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Competition rules (2025 Robotics@ISEP Open version)

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Industrial Robotic Manipulators

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Homepage: https://www.isep.ipp.pt/Page/ViewPage/openrobotica_iii

Email: mss@isep.ipp.pt

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I. General Information

The aim of the Industrial Robotic Manipulators competition is to promote robotics and education in the area of manipulation robotics, within the framework of a competition based on principles of fair play. In addition, it is intended to be a competition in an area where competitions are scarce, and to be possible to implement using both simulators, so that it is possible to implement this competition even in institutions with fewer resources, and real equipment.

Although the competition's target audience is students from ISEP - Instituto Superior de Engenharia do Porto, the competition is open to participants from higher education institutions, vocational schools, primary and secondary schools, and participants who register as individuals.

This competition will be held with the robots available in ISEP's laboratories, namely manipulators from the following brands:

- ABB Portugal (ABB robots)

- Universal Robots Spain S.L (Universal Robots robots)

This version of the rules (2025 Robotics@ISEP Open version) is the final version of the rules that will be in force during the 2025 Robotics@ISEP Open and was developed based on the rules for the same competition, developed by the Portuguese Robotics Society (SPR).

Any questions regarding this competition should be sent to one of the following email addresses: robosmanipuladores@lists.sprobotica.pt or mss@isep.ipp.pt.

II. Competition specification

1. The competition involves developing a solution, based on an industrial manipulator robot, to a problem proposed by the organisation or devised by the team.

2. The competition is divided into two categories:

    a) "Classic" Industrial Manipulators: this category involves developing solutions to a problem that involve realising it in the shortest possible cycle time.

    b) Collaborative Industrial Manipulators: this category involves developing solutions to a problem that necessarily involve robots collaborating with humans.

3. The competition is organised into two phases:

    a) A first phase, which will take place in the month before the Robotics@ISEP Open, and which will take place in a simulated environment; from now on, this phase of the competition will be called the "Simulated Environment Competition".

    b) A second phase, to be held on the days of the Robotics@ISEP Open, and which will take place in a real environment; from here on, this phase of the competition will be referred to as the "Real Environment Competition".

4. There is no limit to the number of teams participating in the first phase. The number of teams participating in the second phase may be limited, depending on the number of robotic manipulators available at the Robotics@ISEP Open venue.

III. Specification of the First Phase of the Competition – Simulated Environment Competition

1. After registering, the team will receive a software licence to develop their solution to the competition.

    a) If any team wishes to participate using other robot simulation software (e.g., CoppeliaSim, ROS / Gazebo, Visual Components, WeBots, etc.), other than that provided by the Robotics@ISEP Open organisers, they may also do so. In this case, the teams will have to secure the necessary software licence if it is not free to use.

2. In the "Classic Industrial Manipulators" category, the month before the start of the Robotics@ISEP Open the teams will be told the problem to which they will have to propose a solution. This proposed solution must be developed in a simulation environment and "submitted" by the day the Robotics@ISEP Open kicks off.

3. In the "Collaborative Industrial Manipulators" category, teams will have to propose a solution to a collaborative problem between robots and humans that they have identified. This proposed solution must be developed in a simulation environment and "submitted" by the day the Robotics@ISEP Open kicks off.

4. Each team's proposals for solving the problem will be assessed by the competition jury, based on technical-scientific criteria and the feasibility of the solution.

5. The result of the evaluation will be an ordered ranking of the teams. If the number of teams in this phase greatly exceeds the number of robots available for the Real Environment Competition, the organisation may limit participation in this competition to only those teams that obtain the best classification in the Simulated Environment Competition.

IV. Evaluation of the Simulated Environment Competition

1. The assessment of the Simulated Environment Competition will be carried out through:

    a) A technical presentation (lasting no more than 15 minutes and based on a PowerPoint presentation (or other medium)) of their proposal for solving the problem, including a video of the simulation developed.

    b) Clarifying any doubts and answering the jury's technical questions.

2. The jury's assessment must follow the following criteria:

    a) Technical and scientific quality of the proposal, assessed based on the technical presentation to the jury; Weighting = 30%.

    b) Feasibility of the proposed solution and potential for application; Weighting = 30%.

    c) Quality and success of the technical solution presented, assessed on the basis of the technical presentation and video of the solution; Weighting = 40%.

3. Each member of the jury will award 0-10 points per criterion.

4. The points awarded by each member are added up, and the teams are ranked according to this sum.

5. In the event of a tie, the jury must vote on the order of the tied teams, with the representative of the competition’s Organising Committee having the power to break the tie if necessary.

V. Specification of the Second Phase of the Competition – Real Environment Competition

1. In the “Classic Industrial Manipulators” category, the teams will be given a problem to which they will have to implement a solution. This solution must be developed using the robot provided by the organisation and must be presented to the competition jury at the presentation session.

2. In the “Collaborative Industrial Manipulators” category, teams will have to implement a solution to the problem of collaboration between robots and humans that they have identified. This solution must be developed using the robot provided by the organisation and must be presented to the competition jury at the presentation session.

3. Each team’s solutions to the problem will be assessed by the jury, based on technical-scientific criteria and the feasibility of the solution.

VI. Evaluation of the Real Environment Competition

1. The Real Environment Competition will be assessed through a presentation session consisting of:

    a) A technical presentation (lasting no more than 20 minutes and based on a PowerPoint presentation (or other medium)) of the team's proposal to solve the problem.

    b) Clarifying any doubts and answering the jury's technical questions.

    c) A short non-technical presentation together with a public demonstration (lasting no more than 30 minutes), simultaneously responding to challenges from the public and/or the jury.

    d) In the "Classic Industrial Manipulators" category, the presentation of the solution on the robot must be done in manual mode and only one member of the team (the one operating the teach pendant) may be inside the robot's working volume.

2. The jury's assessment must follow the following criteria:

    a) Technical and scientific quality of the proposal, assessed on the basis of the technical presentation to the jury; Weighting = 25%.

    b) Quality of the proposed solution; Weighting = 25%.

    c) Ability to present the solution to the public, assessed on the basis of how the non-technical presentation and public demonstration are carried out by the team; Weighting = 20%.

    d) Quality and success of the demonstration, assessed on the basis of the public demonstration; Weighting = 30%.

3. Each member of the jury will award 0-10 points per criterion.

4. The points awarded by each member are added up, and the teams are ranked according to this sum.

5. In the event of a tie, the jury must vote on the order of the tied teams, with the representative of the competition's Organising Committee having the power to break the tie if necessary.

VII. Competition Jury

1. The competition is run under the supervision of a jury, preferably made up of an odd number of individuals, according to the following guidelines:

    a) 1 or 2 researchers from academia (with a PhD), preferably working in the field of automation and robotics.

    b) 1 or 2 individuals linked to industry, preferably working in the field of automation and robotics.

    c) 1 member of the competition's Organising Committee.

2. Any doubts regarding the interpretation of these rules will be decided by the competition jury.

3. In the event of non-compliance with the rules of the competition, or a lack of fair play by one or more members of a team, the jury has the right to impose a penalty in the form of the subtraction of points from the offending team.

4. In the case of behaviour by team members that affects moral standards, good manners, human dignity, religious sentiments or the safety of the participants, the jury has the right to impose a penalty in the form of subtracting points from the offending team or, in cases considered more serious, may even decide to disqualify the team.

5. The jury's decisions are final and cannot be appealed.

VIII. Disclosure of personal data and sharing of information with sponsor(s)

1. The registration of a team in this competition implies that the team members agree to the collection and publication of basic information about the team members, namely the brand of the robot, the name of the team and its members, the name of the institution of the team members, and allows the collection of photos and videos in the place where the competition takes place and adjacent areas and its dissemination, by the organisers of the event and possible partners, without the need to inform the teams.

2. The registration of a team in this competition implies that the team members agree to share the simulations / programmes they develop with the company(ies) sponsoring the competition.