RoboCup Junior Victoria

Max's Manageable Maze Rules 2021

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RoboCup Junior Victoria Executive Committee

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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 competition 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 competitions, that any technological and curricular developments will be shared with other participants after the competition. 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 competitions 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 competition.

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.

Table of Contents

1 The Challenge

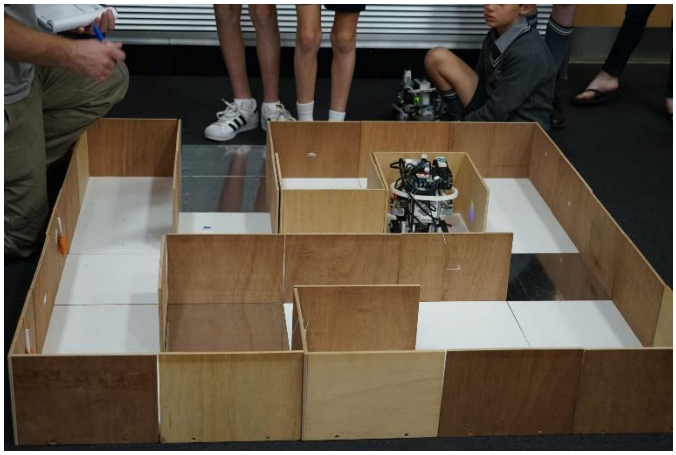
1.1 The Scenario

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.

1.1.2 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 as possible of the maze. The robot will get between 10 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 5 points. The robot should avoid areas with black floor.

1.1.3 If the robot is stuck in the maze it, can be 'freed' (by way of repositioning the robot on the tile it is presently on (or was last completely on if between multiple tiles), and/or restarting the robot and/or restart the program.

2 Playing Field



2.1 Maze Description

2.1.1 The maze may consist of multiple distinct areas. Areas will have a horizontal floor and a perimeter wall. Mazes shall be a single level.

2.1.2 Areas may be joined together by doorways.

2.1.3 Walls that make up the maze are at least 15cm.

2.1.4 Doorways are at least 30 cm wide (less thickness of walls).

2.1.5 The walls can be any colour

2.2 Floor

2.2.1 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.

2.2.2 A tile is defined as a 30 cm x 30 cm space, which is aligned to the grid made up by the walls, however, for virtual events, this may vary to allow construction out of more readily available materials (e.g. A4 paper boxes).

2.3 Path

2.3.1 Wall will lead to entrance/exit are called linear walls.

2.3.2 Paths will be approximately 30 cm wide, but may vary as per 2.2.2.

2.3.3 There shall be a single combined entry/exit points in the maze.

2.4 Environmental Conditions

2.4.1 This competition 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.

2.4.2 Teams must come prepared to adjust their robots to the conditions at the venue.

2.4.3 Lighting and magnetic conditions may vary along the course in the rescue arena.

2.4.4 The arena may be affected by magnetic fields (e.g. generated by under floor wiring and metallic objects).

2.4.5 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.

2.4.6 The Organising 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%.

2.4.7 Objects to be detected by the robot will be distinguishable from the environment by their colour.

3 Victims

3.1 Definition

3.1.1 Victims are located on walls, near the floor of the arena (approximately 7 cm above the floor).

3.1.2 Each victim has a surface area of at least 15 sq. cm.

3.1.3 Victims are identified by highly reflective silver foil type affixed to the walls, with an area of at least 15 sq. cm.

The preferred tape can be found at https://www.bunnings.com.au/ametalin-48mm-x-50m-insulation-ducting-tape_p0810227.

3.2 Locations

3.2.1 There will be a minimum of five (5) victims in any round.

3.2.2 Victims can be located anywhere within the maze with the exception of at the entry/exit point.

4 Robot

4.1 Construction

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

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 challenge will be disqualified. If there is any doubt, teams should consult the Coordinators.

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

4.1.6 Robots must be autonomous in operation. If the robot has the capability for remote or other forms of remote control either by Bluetooth, Wi-Fi or some other 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 tournament. Distributed control is allowed but must operate without human interaction after the robot has started the round.

4.2 Rescue Kits

4.2.1 A Rescue Kit represents a basic health package distributed to a 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.

4.2.2 Each Rescue Kit must have a minimum volume of 0.5 cubic cm.

If available, 3U (3x1) Lego beams make suitable Rescue Kits.

4.2.3 Each team can only carry a maximum number of 12 of those kits.

4.2.4 Each team is responsible for the whole Rescue Kit system (the maximum of 12 kits), including bringing the rescue kits to the competition. 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 Inspection

5.1 Interviews

5.1.1 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 competition prior to the finals.

5.1.2 Teams must bring their journals, logbooks or design diaries 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 are unacceptable.

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

5.1.4 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.

6 Teams

6.1 Definition

6.1.1 A team should have a minimum of 1 member and a maximum of 5 members.

6.1.2 RoboCup Junior Victoria Rescue Maze is an Open Challenge: Open to all students studying at a recognised secondary or primary study provider.

6.1.3 In each round one team member is 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.

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 competition.

7.1.2 Whenever there are dedicated independent arenas for competition and practice, it is at the organisers' discretion if testing is allowed on the competition 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/competition 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 s/he is 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 competition area for any reason.

7.3.3 Each run lasts a maximum of 240 seconds and includes time for calibration.

7.3.4 Calibration is defined as the taking of sensor readings and 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. A robot is not permitted to move using its own power while calibrating.

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 single entry/exit point. It will be hallway style with a wall on either side.

7.3.7 Once a scoring run has begun, 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 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**. 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 Scoring

7.6.1 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.

7.6.2 A robot can carry out the following action to successfully identify a victim:

7.6.2.1 Stop for 5 seconds wholly on the same tile as the victim and clearly indicates for the full 5 seconds.

Note: The method used to indicate the discovery of the victim must be clearly observable in the course of play. Audio indicators must be suitable for a noisy competition environment. Visual indicators must be placed in a clearly observable area. These indicators need to be conveyed to the referee before commencing the course.

7.6.3 Scoring Table for Victim Identification:

State	Indicator	Points	Bonus for One Rescue Kit deployed
Victim Found	Clear indication of victim identification	10	+5

7.6.4 To identify a victim, a robot must stop wholly on the same tile as the victim while using an indication method (see table above).

7.6.5 Successful rescue kit deployment. Robot should drop a rescue kit on the tile where the identified 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.

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

7.6.7 No duplicate rewards. For example, if a robot successfully deployes multiple carepacks to one victim, the carepack deployment points will only be awarded once. The same result applies to all other scoring rules.

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 sign the score sheet. The robot handler should be given a maximum of 1 minute to review the score sheet and sign it. By signing it, the robot handler accepts the final score on behalf of the entire team; in case of further clarification, the robot handler should write their comments in the score sheet and sign it.

8.2 Rule Clarification

8.2.1 If any rule clarification is needed, contact the RoboCup Junior Victoria Rescue Coordinators.

8.2.2 If necessary even during a tournament, a rule clarification may be made by members of the RoboCup Junior Victoria 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 Victoria Committee Chair, 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.

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 competition 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 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 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 competition website and/or the RoboCup or RoboCup Junior websites.

9.3.4 Participants who misbehave may be asked to leave the building and risk being disqualified from the tournament.

9.3.5 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 competition.

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 competition. 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 competition, the mentor will be banned from future participation in RoboCup Junior competitions.

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 competitions 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.