RoboCupJunior Rescue Simulation Rules 2026

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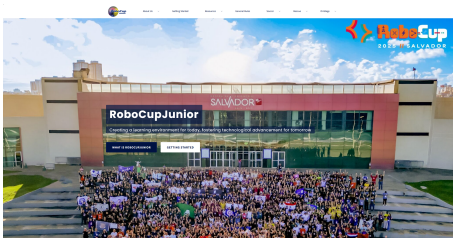
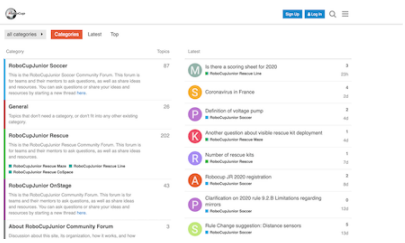
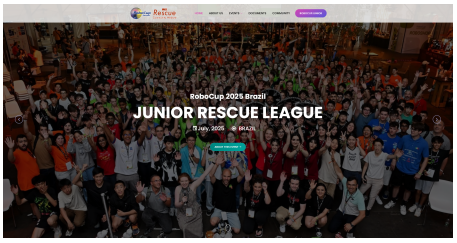
Official Resources

RoboCupJunior Official Website	RoboCupJunior Official Forum	RCJ Rescue Community Website
		
https://junior.robocup.org	https://junior.forum.robocup.org	https://rescue.rcj.cloud

Corrections and clarifications to the rules may be posted on the forum before updating this rule file. It is the responsibility of the teams to review the forum to have a complete vision of these rules.

Before you read the rules

Please read through the RoboCupJunior General Rules before proceeding with these rules, as they are the premise for all rules. The English rules published by the RoboCupJunior Rescue Committee are the only official rules for RoboCupJunior Rescue Simulation 2026. The translated versions each regional committee can publish are only referenced information for non-English speakers to understand the rules better. It is the responsibility of the teams to read and understand the official rules.

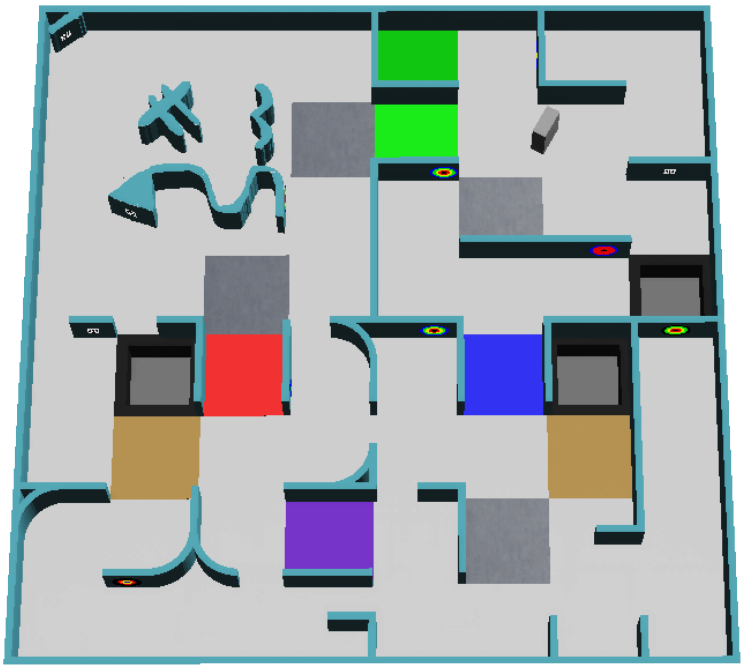
The RoboCupJunior Rescue Simulation rules are developed and reviewed by the RoboCupJunior Rescue Committee. The simulation platform is developed and maintained by the Platform development team.

Corrections and clarifications to the rules may be posted on the forum before updating this rule file. It is the responsibility of the teams to review the forum to have a complete vision of these rules.

The "robot" refers to "virtual robot" in these rules.

Scenario

Rescue teams can use robots to navigate complicated to dangerous or hard-to-access environments for search and rescue operations to minimize the risk to humans. In this challenge, the autonomous controller for a robot must be developed to search and identify wall tokens recognizing the environment in a simulated hazardous rescue scenario. The robot must navigate through challenging terrains without getting stuck, search for wall tokens and signal the wall tokens locations alongside the map of the maze environment to human search teams.



Summary

Since this simulates a rescue environment, the robot's goal should be to try its best to locate all wall tokens by navigating and mapping simultaneously, i.e., map out unknown areas. There are four areas. Areas 1 to 3 consist of a tile-based system maze-like layout. Area 4 (optional area) is not tile-based, and teams are encouraged to explore interesting simultaneous localization and mapping algorithms.

If the robot is stuck anywhere in the field, it can be restarted at the last visited checkpoint or the starting tile if the robot has not reached any checkpoint.

Changes from the 2025 RoboCupJunior Rescue Simulation Rules

- Deleted "Terms and Definitions"
- Deleted "Depending on the competition, games may be executed in one of the following ways or another way. The organizer will notify the teams in advance of how the games will be executed at the competition. It is the responsibility of the teams to be prepared to participate in the games in the manner notified."
- Deleted "The organizers will run the games on a server-client model and prepare one RJ-45 socket for teams to connect to the game server. **Teams must prepare a computer and an ethernet cable to run the prepared programs.** There is documentation at Remote Controller page."
- Deleted " The organizers will run and record the games on the computer which the organizer prepared. They will collect all the teams' simulation software before the competition is recorded. The recordings will be used as competition runs and showcased during the competition. Teams need to prepare proper documents to show how to run the program on the organizer’s computer.},{--The game will be executed on a simulation environment prepared on a cloud environment. Teams will need to provide a Docker file or image that will run on the cloud environment according to the documentation provided. There is documentation at erebus-dockerfiles repository."
- Added "The organizers will run the games on a server-client model and prepare one RJ-45 socket for teams to connect to the game server. **Teams must prepare a computer and an ethernet cable to run the prepared programs.** There is documentation at Remote Controller page."
- Changed "are" to "can be"
- Deleted "In the end, since walls can take any shape, there is no real distinction between objects and walls."
- Changed "While the robot is on this tile, simulation time is consumed at 5 times the normal rate." to "While the robot is on this tile, simulator’s time will run faster.This means that the time shown in the image below will run faster."
- Added "The first time the robot enters a swamp, while it is inside, the simulation time will be consumed 5 times faster than the normal rate. Then, on each subsequent entry into the same swamp, this rate will increase by one point (x6, x7...) until it reaches the limit of x10."
- Added "The center of the obstacle will always be on a tile and not on the edge between them."
- Added "There will be no more than one obstacle on a tile."
- Changed "hazmat signs" to "cognitive targets"
- Changed "Wall tokens" to "Letter victims"
- Changed "H" to "Φ"
- Changed "S" to "Ψ"
- Changed "U" to "Ω"
- Added "On the walls, we can also find wall tokens with the same symbols as the victims, but where the letters are three-dimensional, as we can see in the image below. This depth will be detectable

with one of the sensors provided in the robot customizer.These wall tokens are fake and must not be reported to the supervisor or included on the map."

- Deleted "Hazmat signs are taken from the RoboCup Rescue League Website, out of which four will be used: Flammable Gas, Poison, Corrosive, Organic Peroxide"
- Added "Cognitive targets represent hazmats in the area where they are located."
- Added "They have the shape of a circle with a diameter of 5 cm. The outermost circle has a diameter of 5 cm, consisting of up to five concentric rings. The innermost circle has a diameter of 1 cm, and the diameter of each subsequent outer ring increases by 1 cm, resulting in rings with diameters of 1 cm, 2 cm, 3 cm, 4 cm, and 5 cm."
- Added "The rings and the circle can have different colors. The color of the rings and the circle correspond to a numerical value:"
- Added "Black = -2"
- Added "Red = -1"
- Added "Yellow = 0"
- Added "Green = 1"
- Added "Blue = 2"
- Added "The type of hazmat represented by cognitive targets can be calculated by summing up the value of the 4 rings and the circle. Depending on the sum, type of hazmat can be determined. If the value of the sum is not listed below, the target must be treated as a fake victim."
- Added "Flammable Gas [F]: sum = 0"
- Added "Poison [P]: sum = 1"
- Added "Corrosive [C]: sum = 2"
- Added "Organic Peroxide [O]: sum = 3"
- Added "Adjacent rings of the same color are not merged. The robot must always consider each of the 5 rings separately and sum the value for all 5 rings, regardless of whether colors repeat."
- Added "Example of a cognitive target: The numbers are from the center outwards."
- Deleted "and hazmat"
- Changed "hazmat" to "cognitive target"
- Added "All teams are expected to design their systems with these realistic conditions in mind."
- Changed "-50" to "0"
- Changed "Hazmat" to "Cognitive target"
- Changed "Hazmat" to "Cognitive target"
- Changed "hazmat sign are correct." to "cognitive target are correct"
- Changed "Hazmat" to "Cognitive target"
- Added "tile with obstacle as 'x';"
- Added "There will not be any tile that is simultaneously two or more of the following options:

swamp, hole, checkpoint, starting tile, tile with obstacle, or area passage."

- Added "*1.2"
- Added "All teams must submit a short video demonstrating how to execute their robot controller on a provided example map in a server-client setup. This video will be a formal part of the documentation submission. It ensures that teams are familiar with the competition setup and helps organizers verify that teams understand how the setup works. The video should be submitted alongside the Technical Description Paper, Poster, and Project Video."

Contents

1. RoboCupJunior International 2026 General Rules

These rules apply to the international RoboCupJunior competition. However, regional, SuperRegional, and local tournaments may have variations or adaptations to these rules to suit their specific competition needs. It is important to check with the organizers of the tournaments you are participating in to confirm which exact rules will be in use.

If teams are unsure about any aspects of the General Rules or specific League Rules, they are encouraged to inquire via the official RoboCupJunior Forum for clarification: https://junior.forum.robocup.org/

For questions regarding any of the rules or RoboCupJunior in general, teams can also reach out to the RoboCupJunior community through the official Discord Server.

1.1. Team Requirements

1.1.1. Team Size

Minimum Team Size: Teams must consist of at least 2 members.

Maximum Team Size:

- Soccer and Rescue Leagues: 4 members.
- OnStage League: 5 members.

Regional and SuperRegional competitions may define their own team sizes depending on their venue capacity and regional variations. Teams attending the International competition will only be able to have the maximum number of registered participants in the qualifying team.

Shared Members and Robots: No team member(s) or robot(s) may be shared between teams.

1.1.2. Team Supervision

Junior Mentor Requirement: Each Junior team must have at least one Junior Mentor registered and attending with the team.

Mentors and Parent/Chaperones are responsible for supervising their teams and maintain a duty of care/well being for their team members, as appropriate for their home region's regulations. Any concerns regarding team member welfare should be brought to the attention of the event organizers immediately.

The Junior Mentor is expected to be present during all official competition events with their team. They must not interact in an imposing manner with teams, robots, judges, or the judging process. Any incident considered inappropriate will be handled by the event organizers and may lead to disciplinary actions.

1.1.3. Age Requirements

Junior Student Members: Must be between 14 and 19 years old as of July 1st of the competition year.

Junior Mentors and Parent/Chaperones: Must be 19 years or older as of July 1st of the competition year.

1.1.4. Team Members

Entry Leagues: RoboCupJunior Entry leagues and other "Primary" divisions (where minimum age may vary) are not run at the international competition but feature in many regions and SuperRegional tournaments.

Technical Roles: Every team member must have a defined technical role (mechanical/design, electrical/sensing, software etc.) and should be able to explain their role during technical judging.

1.2. International Team Qualification Process

- To qualify for the International competition, each region's Regional Representative will complete the Slot Allocation Process at the start of the Competition year. Regional Representatives can be found at the Official Website.
- After the region's local qualifying tournament, the Regional Representative will assign slots. Once confirmed by the RoboCupJunior organizers, the qualified teams will be invited to register through the official RoboCup Federation registration system.
- The qualification process differs depending on the size of each region, but slot allocation must strongly reflect results from regional competitions.
- If a region does not use or releases its allocated slots, Regional Representatives may request additional slots during a later stage of the allocation process.

1.3. Robot Requirements

1.3.1. Robot Communication

Permitted Communication: Communication between robots during gameplay is allowed as long as it uses the 2.4GHz spectrum and its power output does not exceed 100 mW EIRP (Effective Isotropic Radiated Power) under any circumstances.

Responsibility: Teams are responsible for managing their robot communication. Spectrum availability is not guaranteed.

Component Communication: Communication between components of the same robot is permitted.

League Adaptability: Each league may modify the robot communication rules to ensure they meet their specific requirements.

1.3.2. Safety and Power Requirements

Electrical Power:

- Robots must not use mains electricity.
- Maximum allowed voltage: 48V DC or 25V AC RMS (Root Mean Square).
- Voltage must be easily measured during inspections, and measuring points must be covered for safety or designed with safety considerations in place.

Battery Safety:

- Lithium batteries must be stored in safety bags, and charging must be supervised by team members in competition areas.
- Teams must follow safety protocols, including battery fire handling and evacuation procedures.

Robot Safety Design:

- **Power Management**: Secure batteries, safe wiring, and emergency stop functionality.
- **Mechanical Safety**: No sharp edges, pinch points, or other hazards. Actuators must be appropriate for the robot's size and function.
- **Hazardous Behavior**: Teams must report potentially dangerous robot behaviors at least two weeks before a RoboCupJunior event.

1.4. Documentation and Sharing Requirements

1.4.1. RoboCupJunior Team Posters

Purpose: Posters are a tool for sharing robot designs and insights with judges, teams, and the public. Posters will be hung in public competition areas in the venue and digital copies or photographs will be shared by RoboCupJunior after the competition.

Size: Posters must be no larger than A1 size (60 x 84 cm).

Content: Posters should summarize design documents and present the robot's capabilities in an engaging format.

1.4.2. Technical Description Video (See League Documentation)

Content:

- **Robotic Demonstration**: Show fully functional robot systems to highlight technical aspects.
- **Design Process**: Explain design choices and team problem-solving approaches.
- **Presentation**: Clear and high-quality, explaining innovative or unusual techniques.
- **Innovation & Sustainability**: Highlight new technologies and sustainable practices.

Submission: Guidelines will specify video length and deadlines per league.

1.4.3. Sharing Team Resources

Sharing: Materials submitted by teams as part of the documentation submission will be shared on GitHub repositories for the leagues: https://github.com/robocup-junior

Credit: Teams must credit creators of external work and adhere to licensing rules. The focus should remain on personal growth and learning.

1.4.4. Plagiarism Guidelines

External Code Use: Teams are allowed to use external code but must credit the original creators.

Learning Priority: Teams should prioritize learning and not use complete solutions from others. Always pay attention to licensing rules.

1.4.5. Bill of Materials (BOM)

Submission: Teams must submit a BOM (Bill of Materials) listing major components and materials used.

Details: The BOM must include:

- Component name/description (e.g., part number).
- Supplier/source of the component (including PCBs/machined components).
- Status (new/reused).
- Kit or custom-built.
- Price.

Template: A standardized BOM template will be provided with the league documentation submissions for the international competition.

1.5. Spirit and Behavior

1.5.1. Behavior

All participants are expected to behave themselves and be considerate and polite especially but not only towards other participants, volunteers, referees and organizers of all Junior and Major Leagues as well as the host venue.

1.5.2. Code of Conduct

All organisers, volunteers, team members, mentors, supporters and visitors must abide by the RoboCup Federation Code of Conduct. Any instances where, a situation occurs that does not meet the code of conduct must be reported to a RoboCup Federation organisation member and will be investigated.

1.5.3. Mentoring and Onsite Assistance

Support from other teams, mentors, teachers, parents, sponsors, internet communities etc. is a core part of how teams learn and grow.

To ensure fair competition and maximize learning it is required that none of the support they receive does the work of competing for the team. A good indication is the team's ability to explain not only what their robots' components do but also how they do it.

1.5.4. Teams Onsite

- During the competition, only the official team members (maximum 4/5 depending on league) can represent the team at registration, setup-day, and have access to the competition areas for rounds and interviews.
- There must be at least 2 team members on-site, unless a team can present evidence of extenuating circumstances, including proof of travel for other team members. Teams where only one participant presents at the venue will be able to compete, but will not be eligible for finals or awards.
- It is the teams' responsibility to ensure that team member are present at the correct time and location for all scheduled activities.
- Teams are not allowed to communicate with or receive help virtually from external parties with the intention of impacting the team's performance during the competition areas. Virtually communicating includes but is not limited to extended phone calls, video calls, remote desktop control etc.
- Any team found to be in breach of these rules may be subject to disciplinary action.
- Teams are recommended to seek help from other teams, or organizers if they are struggling with any issues onsite.

1.5.5. Violations

Teams, Team Mentors/Supporters or Team Members that repeatedly conduct themselves in an unacceptable way or in violation to the General or League Rules may be disqualified from the tournament and asked to leave the venue.

2. Code of Conduct

2.1. Spirit

1. It is expected that all participants (students and mentors alike) respect the aims and ideals of RoboCupJunior as set out in our mission statement.
2. The volunteers, referees, and officials will act within the event's spirit to ensure the competition is competitive, fair, and, most importantly, fun.
3. **It is not whether you win or lose but how much you learn that counts!**

2.2. Fair Play

1. Robots that cause deliberate or repeated damage to the field will be disqualified.
2. Humans who cause deliberate interference with robots or damage the field will be disqualified.
3. It is expected that all teams aim to participate fairly.

2.3. Behavior

1. Each team is responsible for verifying the latest version of the rules on the RoboCupJunior Official website and additional clarifications/corrections on the official forum made by the RoboCupJunior Rescue Committee before the competition.
2. Participants should be mindful of other people and their robots when moving around the tournament venue.
3. Participants are not allowed to enter setup areas of other leagues or teams unless explicitly invited to do so by team members.
4. Teams will be responsible for checking updated information (schedules, meetings, announcements, etc.) during the event. The RoboCupJunior Rescue Committee will provide updated information on notice boards in the venue, the local competition website, or the RoboCupJunior website if possible.
5. Participants and their companions who misbehave may be asked to leave the venue and risk being disqualified from the tournament.
6. Referees, officials, tournament organizers, and local law enforcement authorities will enforce these rules equally to all participants.
7. Teams are expected to be at the venue early on the setup day as important activities will occur. These activities include but are not limited to registration, participation raffle, interviews, captains, and mentor's meetings, among others.

2.4. Mentors

1. Non-team members (mentors, teachers, parents and other family, chaperones, translators, and other adult team members) are not allowed in the student work area.
2. Mentors are not permitted to be involved in building, repairing, or programming their team's robots before and during the competition.
3. In the first instance, mentor interference with robots or referee decisions will result in a warning. If this behavior recurs, the team could face a possible elimination from the tournament.
4. Robots have to be the work of the students. Any robot that appears identical to another robot may be prompted for re-inspection.

2.5. Ethics and Integrity

1. Fraud and misconduct are not condoned. Fraudulent acts may include the following:

a. Mentors working on the software or hardware of student's robot(s) during the competition.

b. More experienced/advanced groups of students may provide advice but should not do the work for other groups. Otherwise, the team risks being disqualified.

2. RoboCupJunior reserves the right to revoke an award if fraudulent behavior is proven after the award ceremony occurs.
3. Suppose it is evident that a mentor intentionally violates the code of conduct and modifies and works on the student's robot(s) during the competition. In that case, the mentor will be banned from future participation in RoboCupJunior competitions.
4. Teams that violate the code of conduct can be disqualified from the tournament. Disqualifying a single team member from further participation in the tournament is also possible.
5. Referees, officials, tournament organizers, and local law enforcement authorities will give a team a warning in less severe cases of violations of the code of conduct. A team can be disqualified immediately without warning for severe or repeated violations of the code of conduct.

2.6. Sharing

1. The spirit of world RoboCup competitions is that teams should share technological and curricular developments with other participants after the tournament. Sharing furthers the mission of RoboCupJunior as an educational initiative.
2. The RoboCupJunior Rescue Committee may publish developments on the RoboCupJunior website after the event.
3. Participants are strongly encouraged to ask questions to their fellow competitors to foster a culture of curiosity and exploration in the fields of science and technology.

3. Field

3.1. Simulation platforms

1. We will be running games on a platform called Webots. For the setup guide: Platform wiki page.
2. Teams are required to create programs to solve maze tasks.
3. [1] [2] [3]
4. **The organizers will run the games on a server-client model and prepare one RJ-45 socket for teams to connect to the game server. Teams must prepare a computer and an ethernet cable to run the prepared programs. There is documentation at Remote Controller page.**
5. Teams are encouraged to develop their worlds and upload these to the forum to enable sharing.
6. The following OpenGL configurations will be used at the competition if there are no further announcements from the organizer.
   - Ambient Occlusion: Low
   - Texture Quality: Low

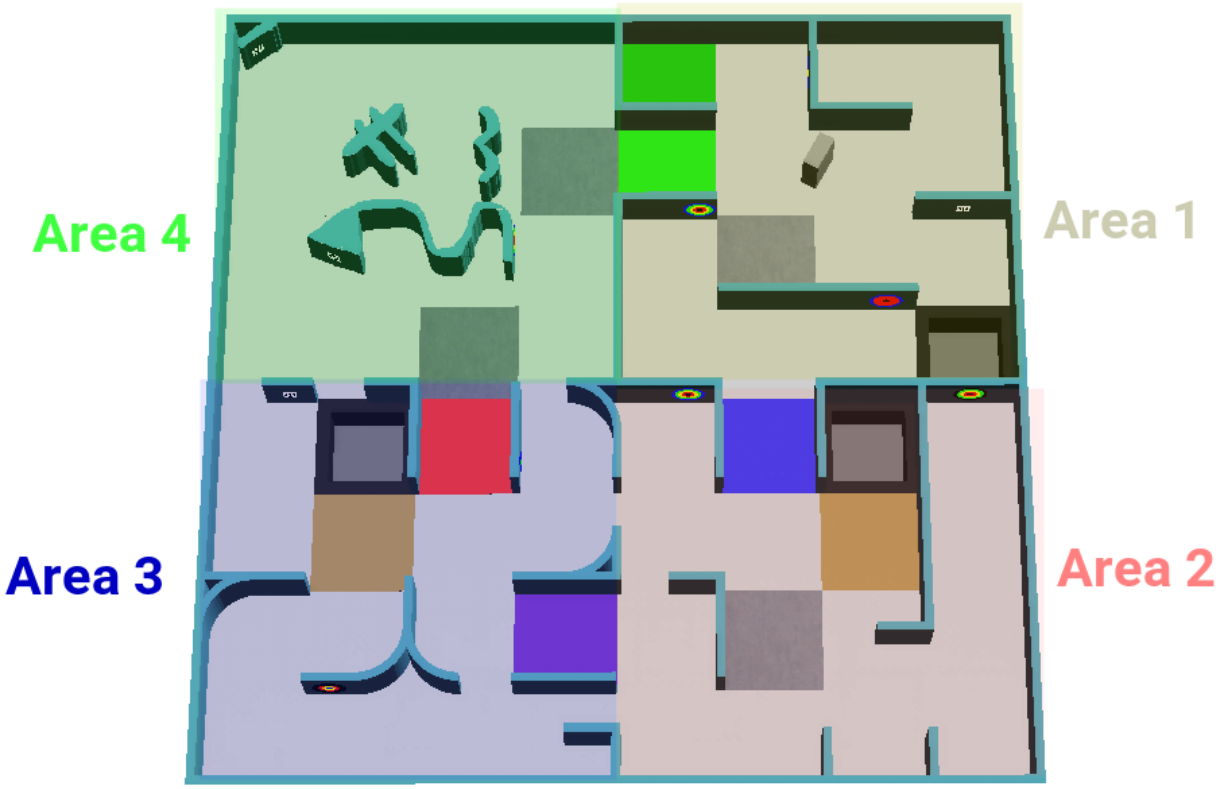
- Max Texture Filtering: 4
- Shadow: Disabled
- Anti-aliasing: Disabled

3.2. Description

1. The field may be divided into four distinct areas with different types of walls for the robot to navigate around.
2. All areas are connected by a passage of one standard tile in width. A color will mark the floor of this passage.
3. The field layout will consist of a collection of tiles with a horizontal floor, a perimeter wall, and walls within the field.
4. Regions where the robot cannot physically traverse, openings that are smaller than the robots width will not contain wall tokens.
5. For area 4 the course may require diagonal movement. The robot's action is not aligned to cardinalities (north, east, south, or west directions).

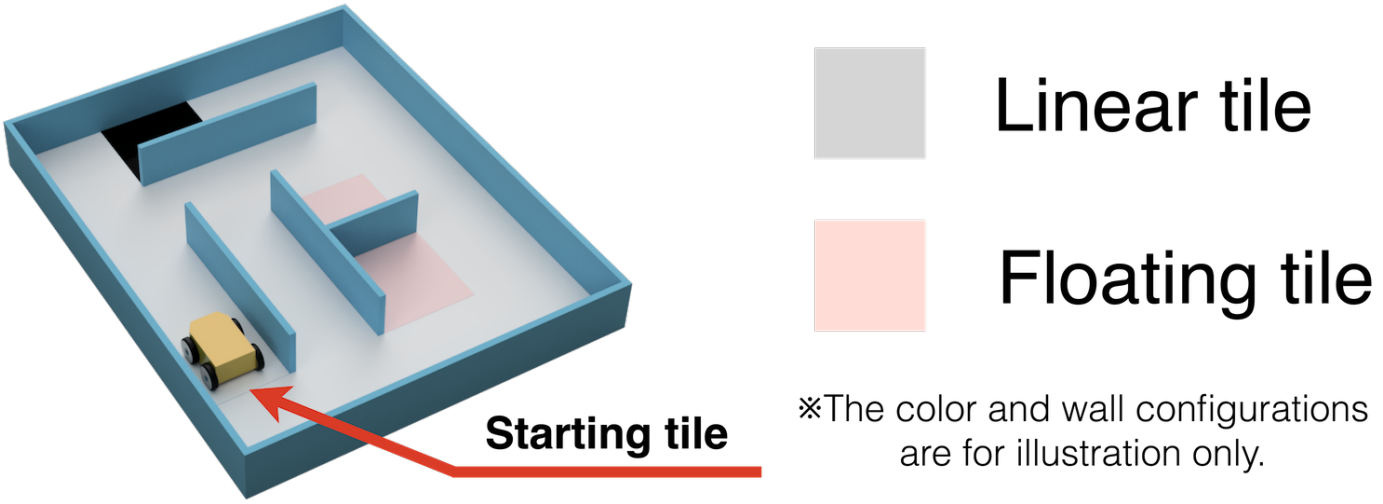
3.3. Tiles, Areas, and Walls

1. The field is divided into tiles of 12cm by 12cm in dimension. The tiles are not physical structures but rather a concept of how the field is generated. For areas 2 and 3, quarter-tiles are considered, where each tile is subdivided into four 6cm by 6cm squares.
2. The walls will have a thickness of 1cm and a height of 6cm.
    - Area 1: Walls **can be** [4] placed on the edges of each tile.
    - Area 2: Walls can be placed on the edges of each quarter tile.
    - Area 3: Walls can be placed on the edges of each quarter tile. Organizers can round a 90-degree corner into a quarter circle.
    - Area 4: This area's layout is not based on a tile system, meaning walls and obstacles are not placed according to a grid system (i.e., arbitrarily).
        - There will be various objects, e.g., boxes, inside this area. Note that these objects will not vary by height (within the context of the robot). [5]



3. Pathways for the robot must be at least the width of the robot itself and may open into foyers more expansive than the pathways.
4. Passages connecting areas (e.g. 1 → 2, 3 → 4) will be distinctively color-coded. Each passage consists of a single tile with standard tile width and must have two sides surrounded by a wall such that the tile has an unambiguous entrance and exit.
5. One of the tiles in Area 1 is the starting tile, where a robot should start the run.

6. Tiles that lead to the starting tile consistently following the leftmost or rightmost wall are called 'linear tiles'. The tiles that do NOT lead to the starting tile consistently following the leftmost or rightmost wall are called 'floating tiles'. The concept of the quarter tile is not taken into account in this.
7. Black holes will affect the determination of the tile type (linear or floating) since they can be considered virtual walls.



3.4. Division of Areas

The colors of the passages are as such:

	Area 1	Area 2	Area 3	Area 4
Area 1		Blue	Yellow	Green
Area 2	Blue		Purple	Orange
Area 3	Yellow	Purple		Red
Area 4	Green	Orange	Red	

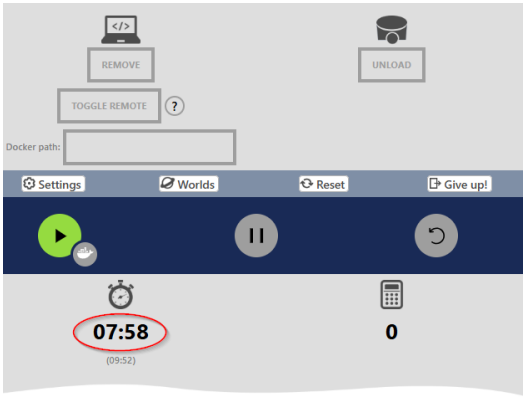
※The actual color tones will follow the platform implementation.

3.5. Checkpoints

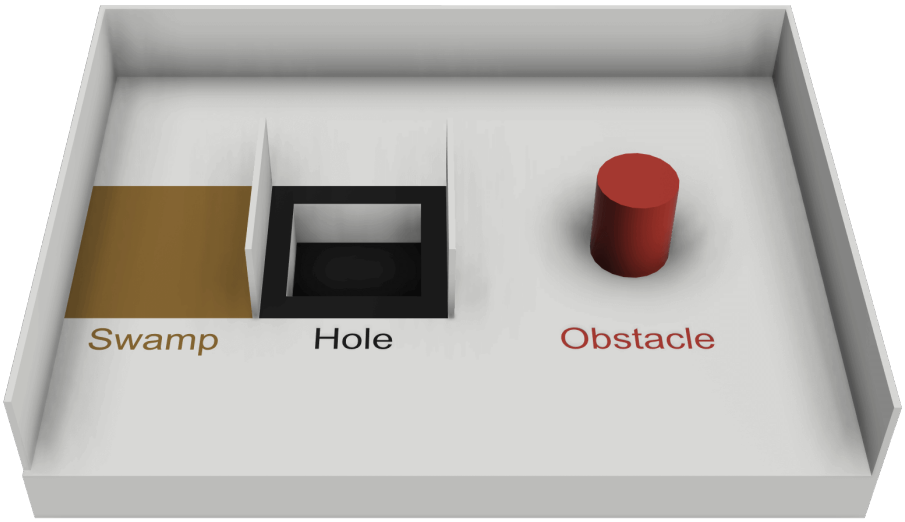
1. Silver tiles in the field represent checkpoints.
2. Silver tiles can be placed anywhere on the field.
3. Area 4 will contain checkpoints immediately after the passages to the room.

3.6. Swamps, Obstacles, and Holes

1. All these items can be placed anywhere in the field with the following restrictions.
2. Swamps:
   a. The color is brown.
   b. **While the robot is on this tile, simulator's time will run faster.This means that the time shown in the image below will run faster.** [6]



   c. **The first time the robot enters a swamp, while it is inside, the simulation time will be consumed 5 times faster than the normal rate. Then, on each subsequent entry into the same swamp, this rate will increase by one point (x6, x7...) until it reaches the limit of x10.**
3. Obstacles:
   a. May be fixed to the floor.
   b. May be any shape, including rectangular, pyramidal, spherical or cylindrical.
   c. The color of the obstacle is not specified.
   d. Obstacles affect the width of the pathway.
   e. **The center of the obstacle will always be on a tile and not on the edge between them.**
   f. **There will be no more than one obstacle on a tile.**
4. Holes:
   a. The edge of the holes is colored black and will be 1.5cm from neighboring tiles.
   b. The robot has to avoid the hole.

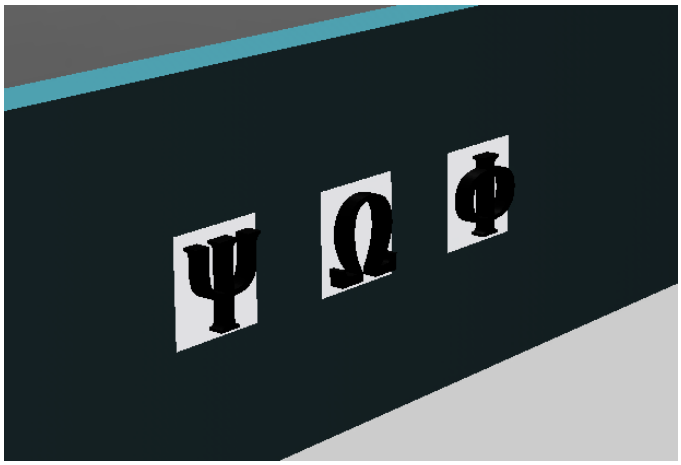


3.7. Wall Tokens

1. There are two kinds of wall tokens - letter victims and **cognitive targets** [7].
2. **Letter victims** [8] are represented by a 2cm by 2cm image placed anywhere on walls (including curved surfaces). However, they are not placed in the passages connecting areas.
3. Letter victims are uppercase letters printed on or attached to the wall. They are printed in black, using a sans serif typeface such as "Arial". The letters represent the health status of the victim.
   a. Harmed victim [H]: **Φ** [9]
   b. Stable victim [S]: **Ψ** [10]
   c. Unharmed victim [U]: **Ω** [11]

Φ Ψ Ω

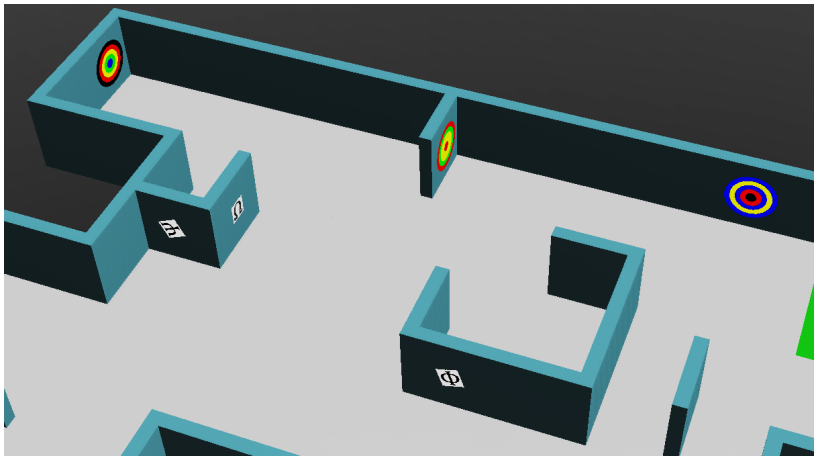
4. **On the walls, we can also find wall tokens with the same symbols as the victims, but where the letters are three-dimensional, as we can see in the image below. This depth will be detectable with one of the sensors provided in the robot customizer.These wall tokens are fake and must not be reported to the supervisor or included on the map.**



5. [12]
6. **Cognitive targets represent hazmats in the area where they are located.**
7. **They have the shape of a circle with a diameter of 5 cm. The outermost circle has a diameter of 5 cm, consisting of up to five concentric rings. The innermost circle has a diameter of 1 cm, and the diameter of each subsequent outer ring increases by 1 cm, resulting in rings with diameters of 1 cm, 2 cm, 3 cm, 4 cm, and 5 cm.**
8. **The rings and the circle can have different colors. The color of the rings and the circle correspond to a numerical value:**
    a. **Black = -2**
    b. **Red = -1**
    c. **Yellow = 0**
    d. **Green = 1**
    e. **Blue = 2**
9. **The type of hazmat represented by cognitive targets can be calculated by summing up the value of the 4 rings and the circle. Depending on the sum, type of hazmat can be determined. If the value of the sum is not listed below, the target must be treated as a fake victim.**
    a. **Flammable Gas [F]: sum = 0**
    b. **Poison [P]: sum = 1**
    c. **Corrosive [C]: sum = 2**
    d. **Organic Peroxide [O]: sum = 3**
10. **Adjacent rings of the same color are not merged. The robot must always consider each of the 5 rings separately and sum the value for all 5 rings, regardless of whether colors repeat.**

Example of a cognitive target: The numbers are from the center outwards.

11. Letter victims [13] signs can be rotated between -PI and PI radians (0 to 360 degrees) in the roll dimension.



4. Robots

4.1. Construction

1. The organizers provide the robot model used on each platform.
2. Using the robot customizer tool, teams can customize their robot's hardware (sensor locations, sensor types, wheel location, etc.).
3. An upper bound to the budget is introduced. Each component costs a certain amount which teams can view in the Robot Customiser Tool. This upper bound is 3000. The number of components is also limited, which can be viewed using the same tool.

4.2. Sensors

1. The robot has the following sensors.
    a. Location sensor GPS to detect where the robot is in the field.
    b. Color sensor to detect floor color.
    c. Distance sensors to measure distance to surrounding walls or obstacles.
    d. RGB cameras to search letter victims and **cognitive target** [14] signs, detect floor color, and much more!
    e. LiDAR to measure the distance to surrounding walls or obstacles.
    f. Inertial measurement unit (IMU) sensors: gyroscopic and accelerometers.
2. The RoboCupJunior Rescue Committee will have created the simulation world and robot with noise that is similar to real-world noise levels. Teams should ensure their programs are robust to this noise. Organizers will not change the noise levels within the simulation for the competition. **All teams are expected to design their systems with these realistic conditions in mind.**

4.3. Control

1. Robots must be controlled autonomously.
2. The referee will start robots.
3. Robots may utilize various maze navigation algorithms. Any pre-mapped type of dead reckoning (movements predefined based on known locations or placement of features in the field) is prohibited.

4.4. Team

1. Each team must have only one robot in the field.
2. Each team must comply with the RoboCupJunior General Rules regarding the number of members and each member's age.
3. Each team member must explain their work and have a specific technical role.
4. A student can be registered on only one team across all RoboCupJunior leagues/sub-leagues.
5. A team can only participate in one league/sub-league across all RoboCupJunior leagues/sub-leagues.
6. Mentors/parents are not allowed to be with the students during the competition. The students will have to govern themselves (without a mentor's supervision or assistance) during the long stretch of hours at the competition.

4.5. Inspection

1. Students will be asked to explain the operation of their programs to verify that all are their works.
2. Students will be asked about their preparation efforts. The RoboCupJunior Rescue Committee may request them to answer surveys and participate in videotaped interviews for research purposes.
3. All teams must complete a web form before the competition to allow referees to prepare better for the interviews. The RoboCupJunior Rescue Committee will provide instructions on submitting the form to the teams at least 4 weeks before the competition.
4. All teams have to submit their source code and proper documents before the competition. If the team agrees, the organizers may share them online after the competition such that other teams can draw inspiration and learn from them.

4.6. Violations

1. If the team's robot or program violates the rules, the team must make modifications within the schedule of the tournament, and teams cannot delay tournament play while making modifications.
2. No mentor assistance is allowed during the competition. (See Section 2, "Code of Conduct")
3. Any rule violations may be penalized by disqualification from the tournament or the game or result in a loss of points at the discretion of the referees, officials, or RoboCupJunior Rescue Committee.

5. Play

5.1. Pre-round Practice

1. When possible, teams will have access to practice simulation environments for calibration and testing throughout the competition.
2. Whenever there are dedicated independent simulation environments for competition and practice, it is at the organizers' discretion if testing is allowed in the competition environments.

5.2. Humans

1. Teams should designate one of their members as "captain" and another as "co-captain." Only these two team members will be allowed access to the competition areas where the simulation environments are located unless otherwise directed by a referee.
2. The referee performs all operations of the simulation environment in-game, such as starting the game and operating external actions such as LoP or stop the game early at any time.
3. No one is allowed to touch the simulation environments intentionally during a game.

5.3. Before the game

1. The organizers will announce in advance how to participate in the games, which will vary depending on how the competition is conducted. It is the team’s responsibility to check and follow the announcements.
2. Failure to comply with the announcements, whether intended or unintended, will result in points being deducted between 20% and 100% from that game’s score. The percentage will be determined by the organizer based on fairness among the teams and throughout the competition. Teams will not be allowed to comment on this decision.
3. If a team fails to play in a game for any reason, score of the game will be **0** [15] points.
4. Organizers will only reveal Competition World for each round for the first time just before games.
5. No program changes or updates after each round’s deadline is allowed.
6. A game begins at the scheduled starting time, whether or not the team is present or ready. Start times will be posted around the venue.
7. Pre-mapping the field or wall token’s location is prohibited. Pre-mapping activities will result in immediate robot disqualification for the round.

5.4. Start the game

1. The next team in the game order must wait their turn near the game area. The referee will give the teams a maximum of 2 minutes to prepare to ready for starting the game.
2. The game will start with a referee’s operation.

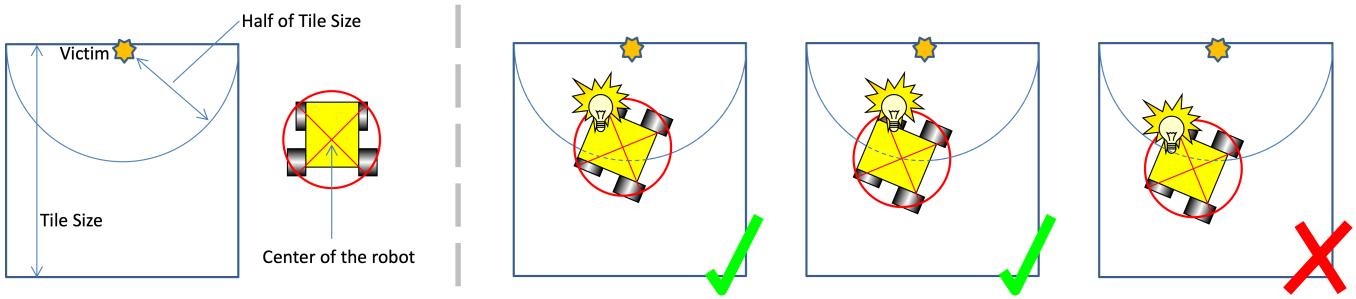
3. The team cannot touch game-related equipment after the game starts for any reason.
4. The game time allowed is 8 minutes in simulated time. At the same time, a second timer running in real time will appear in the control window, with a limit of 10 minutes. The game ends when either timer expires, whichever comes first.
5. A "visited tile" means that the center of the Robot is inside. The game management system makes this judgment.

5.5. Lack of progress

1. A Lack of Progress (LoP) occurs when:
   a. The robot has fallen into a hole.
   b. The robot being in a fixed location for 20 seconds or more (automatically called).
   c. The referee determines the Robot is not entirely static but stuck in a motion sequence.
   d. The robot can call the LoP autonomously.
   e. In any other cases, calling for LOP rests on the team captain, but the referee must make the final decision. However, depending on the game execution way, this may not apply.
2. If there is a lack of progress, the Robot must return to the last visited checkpoint (or the start tile if it never reached a checkpoint). The robot is re-placed by the simulation engine and its direction can not be specified by the team. For the definition of the visited tile (see Section 5.4, “Start the game”).
3. When a LOP is triggered, the engine will send a letter "L" to the robot.

5.6. Scoring

1. To identify a wall token, the robot must stop at each one for at least 1 second. After that time, it must send a command to the game manager with the type of the wall token in a platform-specific format.
2. For successful wall token identification (TI), the center of the robot must be equal to or less than half a tile distance from the location of the wall token when the robot indicates a wall token has been identified.



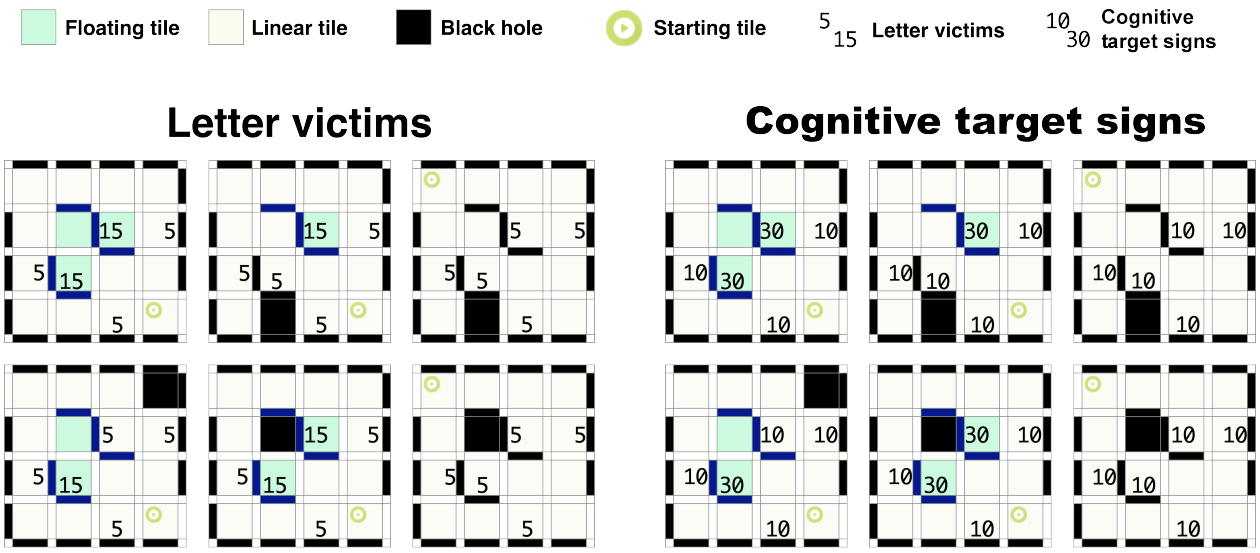
3. Wall token identification (TI). Points are rewarded for each successful identification of a wall token on the field.
   a. For wall tokens located on a linear tile in Area 1 to 3
      i. Letter victims: 5 points

ii. **Cognitive target** [16] signs: 10 points

b. For wall tokens located on a floating tile in Area 1 to 3 and all wall tokens in Area 4

i. Letter victims: 15 points

ii. **Cognitive target** [17] signs: 30 points



4. Wall token type identification (TT). Additional points are rewarded if the victim's reported type or **cognitive target are correct** [18].

a. Letter victims: 10 points

b. **Cognitive target** [19] sign: 20 points

5. Wall token misidentification (TMI). A misidentification will cause 5 points deduction. However, the total score cannot be below zero.

The following is considered a misidentification:

a. The robot identifies the location of the wall token as greater than half the tile size away from the true position.

b. The robot identifies a wall token where is none.

c. The robot identifies a victim as a hazard or vice versa.

6. Successful checkpoint negotiation (CN). A robot is awarded 10 points for each visited checkpoint. Refer to Section 5.4, "Start the game" for definition of visited tile.

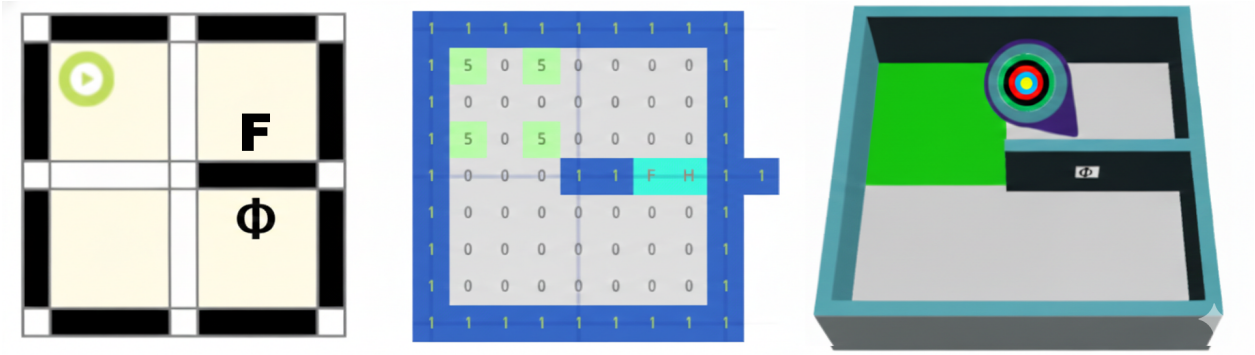
7. Lack of progress (LoP). Each LoP will cause 5 points deduction. However, the total points will never go below zero points.

8. Area multipliers (AM).

a. The scores for TI, TT, and CN obtained in each of the four areas will be multiplied by a unique multiplier. The multipliers are 1, 1.25, 1.5, and 2 for areas 1, 2, 3, and 4, respectively.

9. Successful exit bonus (EB). A robot will be awarded additional 10% of the obtained total score as an exit bonus if: it can identify at least one wall token and return to the starting tile while sending an 'exit' command to the game manager to finish the game.

10. Mapping bonus (MB).
    a. The robot may submit a matrix with the maze map at any time. The maze map should be encoded in the following prescribed format. The map aims to encode the environment's geometry, key elements such as holes, and token locations. The mapping bonus is a multiplier between 1 and 2.
    b. For Area 1, 2 and 3:
        i. Each quarter tile and its surrounding edges and vertices will be represented by a cell (value).
        ii. Walls are marked by '1'; holes as '2'; swamps as '3'; checkpoints as '4'; starting tile as '5'; **tile with obstacle as 'x';** passages from 1 to 2 as 'b', 1 to 3 as 'y', 1 to 4 as 'g', 2 to 3 as 'p', 2 to 4 as 'o' and 3 to 4 as 'r'; wall tokens as the corresponding wall token code (H,S,U,F,P,C,O) and any other tiles/edges/vertices should be '0'.
        iii. **There will not be any tile that is simultaneously two or more of the following options: swamp, hole, checkpoint, starting tile, tile with obstacle, or area passage.**
        iv. For curved walls in area 3, the vertex should be represented by a '0'
        v. The presence of a wall token should be indicated in the cell corresponding to its respective wall. If multiple wall tokens are present on the same wall, their symbols should be concatenated in order based on the both token's absolute positions on the map: first from top to bottom, then from left to right.



        vi. Organizers can store maps in any rotation as long as it is a multiple of 90°
        vii. Organizers will check the correctness of a submitted map matrix against the matrix representing the real map (real map matrix).
            A. Organizers will use the starting tile to align the two maps' matrices. The two values are compared for every non-zero entry on both the real and submitted map matrices.
            B. If the two values match, the correct count is incremented. Otherwise, the incorrect count is incremented.
            C. The correctness is given by the ratio of the correct count over the sum of the correct count and incorrect count.
            D. Organizers will calculate the correctness for each possible orientation of the submitted map matrix aligned to the real map matrix. The maximum value will be used.
        viii. The mapping bonus multiplier will be the correctness ***1.2** + 1
        ix. Ambiguous edge cases will be noted in the official documentation. For new edge cases that

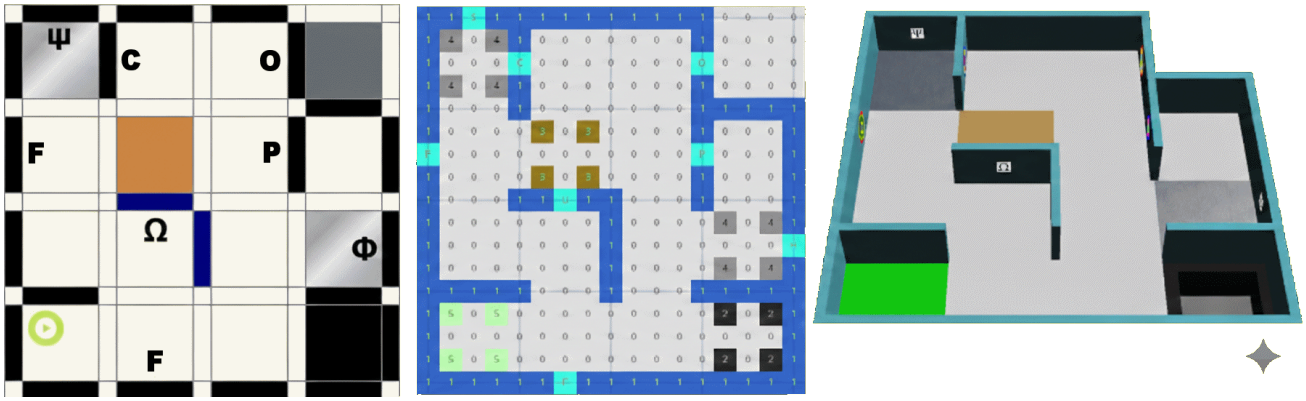
are not defined, please contact the International RoboCupJunior Rescue Committee or the platform development team.

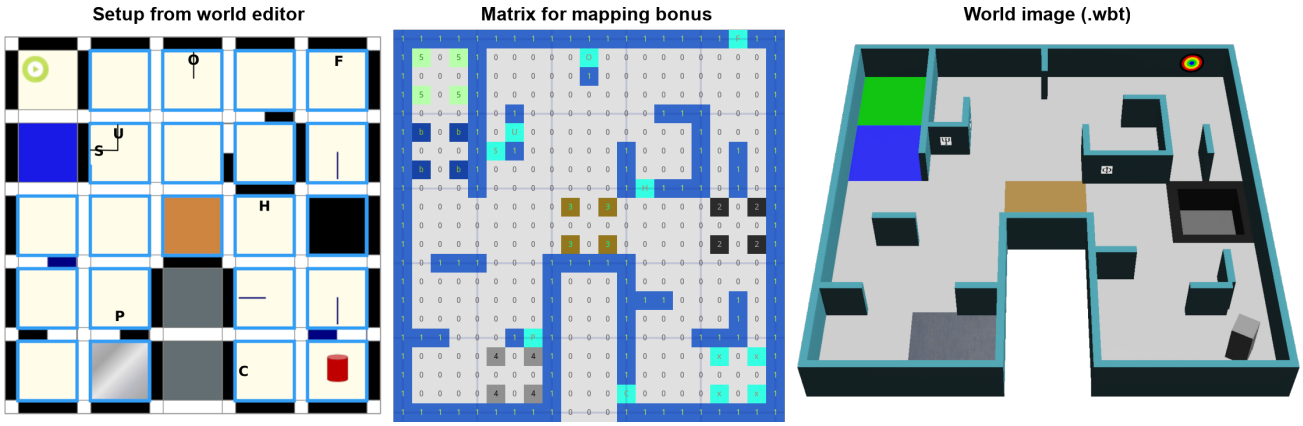
x. The method of submitting a map matrix is described in the documentation and example codes located in the platform releases.

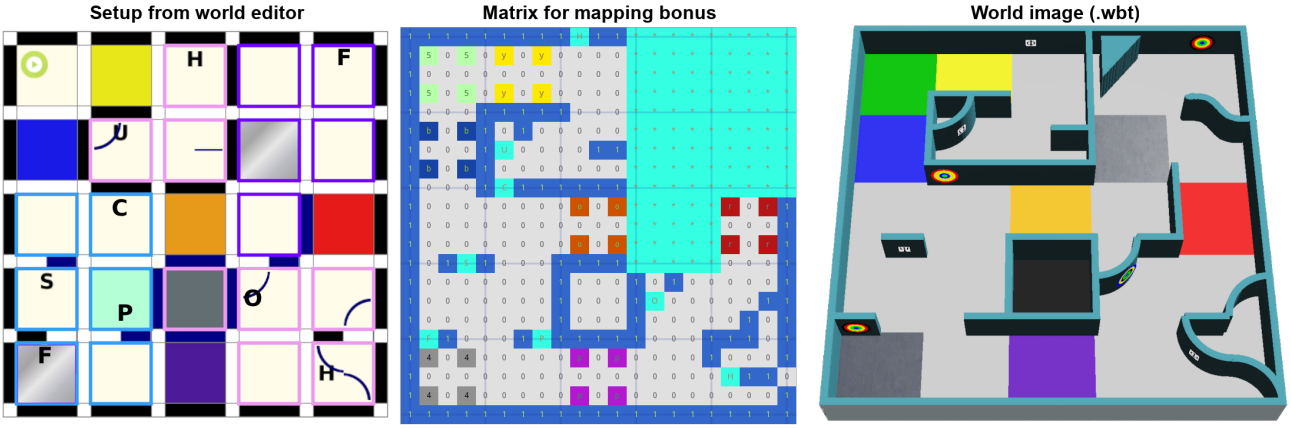
c. For Area 4

i. Simply fill area 4 elements with '*'. This includes the border of area 4.

d. Examples







11. There are no duplicate rewards. For example, if a robot visits a checkpoint multiple times, only one successful checkpoint negotiation will be rewarded. The same result applies to all other scoring rules.

12. Scoring will be automated through the platform scoring engine.

$$\text{Field Score} = \left(\sum_{i=1}^{4} (\text{TI}_i + \text{TT}_i + \text{CN}_i) \cdot \text{AM}_i - \text{TMI}_i - \text{LOP}_i\right) \cdot \text{EB} \cdot \text{MB}$$

Example:

TI	Wall Token **I**dentification
TT	Wall Token **T**ype Identification
CN	**C**heckpoint **N**egotiation
VMI	Wall Token **M**is**I**dentification
LOP	Lack **O**f **P**rogress
EB	**E**xit **B**onus
MB	**M**ap **B**onus

The multipliers are 1, 1.25,1.5 and 2 for areas 1, 2, 3 and 4 respectively

	AM	TI				TT		CN	Sum-VI,	TMI	LOP	Sum-TMI
score ea.		5	10	15	30	10	20	10	TT, CN	-5	-5	& LOP
Area 1	1	2	4	0	0	2	3	1	140	1	2	-15
Area 2	1.25	1	1	3	2	4	3	1	287.5	0	1	-5
Area 3	1.5	2	2	4	3	6	3	1	465	2	1	-15
Area 4	2	1	1	1	1	2	2	1	260	0	2	-10
									1152.5			-45

	Sub-total for TI, TT, CN	1152.50
	Sub-total TMI & LOP	-45.00
		1107.50
With 10% EB	1107.5 x 1.1	1218.25
With MB (assuming all correct)	1218.25 x **2.2**	**2680.15**

5.7. End of Play

1. A team may elect to stop the game early at any time. In this case, the team captain must indicate the team's desire to terminate the game to the referee. The team will be awarded all points earned up to the call at the end of the game.
2. The game ends when:
   a. The time expires (the simulated time or the real time timer, whichever comes first. See Section 5.4, "Start the game").
   b. The Robot sends an 'exit' command to the game manager.
   c. The team captain calls the end of the game. Depending on the game execution way, this may not apply.

6. Competition

This chapter outlines the structure of an international RoboCupJunior Rescue competition. The competition format and the inclusion of elements like rubrics based scoring, Technical Challenges and the SuperTeam Challenge may vary in local, regional and super-regional competitions. Please refer to the respective organiser for details.

6.1. Rounds & Scoring

1. The competition will consist of multiple rounds of which the worst one or more will be omitted from the final score. The worst round is defined by the lowest normalized field score of the team.
2. The field score for every round will be normalized with the score of the best team of that round:

```
(NORMALIZED FIELD SCORE) = (FIELD SCORE) / (BEST FIELD SCORE)
```

3. The normalized field scores will be used to calculate the mean. The worst round(s) will not be considered here:

```
(MEAN OF NORMALIZED FIELD SCORES) = (SUM OF NORMALIZED FIELD SCORES EXCLUDING OMITTED
ROUNDS) / (NUMBER OF ROUNDS - NUMBER OF OMITTED ROUNDS)
```

4. The normalized rubrics score is made up of a sum of normalized scores for the individual rubrics as follows:

```
(NORMALIZED RUBRICS SCORE) =
   0.6 x (TDP SCORE) / (BEST TDP SCORE)
 + 0.2 x (VIDEO SCORE) / (BEST VIDEO SCORE)
 + 0.2 x (POSTER SCORE) / (BEST POSTER SCORE)
```

5. The Rubrics for TDP, Video and Poster will be available on the RoboCupJunior website and the RCJ Rescue Community website.
6. The score from the Technical Challenge will be normalized with the score of the best team:

```
(NORMALIZED TECHNICAL CHALLENGE SCORE) = (TECHNICAL CHALLENGE SCORE) / (BEST TECHNICAL
CHALLENGE SCORE)
```

7. The final score is made up of a weighted sum of normalized scores from the field score, the rubrics and the Technical Challenge as such:

```
(TOTAL SCORE) =
   0.6 x (MEAN OF NORMALIZED FIELD SCORES)
 + 0.2 x (NORMALIZED RUBRICS SCORE)
 + 0.2 x (NORMALIZED TECHNICAL CHALLENGE SCORE)
```

8. Ties in scoring will be resolved based on the mean of normalized field scores.

6.2. Technical Challenge

The Technical Challenge is an additional part of the competition where each teams' ability to quickly modify the bahaviour of their robot will be tested. It consists of one or more mini-tasks with only a limited timespan to solve.

1. The Technical Challenge will take place after the scoring runs have ended.
2. The rules of the individual parts of the Technical Challenge will not be announced before the

competition. The teams will only have limited time to prepare for the Challenge.

3. The timeframe for the completion of these tasks will be announced alongside the rules and scoring at a team meeting after the scoring runs.
4. The rules will require the teams to reprogram their robot to change its behaviour. There will be no hardware changes required compared to the main scoring runs.
5. The time given will correspond to the difficulty level of the tasks.
6. Any external contact during the Technical Challenge is prohibited; non-team members are not allowed to take place on the competition area or to help the competitors remotely.

6.3. SuperTeam Challenge

The SuperTeam Challenge takes place independantly of the main competition and won't influence the team's individual score. It has its own award and is focussed on the cooperation between the teams.

1. Each SuperTeam will consist of at least two teams. Teams coming from regions that share a native language will not be part of the same SuperTeam.
2. The rules of the SuperTeam Challenge will be announced at the competition and require the teams of each SuperTeam to work together.
3. The SuperTeam Challenge will require substantial software changes.

7. Open Technical Evaluation

7.1. Description

1. The organizers will evaluate your technical innovation during a dedicated time frame. All teams need to prepare for an open display during this time frame.
2. Judges will circulate and interact with the teams. The Open Technical Evaluation is intended to be a casual conversation with a question-and-answer atmosphere.
3. The Open Technical Evaluation's main objective is to emphasize the innovation's ingenuity. Innovative may mean technical advances compared to existing knowledge or an out-of-the-ordinary, simple but clever solution to existing tasks.

7.2. Evaluation Aspects

1. A standardized rubric system will be used, focusing on:
    - creativity
    - cleverness
    - simplicity
    - functionality
2. Your 'work' can include (but is not limited to) one of the following aspects:

- Creation of a new software algorithm for a solution
- Creation of a custom robot structure from the Erebus Robot Customization Tool

7.3. Documents

1. Teams must provide documents that explain their work. Each invention must be supported by concise but clear documentation. The documents must show precise steps towards the creation of the invention.
2. The deadline for delivering the documents is scheduled for 3 weeks before the first day of the competition through an online form.
3. Documents must include one Technical Description Paper (TDP), one Poster and one Video. Teams should be prepared to explain their work.
4. All teams must submit their TDP before the competition. The TDP is a public document that will be shared with the community. The competition organizer will ask the team to fill out the web form or ask to submit a PDF file. All teams must strictly follow the guidance on the web form or, in the case of PDF submissions, strictly follow the template provided. If a team does not follow this guidance / template (including but not limited to the different sections, fonts, sizes and lengths) the score for the document will be 0 and is not going to be evaluated. A template for the TDP and rubrics are available on the RoboCupJunior Rescue Community Website.
5. All teams must submit a Poster file before the competition and bring a physical Poster to the competition venue. The Poster is a public document that will be shared with the community during the Poster Presentation session at the competiiton venue. The poster should include but is not limited to: the name of the team, country, league, robot description, robot capabilities, controller, the 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. A guide for the poster format and rubrics are available on the RoboCupJunior Rescue Community Website.
6. All teams must create and submit a Video before the competition. The Video should be short and showcasing the work of the team. These videos will be presented during the competition and should summarize the key aspects of the team's project, design process, and innovations. A guide for the video format and rubrics are available on the RoboCupJunior Rescue Community Website.
7. **All teams must submit a short video demonstrating how to execute their robot controller on a provided example map in a server-client setup. This video will be a formal part of the documentation submission. It ensures that teams are familiar with the competition setup and helps organizers verify that teams understand how the setup works. The video should be submitted alongside the Technical Description Paper, Poster, and Project Video.**

7.4. Sharing

1. Teams are encouraged to review others' posters, TDPs and presentations.
2. Teams awarded certificates must post their documents and presentation online when the RoboCupJunior Rescue Committee asks.

8. Conflict Resolution

8.1. Referee and Referee Assistant

1. All decisions during gameplay are made by the referee or the referee assistant, who are in charge of the field, persons, and objects surrounding them.
2. During gameplay, the decisions made by the referee or the referee assistant are final.
3. After gameplay, the referee will ask the captain to sign the score sheet. Captains will be given a maximum of 1 minute to review the score sheet and sign it. By signing the score sheet, the captain accepts the final score on behalf of the entire team. In case of further clarification, the team captain should write their comments on the score sheet and sign it.

8.2. Rule Clarification

1. If any rule clarification is needed, please contact the International RoboCupJunior Rescue Committee through the RoboCupJunior Forum.
2. If necessary, even during a tournament, a rule clarification may be made by members of the International RoboCupJunior Rescue Committee.

8.3. Special Circumstances

1. If particular circumstances, such as unforeseen problems or capabilities of a robot occurs, rules may be modified by the RoboCupJunior Rescue Committee Chair in conjunction with available committee members, even during a tournament.
2. Suppose team captains/mentors do not attend the team meetings to discuss problems, and the resulting rule modifications described at 1.. In that case, the organizers will understand that they agreed and were aware of the changes.

[1] In previous version this said "Depending on the competition, games may be executed in one of the following ways or another way. The organizer will notify the teams in advance of how the games will be executed at the competition. It is the responsibility of the teams to be prepared to participate in the games in the manner notified."

[2] In previous version this said "The organizers will run the games on a server-client model and prepare one RJ-45 socket for teams to connect to the game server. **Teams must prepare a computer and an ethernet cable to run the prepared programs.** There is documentation at Remote Controller page."

[3] In previous version this said " The organizers will run and record the games on the computer which the organizer prepared. They will collect all the teams' simulation software before the competition is recorded. The recordings will be used as competition runs and showcased during the competition. Teams need to prepare proper documents to show how to run the program on the organizer's computer.},{--The game will be executed on a simulation environment prepared on a cloud environment. Teams will need to provide a Docker file or image that will run on the cloud environment according to the documentation provided. There is documentation at erebus-dockerfiles repository."

[4] Changed from "are" to "can be"

[5] In previous version this said "In the end, since walls can take any shape, there is no real distinction between objects and walls."

[6] Changed from "While the robot is on this tile, simulation time is consumed at 5 times the normal rate." to "While the robot is on this tile, simulator's time will run faster.This means that the time shown in the image below will run faster."

[7] Changed from "hazmat signs" to "cognitive targets"

[8] Changed from "Wall tokens" to "Letter victims"

[9] Changed from "H" to "Φ"

[10] Changed from "S" to "Ψ"

[11] Changed from "U" to "Ω"

[12] In previous version this said "Hazmat signs are taken from the RoboCup Rescue League Website, out of which four will be used: Flammable Gas, Poison, Corrosive, Organic Peroxide"

[13] In previous version this said "and hazmat"

[14] Changed from "hazmat" to "cognitive target"

[15] Changed from "-50" to "0"

[16] Changed from "Hazmat" to "Cognitive target"

[17] Changed from "Hazmat" to "Cognitive target"

[18] Changed from "hazmat sign are correct." to "cognitive target are correct"

[19] Changed from "Hazmat" to "Cognitive target"