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AI Mission Racing

League
Junior/
Challenge

Participation
1~2
Person  1
Robot

Construction
Pre-made

1. Game Description

AI mission racing aims to program humanoids and drive along a given line on the field, remove obstacles on the line and arrive at the destination quickly. For line recognition, robots must judge themselves in a given situation using a camera, and sensors can be used to recognize obstacles. This event will be held face-to-face only.

2. Robot

2-1. Robot type Humanoid

2-2. Composition of robot

2-2-1. Construction All robots must be pre-made before the competition and extra time will not be given in the competition hall.

2-3. Power

2-3-1. Autonomous movable independent power must be used, and combustion engine is not allowed to use.

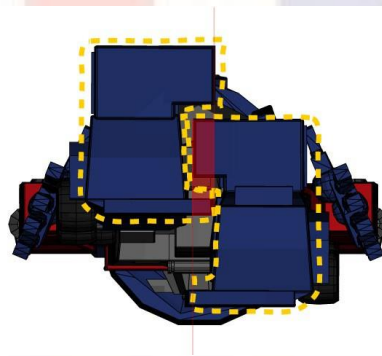
2-3-2. No limit on current or voltage

2-4. Operation

2-4-1. It should walk by two legs, without any linking structures.

2-4-2. While standing, both feet should not cross each other.

EX



<While robot is standing, sole should not cross each other like above.>

2-5. Program

2-5-1. Robot must move by itself and moving by remote controller is not allowed.

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2-6. Spare robot

2-6-1. Robot preparation Participant can bring spare robot to the competition site, but both main and spare robots must be confirmed by referee before the match.

2-6-2. Usage of spare robot Before the declaration of starting the competition, the spare robot must get a confirmation by the referee for exchange.

2-7. Camera module

2-7-1. Camera modules for robot situation determination shall be installed.

2-7-2. There is no restriction on communication standards or the number of pixels.

2-7-3. The camera is connected to the power of the robot.

2-7-4. Smartphone cameras are not available.

2-8. Sensor

2-8-1. Usage of sensor Sensor may be used for recognizing an obstacle.

2-8-2. Number of sensor 1

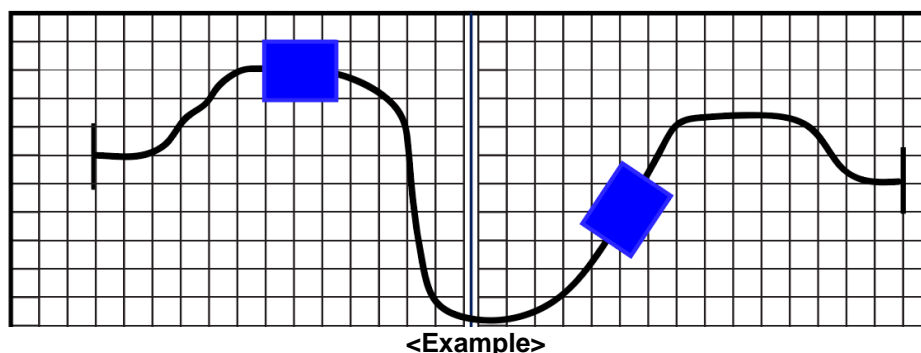
2-8-3. Type of sensor No limitation

2-8-4. Limitation on purpose of sensor Cannot use except on the purpose of recognizing obstacle.

3. Competition site

3-1. Competition site Playfield approved by International Robot Olympiad Committee.

3-2. Size and composition The size of playfield has to be 160cm X 120 cm (error $\pm 10\%$) and is constituted with one or two or more plates connected together.



3-2-1. Allowable range of error in the stadium The slope under 2° (error $\pm 10\%$) and a gap or bump under 0.3cm (error $\pm 10\%$) is allowable.

3-2-2. Prevention for falling robot There will be no special structure to prevent robot from falling.

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3-2-3. Distance between fields Distance between two playfields are within 50cm.

3-3. Playfield Covered with a white sheet paper, and there may be an advertisement or a logo of the host.

3-3-1. Mission map Checkered map with 10cm interval is used, stick on the field with sheets and tape. Also, distance points will be written on the checkered patterns based on starting point to record score. Obstacles are installed on the driving course.

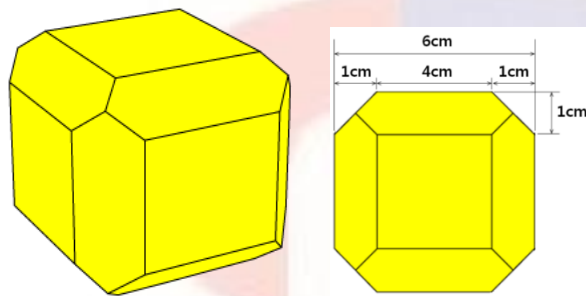
3-3-2. Driving course Course will be drawn in line with a combination of straight and curved lines.

3-3-3. Line Yellow line with 2cm (error $\pm 10\%$) in width.

3-4. Playfield adjuncts

3-4-1. Obstacle

Large obstacle: 6cm x 6cm x 6cm (W x L x H, error $\pm 10\%$)



<Example>

4. Process

4-1. Game process Game is processed by record, and the chance is given twice. Rectifying time will be given between chances.

4-2. Robot production and practicing time At least 30 minutes and 2 hours in maximum will be given for producing robot and practicing, and will be noticed on the day.

4-3. Assignment of playfield Depends on number of participants and level of difficulty.

4-4. Production and practicing Participant can practice on the playfield until production and practicing time noticed, but cannot before playfield assignment.

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4-5. Production and end of practicing When time for production and practicing finishes, the participant must stop the robot and go back to their seat following staff and referee's instruction.

4-6. 1st trial 1st trial will start right after the production and practicing time (or after lunch).

4-6-1. Preparing competition All participants must bring their robots and wait in line following instruction of staff and referee.

4-6-2. Stand by after competition All participants should not go back to their seat, but must wait in line after their trial until all participant finishes their trial.

4-7. Modification Time for modification will be given to all participant after 1st trial for robot modification and practicing. Modification time will be noticed on the day.

4-8. 2nd trial 2nd trial will be held right after the modification.

4-8-1. Preparing competition All participants must bring their robots and wait in line following instruction of staff and referee.

4-8-2. Stand by All participant must go back to their seat after their trial.

5. Match

5-1. Performing of the mission The robot must drive through the given line and arrive at the destination following the mission open on the day. Obstacle on the line must be erased by the robot while moving.

5-1-1. Erase of obstacle Obstacles must be erased, since they are considered as a structure blocking the driving course.

1) Obstacles are not fixed

2) When removing an obstacle, it should be removed using the hand that removes the obstacle, and if the act of removing the obstacle or removing the obstacle with the robot's foot is performed while walking forward, the game is immediately terminated (TKO)

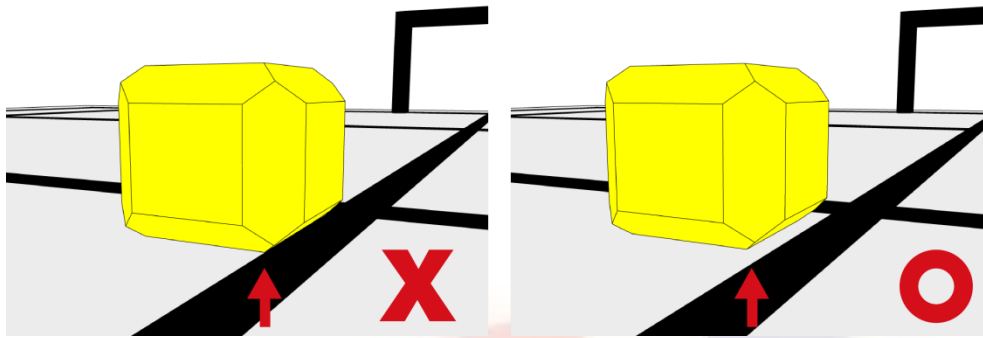
3) The criteria for determining the removal of obstacles are shown in the figure below.



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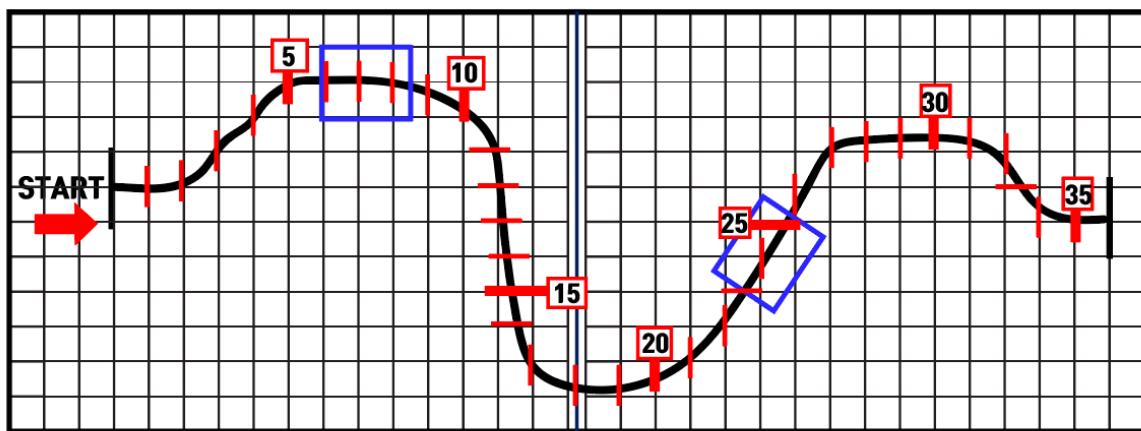
Example of obstacle erase

5-2. Earning points The points of the place where robot stopped is earned.

5-3. Mission open All missions such as playfield, driving course, arrangement of obstacle is open on the day before the competition at the site, and extra mission paper for checking the points will be given.

2022 International Robot Olympiad Committee

AI Mission Racing



1. 1points when robot goes through the red line.
2. Counting starts at the moment when getting out of the starting area, and counted as returning when the robot goes above the returning point.
3. If robot at least touches the red line, it is counted as earning point.

obstacle

***This mission map is not allowed to be brought outside till the end of the competition.**

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<Example>

5-4. Departure Start at the starting point with the sign of referee. Referee must give starting sign while starting the timer.

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5-5. Arrival Referee stops timer when robot stops. (10 seconds will be counted and if moving while counting, the timer starts again.)

5-6. Start Start by referee's start sign.

5-6-1. False start If starting before referee's starting sign, false start will be announced, and the game will be played again.

5-6-2. Restart Chance of restarting is given once per game. If false start occurs twice a game, the participant may be disqualified.

5-7. Time limit Mission will be on open on the day, and the time will be given within maximum of 2 minutes depending on the mission.

5-8. Finish of competition

5-8-1. Record Points for moved distance and time is recognized as record. If same in distance, time takes the priority.

5-8-2. Line breakaway Considered when robot doesn't touch the line at all. If the robot breakaways the line, the game finishes, and the record before the declaration of finish is accepted.

5-8-3. TKO (Technical Knock Out) When moving ordinarily is impossible, referee may declare TKO conforming to robot stop without 10 counts. The best record till the declaration of TKO is considered as the final record. (i.e. when moving the same places repetitively, when blocked by a structure or obstacle and not moving, when moving out of the playfield (falling from the playfield), etc.)

5-9. Game over due to disqualification When violating game rules or doing an action interrupting game, game will finish as disqualification, and the record of the trial will not be accepted.

5-9-1. Robot touch When the participant touches robot without acceptance of referee or staff, robot touch may be declared, and the trial will be disqualified.

5-9-2. Robot modification while competition Adding, removing, exchanging or modifying component of the robot during the competition is not allowed, and if holding extra components, tool, or battery while waiting for modifying robot, the trial will be disqualified.

5-9-3. Defaulting assigned playfield When playing or practicing at other's playfield except the assigned field, the participant will be disqualified.

5-10. Rematch When accident such as blackout or trouble in timer happens, rematch may occur as a decision of referee.

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5-11. Decision of referee Referee has authorization to control all situations and participants at all times during the competition. Judgement of the competition result is referee's own authorization and referee has authorization for the final judgement.

6. Competition record

6-1. Recording items Points per course and time recorded

6-2. Points per spots in course Judgement of points is considered on the spot where the robot stopped at declaration of finish. The highest point of the spot where the robot stands will be recognized at the final point.

6-3. Time record Time counted at the timer when the robot finally stops at the finishing point will be acknowledged as the time record. (Line breakaway, TKO will not be acknowledged as time record.)

6-4. Final record Better record among 1st trial and 2nd trial will be considered as the final record.

6-5. Priority of record If tied when arriving at the same grid, comparison between time record will be held to choose the rankings.

6-5-1. Priority on trial If tied on the same trial, record of another trial should be compared to choose the rankings.

6-5-2. Priority when record Better record among 1st trial and 2nd trial will be considered as the final record, but when tied, the participant with better score on the 1st trial takes priority.

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