ROBOMANIA

Hosted by IEEE SB Nirma University

26th June 2022
Venue: Nirma University Ahmedabad

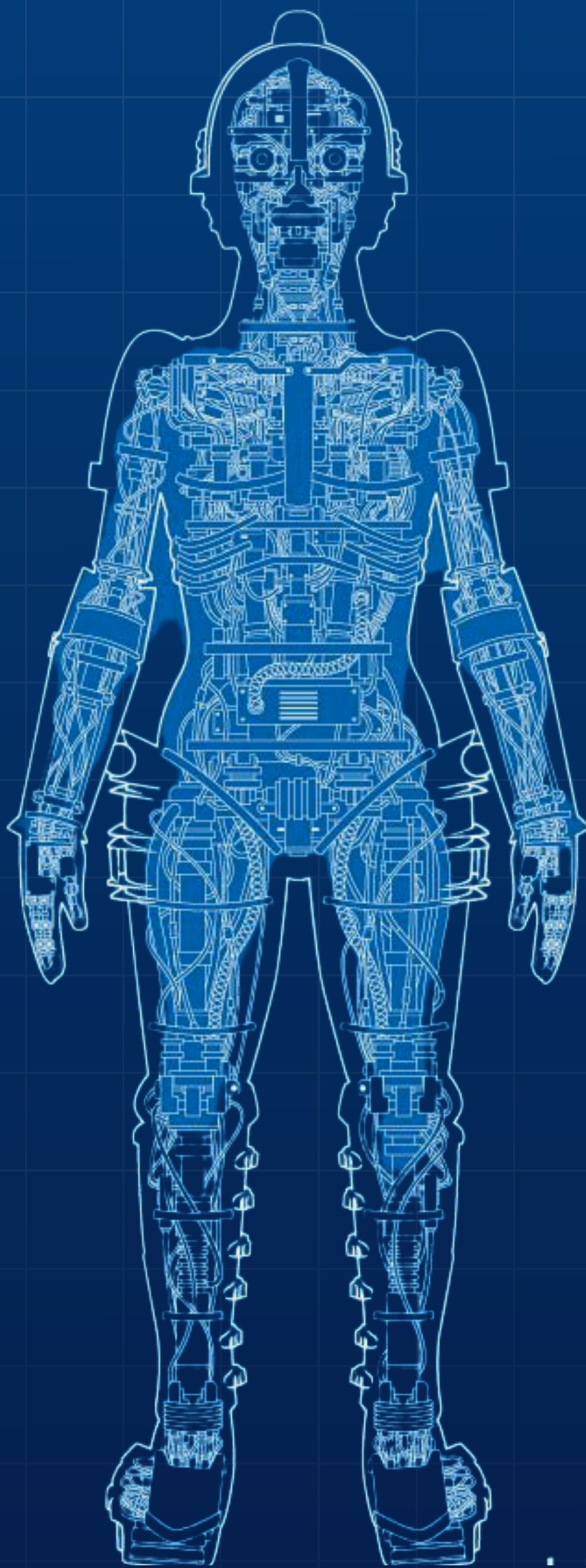**Selected Top 2 Teams will compete at International Level**

BROCHURE

ABOUT THE EVENT

R-10 robotics competition aims toward IEEE Student members and young professional members who graduated within the last 5 years. IEEE SBNU in collaboration with the IEEE Gujarat section, Region 10 identifies this opportunity and aims to bring the robotics and automation technology to the hands of students across the Nation. The main objective of the competition is to create awareness amongst young IEEE members about the importance of technology in providing solutions to real-world problems by harnessing their creativity and capabilities. Robotics is a multi-disciplinary field (hardware, coding, digital signal processing/image processing, artificial intelligence, etc.) that offers a hands-on opportunity to apply classroom theory to building a substantial piece of engineering that can serve a useful purpose. Thus, such pursuits allow a deep understanding of the problems and challenges of building robots for a practical solution.

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THEME

Project 1:
Modelling & Simulation for Robot Development

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PROBLEM STATEMENT

Instrument nurses, commonly known as Scrub nurses, often work in the operating room (OR) for long hours, which can be physically and emotionally exhausting and can result in mistakes. A Scrub Nurse Assistant Robot is required to help during the perioperative period with the following duties:

Preoperative:
- Collect instruments and devices required for the operation from a storage area and set them up on the instrument table without breaching sterility.
- Recognize and count instruments preoperatively.

Intraoperative:
- Assist instruments handling between instruments table and the operating field. Handling is mostly physically passing instruments to and from the surgeon's hand. Handling could also include removing instruments that the surgeon has left on the field
- Wash and clean instruments between uses within the same medical operation.
- Assemble and prepare specific instruments (e.g., loading needle on a needle driver, attaching the preferred blade on scalpel handle, loading clips on clip applier).
- Maintain an accurate count of all accountable items throughout the procedure

Postoperative:
- Count instruments post-operatively to ensure no instruments are left within the surgical site. Informs surgeons and nurses of count results and pack instruments into containers for sterilization for the next medical operation.
- Perform safety checks and discard waste from the surgery room.
  - Make sure "sharps" (e.g., needles, blades) are removed from the table and placed in a safe container before disposable items are discarded.

CRITICAL FEATURES AND FUNCTIONS

Features:
- Ability to recognize, classify and count items on the Instrument table using machine vision and object recognition techniques.
- Ability to lift and pass instruments in a safe manner and according to the prescribed method. For example, sharp instruments should be passed in a small tub.
- Ability to lift and pack used instruments in containers.
- Able to perform some tasks of Scrub nurse such as loading needle on a needle driver, attaching the preferred blade on scalpel handle, loading clips on clip applier.
- Able to navigate around objects.
- Safety features – Avoidance of (a) sterility breaches, (b) instrument dropping, (c) accidents with sharp instruments, and (d) collision with the medical staff.

Functions:
- Function autonomously
- Pass instruments as requested and remove used instruments from the over-bed-table
- Maintain a count of each class of objects on the instrument table and keep track of inventory. Warn about any missing object.
- Sanitization - Wash and clean/dry/disinfect instrument during the surgery
- Prepare specific instruments (loading needle on a needle driver, attaching the preferred blade on scalpel handle, loading clips on clip applier).
- Pack used instruments in containers and informs doctors and nurses of objects count results.

ELIGIBILITY CRITERIA

- IEEE Student members, Graduate Student members, and Young Professionals (YP) members are eligible to participate in the competition.
- IEEE Student members enrolled for a Bachelor's degree in electrical engineering, electronics engineering, computer science, or any other field of interest of an IEEE Society are eligible undergraduate students (UG).
- Young Professionals must not have graduated more than 5 years ago.
- Participants in the contest can be individual or a team as explained below:
- Individual: Must be an active IEEE student or YP member
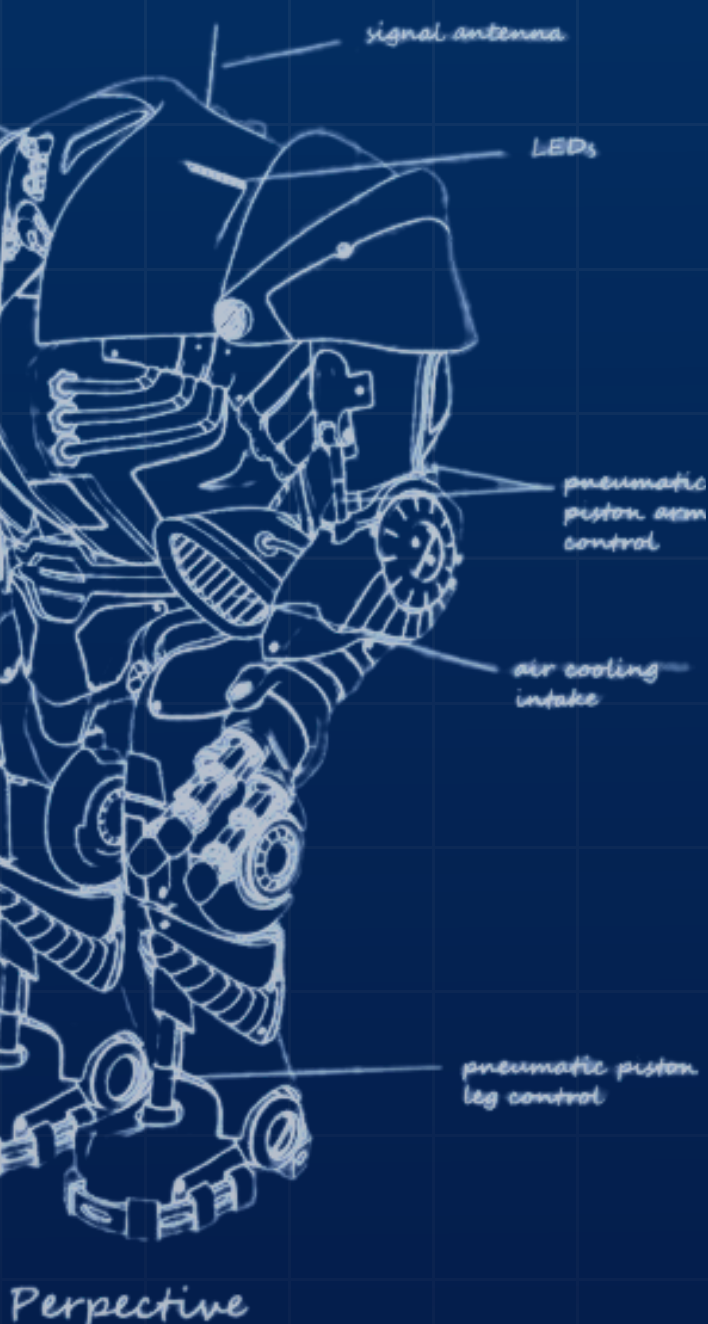
- Anyone who joins the IEEE as a member of any grade after the start of the R10 Robotics Competition will not be accepted as an IEEE member for the competition in 2022.
- Non-IEEE members in the team will not be eligible for a cash prize. However, they can receive a certificate of participation.

signal antenna
LEDs
pneumatic piston arm control
air cooling intake
pneumatic piston leg control

Perpective

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GENERAL RULES

- A team can work on only one project. Submissions from the same team for more than one project will not be accepted.
- A maximum of two teams will be accepted from a Section for Stage 2.
- Robot projects must be original and must not contain plagiarized material, and must not violate any copyright or intellectual property rights.
- The robots should be built from scratch using the different geometrical structures in Gazebo.
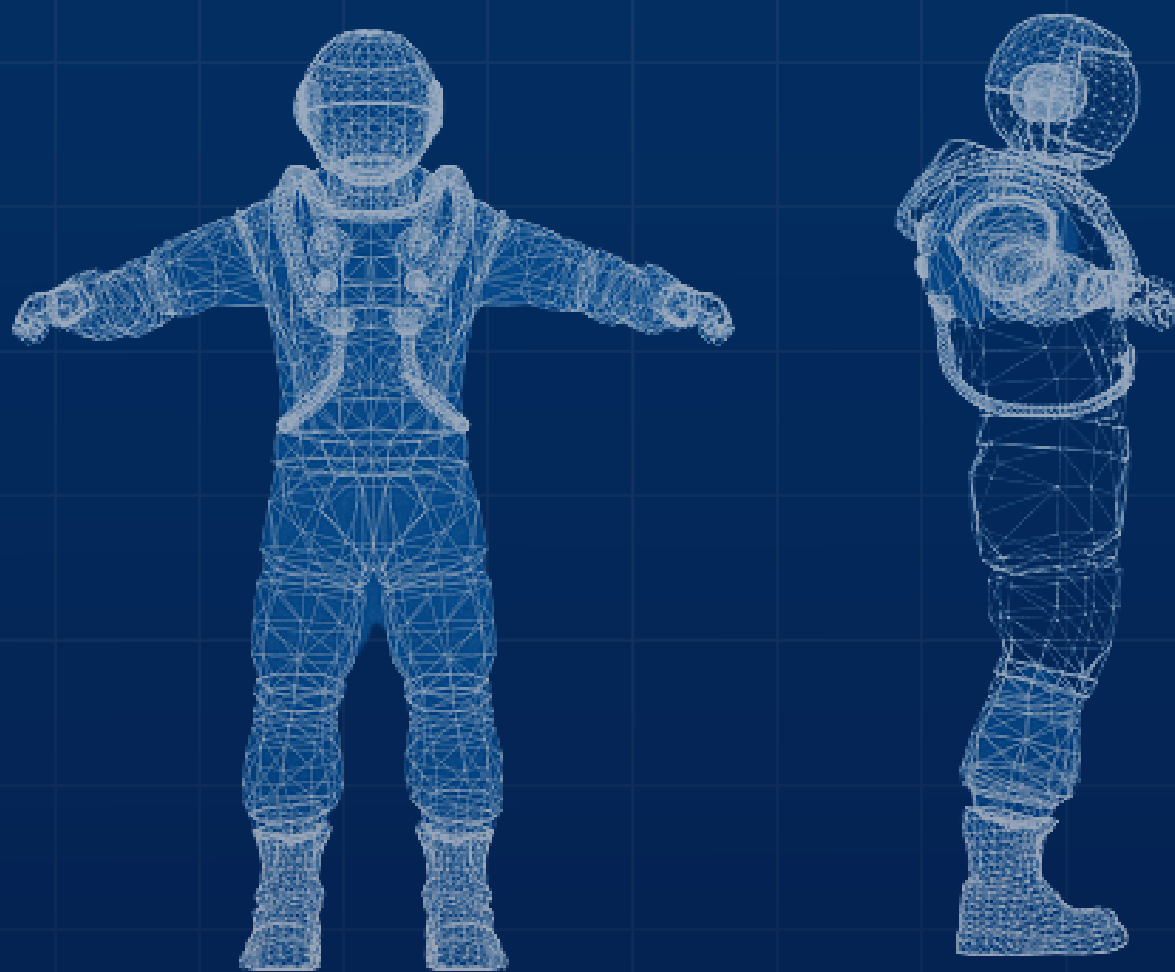
RULES

- The participants will use the ROS2 Foxy Fitzroy framework with Gazebo 11.0 simulation tool to build a robot model. The different models can also be created using Blender (https://www.blender.org/)

- Model Operating Environment: This is the digital environment model in which the robot model will run and interact with the objects in the environment as set by the user or the judging panel.

- The functioning environment model will be built in Gazebo, in which all the elements should be interactive and react to the actions of the robot model.

- For example, if a robot hand is pushing an object in the environment, then the object should react by moving in the direction of the force. If a robot hand presses on a soft surface, the surface should react by compressing or if more pressure is given, it should bend or break.

TEAM SPECIFICATION

Modeling & Simulation Project:
- The majority of team members must be IEEE student members.
- For example, in a 3 or 4-member team a maximum of one non-IEEE member can be in the team.
- The team can NOT have an equal number of IEEE members and non-members.

Team-based:
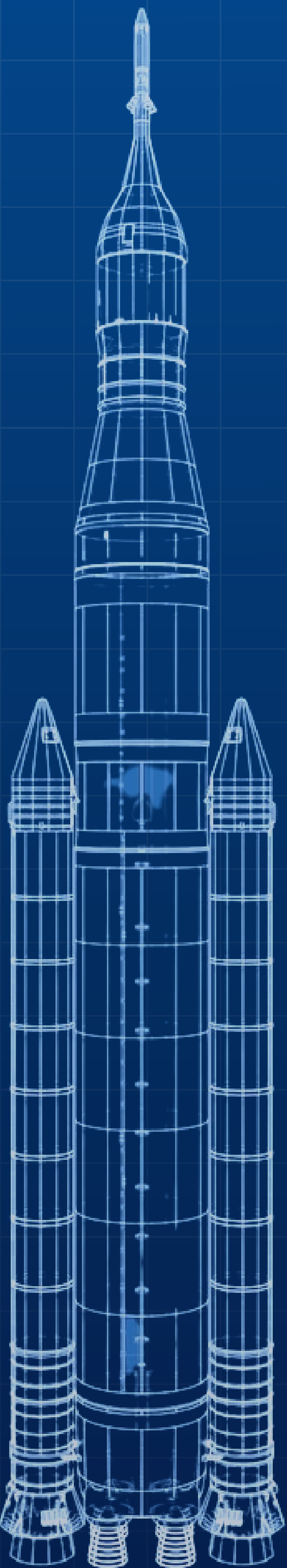- The number of team members is limited to a maximum of 4 members for the modeling and simulation project.

To qualify as a **WIE team:**
- **M**ost 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.

visual devices
night vision
infrared
x-ray

uber powerful
phase cannon

plutonium
energy core

Perpect

FLOW OF COMPETITION

The competition will be held in 3 stages

STAGE 1
The best teams will be picked to go forward in the online R10 competition in Stage 2. various robotics activities such as workshops and technical talks, and robotics competitions,
hands-on workshops are organised and local industry leaders and Government officials are invited.

STAGE 2
R10 Level online rounds for 2 to 3 days. The winners of this stage will progress to Stage 3, which is planned to be a physical gathering.

STAGE 3
Real R10 Level – A mega-event with a Technology Exhibition and the Awards Ceremony at a gala dinner.

IEEE **Gujarat Section**

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REGISTRATION

Registration Link:
https://forms.gle/2WBT2miDSUpae25n9

Registration Fees:
Rs 400

CONTACT DETAILS

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