

# Automatic Robot : Robo Rescue

## Objective

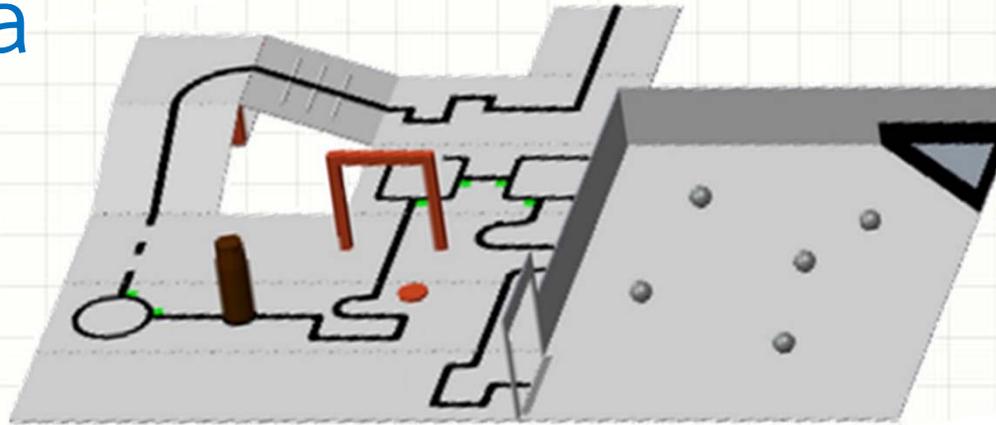
The land is simply too dangerous for humans to reach the victim! Your team has been given the most difficult tasks. It must be able to carry out the rescue mission in fully autonomous mode with no human assistance. The robot must be strong and smart enough to navigate through a treacherous terrain with hills, uneven lands and rubbles without getting stuck. When the robot finally finds the victim, it has to gently and carefully transport the victim to the safe evacuation point where humans can take over.



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## Game Field Specification

### The Arena



- The arena is modular by tiles, which can be used to make an endless number of different courses for the robots to traverse and also provides with the ability to add new tiles in the future.
- The field will consist of 300 mm x 300 mm tiles, with different patterns. The final selection of tiles and their arrangement will not be revealed until the day of the competition. Competition tiles may be mounted on a hard backing material of any thickness.
- There will be a minimum of 8 tiles in a competition field.
- There are different tile designs (examples can be found under rule “Line”).
- Tiles on different levels are connected with a ramp. A ramp does not exceed an incline of 25 degrees from the horizontal surface.

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## Game Field Specification

### FLOOR

- The floor has a white or close to white tone. The floor may be either smooth or textured (like linoleum or carpet), and may have steps of up to 3 mm height at joins between tiles. Due to the nature of the tiles, there may be a step and/or gap in the construction of the arena. These are not intentional and will be minimized as much as possible by the organizers.
- Competitors need to be aware that in some competitions, tiles may be mounted on thick backing or raised off the ground, which may make it difficult to get back on a tile should the robot come off. No provision will be made to assist robots that drive off a tile, for getting back on the tile.

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## Game Field Specification

### FLOOR

- Tiles will be used as ramps to allow the robots to “climb” up to and down from the elevated tile.
- Robots, therefore, must be designed so that they can navigate along any tile that may be placed under another tile. The minimum free height will be 25 cm.

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## Game Field Specification

### LINE

- The black line, 1-2 cm wide, may be made with standard electrical insulating tape or printed onto paper or other materials. The black line forms a path on the floor. (The grid lines indicated in the drawings are for reference only and competitors can expect tiles to be duplicated, different and/ or omitted.)
- Straight sections of the black line may have gaps with at least 5 cm of straight line before each gap. The gap is 20 cm at most.
- The arrangement of the tiles and paths may vary between rounds.
- The line will never be closer than 10cm to any edge, so the robot will never fall of the arena.

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## Robot Dimensions

## Control

- Robots must be controlled autonomously. The use of a remote control or manual control, or passing information (by sensors, cables, wirelessly, etc.) to the robot is not allowed.
- Robots must be started manually by the team captain.
- Pre-mapped type of dead reckoning (movements predefined based on known locations before game play) is prohibited.
- Robots must not damage any part of the arena in any way.

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## Robot Dimensions

### Construction

- Any robot kit or building blocks, either available on the market or built from raw hardware, may be used, as long as the design and construction of the robot are primarily and substantially the original work of the students.
- Any commercially produced robot kits or sensor components that are specifically marketed to complete any single major task of Robo Rescue will be disqualified. For example, pre-programmed sensors with special features for line-following or obstacle tracing are not allowed. If there is any doubt, For the safety of participants and spectators, only lasers of class 1 and 2 are allowed. This will be checked during inspection.
- Bluetooth Class 2, 3 and ZigBee communications are the only wireless communication types allowed in this competition. Robots that have other types of wireless communications on board will need to be either removed or disabled for possible interference with other competing in competition area. If the robot has equipment for other forms of wireless communication, the team must prove that they have disabled them. Robots that do not comply may face immediate disqualification from the tournament.
- Robot must be able to pass through the doorway without moving it from its original position.

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## Game Rules

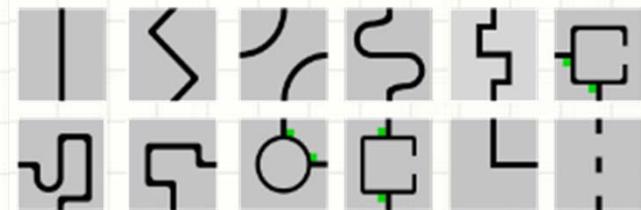
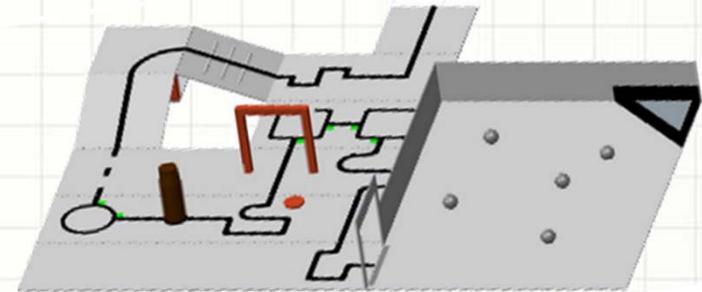
A robot will be given a maximum time of 8 minutes

The robot should follow the line while overcoming different problems:

- 15 points for each tile with intersection(s)
- 10 points for each obstacle
- 10 points for reaching the line after a gap in the line
- 5 points for each tile with speed bump(s)

At the end of the line it will be a rectangular room with walls, where the robot should transport as many balls as possible to an evacuation point in one of the corners of the room. The team will earn 40 points for each ball.

If the robot gets stuck somewhere in the field it can be restarted at the last visited checkpoint. The robot will also earn points when it reaches new checkpoints



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## Score Sheet

Round	Intersection (1)	Obstacle (2)	Gap (3)	Droptile (4)	Ball (5)	Total (1+2+3+4+5)
	15 Point	10 Point	10 Point	5 Point	40 Point	
1	..... X 15	..... X 10	.....X 10	.....X5	.....X 40	..... (A)
2	..... X 15	..... X 10	.....X 10	.....X5	.....X 40	..... (B)
3	..... X 15	..... X 10	.....X 10	.....X5	.....X 40	.....(C)
SUM	(A) + (B) + (C)					.....(D)

$$\text{Score} = \frac{(D)}{\text{Whole Score}} \times 100$$



Result of Competition / Ranking