

Synergy Competition: Robotics

Last Date of Registration: 09 November 2022



(Entry fees are per team, payable on the spot, and exempted for “school students”)

Robotics is the present and future of the industrial world. With ever-increasing automation in the industrial sector, robotics already plays and will continue to play an extremely crucial role. To encourage conceptualization and design thinking skills, robotic competitions are being organized. The contesting teams will participate in events with their Robots and the teams will be judged by a panel of highly qualified judges on the predetermined criteria.

Entries are invited in the following event categories:

- Robo Race
- Robo Hurdle Race
- Robo Soccer
- Robo War
- Robot Innovation

1. Event: Robo Race

The challenge is to build your own robot either wired or wireless within the specified dimensions (as mentioned in the rules and guidelines) to achieve the maximum speed and beat other robots on a given track to reach the finishing line in a minimum time. The robot must run on the given planar racetrack with the circuit design to be disclosed on the race day itself. The robot must start behind the starting mark and is considered to have crossed the finishing line if any part of the robot crosses it, while the robot completes a full lap of the course. Your robot might be manually/autonomously controlled. The basic guidelines are:

- Robot should adhere to the given specifications.
- Each Robot will be inspected by a referee to check for violations of rules if any. Any violation observed by the referee reserves the right to disqualify the robot.
- Each lap will be of 5 minutes, and the fastest team will win.
- Time taken in robot adjustment/repair will be included in the given duration (5 min).
- Each run will start from the starting point.
- If an operator touches the robot during a run, the team will score negative points and shall start from the previous checkpoint.
- There will be negative points each time the Robot moves off the track and for every human intervention during the evaluation, affecting the final score of a team.
- In case of a draw, a tiebreaker round (at the discretion of the judges) will be conducted.
- Decision of the Judges and Event Organizers will be final with bindings on all.

2. Event: Robo Hurdle Race

Robots within specified dimensions (refer to Rules and Guidelines) will compete in a race on a track with hurdles. Evaluation will be based on the time taken to complete the full lap without leaving the track. The basic guidelines are:

- Robot should adhere to the given specifications.
- Each Robot will be inspected by a referee to check for violations of rules if any. Any violation observed by the referee reserves the right to disqualify the robot.
- Each lap will be of 5 minutes. The fastest team to cross all the hurdles successfully in a minimum time.
- Each hurdle carries a different weightage. Successfully clearing each hurdle will add points to the total tally.
- Time taken in robot adjustment/repair will be included in the given duration (5 min).
- Negative points will be awarded each time the Robot moves out of the track.
- Each run will start from the starting point.
- If an operator touches the robot during a run, there will be negative points, and shall start from the previous checkpoint.
- There will be negative points each time the Robot moves off the track and for every human intervention during the evaluation, affecting the final score of a team.
- In case of a draw, a tiebreaker round (at the discretion of the judges) will be conducted.
- Decision of the Judges and Event Organizers will as final with bindings on all.

3. Event: Robo Soccer

Robots will compete in an arena specially designed for robotic soccer match. The event is aimed at testing the manoeuvring skills and controlling the robot. A specific number of robots will play simultaneously but against each other and scoring will be based on number of goals (Pushing the ball in a specific confined space), using their robots. The basic guideline are:

- Robot should adhere to the given specifications.
- Each Robot will be inspected by a referee to check for violations of rules if any. Any violation observed by the referee reserves the right to disqualify the robot.
- A robot can push or hit the ball. It cannot withhold or grab the ball.
- Human interference (e.g. touching the robot) during the game is not allowed.
- Positions of balls and obstacles in the arena will be decided by the organizers on the particular day of event.
- In case of a draw, a tiebreaker round (at the discretion of the judges) will be conducted.
- Decision of the Judges and Event Organizers will as final with bindings on all.

4. Event: Robo War

Robots will engage in a one-on-one fight in an arena and will be judged by awarding points on the basis of offensive and defensive manoeuvres. Winners will be selected on the basis of knocking-out the opponents or total cumulative points awarded to them.

GAME PLAY:

- **Group Battle:**

- First round of the competition will be of 8 minutes
- There will be group battle among three to four robots in each battle.
- The winning robot from each battle will progress to the next stage of the competition.

- **Head-to-Head:**

- The top two performing robots from group battle, will compete in the Head to Head round of 5 minutes.
- The robot scoring maximum points from Head-to-Head round will be the declared WINNER.

Robo War Guidelines:

- Robot should adhere to the given specifications.
- Each Robot will be inspected by the referee to check any possible violation of rules by the team, if any violation is observed the referee reserves the right to disqualify the robot.
- The main objective of robots will be to immobilize the opponent's robot for at least 30 seconds or score maximum points by damaging or pushing it out of the battlefield.
- Once the competition starts, the robot must move (at least 1 inch) within initial 30 seconds, else the robot will be flagged immobilized and will lose the match by knockout.
- The robot is considered out of the ring if the *whole robot* crosses the defined battlefield.
- Decision of the Judges and Event Organizers shall be treated as final and binding on all and cannot be contested

ROBO WAR COMPETITION SCORING SCHEME**Game Points:**

S. NO.	Manoeuvre	Maximum Points
1	Flip the Ring	40
2	Pitfall	30
3	Arena Weapon	20
4	Freestyle	100
5	Aggression	100
6	Defense	100
7	Damage	100
8	Control/Strategy	100

Weapons:

All high-speed weapons (e.g. all pneumatic/hydraulic/spring/flysheet and rotational weapons) must be properly secured to avoid any unintentional harm. The design should ensure that the weapon must remain off in ideal conditions and functions only when activated by the controller.

Permitted Weapons for the competition:

- Pneumatics and Hydraulics: Pressure should be limited to 4 bars
- Springs and Flywheels

Weapons Restrictions:

- **Invisible Damage:** Weapons designed to cause invisible damage to the opponent are prohibited. This includes but are not limited to Electricity, Radio Frequency, Radio Frequency Noise, and Electromagnetic Fields.
- **Entanglement:** Entangling material such as nets, fishing line, cables, string, glues or tapes and any similar devices are forbidden.
- **Smoke and Light:** Smoke and light-based weapons, which impair the viewing of robots are prohibited. This includes, but is not limited to; Smoke or Dust, Lights such as external lasers and bright strobe lights, which may blind the opponent.
- **Hazardous Materials:** Hazardous or dangerous materials are strictly forbidden
- **Explosives:** Explosives of any kind are strictly prohibited as a weapon system for the robot.

5. Event: Robot Innovation

The creativity and innovativeness would be measured from the perspective of structural and operational aspects of the model, its social impact and application areas.

Evaluation will be based on:

- Presentation
- Uniqueness
- Extent of social impact

Robot specifications

- The robot participating in the competition can be wired/wireless, autonomous or manual.
- Lego kits are strictly prohibited. The robot must not be made from any ready-made kit, if found so, the team will be disqualified.
- The Robot must be non-destructive and non-harmful to humans and the track or the arena.
- Radio systems **MUST NOT** cause interference to other radio-frequency users.
- The length of the wire (for wired bots) should be long enough (12 meters approx.) to cover the whole track/arena and wire should remain slacked during the run across the track.
- Participants must arrange their own batteries.
- Use of IC engines or compressor is not allowed. All vehicles must depend only on electric motors for their motion and control.
- The Robot must not emit smoke or fire, leak, stain or soil.

Dimensions: The following size limitations apply for each robot

- **Width** - Not more than **45 centimeters**
- **Length** - Not more than **45 centimeters**
- **Height** - Not more than **45 centimeters**

- Maximum weight must not exceed 10 kg (including battery for wirelessly controlled Robots). However, a tolerance of 5% is acceptable.

Power Source:

- Only Electrically powered Robots are allowed in the competition.
- Batteries must be sealed, immobilized electrolyte type (gel cell, lithium, NiCad, or dry cells).
- The electric voltage anywhere in the machine should not be more than 12V DC at any point of time.
- Battery can be placed on the robot or can be carried in hand by the robot operator in case of wireless robot.

Construction: Any robotic parts/building material can be used until the robot meets the above specifications and if the design and construction are primarily the original work of the team as ready-made robots are not allowed to compete in the competition.

RULES & REGULATIONS:

Team Members & Mentors:

- Minimum 2 members and maximum 05 members are allowed in each participating team. Multiple teams from same school/college can participate in the competition.
- Different Teams from the same school/college must use their own individual Robots for the competition.
- It's not mandatory to have coach for each team but a team can have a coach (only one) from the school or outside as a technical advisor.
- The coach will be seated in a supervisory position around the competition area and is not allowed to touch or repair the robot during the competition.
- The coach should not be involved in the programming of the robot. In case of the coach interference with the robot or referee decisions during the competition, the team will risk being disqualified.
- The robot should follow the robot specifications provided. Any deviation from the mentioned specifications will lead to disqualification.
- No test practice will be allowed on the main track/Arena.
- The Race track/Arena is subject to change before the commencement of any round.
- The decision of the judges will be final and abiding. Argument with judges in any form will lead to the disqualification of the team right-away.

Code of Conduct: Fair Play

- Robots causing deliberate interference with other robots or damaging track will be disqualified.
- Teams that cause deliberate interference with robots or damage to the track will be disqualified.
- It is expected that the aim of all teams is to play a fair and clean game.

Behavior:

- Misbehaving teams and participants will have the risk of disqualification in the contest.
- The rules will be at the discretion of referees, officials, and local law enforcement authorities.

Organizing Committee:

- The Organizing committee is from Faculty of Engineering and Technology.
- All decisions about scoring, game play and timing are made by the juries. Teams should completely respect their vote and decisions.