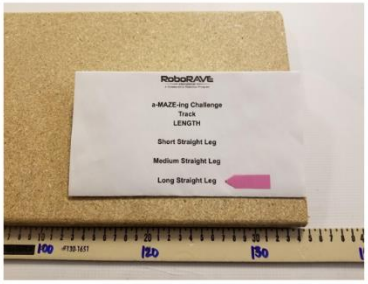
Triangle Connector (Isosceles right triangle) of 45° - 45° - 90°

Hypotenuse ~33 cm

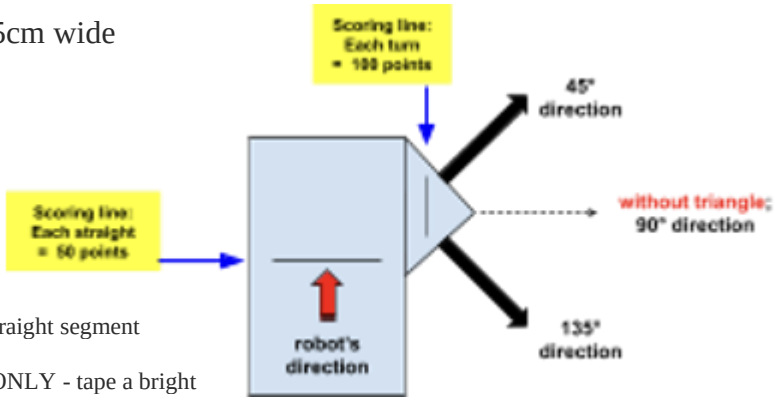


Legs ~23 cm_





B) Securing the track to the floor: Duct tape, 5cm wide



1. Attach to the floor, up and over
2. each segment joint
3. Attach both ends
4. **SMOOTH surface** on the track NOT smooth? Do it again!
5. Scoring Lines (**Any part of the robot must touch** the line to score the points)
    1. Draw lines across each segment
        1. ~20 cm from the end of each straight segment
        2. ~10 cm into the angled turn
6. Mark an area around each track that is for players ONLY - tape a bright rectangle around the track area
7. One track design - two challenges. ES uses the first 3 full legs + cross onto 4th leg; MS - whole track 9) Angled turns - include at least one 45° angled turn AND one (1) 135° angled turn for the ES section
8. Double check your finished track for:
    1. Tape smoothness
    2. No raised edges between boards

Scoring

1. Each completed straight section is worth 50 points.
    1. A straight section is considered completed when any part of the robot crosses the scoring line as marked on the tracks, as seen from above.
2. Each completed angle is worth 100 points.
    1. An angle is considered completed when any part of the robot crosses the scoring line as marked on the tracks, as seen from above.
3. ES Division has 4 straights, and 3 angled turns for a total of 500 points possible
4. MS Division has 6 straights and 5 angled turns for a total of 800 points possible.
5. If the robot ***does not complete*** the maze when time runs out, the score awarded will be for the furthest completed section of the track.
6. If the robot ***completes*** the maze before time runs out, the score will be the maximum score for their division, plus the bonus points...1 point for each whole second remaining. (e.g, if 3.14 s remain? 3 bonus points awarded); if 12.94 s remain? 12 bonus points awarded)

Tournament Scoring:

1. The top eight teams from each division will compete in the final tournament.
2. Ties will be broken based on a **PERFORMANCE BASED CRITERIA** chosen by the Event Director. (e.g., using the highest individual run score of all the tied teams).
3. Advancing teams will be seeded into the tournament bracket according to their aggregate score . (see bracket below).
4. Runners Up are used to determine 3rd & 4th places based on the outcome of semi-finals.