



IEEE Region 10 Robotics Competition 2022

Robotics for Healthcare



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Innovative Robots Development for Healthcare and Humanitarian Applications

Competition Project# 4

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Project# 4

1. Introduction

R10 Robotics Competition Project 4 is an opportunity to all IEEE Student members (Undergraduate and Postgraduate) and Young Professionals (YP) to demonstrate their innovative robot projects designed for healthcare and humanitarian purposes and compete at an international level.

A robot designed to assist with any medical situation or requirement will be considered as a healthcare robot. A robot designed to assist or deal with natural disaster, mitigate climate change threats, eliminate/reduce human sufferings or improve common person life will be considered as a humanitarian class robot.

Entries to the competition can be a final year project for undergraduate students or a research project for postgraduate students and YP. For undergraduate students the robot development must not have commenced prior to June 2021. Projects based on work done prior to June 2021 may be considered if the significant amount of work has been carried out in 2022. For postgraduate students and YP the robot or enabling automation technology must have been developed in 2021-2022.

The competition aims for participants to showcase their technical ingenuity and abilities by:

- Application of classroom knowledge and enabling methodologies to develop innovative robot design for a practical purposes,
- Demonstrated abilities to:
 - Study and understand the problem,
 - Analyze and decompose requirements,
 - Develop hardware and software codes for the development robot, and
 - Dissemination of scientific knowledge.
- Demonstrated team work for the robot development.
- Evidence of Sound Engineering Practices – Documentation and recording keeping for (a) robot design features requirements, (b) design decisions, i.e. different options contemplated and the reasons for selected options, (c) ability to trace back the technical errors if any and troubleshooting, (d) foundations for future developments, and (d) proof of originality and ownership of the work.

2. Competition Outline

The competition for Project# 4 will be conducted in two segments: (a) Projects Selection segment and (b) a Final round. In the first segment projects registered for the competition will undergo a selection process to pick teams to go into the final round. Both segments will be conducted by R10.

For the Projects Selection segment all registered teams will be required to demonstrate the full functionality of the robot or enabling automation technology in a 6-minute video along with a poster as specified below. The successful teams from the first segment will compete in the final

round, which is planned to be a physical gathering subject to COVID-19 restrictions. If the physical gathering is not possible for any reason, then the final round will be held online.

R10 will specify the assessment rubrics to evaluate the performance of the robots as well as the teams' performance in achieving the competition aims (listed above in section 1). At both stages, entries will be judged for the the practical usefulness of the robot, design innovation, practical hardware & software implementation, technical simplicity and cost effective solution, and potentials for further development of the robot into a marketable product.

3. Eligibility Criteria

Project# 4 of the R10 Robotics Competition is open to IEEE Student members and Young Professionals (YP) in the IEEE Region 10. Non-members must join the IEEE to be eligible to participate in the competition.

All contestants in the competition must belong to one of the IEEE Sections in Region 10. Contestant(s) can be an individual or a team as explained below:

- Individual must be an active IEEE student/PG/YP member.
- All participating YP must have graduated within the last five years.
- Team-based. The number of team members nominated for the competition should be no more than four for any project. One of the team member must be designated as the team leader. If selected, a maximum of two members will be allowed to attend the final rounds.
- A senior volunteer in the Section or from the industry can act as an advisor for the team but must not carry out the tasks related to robot hardware or coding the algorithms. It is not necessary for the Advisor to be an IEEE member.
- To qualify as a WIE team, the majority of team members must be female IEEE members and not just the majority of female members. The team can NOT have an equal or more number of males than female members.
- Teams must not include any member from outside the Region 10.

4. General Rules

1. Submissions should be of innovative and useful robotics and automation technology applicable to healthcare and/or humanitarian purposes.
 2. The scope may include but is not limited to mechanism design, software algorithms, hardware development, sensory technology etc.
 3. The participants cannot use a commercially available robot for the competition.
 4. Robots must operate autonomously and must not be operated via any remote control system.
1. All participants will be required to submit by the **closing date of 15 August 2022** for selection for the final competition:
 - a. A registration form (to be made available on the competition website).
 - b. A electronic copy of an A1 (59 cm x 84 cm) size scientific poster consisting of an abstract, short list of key words, brief introduction of the robot project and appropriate diagrams/images to illustrate the robot design and functions. Poster must be appropriately titled with the names of the project team and their educational institute's name(s).

- c. A video presentation no longer than 6-minute in mp4 format, showing the performance of the Robot system or an innovative automation technology with explanation of key innovative feature incorporated into the robot design and autonomously working robot for carrying out tasks successfully. Any video more than 6 minutes long may result in disqualification of the team.
 - d. Endorsement from the IEEE Section to whom the majority of team members belong. R10 will accept a maximum of two teams endorsed by the IEEE Section.
 - e. A testimonial letter from the Academic supervisor about the project starting date and anticipated finish date. Academic supervisor must also mention any prior work on which the current project is based.
2. A fully functional system should be demonstrated during the final competition rounds, which can be online live demonstration or at a physical gathering organized by IEEE Region 10 at a venue.
 3. It will be the responsibility of the team to arrange appropriate set-up to demonstrate the robot system functions and working performance.
 4. The final rounds of the competition are expected to be held around mid-December 2022. R10 may provide partial or full financial assistance for participation in the final rounds.
 5. The competition will be conducted in English, i.e., all submissions, including project documentation must be in English. However teams will be allowed to arrange the services of a translator to answer judges' questions during the competition.
 6. The judges' decision will be final and no appeal against the judges' decision will be entertained.

5. Judging Criteria

The judging criteria given below are broad standards and the judging panel may look into other factors if required, particularly when there is an issue of a tie between the multiple teams. The decision of the judges is final at every stage of the competition.

5.1 Robot Projects Selection

For selecting the robot projects for the final round following judging criteria will apply:

1. Video (Clarity and quality of video, quality of technical content, and factual and technical accuracy),
2. The originality of the research process and solution to meet the stated objectives shown in the poster. The poster must contain Abstract and Keywords.
3. Evidence of thought process and team work for developing the project plans, identification of potential risks, and risk mitigation strategies (from submitted documents),
4. Design innovation and cost-effectiveness
5. Commercial viability,
6. Safety features,
7. Testing accuracy and

8. Quality of documentation (Design details, software code, and testing procedures with results).

5.2 Final Round Judging

In the final round all robots will be judge according to the follow broad criteria:

1. Robot project objectives and practical usefulness related to healthcare and Humanitarian causes.
2. Working functions of the robot,
3. Design innovations & simplicity with cost effective solution,
4. Safety features,
5. Demonstrated team work,
6. Quality of documentation.
7. Answers to judging panel's questions

6. Prizes

The selected projects for the final round will be categorize based on robot functions or enabling technologies. For each competition category the winners will be declared as first, second and third positions and the prizes will be:

First Position Winner – A cash prize of USD 500 plus a plaque.

In case of a team winning the first position, one cash prize of USD 500 plus a plaque will be given out for the whole team. Additionally each team member will receive a certificate.

Second Position Winner – A cash prize of USD 350 plus a plaque.

In case of a team winning the second position, one cash prize of USD 350 plus a plaque will be given out for the whole team. Additionally each team member will receive a certificate.

Third Position Winner – A cash prize of USD 250 plus a certificate.

In case of a team winning the second position, one cash prize of USD 250 plus certificates for each team member.

Every individual and team member reaching the final round but not able to win a position will receive a certificate of participation in the R10 Robotics Competition.

Contacts for further Information:

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