



Junior Robotics Competition 2018 RoboJunior Save Metropolis Rules

The recent natural disaster hit Metropolis hard! It is dangerous for rescue workers to enter the centre of the city to save those injured or trapped. Your mission as a team is to design, build and program your robot to maneuver across broken roads, fallen trees, obstacles and debris to save as many victims as possible within a specified duration.

The difficulty level of this mission will be different for the primary (elementary school) level and the secondary (high school) level.

Important to remember:

The Robots are required to have full autonomy. The students competing in the event must build and program their robots without any help or interference from their teachers or mentors.

The Judge will apply all the rules fairly and without prejudice. All decisions made by the Judge during the games are final. Any argument with the judges by a team member, teacher, or chaperon will result in a warning. Continued or repeated arguments will result in immediate disqualification of the team. At the conclusion of each game, the Judge will ask the captains to sign the score sheet. By signing the score sheet the captains accept the final score on behalf of the entire team.

GENERAL RULES

1. A team is composed of 2 to 4 members. A team can compete with one qualified robots. The substitution of robots during the competition within the team or with other teams is forbidden.
2. For each round, the team designates a Team Captain who manually starts the robot. The Team Captain is the only member allowed to handle the robot when instructed by the Judge. No member is allowed to step or lean on any part of the arena. Only team members participating in the round are allowed to be near the arena.
3. The Robot must be controlled autonomously. It is forbidden to use pre-mapped type of dead reckoning (movements predefined based on known locations before game play).
4. Any robot kit or building blocks, either available on the market or built from raw hardware, may be used if the design and construction of the robot are primarily and substantially the original work of the students.
5. Any commercially produced robot kits or sensor components that are specifically marketed to complete any single major task of this event will be disqualified. For example, pre-programmed sensors with special features for line-following are not allowed. If there is any doubt, the teacher-in-charge should verify with the Competition Coordinator or the Chief Judge at least a month before the start of the competition. Any team found to be in violation of this rule during the competition will be immediately disqualified.

EVENT DESCRIPTION

The city centre: represented by 8ft x 6ft (or less) white or light coloured linoleum piece (or other material) with (or without) tile design. The piece of material is placed directly on the floor and there will be no walls around the sides.

The streets are represented by a 2 cm (approximately) thick black lines or electrical tape.

The damaged parts of the streets are represented by gaps in the line that are no more than 18 cm in length. There could be multiple gaps close to each other, and the gaps could be on a straight or curved part of a street. Between successive gaps, there will always be a solid line of no less than 8 cm long.



JRC 2018 RoboJunior – Save Metropolis Rules
Preliminary (Revised Nov. 30, 2017)

Trees have fallen on the roads. These trees are represented by fixed pieces of wood (painted white) that are no more than 1 cm high. They may be placed perpendicular to the road or at an angle. A maximum of 5 trees could be found close to each other.

Debris is scattered everywhere. It is represented by small material (toothpicks, wooden dowels, etc) of any colour. The debris is not fixed to the linoleum so the robot should be able to push it out of the way.

Obstacles are found in different locations. Some have fallen in the middle of the street and others are too close for your robot to pass. The obstacle might be very heavy to be moved aside, so your robot must go around it. These obstacles may be represented by black painted bricks, blocks or bottles. If your robot is strong enough to push an obstacle aside that is acceptable, but once pushed, the obstacle must remain where it is until your round is over.

From the aerial view of the city centre, it is determined that some streets should be completely avoided. At certain intersections, markers are placed to indicate the safe path that the robot must take. These markers are 3 cm x 3 cm green squares. They will be placed just before the intersection. The robot must turn towards the green marker. If there are no markers at an intersection, the robot must continue straight.

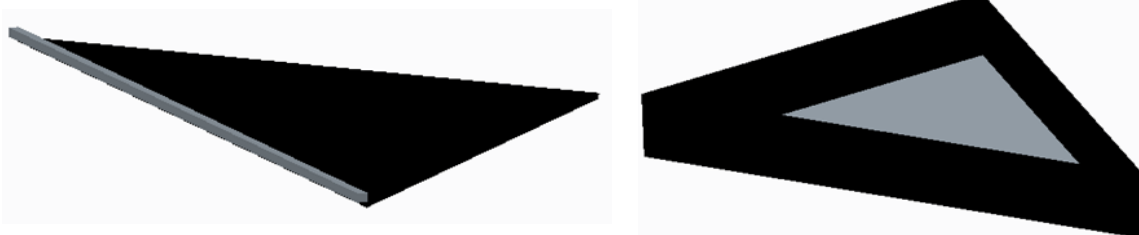
Luckily for the citizens of Metropolis, the hospital on the outskirts of the city is not damaged. Inside the hospital compound, the robot will encounter victims that need immediate attention. A victim is represented by a well balanced infrared (IR) electronic ball set to pulse mode. (HiTechnic Infrared Electronic Ball-IRB 1005 or similar). In order to locate the ball (victim) the robot must have an IR Seeker, such as HiTecnec IRSeeker V2 (NSK1042) or similar.

The hospital compound has a 10 cm to 15 cm white wall around it, except for the entrance which is at least 30 cm wide. In front of this entrance, there is a strip of reflective aluminium tape **measuring 25 mm in width and 300 mm in length**.

Victims will be placed in the compound one at a time. To save a victim, the robot must **place it in** the safe indicated corners. **There are safe zones in 3 of the 4 corners of the compound (not in the corner close to the entrance)**. Once a victim is safe, another will be placed by the judge. **Note that students may use touch, ultrasonic, or other sensors to locate a corner**.

At the elementary level, the victim (ball) is pushed into the safe zone , **which is a black painted surface in the shape of right angle triangle with 30 cm x 30 cm sides and a bump of 5 mm (left figure below)**.

For the secondary level, the victim (ball) must be lifted into the safe zone **which is a hollow, black painted, right angled wooden piece with 30 cm x 30 cm sides and height of 6 cm (right figure below)**.



The duration of the entire mission (per round) will be at most 15 minutes but will be specified at a later date. The scoring points for negotiating the aforementioned problems (gaps, obstacles, debris, intersections etc) will be revealed at a later date.

Sensors that you may wish to use with NXT or EV3 robot:

- IR seeker sensor (ball finding)
- light sensors or light/colour sensors (line following)
- ultrasonic sensor (distance measurement & obstacle negotiation)
- compass sensor (orientation measurement; recommended for secondary level only)



PRE-GAME INSPECTIONS AND PRACTICE PERIOD

The robots will be examined by the Judge before the start of the competition, before any round if the robots are modified, or if requested by the Judge.

Team members will be asked to explain the operation of their robots, in order to verify that construction and programming of the robot is their own work. Members will be asked about their preparation efforts.

Every team will be given access to the arena for calibration, testing, and practice. The allotted time will be the same for each team and the duration will be decided by the Judge for each modified round.

At the end of the "practice period" of each round, the Judge will call for the start of the games. All teams should be ready to play according to the schedule prepared by the Judge and distributed at the first day of the competition. Note that this schedule may be changed by the Judge at any time if necessary.

CODE OF CONDUCT

Fair Play and Behaviour:

All team members are expected to play a fair and clean game. It is important that the participants learn from each other as well as enjoy the competition. Team members and robots are not allowed to cause damage to any part of the arena.

All participants (team members, teachers-in-charge and chaperons) are expected to treat each other with respect and to adhere to the rules and regulations of the competition. Participants must follow the directions of the Judges and of the JRC-RoboJunior Officials.

Teams will be responsible for checking update information (schedules, meetings, announcements, etc.) during the event. Update information will be provided by the Judges. All teams are required to compete in the two days of the competition.

Teacher-In-Charge and Mentors:

The teacher-in-charge and mentors (chaperons, parents, or visitors) are not allowed to assist in the construction or programming of the robots. For safety reasons, only the teacher-in-charge and the officially registered chaperon(s) are allowed to stay at the team's work areas, but not around the arena. These teachers and chaperons must refrain from touching the robots or giving any verbal directions to repair or re-program any robot. Violators may risk the disqualification of their team.

ADDITIONAL REQUIREMENTS

Robot Inspection and Team Member Interviews:

Team members should make sure that the Judge inspects and certifies their robot during the practice period and before any scoring run. The Judge may request other inspections if necessary. The inspections may include verification of the robot's construction and/or programming.

The Judges may arrange for a technical interview for all team members during the event. The judges will go around interacting with the students. The interview will be set up as a casual conversation in a "questions and answers" atmosphere. The main objective of the interview is to discuss the technical challenges which the students faced during the construction and programming of the robots. The judges will be looking for innovative solutions to the different challenges.

A team will not fail an interview except if the judges determine that the students did not follow the rules. Failing the interview may disqualify the team from maintaining (if applicable) their first, second or third place. It is acceptable that different team members have varied skills in programming and/or construction.

