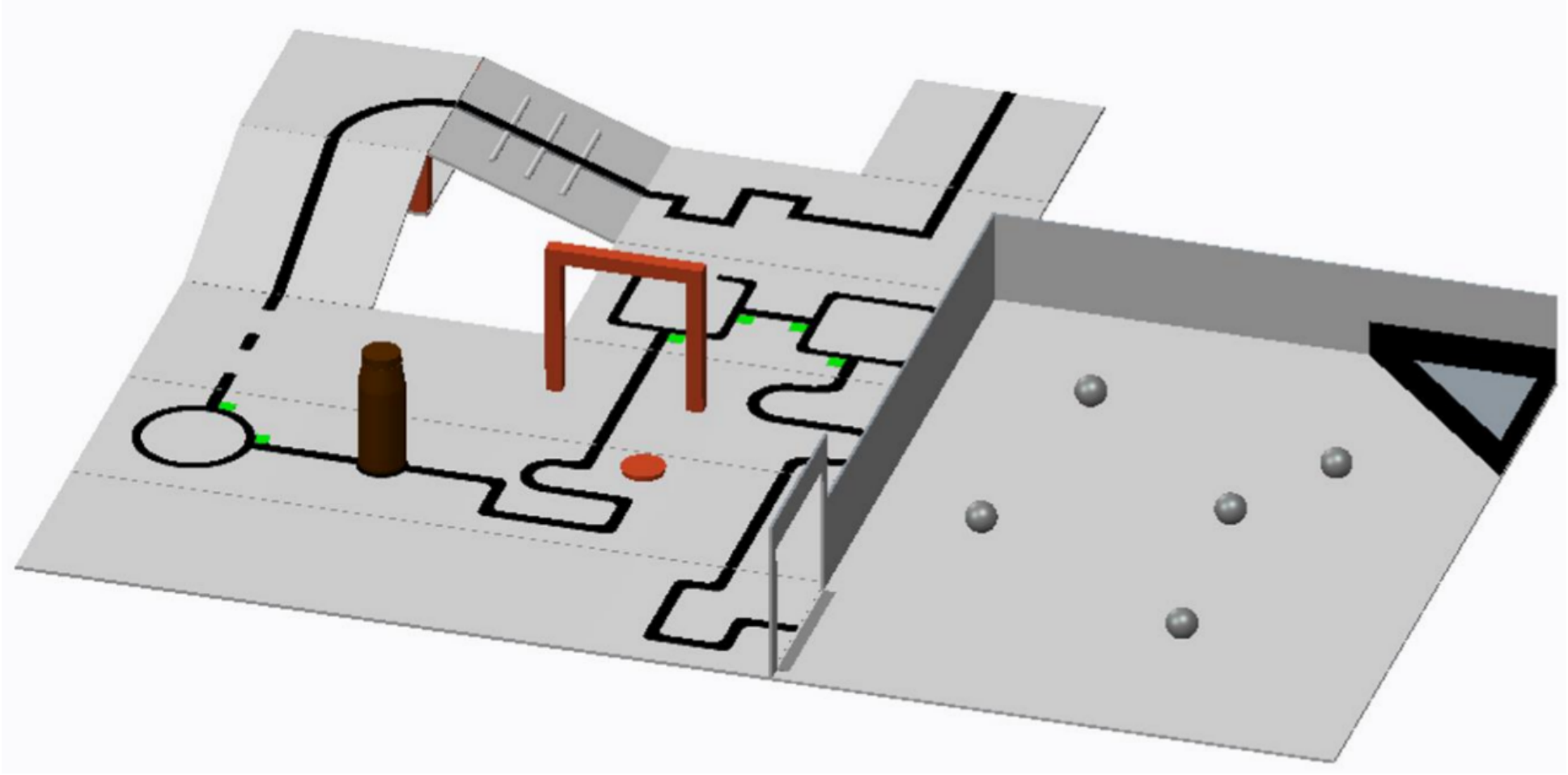
RoboCupJunior Rescue Line



2017 Rules

Story

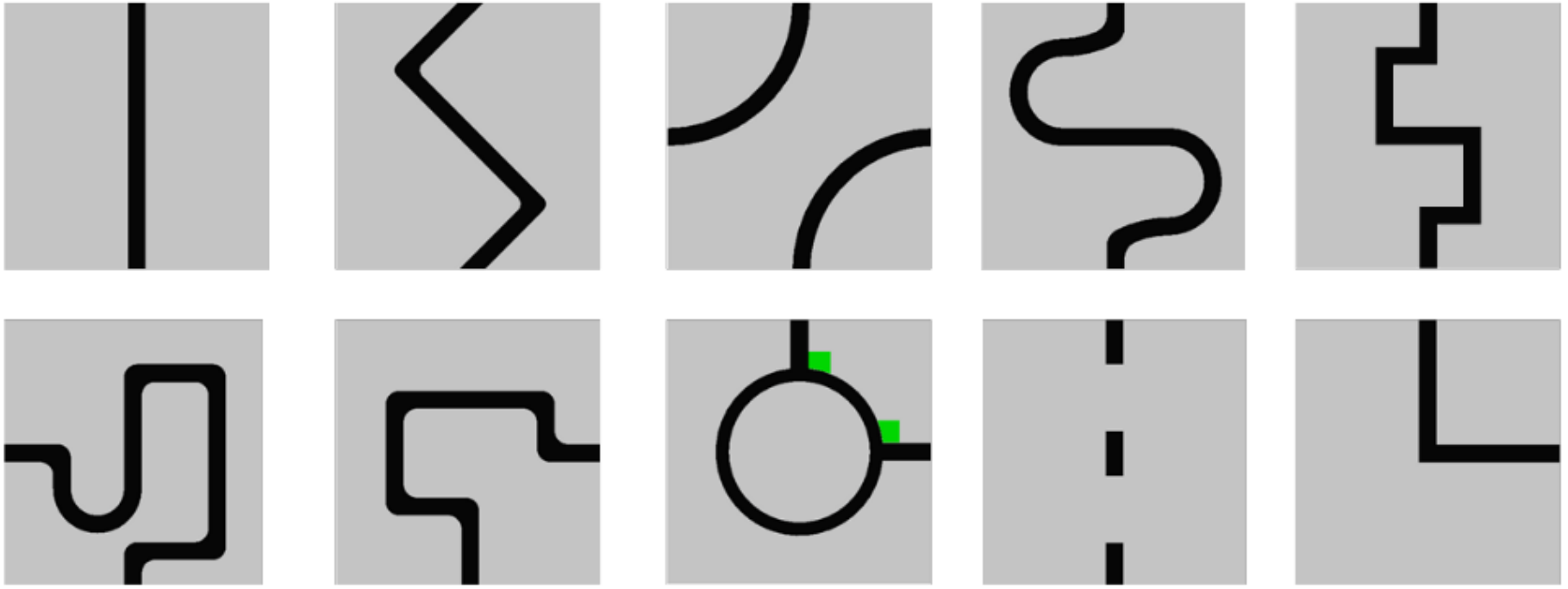
The land is simply too dangerous for humans to reach the victims. Your team has been given a difficult task. The robot must be able to carry out the rescue mission in a **fully autonomous** mode with no human assistance. The robot must be durable and intelligent enough to navigate through treacherous terrain with **hills**, **uneven land** and **rubble** without getting stuck. When the robot finally **finds the victims**, it has to gently and carefully **transport the victims to the safe evacuation point** where humans can take over the rescue. After the victim rescue, the robot should be able to **find its way out** of the dangerous area.

Team

- 1 x Captain, 1 x Co-Captain
- Only Captain and Co-Captain are allowed access to competition field (others must stay 1.5m away)
- Only Captain may touch the robot during competition run

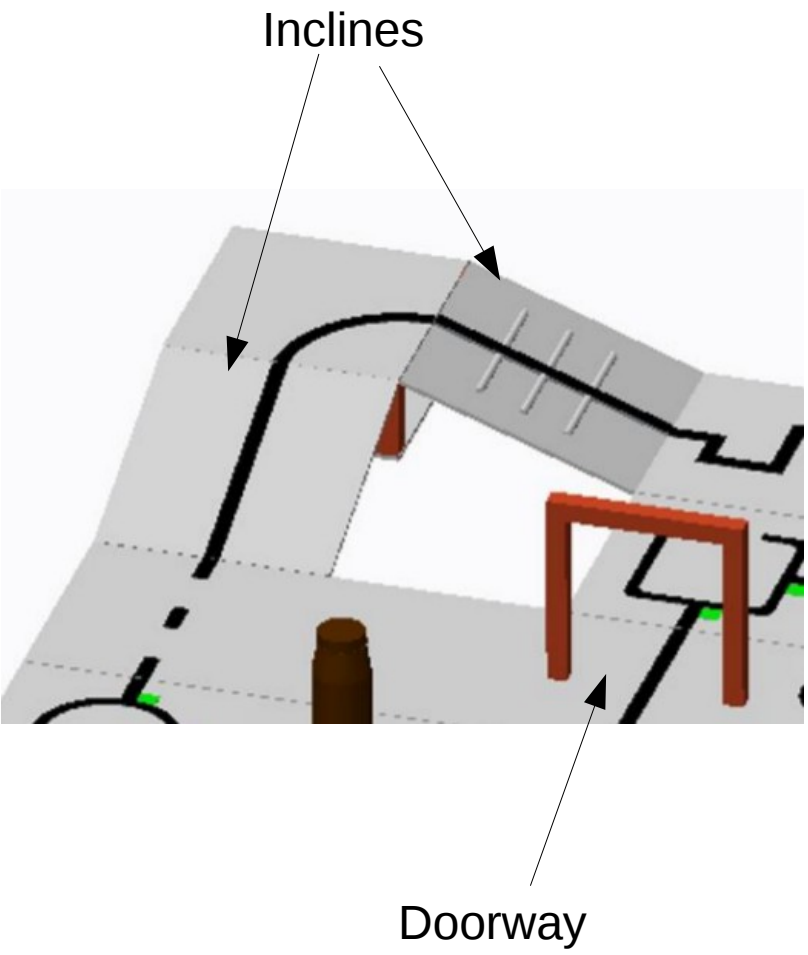
Playing Field

- White modular tiles: 30cm x 30cm
- Black lines: 1 - 2cm wide, 10cm away from edge
- Gaps: 20cm max, at least 5cm straight section before gap



Inclines and Doorway

- Inclines
  - Not more than 25 degrees angle
  - Keep CG low to prevent toppling over!
- Doorway
  - 25cm wide and 25cm tall
  - Robot must be smaller than this to pass through!

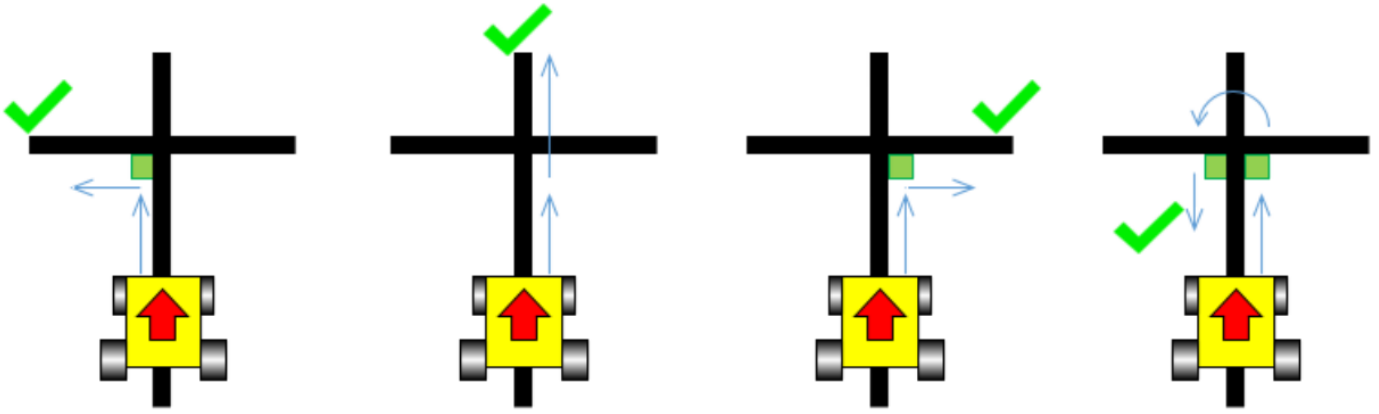


Speed Bumps, Debris, Obstacles

- Speed bumps
  - White and fixed to floor
  - Max 1cm height (eg. chopsticks)
- Debris
  - Not fixed to floor
  - Max 3mm height (eg. toothpicks)
- Obstacles
  - Very heavy or fixed (eg. Bricks)
  - At least 15cm height
  - Should navigate around

Intersection and Dead Ends

- Intersections markers are green and 25mm x 25mm
- May have 3 or 4 branches

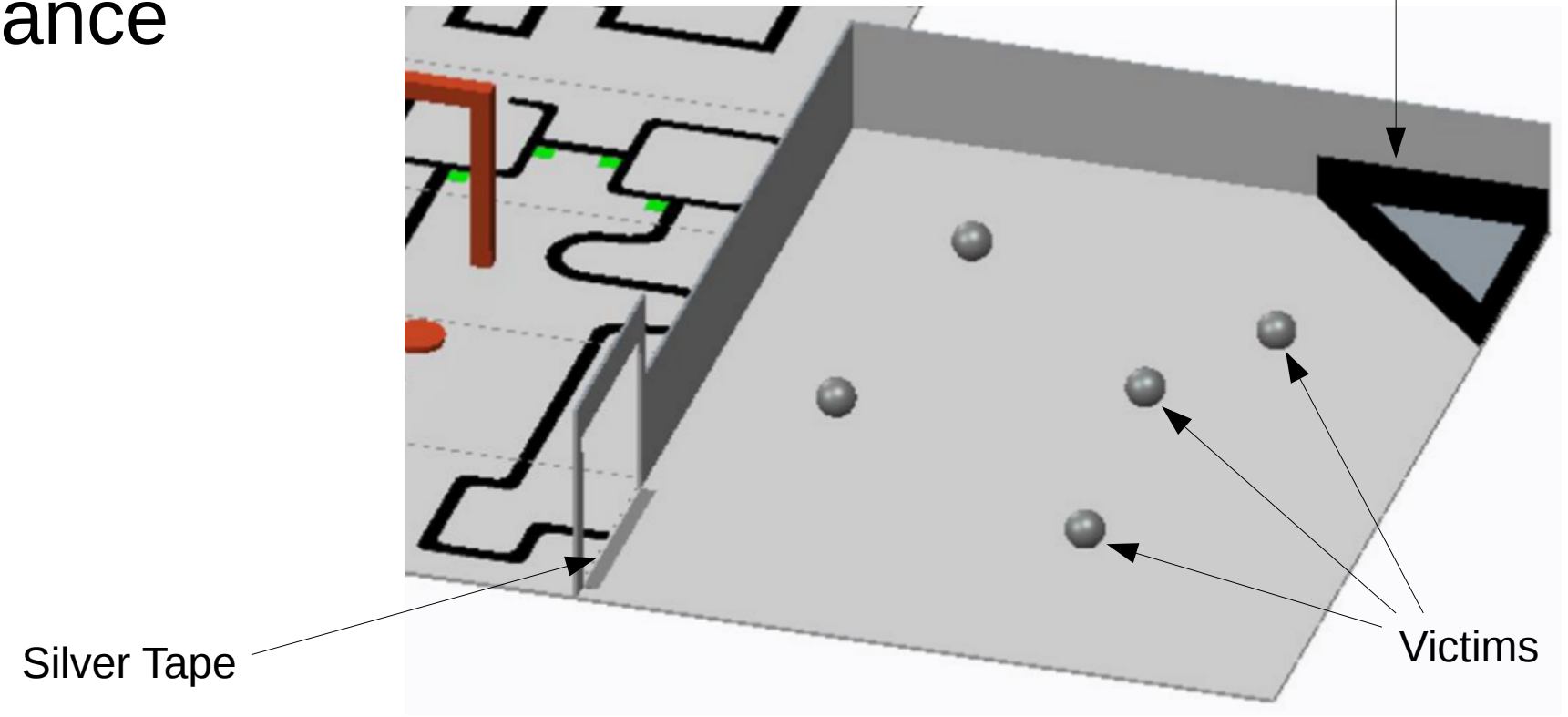


3 Branches

4 Branches

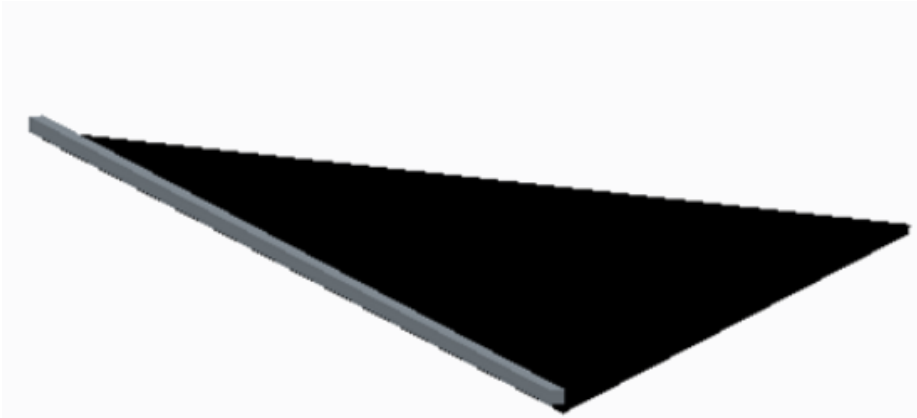
Evacuation Zone

- 120cm x 90cm
- Wall at least 10cm high
- 25mm x 250mm reflective silver tape at entrance

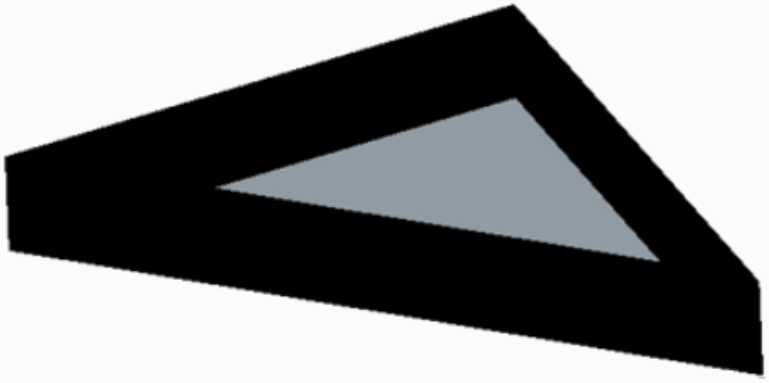


Evacuation Zone

- Evacuation Points
  - Team can choose between 2 types
  - Level 1 (Less points, but easier)
    - Black triangle with a bump of 5mm along the side
  - Level 2 (More points, but harder)
    - Black triangle with 6cm walls and a hollow center



Level 1



Level 2

Evacuation Zone

- Victims
  - 4 - 5 cm diameter ball.
  - Dead victims are black and not electrically conductive.
  - Living victims are silver, reflect light and are electrically conductive.

Competition Run

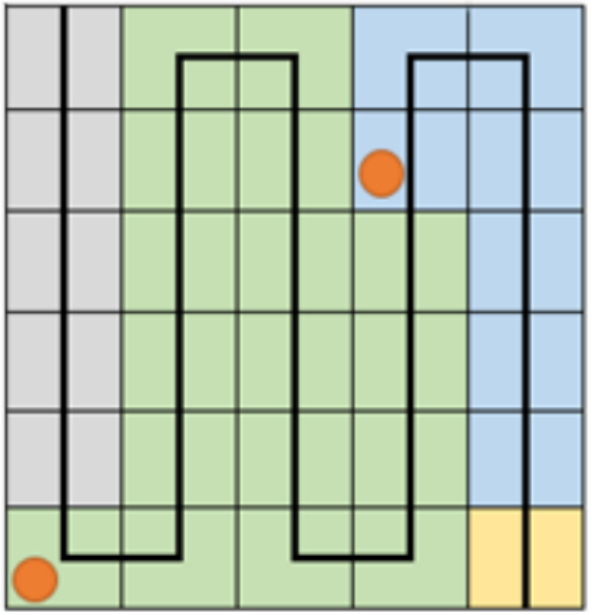
- Choose evacuation point type (Level 1 or 2)
- Place checkpoints markers (robots can restart at checkpoints)
- 8 mins total, including calibration
- Layout, obstacles, and evacuation point location may be changed after calibration

Competition Run

- Lack of Progress
  a) Team captain declares a Lack of Progress.
  b) Robot loses the black line without regaining it by the next tile
  c) Robot does not follow the indicated direction at an intersection.
  d) Robot failed to navigate a hazard in the field
- Unlimited restarts at previous checkpoint
- May proceed to next checkpoint after 3 Lack of Progress

Scoring

- Reaching a checkpoint
  - 3 points/tile (1st attempt)
  - 2 points/tile (2nd attempt)
  - 1 points/tile (3rd attempt)
  - 0 points/tile (4th or more attempts)



1 checkpoint of 1 tile (starting tile) x 3 points 1st attempt

1 checkpoint of 7 tiles x 3 points 1st attempt

1 checkpoint of 17 tiles x 3 points 1st attempt

0 checkpoints of 5 tile (no more checkpoints)

Scoring

- Hazards
  - Gap in line (10 points)
  - Obstacles (10 points)
  - Speed bump (5 points)
- Intersection
  - Intersection (15 points)
  - Dead end (15 points)

Scoring

- Evacuation of victims
  - Level 1
    - 30 points for living victims
    - 15 points for dead victims
  - Level 2
    - 40 points for living victims
    - 20 points for dead victims
- 20 points for driving out of the evacuation zone and finding line after at least one successful victim rescue or touching a victim

Open Technical Evaluation

- Question and Answer style
- Focuses on
  - Creativity
  - Cleverness
  - Simplicity
  - Functionality
- Your “work" can include (but is not limited to) one of the following aspects:
  - Creation of your own sensor or sensor module instead of a pre-built sensor
  - Creation of a mechanical invention which is functional, but out of the ordinary
  - Creation of a new software algorithm to a solution
- Invention must be supported by documentation, showing the steps towards the invention.

Documentations

- Documents should include one poster and one engineering journal
- Poster
  - Name of team
  - League
  - Robot description, robot capabilities, controller and
  - programming language used, sensors included, method of construction, time used for development, cost of materials
  - and awards won by the team in its country, etc.

Engineering Journal

Recorder: XXX **Date:** 1 Jan 2018

Agenda:

1) Build basic robot

2) Program and test line following function

Progress / Status:

1) Robot built with 2 large motor and 2 light sensor

2) Line following works on gentle curves, but fails on sharp bends

Issues:

1) Line following doesn't work on sharp bends

Solutions:

1) Changed program to increase turning speed

Include name of recorder and Date

What the team plans to do today

What was done. What is the current status.

Problems (...be detailed!)

Solutions (...be detailed!)

Engineering Journal

- Highly recommended to include diagrams or tables
- Capture both success and failures with clear explanations
- Must be informative. (...“wheels doesn’t work” is not informative)

Videos

- Video 1 (Common design)
- Video 2 (Alternative design)
- Don’t be limited by what you see in the video!
- You can make any design you want!

What’s Next?

- Plan your design milestones
- Decide on a deadline for each milestone
- Start building, programming, and testing!

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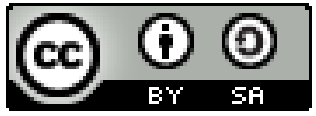
- 

A POSTERIORI

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