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Mission Challenge	Division	Team	How to Create
	Junior/Senior	1-3 people, teams	On-site

## 1. Description

**Mission Challenge** is an event where teams are given unexpected missions on-site and creatively build robots on-site according to the given mission. It is conducted in a limited situation and without a fixed platform to evaluate problem-solving, creativity, and collaboration through the application of scientific knowledge and robotics.

## 2. Robot

**2.1 Type of robot** No restriction

**2.2 Robot manufacture** All mechanical parts except the robot controller must be built by the competitor. It must be built on-site (solderable) at the competition site, comply with the specifications, and be measurable with instruments.

### 2.2.1 Dimensions of the robot

**2.2.1.1 Robot size** is no larger than 18 cm x 22 cm (width x height)

#### 2.2.1.2 Measuring size

- 1) Self-measuring:** Participants can measure their robots on their own during build and practice time.
- 2) Official Measurement:** The referee measures the size of the robot before the match starts.
- 3) Measurement method:** In the presence of the contestant, the referee will power on the robot and measure it with a size measuring tool, and the contestant cannot challenge the referee's decision.
- 4) Correction time:** If the robot is over-sized, it will be given one minute to correct. The correction must be made at the timekeeper's table in the arena. Failure to make corrections within the allotted time will result in disqualification for the next round. However, modifications can only be made to the hardware, not the software.

International Robot Olympiad Committee



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**2.2.2 Robot sensor** No limitations on the robot

**2.2.3 Powering the Robot**

**2.2.3.1 Power source configuration** Must use an autonomous, mobile, off-grid power source; combustion engines are not allowed.

**2.2.3.2 Power Capacity** There are no usage restrictions on the capacity current and voltage of the power source.

**2.2.4 Robot drive** No drive restrictions for robots

**2.2.5 Robot motor** No motor limitations on the robot

**2.3 The programmed and control** Robot must be capable of autonomous operation by the program and must not be operated from the outside except at the time of departure (you may hold the robot at the start line).

**2.4 Disassembling the motor horn and wheels** The wheels and tires do not need to be removed, and the wheels and motor horn cannot be pre-attached.

### 3. Playfield

The composition, layout, and size of the arena is determined by the mission and will be announced on the day of the match.

### 4. Match

**4.1 Match** The match is a record match, with a total of two chances, with a correction period between each attempt.

**4.2 Robot construction and practice time** Robot construction and practice time will be at least 2 hours and will be announced on the day of the competition.

**4.3 Playfield assignment** Will be allocated based on the number of participants and difficulty level of the competition.

**4.4 Production and practice** participants may practice in their assigned playfield until the announced production and practice time and are prohibited to begin practicing prior to their assigned arena.

**4.5 End of Build and Practice Time** When Build and Practice Time is over, stop robot and follow the instructions of the moderator to designated seat.

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**4.6 1<sup>st</sup> Round** Immediately following the production and practice time (or after lunch), conduct the first period.

**4.6.1 Match Preparation** All competitors must come out with their robots and wait as directed by the referees and officials at each venue.

**4.6.2 Post-match** All participants do not return to their seats after finishing their match, but wait in the queue until all participants' matches have finished.

**4.7 Modification Time** After the first round of competition, all competitors will be given time to modify or practice their robots. The modification time will be announced on the day of the competition.

**4.8 2<sup>nd</sup> Round** The match will be played immediately after the correction period.

**4.8.1 Preparation** All competitors must come out with their robots and wait as directed by the referees and officials at each venue.

**4.8.2 Post-match waiting** All participants take their turn to play and return to their seats to wait.

## 5. Match

**5.1 Mission completion** Missions do not specify a driving route and mission order, participants can autonomously determine the driving route and mission order to complete the mission.

**5.2 Scoring Points** You earn points based on the number of objectives you complete. Your objective score will be revealed on the day of the match alongside the mission.

**5.3 Start** Starts after signal from the start referee.

**5.3.1 Miss Start** Failure to start within 5 counts of the start signal is a failure to start and a restart is allowed. You will be given a total of 2 chances to restart for a miss start.

**5.3.2 False Start** If the robot is operated before the referee's start signal, an illegal start is declared and the robot is given one chance to restart.

**5.3.3 Restart** Will be given 2 restarts for a miss start and 1 restart for a false start. However, you will be given a maximum of two restarts. (Only one restart will be granted if you miss start after a false start.)

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**5.4 Time** Unveiled on-site before the start of a match with mission.

**5.5 Mission Opening** The shape of the mission's playfield, the location and number of targets and objectives, etc. will be revealed on-site before the mission and match begins.

**5.5.1** Before the start of the match, the referee will explain the mission to the representatives of the participating teams.

(e.g., lift a target weighing 500 grams and pass it behind a 1 meter high wall, climb a 1 meter wall to reach the target, etc.)

**5.5.2** The referee explains the scoring criteria for the mission.

(e.g., the robot must quickly move three metal balls in water, and if it misses one, it will receive a 60-second penalty that will be added to its final time.)

**5.5.3** Scoring is based on quantitative criteria such as time, distance traveled, and number of targets moved, but competitions can be conducted through knock-out competition and subjective evaluation.

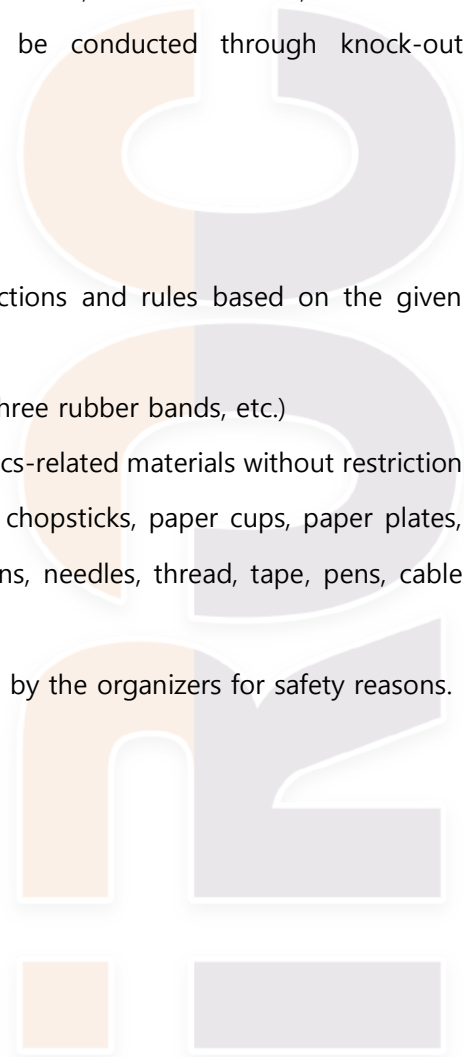
**5.5.4** The referee may announce additional restrictions and rules based on the given mission.

(For example, participants must use at least three rubber bands, etc.)

**5.5.5** Participants can also use common, non-robotics-related materials without restriction.

(Examples: paper, Styrofoam, wooden sticks, chopsticks, paper cups, paper plates, plastic plates, paperclips, binder clips, hairpins, needles, thread, tape, pens, cable ties, rubber bands, etc.)

**5.5.6** Some tools and equipment may be restricted by the organizers for safety reasons.

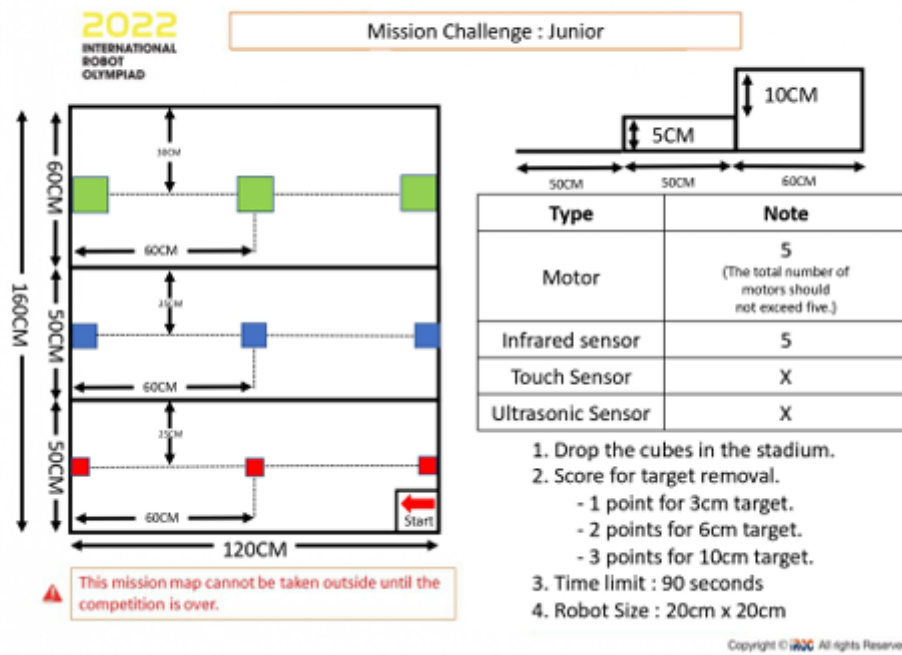


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### Example of the mission



<Figure 1> Mission example

## 5.6 Ending a match

**5.6.1 Mission Completion** If you complete a mission before the time limit, the match will end and your mission score and time will count as of the end of the match.

**5.6.2 Time limit** If you fail to complete the mission within the time limit, your score will be counted at the end of the time limit.

**5.6.3 Robot Stop** If a robot stops moving during a match, the referee will give a 10-count. If the robot does not resume operation within the count, the robot is declared robot stop and the score at the time of the stop is recognized as the score.

**5.6.4 Technical Knock Out (TKO)** If a robot is unable to drive normally, the referee may declare a TKO, which is equivalent to stopping the robot without a 10-count.

- 1) Repeatedly moving an area
- 2) Stopped progressing at a point being stuck or blocked by a structure, obstacle, etc.
- 3) Out of playfield (falling robots), etc.

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**5.7 Disqualification** If a player violates the rules of the game or interferes with the progress of the game during a match, the match will be terminated by disqualification and the player's score will not be recognized.

**5.7.1 Robot Touch** If a player touches the robot during a match without the permission of the referee and supervisors, a Robot Touch will be declared and the player will be disqualified.

**5.7.2 Robot repair during match** Adding, removing, exchanging, or altering parts of the robot during the competition is not allowed, and if a team is found to be in possession of spare parts, tools, batteries, etc. for the purpose of repairing the robot while waiting for the competition, the team will be disqualified.

**5.7.3 Sensors** Attempting to tune sensors in the arena before the start of a match or being caught doing so will result in disqualification.

**5.7.4 Failure to honor playfield assignment** Any participant found practicing or competing in a playfield other than the assigned playfield will be disqualified.

**5.7.5 False Start** Any competitor with two false starts in a given race will be disqualified.

**5.7.6 Miss Start** If a competitor fails to start three times in a given race, the competitor will be disqualified.

**5.8 Rematch** In the event of an unforeseen event at the venue, such as a power outage, the referee and supervisors may conduct a rematch at their discretion.

**5.9 Referee's Decision** The referee has the authority to preside over all situations and supervise the participants from the beginning to the end of the match. Deciding the outcome of a match is the sole authority of the referee and his/her declaration is final.

## 6. Match Record

**6.1 Match history items** Mission performance scores and timed times.

**6.2 Timekeeping** The time measured by the referee's stopwatch for the mission that reflects the timekeeping will be accepted as the record. (Stoppages, falls, and TKOs do not count as time.)

**6.3 Final score** The best of the two runs, the first and second, is the **final score**.

**6.4 Priority in record** Separate groups based on their performance scores on the mission and compare driving records for each group to determine their ranking.

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### Mission Performance Score > With or Without Timekeeping > Compare Timekeeping

- 6.4.1 **Priority in round** If the driving results are the same for the same round, the records from different round are compared to determine the ranking.
- 6.4.2 **Priority in tied** Better record upon first or second trial is approved. However, when tied, participant with better record on the first trial is gets priority.



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