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Emergency Rescue Extreme	League	Participation	Construction
	Junior/ Challenge	1 Person 1 Robot	Pre-made

1. Game Description

It aims to complete various missions with humanoid robot to save people in the playfield which is assigned as disaster scene. Your robotics controlling ability will be evaluated by completing missions in area where people are not allowed to enter inside.

2. Rules

2-1. Type of robot: Articulated two-legged walking robot (humanoid). TBA

2-2. Composition of robot

2-2-1. Construction: pre-made

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

2-2-2. Classification

2-2-2-1. Match is divided into standard and extreme game.

- 1) Standard: It appoints first version of regular humanoid, only robots approved by IROC can participate the competition.
 - Not allowed to modify anything in the kits such as gripper.
- 2) Extreme: No limitation on components and items, all humanoid robot can participate in the competition

2-3. Power

2-3-1. Robots should work with an independent electric power supply; it cannot use a combustible device.

2-3-2. There are no limitations on battery type and voltage level

2-4. Operation

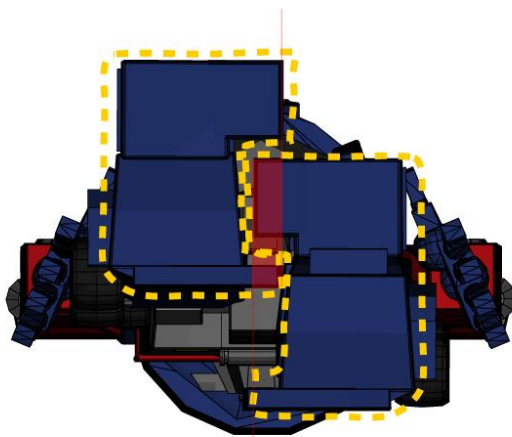
2-4-1. It should be two-legged articulated robot without linking structure

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

ex



<While robot is standing, feet should not cross like above picture>

2-5. Programming and control

2-5-1. Both programmed robot and remote-controlled robot are both allowed.

2-5-2. communication control specification

2-5-2-1. Only Zigbee /Bluetooth /2.4Ghz wireless are allowed to use.

2-5-2-2. Smartphone are allowed as a remote controller, but airplane mode must be turned on all the time.

2-5-2-3. Cable-based control is not allowed.

2-5-2-4. When communication system is interrupted, any team couldn't change channel or failed to function will be disqualified.

2-6. Spare robot

2-6-1. Robot preparation

Participant can bring spare robot to competition site and both main and spare robots should be confirmed by referee before the match.

2-6-2. Use of spare robot

It is not allowed to switch robots during the match. After getting confirmation by the referee, then can switch spare robot before the match starts.

2-7. Module of Camera

2-7-1. This extreme category requires installation of camera module that can transfer video images in real time.

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2-7-2. There is no limitation on standard of telecommunication and pixel.

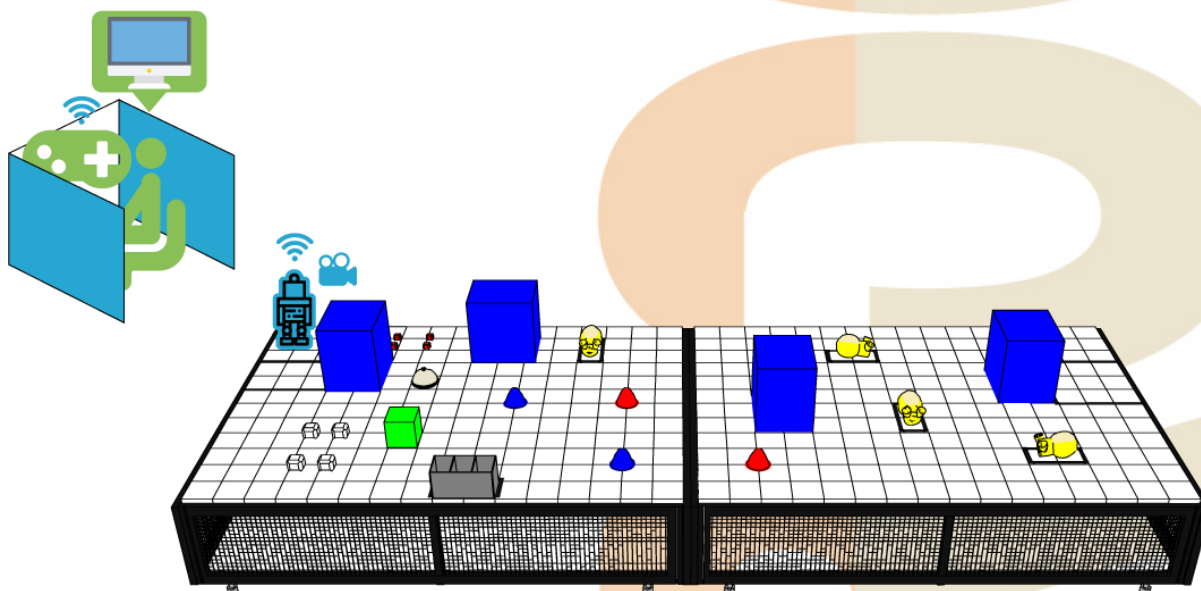
2-7-3. It can use independent power or connect to power of the robot.

1. Competition Site

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

3-2. Size and composition

The size of playfield must be 160cm X 120 cm ($\pm 10\%$) and connecting two playfields.



<Example of Playfield>

3-2-1. Allowable range of error in the stadium: The slope that is less than 2° ($\pm 10\%$) and a gap or bump that is less than 3mm ($\pm 30\%$) is allowable.

3-2-2. Prevention for falling robot: There will be no special structure for falling robot.

3-3. Playfield It is cover with matt coat polyethylene terephthalate paper which includes advertisement and logo from the organizers.

3-3-1. Mission map

It will be printed with 10cm squares and it will be fixed to the steel structure. Various objects and obstacles could be assigned in different location and direction.

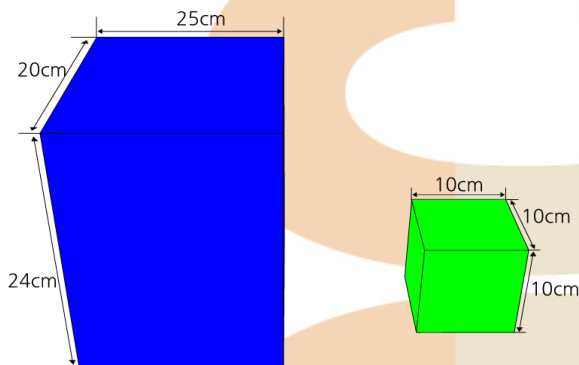
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3-4. Appendage of Competition

3-4-1. Obstacles

- 1) Large obstacle: 24cm x 20cm x 25cm (W x L x H, $\pm 10\%$)
- 2) Small obstacle: 10cm x 10cm x 10cm (W x L x H, $\pm 10\%$)



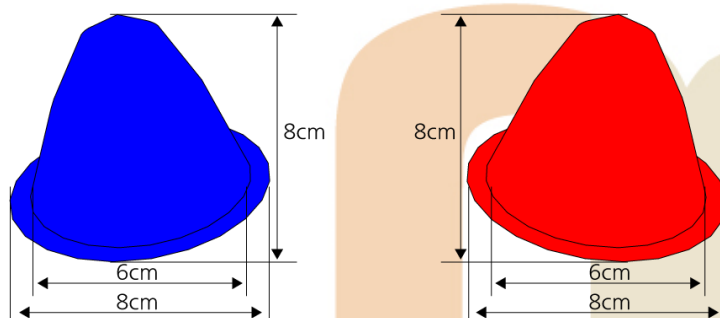
<Example of Obstacles>

3-4-2. Flame cone: Red cone which is made of PVC.

8cm x 8cm (Diameter x Height, $\pm 10\%$), Weight is 15g ($\pm 10\%$)

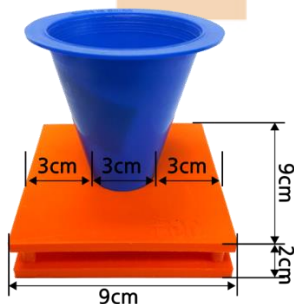
3-4-3. Extinguishing cone: Blue cone which is made of PVC.

8cm x 8cm (Diameter x Height, $\pm 10\%$), Weight is 15g ($\pm 10\%$)



<Example of Cones>

- 1) Allocation of extinguishing cone: It will be allocated in the playfields in unfixed form



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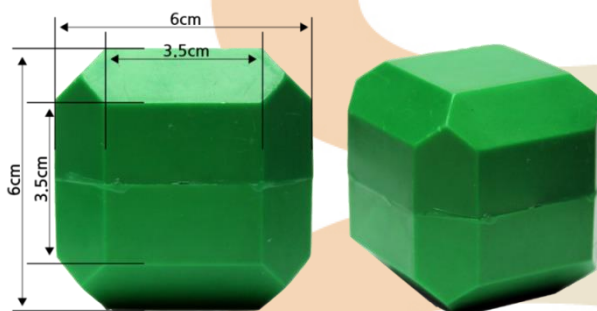
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<Example of extinguishing cone>

- 2) Adjustment of extinguishing cone: Before the match, participant can adjust the pallets and cones slightly in the designated grid.

3-4-4. Debris

- 1) Large debris: 6cm x 6cm x 6cm (W x L x H, $\pm 10\%$), Weight is 23g($\pm 10\%$)



<Example of large debris>

- 2) Small debris: 3cm x 3cm x 3cm (W x L x H, $\pm 10\%$), Weight is 15g($\pm 10\%$)



<Example of Small debris>

- 3-4-5. Citizen: Doll in human form and made up of fiber. 52g($\pm 10\%$)

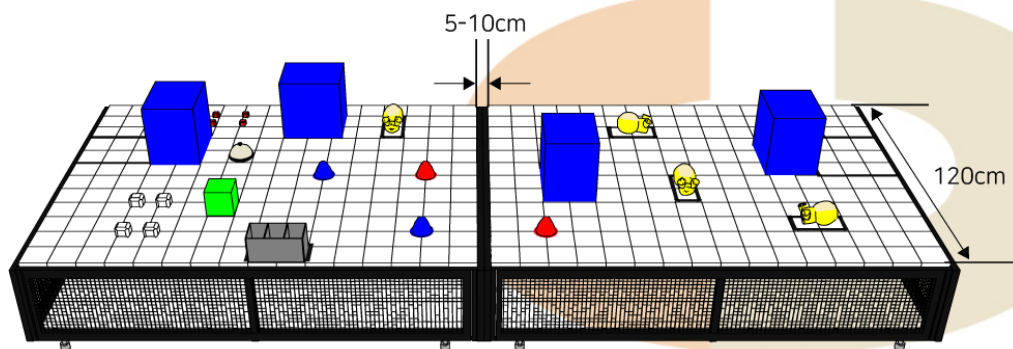


<Example of citizen>

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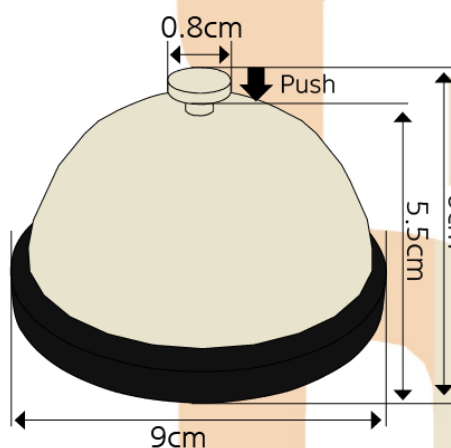
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3-4-6. Crevasse: 5~10cm x 120cm deep crevasse on the playfield (W x H, $\pm 10\%$)



<Example of crevasse>

3-4-7. Bell: Dome type chime bell, 9cm x 6cm(Diameter x Height, $\pm 10\%$)



<Example of bell>

3-4-8. Stretcher(Participant self-production)

Participant must bring their own stretcher for their match. Before starting the match, they can locate their own stretcher on the designated place noted in the mission paper. It can be only used in a way to rescue citizen

- 1) Size of stretcher can't be more than 10cm x 20cm x 10cm(W x L x H)
- 2) It is not allowed to use if it exceeds the above size limits.
- 3) It is not allowed to use gearing equipment.
- 4) It is not allowed to connect with your robot using rope or magnets.
- 5) It will be considered as same as your robot if it touches obstacles.
- 6) Individual Stretcher is considered as a personal item for each participant

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and it can't be shared with other participants.

4. Competition progress

4-1. Game process

Chance will be given twice. After first trial there will be repair time.

4-1-1. There will be a closed place which is less than 5m far from the competition site and participants should control their robot through the installed camera in that place.

4-2. Practice time

Practice time will be given more than 30min, less than 120min depending to the number of participants and mission level. It will be announced the day of match.

4-3. Allocation of competition site

It will be allocated based on number of participant and difficulty level of the game.

4-4. Practice

Participants can practice until the end of announced practice time; however it is not allowed to practice before their seat's been assigned.

4-5. End of practice time

When the practice time ends, participants should stop their robot and go back to their seat and follow the instruction of referee and staffs

4-6. 1st Trial Right after the construction and practice time, the 1st run will begin.

4-6-1. Preparation of the game

All participants must take out the robot and be ready for referee's instruction.

4-6-2. Stand by after the game.

When a participant finished their 1st trial, they have to line up and wait for all participants' game to be completely finished.

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4-7. Repair Time

After the end of 1st run, the entire participant will have repair and practice time. It will be announced on the day of match.

4-8. 2nd Trial Right after the repair time, 2nd trial will begin directly.

4-8-1. Preparation of the game

All participants must take out the robot and be ready for referee's instruction.

4-8-2. Stand by

After their second trial, participant should go back to their seats.

5. Match

5-1. Performing of the mission

Emergency rescue situations such as earthquake, building on the fire and multiple car accident will be given to participants. There will be a concept for each competition. Depending on the concept, combination of 4~5 following missions will be given to participants.

5-1-1. Avoiding obstacles: Obstacles are considered as dangerous structures that can collapse, so participant should avoid obstacles.

- 1) It is not fixed with playfield.
- 2) If Any parts of robot touches obstacle, it will be deducted 1 point.
- 3) When robot touches the obstacle several times because of its continuous motion, it is considered as one time touch.
- 4) If obstacle moves away from its designated place completely, referee will declare the collapse of obstacle and the match will be ended. Referee will declare the disqualification of the player.

5-1-2. Build up a clearway: It is required to secure a clearway by removing cars, debris and other things for people to escape safely.

5-1-3. Fighting against the fire: It is required to overlap the extinguish cone on the flame cone in order to fight against the fire.

- 1) It will be declared as failure of mission when the extinguish cone has fallen down on the playfield at the time match finished.
- 2) Participant can try again when they fail to fight against the fire.
- 3) If any parts of robot touch the flame cone, it will be same rule will apply above

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article 5-1-1.

5-1-4. Removing debris: Debris is required to be thrown out of playfield.

5-1-5. Rescue the people: It is required to save people who are in danger.

1) Debris or any dangerous structures must be removed first to escort people to safe place.

2) Stretcher can be used to rescue several people at a time.

3) When you rescue the people, you must use its both hands and your own stretcher.

4) If citizen has been touched on the floor(not stretcher) or one of robot hands has been detached during the movement or citizen falls down from the stretcher during the move, referee will stop the match and citizen doll should be relocated in the original place directly and restart the match. Those decisions will be made by referee.

- It will be admitted to hold human with one hand and use the other to support the actuator of the hand. However, it will be considered as one hand deliver when it is detached.

5) If the stretcher including citizen failed to get in safety zone more than 50%, It is not considered a point.

6) If citizen or stretcher touches obstacle or flame cone, the point will be deducted. (This deduction will be applied when it touches obstacle or flame after the citizen has been moved in the safe zone.)

5-1-6. Pass through crevasse: It is required to pass through crevasse with certain movement.

5-1-7. Ring the bell: It is required to ring the bell in order to alarm the disaster.

5-1-8. Avoid traps: It is required to avoid the areas of collapsed hazard.

5-1-9. Emergency mission: Emergency mission will be given to participant. There will be a time limit for these emergency missions.

Ex1) Ring the bell within 30 sec. Even if participant ring the bell after 30 sec, there is no point for the emergency mission.

Ex2) Fight against the fire within 50 sec. Even if participant extinguishes the fire after 50 sec, there is no point for the emergency mission.

5-2. Start A participant should start the robot when the referee starts the game.

5-2-1. Miss Start

If participant couldn't start within 5 counts from referee's signal, it will be declared as

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'Miss Start' and they have two more chance to restart for this miss start.

5-2-2. False start

If the participant starts the robot before the referee's signal, it is declared as 'False start' and they have only one more chance to restart.

5-2-3. Restart

Rule will apply according to 5-2-1, 5-2-2. However, If it is declared as 'Miss start' when you restart after 'False start', it will be given only one chance to restart.

5-3. Robot falls

When robot falls off the playing field, referee will pick up the robot on the place where the robot falls and restart the game after 10 seconds count. If robot moves during those 10 counts, it will be declared as 'False Start' and participant will have one more chance to restart after 10 counts again.

5-4. Time limit

It will be given 2 minutes for the match.

5-5. Officialize of the Mission

Arrangement of the block and given mission that has to be performed will be released on the day of match on the mission paper. Different points for each mission will be assigned depending on mission level and concept. Points for each mission and mission map will be announced on the day of match.

5-6. End of Match

5-6-1. Complete the mission

If participant completes the mission before 2 minutes, it will be finished and the time record and mission points will be recorded at the moment robot completes the mission.

5-6-2. Time limit

If robot couldn't complete the missions within 2 minutes, points will be recorded at the moment that time ends.

5-6-3. Robot stop (Malfunction)

If the robot doesn't move the referee will count 10 seconds and if the robot still cannot move, referee call it a robot stop and record the points before it stops.

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5-6-4. TKO (Technical Knock Out)

During the match, referee can declare of TKO without 10 counts when referee judge that the robot can't drive properly anymore. (Ex. robot had been stopped over the structure and obstacle, robot driving settled zone repeatedly)

5-7. Disqualification

Participants can be disqualified if violation is spotted by referee or staff.

5-7-1. Robot touch

During matches, If participants touch the robot without judge and supervisor authorization, it will be declared as 'Robot Touch' and will be disqualified for that trial.

5-7-2. Disobey of seat allocation

If participant practice or play the game in a playfield where they are not allocated, participant will be disqualified.

5-7-3. False Start

If participant conduct 'False Start' twice, participants will be disqualified.

5-7-4. Miss Start

If participant conduct 'Miss Start' three times, participants will be disqualified.

5-8. Referee will control all situations from and referee have authority to control participants. The judgment of game result is exclusive authorization of referee. The declaration shall be final.

6. Evaluation

6-1. Ranking decision factors: Mission points and time record

6-2. Mission point

When referee declares that the game finished, he/she will count mission points. Only referee has right to finalize the score.

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6-3. Time record: Time record is based on the timer.

6-4. Final score

Better score out of 1st and 2nd trial will be the final score.

6-5. Order of priority to result

Mission point > Time record

6-5-1. Order of priority according to trial

If result is same, winner will be decided after looking at the result of another trials.

6-5-2. Order of priority according to Tie-Breaker

- 1) Better score out of 1st and 2nd trial will be accepted as final point, but if tied, player with better result in 1st trial will win the game
- 2) **If tied when deciding 1st and 2nd runner, the winner is decided according to the mission priority below.**

Rescue the people > Fighting against the fire > Ring the Bell