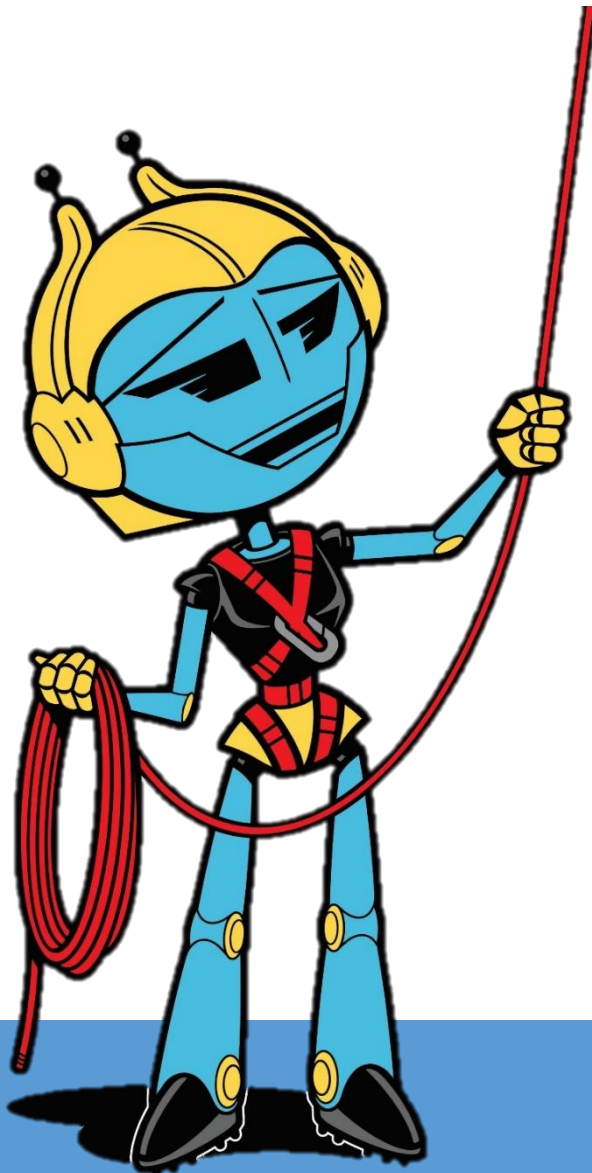


A U S T R A L I A

RoboCup Junior Australia

Rescue Maze Rules 2024

Version 24.0 | Last Modified: 21 Jan 2024





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For State and Territory enquiries, contact information can be found on the RCJA Website:

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Code of Conduct

Spirit

It is expected that all participants, students and mentors, will respect the aims and ideals of RoboCup Junior as set out in our mission statement. In turn, the volunteers, referees and officials will act within the spirit of the event to ensure the event is competitive, fair and most importantly fun. "It is not whether you win or lose, but how much you learn that counts."

Sharing

It is the overall desire of RoboCup Junior events, that any technological and curricular developments will be shared with other participants after the event. Any developments including new technology and software examples may be published on the RoboCup Junior website after the event, furthering the mission of RoboCup Junior as an educational initiative. Participants are strongly encouraged to ask questions of their fellow competitors to foster a culture of curiosity and exploration in the fields of science and technology.

Local Variations

These rules will be in use for the Australian National Championships for the titled year. State and Regional events may implement minor variations with respect to age groups, divisions and judging. These variations will be communicated to the participants through email and/or on their relevant website prior to the state or regional event.

Notes/Advice vs. Rules

This document includes notes/advice to the competitors and mentors, plus rules that are firm. This has been done to remove ambiguity. There is a notation to indicate whether the content of this document is to be read as a note/advice or as a rule. **Notes/advice appear in green.**



Change Log

Revision	Change(s) Made
24.0	<p>Initial release for the season. Key changes from 2023 include:</p> <ul style="list-style-type: none">• Change to Open Maze Victim specifications (see section 3.3)• Change to restrictions to devices in games area and starting of robots (see section 4.2)• Change to repeat participation restrictions for Mighty Maisy Maze (see section 6.1.2.1)• Define wall height for Mighty Maisy Maze (see section 2.1.5)



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1 The Challenge

1.1 The Scenario

1.1.1 There has been an accident at a manufacturing plant. There are a number of victims still trapped within the plant and it is too hazardous to send in human rescue teams. Your autonomous robot must be able to navigate through a treacherous building with obstacles, uneven floors and restricted areas to identify victims and (optionally) leave rescue packages to aid anyone still trapped. Time and technical skills are essential! Come and prepare to be the most successful Rescue Maze Response Team.

1.2 Event Divisions

1.2.1 The Rescue Maze Challenge has two divisions: Mighty Maisy Maze and Open Maze.

Mighty Maisy Maze was developed with the aim to create a very accessible entry point for students who are new to the Challenge or are significantly changing hardware and/or software platform.

Open Maze extends the Challenge with more complexity for more experienced students.

Subject to age limitations and other criteria, Open Division teams who perform well in the National Event may qualify for the annual RoboCupJunior International Event. Other international events may have other divisions/qualification requirements.

- 1.2.2 **Mighty Maisy Maze:** The robot needs to search through a maze for colour identifiable victims. i.e. the robot should not find the fastest path through the maze, instead it should explore as much as possible of the maze. The robot will score points for each victim found. The robot should avoid areas with black floor.
- 1.2.3 **Mighty Maisy Maze:** If the robot is stuck in the maze, it can be restarted at the last correctly identified victim.
- 1.2.4 **Mighty Maisy Maze:** If the robot can find its way back to the start tile after exploring a large proportion of the maze it will receive an exit bonus.
- 1.2.5 **Mighty Maisy Maze:** Additional bonuses will be awarded upon exit if the robot can accurately report the number and type of victims that it finds in the maze.
- 1.2.6 **Open Maze:** The robot needs to search through a maze for colour identifiable and/or heated victims. i.e. the robot should not find the fastest path through the maze, instead it should explore as much of the maze as possible. The robot will get between 10 to 25 points for each victim found. If the robot can also deliver a Rescue Package (designed by the team themselves) close to the victim, it will earn an additional 10 points. The robot should avoid areas with black floor.
- 1.2.7 **Open Maze:** If the robot is stuck in the maze, it can be restarted at the last visited checkpoint. The checkpoints are indicated with reflective floor so the robot can save its map (if it uses a map) to a non-volatile medium and restore it in case of a restart, optimising the robot's search.
- 1.2.8 **Open Maze:** If the robot can find its way back to their start tile after exploring a large proportion of the maze it will receive an exit bonus.



2 Playing Field

All measurements in the rules have a tolerance of 5%.

2.1 Mighty Maisy Maze: Maze Description

- 2.1.1 The maze will be on a single level and may consist of multiple distinct areas. Areas will have a horizontal floor and a perimeter wall. Walls can be constructed either using reams of A4 Paper laid on their long side or using the Open Maze walls.
- 2.1.2 Areas may be joined together by doorways.
- 2.1.3 Walls will be located approximately 29 cm (tolerance ± 1.5 cm) apart. There may be a 5mm gap between wall sections.
- 2.1.4 Doorways are approximately 29 cm (tolerance ± 1.5 cm) wide.
- 2.1.5 Walls that make up the maze are at least 15 cm to a maximum of 30 cm high. There may be a 5mm gap between wall sections.

2.2 Mighty Maisy Maze: Floor

- 2.2.1 Floors should be smooth (e.g. vinyl) and lightly coloured and may have up to 3 mm height difference at joints. There may be holes in the floor (about 5 mm diameter) for fastening walls. There may also be 5mm gaps between floor tiles.
- 2.2.2 The Start/Exit Tile will be marked by aluminium foil approx. 30cm square.
- 2.2.3 Throughout the arena, there may exist black tiles that represent “no go” spaces.

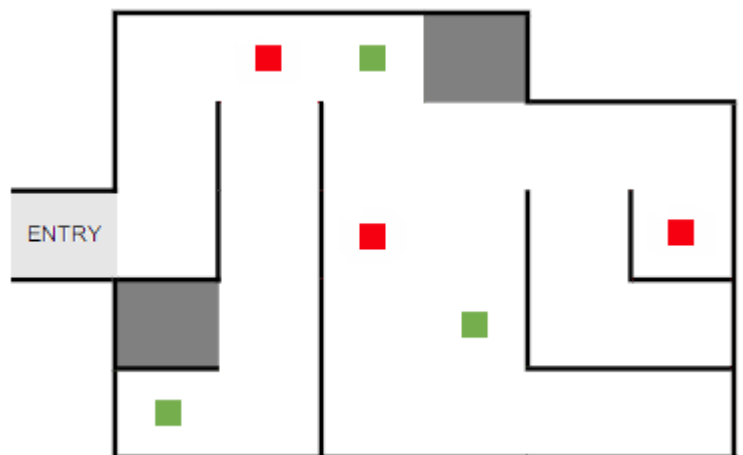
2.3 Mighty Maisy Maze: Path

- 2.3.1 Walls will lead to the entrance/exit. Walls that lead to the entrance/exit are called linear walls. The walls that do NOT lead to the entrance/exit are called "Floating Walls" and are not included in the Mighty Maisy Maze division.
- 2.3.2 Paths will be approximately 30 cm wide but may open into foyers wider than the path.

2.4 Mighty Maisy Maze: Debris, Obstacles and Stairs

- 2.4.1 There are no Debris, Obstacles, Stairs or Ramps in the Mighty Maisy Maze division.

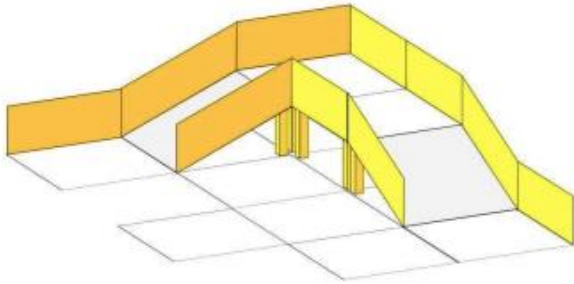
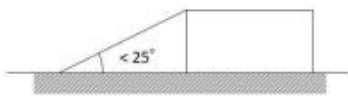
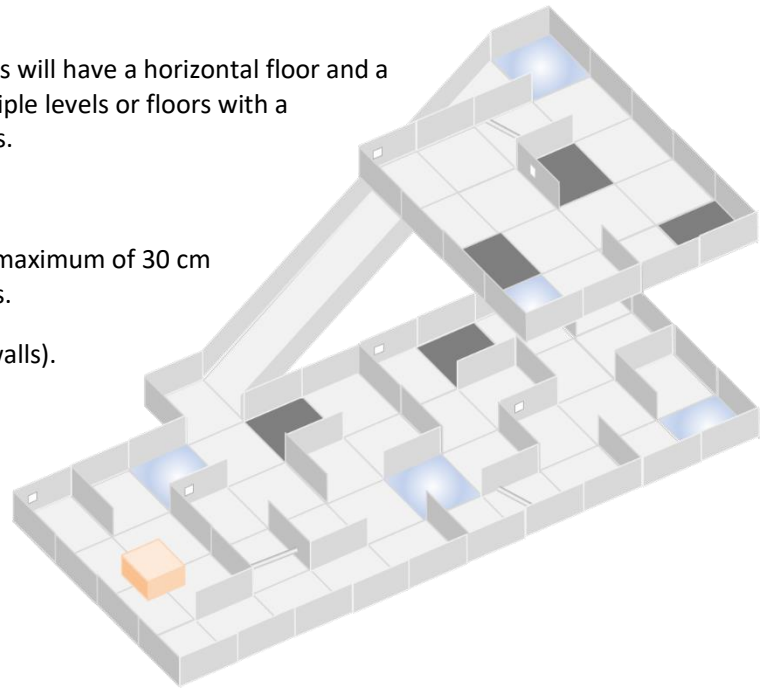
Example Courses:





2.5 Open Maze: Maze Description

- 2.5.1 The maze may consist of multiple distinct areas. Areas will have a horizontal floor and a perimeter wall. Mazes may be constructed with multiple levels or floors with a height of 40-60 cm Which will be accessible via ramps.
- 2.5.2 Areas may be joined together by doorways or ramps.
- 2.5.3 Walls that make up the maze are at least 15 cm to a maximum of 30 cm high. There may be a 5mm gap between wall sections.
- 2.5.4 Doorways are at least 30 cm wide (less thickness of walls).



- 2.5.5 Ramps will be at least 30 cm wide (less thickness of walls) and have an incline with a maximum of 25 degrees from horizontal surface. The ramp is always straight.
- 2.5.6 The walls can be any colour.

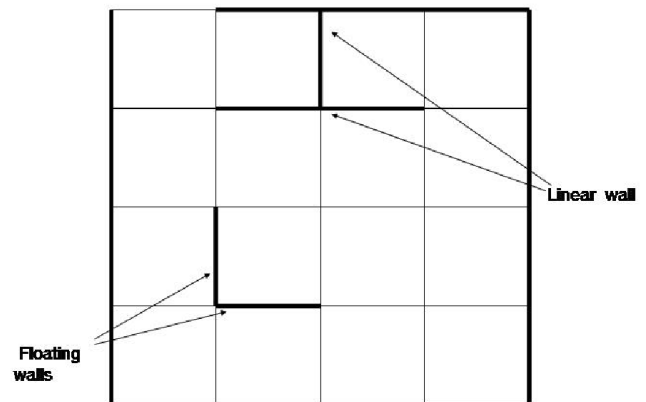


2.6 Open Maze: Floor

- 2.6.1 Floors may be either smooth or textured (like linoleum or carpet) and may have up to 3 mm height difference at joints. There may be holes in the floor (about 5 mm diameter) for fastening walls. There may also be 5mm gaps between floor tiles.
- 2.6.3 There may also exist silver tiles that represent Checkpoints. Silver tiles may not be completely fixed on the floor.
- 2.6.4 Throughout the arena, there may exist black tiles that represent “no go” spaces. Black tiles may not be completely fixed on the floor.

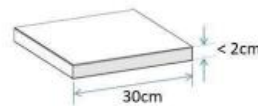
2.7 Open Maze: Path

- 2.7.1 Walls may or may not lead to the entrance/exit. Walls that lead to the entrance/exit are called linear walls. The walls that do NOT lead to the entrance/exit are called "Floating Walls".
- 2.7.2 Paths will be approximately 29 cm wide but may open into foyers wider than the path.
- 2.7.3 There may be multiple entries with coloured floors that are randomly selected prior to the start of the run.
- 2.7.4 Paths may form passages passing under upper floors.



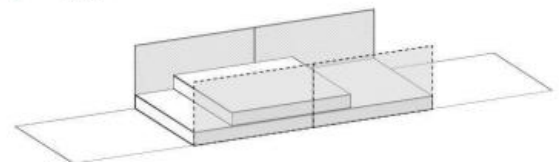
2.8 Open Maze: Debris, Obstacles and Stairs

- 2.8.1 **Floor Obstacles** are fixed to the floor, have a maximum height of 2 cm and will be no closer than 5 cm apart.
 - 2.8.2 **Debris** will not be fixed on the floor, and have a maximum height of 1 cm. Debris can be placed anywhere on the tile and should be a contrasting colour to the start tiles, black or silver tiles.
- Hint: Make sure that your robot can negotiate obstacles and has sufficient ground clearance.
- 2.8.3 **Room obstacles** have a minimum height of 15 cm, may consist of any large, heavy items and can be any shape, including rectangular, pyramidal, spherical or cylindrical. Obstacles can be coloured or clear. Obstacles are not fixed to the floor so may be moved by the robot during play.
 - 2.8.4 Obstacles will not prevent a robot from discovering routes in the maze. An Obstacle may be placed in any location where at least 20 cm is left between the obstacle and a wall.

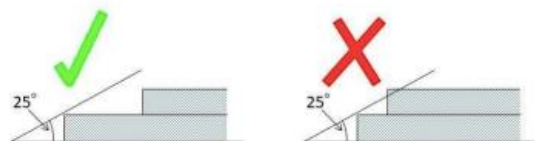


- 2.8.5 Floor Obstacles & Room Obstacles that are moved or knocked over will remain where they are moved to/fall and will not be reset during the scoring run.

- 2.8.6 Stairs will be the full width of the passageway (30cm less thickness of walls) and the individual maximum height is 2 cm.



- 2.8.7 The incline of stairs (i.e.: the incline of a plate to the horizontal when placed on the stairs) will be less than 25 degrees.



- 2.8.8 Stairs will be placed between walls.



2.9 Environmental Conditions

- 2.9.1 This event simulates a disaster area. There may be gaps and misalignments between wall panels, differences in flooring materials and heights, and changes may occur as the robot moves through the maze. Teams should expect the environmental conditions at a tournament to be different from the conditions at their home practice field.
- 2.9.2 Teams must come prepared to adjust their robots to the conditions at the venue.
- 2.9.3 Lighting and magnetic conditions may vary along the course in the rescue arena.
- 2.9.4 The arena may be affected by magnetic fields (e.g. generated by under floor wiring and metallic objects).
- 2.9.5 Teams should prepare their robots to handle unexpected lightning interference. While the organizers and referees will try their best to minimize external lighting interference, it is not possible for them to foresee all unexpected interferences such as camera flash from spectators.
- 2.9.6 The Organizing Committee will try their best to fasten the walls onto the field floor so that the impact from regular robot's contact should not affect the robot. All measurements in the rules have a tolerance of 5%.
- 2.9.7 Objects to be detected by the robot will be distinguishable from the environment by their colour and/or heat signature.



3 Victims

3.1 Mighty Maisy Maze: Definition

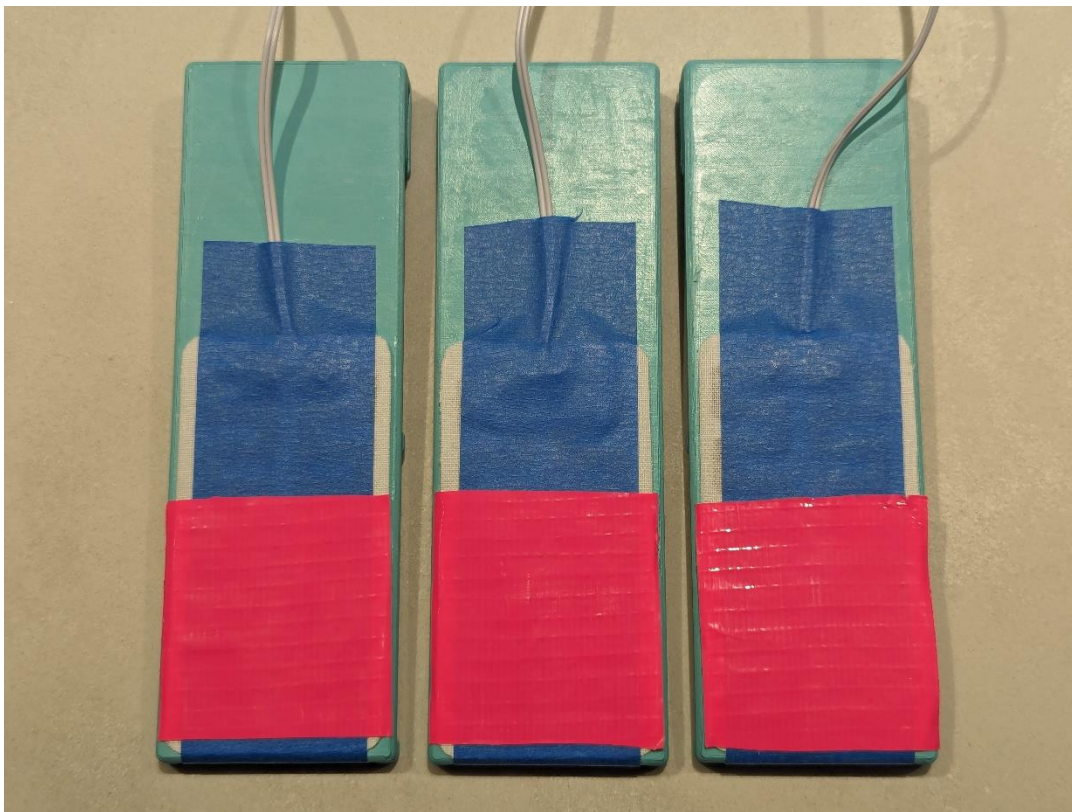
- 3.1.1 Victims are represented by red or green coloured 5cm squares laid on the floor approximately 15cm from the nearest wall (as measured to the centre of the square).
- 3.1.2 The trapped victims are depicted as green squares while the critically injured victims are red squares.

3.2 Mighty Maisy Maze: Locations

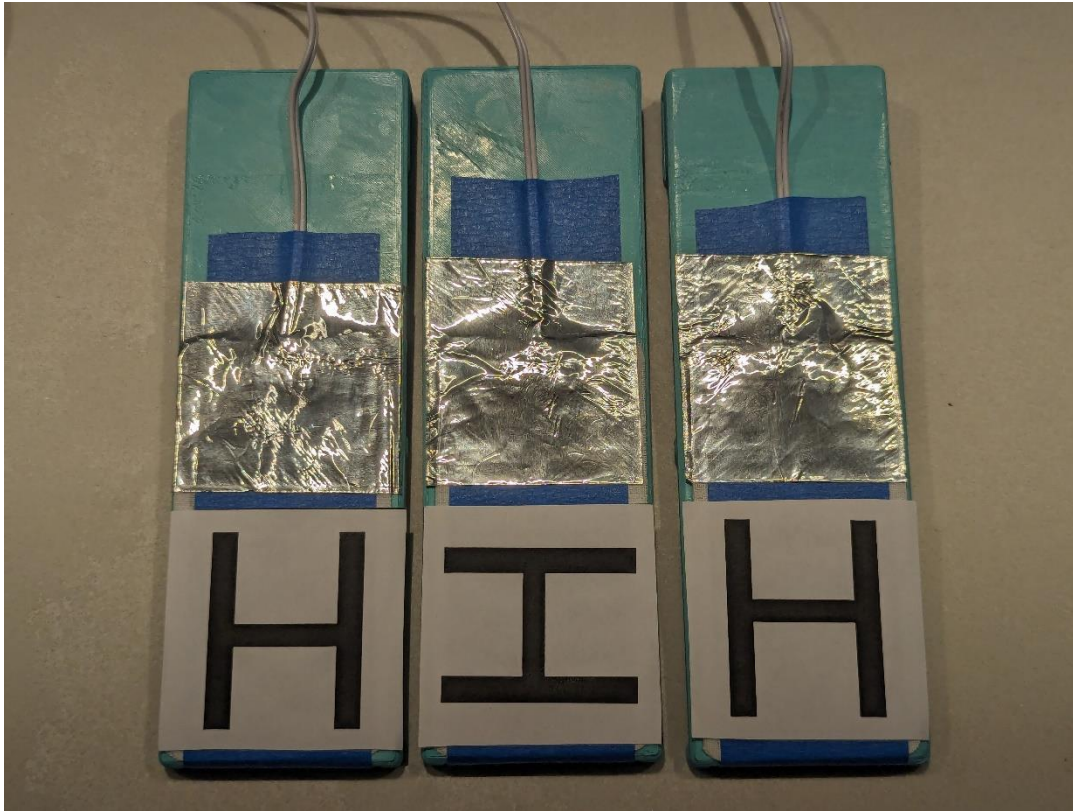
- 3.2.1 There will be a minimum of five (5) active victims in any round.
- 3.2.2 Victims can be located anywhere within the maze with the exception of black tiles.
- 3.2.3 Victims will be placed more than 10cm apart as measured from the edge of each square.

3.3 Open Maze: Definition

- 3.3.1 **There are two types of victims that may be used: Coloured Victims or Visual Victims. The inclusion of Visual Victims helps align with the International Rescue Maze rules.**
 - 3.3.1.1 Coloured Victims will be located on walls, near the floor of the arena (centred approximately 7 cm above the floor) and will be a colour that is easily distinguishable by common light, colour and vision sensors. Each victim has a surface area of at least 16 sq. cm **and be approximately 5 cm square.**



- 3.3.1.2 **Visual Victims will be located on walls, near the floor of the arena (centred approximately 7 cm above the floor). A Visual Victim will be an uppercase letter “H” (for Harmed) on a white background. It will be printed in black using a sans serif typeface (such as ‘Arial’ 160 point) with a height of 4 cm. The letter can be rotated.**
- 3.3.1.3 **Visual Victims will also have “locator beacons” simulated by reflective tape (e.g. Aluminium tape) fixed to them. The tape will be centred approximately 13 cm above the floor and be approximately 5 cm square.**



- 3.3.2 Either type of victim (Coloured or Visual) may be heated to signify that the victim is still alive and requires a Rescue Kit dropped.
- 3.3.3 Victims which are not heated do not need a Rescue Kit. There will be no point change for dropping a Rescue Kit.
- 3.3.4 The organisers will keep a minimum of 10° Celsius difference between victim temperatures and the indoor temperature. The victim temperatures will be in the range of 40°C to 60°C.

Advice: It is recommended that teams using Lego robots be aware that if they are using the standard Lego software they may be restricted in their choice of sensors and that the standard Lego sensors, while usable, may not be very effective. We would recommend that the teams consider using some of the text-based programming alternatives in combination with either third party IR temperature sensors or robot vision to identify victims.

3.4 Open Maze: Locations

- 3.4.1 There will be a minimum of five (5) active victims in any round.
- 3.4.2 Victims can be located anywhere within the maze with the exception of black tiles or on tiles with obstacles. Victims may be located on ramps and stairs.



4 Robot

4.1 Robot Configuration

4.1.1 The height of a robot must not exceed 30 cm.

Care should be taken in robot design to ensure that it is of a manageable size to negotiate its way successfully through the maze and past obstacles.

4.1.2 Robots may not have any sensor or devices that enable it to 'see' over the walls.

4.1.3 Any robot kit or building blocks, either available on the market or built from raw hardware and materials, may be used, as long as the design and construction are primarily and substantially the original work of the students.

4.1.4 Any commercially produced robot kits or sensors components that are specifically marketed to complete any single major task of RoboCup Junior Australia Rescue Maze will be disqualified. If there is any doubt, teams should consult the Technical Committee (TC).

4.1.5 Robots should be well engineered and constructed. The robot should not fall apart during the game. If the robot has substantially failed mechanically, fallen apart or is unable to complete the challenge, the robot will be deemed damaged, and the Robot Handler will be asked to remove the robot from the field. The Robot Handler may choose to restart according to 7.5.3, otherwise the round is deemed to have ended.

4.1.6 A team will not be able to compete with a robot substantially the same as another team's robot.

4.1.7 A team will not be able to compete with a robot that is identical to another team's robot from previous years.

4.1.8 For the safety of participants and spectators, only lasers of class 1 and 2 are allowed. This will be checked during inspection.

4.2 Robot Control

4.2.1 ~~Robots must be started/restarted manually by the Robot Handler.~~ Robots cannot be started from a secondary device, such as a laptop, tablet, or mobile phone. Robots must have their program downloaded to them and be able to started/restart manually by the Robot Handler.

4.2.2 ~~Once started the~~ Robots must be autonomous in operation. If the robot has the capability for remote or any other wireless control (such as by Bluetooth, Wi-Fi or another form of wireless communication), the team must prove that they have disabled the capability for third party operation in some way. This could be by software, hardware or degree of human interaction. Robots that do not comply may face immediate disqualification from the event. Distributed control is allowed but must operate without human interaction after the robot has started the round.

4.2.3 Pre-mapping and/or any type of dead reckoning (i.e., configuring the robot's program based on predefined locations, tiles, obstacles, location of victim, number of victims etc. before game play) is prohibited.

4.2.4 The use of remote control of any kind is forbidden.



4.3 Inspection

- 4.3.1 Teams may be scrutinised to establish the ownership of robot design and programming.
- 4.3.2 The robot will be inspected by a panel of referees before/during or after the event to ensure that the robot adheres to all relevant rules.
- 4.3.3 It is the responsibility of teams to have their robot re-inspected if their robot is modified at any time during the event.

4.4 Violations

- 4.4.1 Any violations of the inspection rules will prevent the robot from competing in a round until modifications have been made to the robot to ensure compliance.
- 4.4.2 Modifications must be made within the time schedule of the events. Rounds will not be delayed due to late teams.
- 4.4.3 If a robot fails to meet all specifications (including modifications) the robot will be disqualified from that round (but not the event).
- 4.4.4 If it is determined that the work on the robot is not substantially the original work of the team members or the construction or programming of the robot be deemed not that of the team, the team will be referred to officials. Should the Rescue Coordinator (or other relevant person) on the advice of the officials then uphold the view of the scrutiniser, the team may be disqualified from the event.

4.5 Mighty Maisy Maze: Rescue Kits

- 4.5.1 There are no Rescue Kits in the Mighty Maisy Maze division.

4.6 Open Maze: Rescue Kits

- 4.6.1 A Rescue Kit represents a basic health package distributed to an **alive** victim caught in a natural disaster. It symbolizes tools or devices used in the rescue process, such as GPS Transponders or even something as simple as food, water or light source providers.
- 4.6.2 Each Rescue Kit must have a minimum volume of 0.5 cubic cm.
- 4.6.3 Each team can only carry a maximum number of 12 of those kits.
- 4.6.4 Each team is responsible for the whole Rescue Kit system (the maximum of 12 kits), including bringing the rescue kits to the event. The Robot Handler is responsible for loading their own Rescue Kits on their robots and cleaning the field with the referee's/judges' authorization after the game is called to end.



5 Validation of Work

5.1 Electronic Submission

5.1.1 Before registration closes, prior to the event, each team must electronically submit their journal, logbook or technical description paper and program or source code to the event organisers via the event web site or as otherwise directed. **Teams can continue to work on their robot, programs and this document after submission.**

5.2 Interviews

5.2.1 Teams may be required to attend a technical interview to explain the operation of their robot in order to verify that the design, construction and programming of the robot is the students' work. There are no set questions. If interviews are being conducted, either a schedule will be released, or teams will be advised to go for an interview throughout the event prior to the finals.

5.2.2 Teams must bring their journals, logbooks or technical description papers and a running laptop to their interview with their program open and be able to talk through the logic of the program with the interviewer. Screenshots of the program or source code are not sufficient.

5.2.3 Interviews are not scored and do not contribute to team overall score.

5.2.4 Team member(s) will be asked questions about their preparation efforts, and they may be requested to answer surveys and participate in videotaped interviews for research purposes.

5.3 Journal/Log Book/Technical Description Paper

5.3.1 For the RCJA National Event all teams must maintain a design journal/logbook/technical description paper detailing the design, development and construction of the robot and its programs as part of the learning experience. The journal can be in the form of a written document, PowerPoint presentation, website or blog, etc. Journals/Logbooks/Technical Description Paper are not scored and do not contribute to the team's overall score but will be used to determine ownership of designs. Journals/Logbooks/Technical Description Paper may be used to determine the awarding of special honours. State and regional events may elect to use other methods to determine originality of students work.

5.3.2 Construction of components (not freely or commercially available to all competitors) must be accompanied by full documentary proof that the developments were wholly the work of the students. This should be in the form of technical documentation showing all stages of design, development, testing and construction.

5.3.3 Failure to produce documentary proof of students' work may result in the robot or bespoke component not being allowed to compete in the tournament.

5.3.4 Teams who fail to submit a journal, logbook or technical description paper may not be eligible for special awards.



5.4 Journal/Logbook/Technical Description Paper Criteria

5.4.1 The following headings are a guide in the development of student logbooks/journals. [These criteria are mapped to the Australian National Technologies Curriculum. A Technical Description Paper template is available to download from the RCJA Rescue Maze Challenge Web Page.](#)

Team Name	
Team Members	List each member's role
School or Organisation	
Problem Definition	Define and decompose the problem
Planning	Identify a number of possible solutions to meet the requirements and constraints
	Identify the roles of the team and the order of tasks
Solution Design	Design the user experience of a digital system
	Design Algorithms and validate them.
Implementation	Implement modular programs, applying selected algorithms and data structures
Evaluation	Critically evaluate the developed solution.
Student Collaboration	Create innovative solutions for sharing your ideas and information.
	Plan and manage projects using an interactive and collaborative approach
Robot	Construction Photos
	Code



6 Teams

6.1 Definition

6.1.1 A team should have a minimum of 2 members and a maximum of 4 members.

An individual participant is allowed to compete in a RoboCup Junior Australia National Rescue Maze Challenge as an individual only once. To do so the individual must seek approval from the Challenge Committee. If a team can only afford, or due to extenuating circumstances, cannot send more than one member to an event, then this is allowed as the Journal/Logbook/Technical Description Paper will show that they have been part of a team.

6.1.2 The eligibility requirements for each Rescue Maze Challenge Division are:

6.1.2.1 **Mighty Maisy Maze:** Open to students at an age that would typically be studying at either a primary or secondary provider. This is open to students who are new to Rescue Maze or attempting a new challenge such as creating a robot based on an Arduino or Raspberry Pi controller programmed with a text-based coding language. Teams will only be allowed to enter this division where all students have less than two year's experience participating in Rescue Maze (if all Team Members are in Year 8 or below), or have not participated in Rescue Maze in a prior year (if any Team Member is in Year 9 or above). Additionally, if the team significantly changes hardware and/or software e.g. changing from a LEGO robot to a custom Arduino Robot, it is deemed the years of participation resets to zero. Students should be guided to a higher division by their mentor as capability increases.

6.1.2.2 **Open Maze:** Open to all students studying at a recognised primary or secondary study provider.

6.1.3 For each round, one team member is to be nominated as the Robot Handler. Only the Robot Handler is permitted to enter the Game Zone and handle the robot during the round. All other team members must remain outside the Game Zone unless authorised by the Referee, Official or other relevant person.

6.1.4 The Robot Handler is the only team member permitted to communicate directly with the Referees, and Officials.



7 Game Play

7.1 Pre-round Practice

- 7.1.1 Where possible, competitors will have access to practice arenas for calibration, testing and tuning throughout the event.
- 7.1.2 Whenever there are dedicated independent arenas for event and practice, it is at the organizers' discretion if testing is allowed on the event arena.

7.2 Humans

- 7.2.1 Teams should designate one of its own team members as Robot Handler. Only this team member will be allowed access to the practice/event arenas, unless otherwise directed by a referee. Only the robot handler will be allowed to interact with the robot during a scoring run.
- 7.2.2 The robot handler can move the robot only when told to do so by the referee.
- 7.2.3 Other team members (and any spectators) within the vicinity of the rescue arena have to stand at least 150 cm away from the arena while their robot is active, unless otherwise directed by the referee.
- 7.2.4 No one is allowed to touch the arenas intentionally during a scoring run.

7.3 Start of Play

- 7.3.1 A run begins at the scheduled starting time whether or not the team is present/ready. Start times will be posted prominently around the venue.
- 7.3.2 Once the scoring run has begun, the playing robot is not permitted to be taken from the event area for any reason.
- 7.3.3 Each run lasts a maximum of 240 seconds and includes time for calibration. Time Limits for a round may be varied at the discretion of the Challenge Coordinator at the event.
- 7.3.4 Calibration is defined as the taking of sensor readings and if necessary, modifying a robot's program to accommodate such sensor readings. Once the clock has started, a team may calibrate their robot at as many locations as desired on the arena, but the clock will continue to count down.
- 7.3.5 Calibration time is not for pre-mapping the arena and/or the locations of the victims. Pre-mapping activities will result in immediate robot disqualification for the round.
- 7.3.6 The maze will have a minimum of 2, and up to 4 possible entries. These entries will be a hallway style (that is walls on either side) and will have a floor that is uniformly coloured with the exception of a black strip of 50mm width at the open end. The floors can be red, green, blue or yellow. Calibration for the colour of the entry tile will be included within the Run Time. Entries may be on either the ground or upper levels.
- 7.3.7 The start tile for each run will be randomly determined just prior to the commencement of the timed period. Black tiles and Checkpoints may also be relocated at this time.
- 7.3.8 Once initial calibration has been completed, no more calibration is permitted (this includes changing of code/code selection) without penalty as per section 7.5.3.

7.4 Scoring Run

- 7.4.1 Modifying a robot during a run is prohibited, which includes remounting parts that have fallen off.
- 7.4.2 All parts that the robot is losing intentionally or unintentionally will be left in the arena until the run is over. Neither the team nor the judge are allowed to remove parts from the arena during a run.



7.4.3 A “visited tile” means that more than half of the robot is inside the tile when looking down from above and shall be determined by the referee.

7.4.4 The scoring run ends when:

7.4.4.1 The time expires.

7.4.4.2 The Robot Handler declares an end of their scoring run. The team will be awarded all points achieved up to the call for end of round.

7.4.4.3 The robot returns to the start tile and gets the exit bonus. To collect points, the robot must stop on the start/exit tile and indicate in some way that it has completed the round. Exit indication should be distinct from the victim indication as detailed in section 7.6.2. The operator should be prepared to demonstrate the exit indication to the referee if required.

7.4.4.4 A team member touches the arena or their robot without permission from a referee. If a team member is in breach of this rule the referee can declare a Restart where the robot is returned to the Start tile as per 7.5.3.

7.5 Lack of Progress

7.5.1 A Lack of Progress occurs when:

7.5.1.1 The Robot Handler can request a Lack of Progress from the referee provided that the robot can genuinely not continue through either a stoppage or recursive (looping) behaviour.

7.5.1.2 A robot fails to retreat from a ‘visited’ black tile. A robot is deemed to have entered the tile when more than half the robot is within the tile as determined by the referee. For a successful retreat, it needs to back up without turning inside the black tile (it has to move straight backwards inside of a black tile). (See definition of visited tile on rule 7.4.3.) If a robot is deemed to have visited the black tile it must return to the last visited checkpoint (or the start tile if never reached a checkpoint). All points scored to that stage are still valid, but obstacles and debris will not be reset.

7.5.1.3 A robot or a team member damages the arena.

7.5.2 If a Lack of Progress occurs the robot must be returned to the last visited checkpoint (or the Start tile if the robot has not reached a checkpoint). The robot can be placed in any direction but must be wholly within the tile. The program can be paused but not reset or changed.

7.5.3 After a Lack of Progress or when Rule 7.4.4.4 is breached, the Robot Handler may declare a **Restart**. After a Restart, the team can reset the power supply (turn the robot off and on), change programs, and the maze will be returned to original condition by the referee.

Note: All points earned prior to a call of restart are invalid.

Note: The round timer remains running.

7.6 Mighty Maisy Maze: Scoring

7.6.1 **Successful Victim Identification:** Robots are rewarded points for each Successful Victim Identification in the arena:

- 10 points per Trapped (green) victim.
- 25 points per Critical (red) victim.

7.6.2 A robot can carry out the following action to successfully identify a victim by stopping for 1 second over the victim and clearly indicating by either visual indicator or sound.

7.6.3 Once identified a victim can be used as a checkpoint for lack of progress.

7.6.4 **Exit Bonus.** A successful exit bonus of 25 points will be awarded if the robot reaches and stops on the Start/Exit Tile.



7.6.5 **Count Bonus.** The robot will be awarded a further bonus of 25 points if it stops on the Start/Exit tile and clearly indicates the number of trapped (green) victims found. A bonus of 50 points will be awarded if the number of critical (red) victims is clearly indicated.

7.6.6 **Scoring Summary:**

State	Indicator	Points
Trapped (green) victim found	Stop for 1 second and give clear indication of victim identification	10 per victim
Critical (red) victim found	Stop for 1 second and give clear indication of victim identification	25 per victim
Exit Bonus	The robot will be awarded 25 points for reaching and stopping on the Start/Exit tile within Time Limit	25
Trapped (green) Victim Count Bonus	The robot will be awarded 25 points for an accurate count of green victims	25 points
Critical (red) Victim Count Bonus	The robot will be awarded 50 points for an accurate count of green victims	50 points

7.6.7 Total cumulative scores at the end of all the event rounds will decide the overall positions of the teams.

7.6.8 **Ties at the end.** Ties in scoring will be resolved on the basis of the cumulative time each robot took to complete the runs with the lowest cumulative time being declared the winner.

7.6.9 **No duplicate rewards.** Each victim can only be scored once.



7.7 Open Maze: Scoring

7.7.1 **Successful Victim Identification.** Robots are rewarded points for each Successful Victim Identification in the arena:

- 10 points per “victim” located at a tile adjacent to a linear wall (even diagonally), i.e. all victims at the 6 tiles around a linear wall.
- 25 points per “victim” at floating walls, i.e. all the victims at the 4 floating wall tiles.

7.7.2 The method used to indicate the discovery of the victim must be clearly observable in the course of play. The indicator method used must be conveyed to the referee before commencing the course. The robot must carry out one or more of the following actions to successfully identify a victim:

7.7.2.1 Stop for 5 seconds wholly on the same tile as the victim and clearly indicates for the full 5 seconds, or

7.7.2.2 Stop wholly on the same tile and play a Sound, or

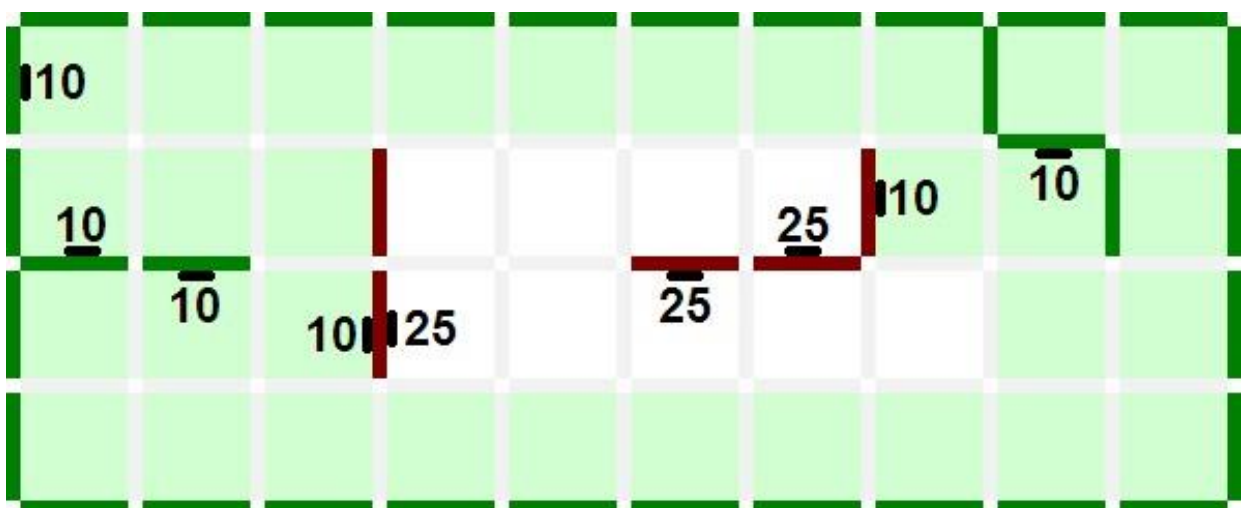
7.7.2.3 Stop wholly on the same tile and provide a visual notification, such as a flashing light or colour change.

Note: Audio indicators must be suitable for a noisy event environment. Visual indicators must be placed in a clearly observable area.

7.7.3 **Successful rescue kit deployment.** Robot should drop a rescue kit on the tile where an identified **heated** victim is, and the deployment point and the rescue kit needs to be wholly on the tile of the victim. The robot is awarded points (see table) per successful rescue kit deployment.

7.7.4 **Scoring Table for Victim Identification:**

State	Indicator	Points Linear Wall	Points Floating Wall	Bonus for One Rescue Kit deployed for heated victims
Victim Found	Clear indication of victim identification	10	25	+10



Note: In the above diagram, red/brown lines mean floating walls while the green ones represent linear walls. Some of the victims on the floating walls are worth 10p, because the 10p victims are located in a tile near a linear wall. The colours on the diagram are just for illustrative purposes.

7.7.5 **Successful Checkpoint Negotiation.** A robot is awarded 10 points for each visited checkpoint. Refer to 7.4.3 for definition of visited tile.



7.7.6 **Successful Exit Bonus.** A successful exit bonus is awarded when a robot successfully finishes a round on the start tile (see rule 7.4.4.3) and has visited at least 50% of the checkpoints. The points awarded will be 10 points per victim successfully identified.

7.7.7 **Ties at the end.** Ties in scoring will be resolved on the basis of the time each robot took to complete the run.

7.7.8 **No duplicate rewards.** For example, if a robot successfully crosses a tile with a checkpoint multiple times, only one successful checkpoint bonus will be rewarded per tile. The same result applies to all other scoring rules.

7.7.9 Table for Checkpoint and Exit Bonus:

Action Completed	Score
Checkpoint	10
Exit Bonus	10 x n (identified victims)

7.8 Event Structure

7.8.1 The regular event will consist of as many rounds as possible with the team scores cumulative over the rounds. Placings at the event will be awarded on the basis of the cumulative scores. In the event of a tied position the placings will be awarded based on the number of victims identified over the regular event rounds.

7.8.2 The organisers may include a Super Round for the final round of the event.

7.8.2 The top 4 scoring teams in the rounds will be eligible to compete in the Super Round. In the event of a tie for 4th position the team with the highest number of victims identified over the normal event rounds will secure the invitation to compete.

7.8.3 The Super Round will be scored as a regular individual round and the points added to the regular rounds cumulative total.

7.8.4 In the Super Round all 4 teams compete at the same time.

7.8.5 The teams will select their starting colour in the order that they have finished in the regular rounds.

7.8.6 Scoring in the Super Round is identical to the regular event with the exception that if a team is the first to correctly identify and leave a rescue package for a particular victim, they “claim” that victim and no other team can score points for that victim. Claimed victims will be identified by coloured tags or stickers.



8 Conflict Resolution

8.1 Referee and Referee Assistant

- 8.1.1 All decisions during game play are made by the referee or the referee assistant who are in charge of the arena, persons and objects surrounding them.
- 8.1.2 During game play, the decisions made by the referee and/or the referee assistant are final.
- 8.1.3 At conclusion of game play, the referee will ask the Robot Handler to check the score. The Robot Handler will be given a maximum of 1 minute to review the score sheet. If the robot handler accepts the score this will be noted on the scoring system. By accepting it, the Robot Handler accepts the final score on behalf of the entire team. If there is any dispute this must be noted in writing. The dispute will be noted on the scoring system and the dispute passed to the Rescue Maze Challenge Coordinator (see 8.4).

8.2 Rule Clarification

- 8.2.1 If any rule clarification is needed, contact the RoboCup Junior Australia Rescue Technical Committee.
- 8.2.2 If necessary, even during a tournament, a rule clarification may be made by members of the RoboCup Junior Australia Rescue Technical Committee and Organising Committee.

8.3 Special Circumstances

- 8.3.1 If special circumstances, such as unforeseen problems or capabilities of a robot occur, rules may be modified by the RoboCup Junior Australia Rescue Organizing Committee Chair in conjunction with available Technical Committee and Organizing Committee members, if necessary, even during a tournament.
- 8.3.2 If any of the team members/mentors do not show up to the team meetings to discuss the problems and the resulting rule modifications described at 8.3.1, it will be considered as an agreement.

8.4 Grievance Process

- 8.4.1 The aim of the grievance process is to ensure the fairest possible outcome for all competitors, recognising that is not always possible. The process should be kept with the spirit of the event (i.e. it should be supportive of all people involved and not become adversarial).
- 8.4.2 Any concerns regarding a Scoring Round (8.1.3) will be adjudicated by the Rescue Challenge Coordinator or a representative based on the recorded recollection.
- 8.4.3 If further clarification is required the Team and the referee will be consulted separately. The Team's mentor may be present to provide support only.
- 8.4.4 Video evidence will not be considered since this cannot be fairly used for all scoring runs for all teams.



9 Code of Conduct

9.1 Spirit

- 9.1.1 It is expected that all participants (students and mentors alike) will respect the aims and ideals of RoboCup Junior as set out in our mission statement.
- 9.1.2 The Volunteers, Referees and Officials will act within the spirit of the event to ensure the event is competitive, fair and most importantly fun.
- 9.1.3 It is not whether you win or lose, but how much you learn that counts!

9.2 Fair Play

- 9.2.1 Robots that cause deliberate or repeated damage to the arena or interfere with any robots in any way will be disqualified.
- 9.2.2 Humans that cause deliberate interference with robots or damage to the arena will be disqualified.
- 9.2.3 It is expected that the aim of all teams is to participate fairly.

9.3 Behaviour

- 9.3.1 Participants should be mindful of other people and their robots when moving around the tournament venue.
- 9.3.2 Participants are not allowed to enter setup areas of other leagues or other teams, unless explicitly invited to do so by team members.
- 9.3.3 No electronic devices may be used for one- or two-way communication between event participants within the Game Zone, or from outside the Game Zone or vice versa.
- 9.3.4 Teams will be responsible for checking update information (schedules, meetings, announcements, etc.) during the event. Update information will be provided on notice boards in the venue and (if possible) on the local event website and/or the RoboCup or RoboCup Junior websites.
- 9.3.54 Participants who misbehave may be asked to leave the building and risk being disqualified from the tournament.
- 9.3.6 These rules will be enforced at the discretion of the referees, officials, tournament organizers and local law enforcement authorities.

9.4 Mentors

- 9.4.1 Adults (mentors, teachers, parents, chaperons, translators and other adult team members) are not allowed in the student work area.
- 9.4.2 Sufficient seating will be supplied for mentors to remain in a supervisory capacity close to the student work area.
- 9.4.3 Mentors are not permitted to repair robots or be involved in programming of their team's robots.
- 9.4.4 Mentor interference with robots or referee decisions will result in a warning in the first instance. If this recurs, the team will risk being disqualified.
- 9.4.5 Robots must be mainly students' own work. Any robot that appears to be identical to another robot may be prompted for re-inspection.

9.5 Ethics and Integrity

- 9.5.1 Fraud and misconduct are not condoned. Fraudulent acts may include the following:
 - 9.5.1.1 Mentors working on the software or hardware of students' robot(s) during the event.



- 9.5.1.2 "Higher league group" and/or more advanced group of students may provide advice but should not do the work for "Lower league group". For example, a secondary group helped to fix its peer primary group's work, software or hardware prior to and/or during the event. This may also risk disqualification for the secondary group. See "Code of Conduct, 9.4.3 & 9.4.5". This applies not just to mentors, but also to higher league (advanced) groups of students as well.
- 9.5.2 RoboCup Junior Australia reserves the right to revoke an award if fraudulent behaviour can be proven after the award ceremony took place.
- 9.5.3 If it is clear that a mentor intentionally violates the code of conduct, and repeatedly modifies and works on the students' robot(s) during the event, the mentor will be banned from future participation in RoboCup Junior events.
- 9.5.4 Teams that violate the code of conduct can be disqualified from the tournament. It is also possible to disqualify only a single team member from further participation in the tournament.
- 9.5.5 In less severe cases of violations of the code of conduct, a team will be given a warning. In severe or repeated cases of violations of the code of conduct, a team can be disqualified immediately without a warning.

9.6 Sharing

- 9.6.1 The spirit of world RoboCup events is that any technological and curricular developments should be shared with other participants after the tournament.
- 9.6.2 Any developments may be published on the RoboCup Junior website after the event.
- 9.6.3 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.
- 9.6.4 This furthers the mission of RoboCup Junior as an educational initiative.

9.7 Batteries

- 9.7.1 Due to safety reasons, Lithium-based batteries can only be used in conjunction with commercially produced, dedicated balanced Lithium-based battery chargers and fireproof charging bags. These batteries can explode due to incorrect charging and discharging (check manufacturer's recommendations), or if they are damaged.
- 9.7.2 Protection circuits for Lithium-based batteries are strongly encouraged. The use of swollen, damaged or otherwise dangerous batteries is not allowed.
- 9.7.3 At any event venue all teams charging lithium-based batteries (including LiPo (Lithium Polymer) and Li-ion (Lithium-Ion) batteries) must charge their batteries at the lower of either:
- 9.7.3.1 the manufacturer's recommended charging rate (if available)
- 9.7.3.2 a maximum charging rate of 1C

The charging rate equivalent of 1C for a given battery can be identified through its capacity. For example, a 1500mAh (1.5Ah) LiPo battery would have a 1C of 1500mA (1.5A), where as a 2200mAh (2.2Ah) LiPo battery would have a 1C of 2200mA (2.2A).

If the manufacturer's recommendations are not available, teams should charge lithium-based batteries at a rate within the range of 0.5C to 1C.