# NERC Rulebook for Robowars Competitions in Pakistan Ensuring Consistency and Fair Play



## CHANGE LOG

The table below will list the pages on which changes have been made to the theme.

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# NERC Rulebook for RoboWar Competitions:

Robotic combat sports where two or more remote-controlled robots fight inside an arena. The robots are typically equipped with various weapons such as saws, hammers, and flippers, and are designed to be both sturdy and agile to withstand and deliver powerful attacks. The teams are required to design and fabricate a reliable robot which would have the most brutal yet effective offense, well armored defense and uncompromising nimbleness. The matches usually have a time limit or are won by knockout or judges' decision. These events have gained popularity in recent years as spectators enjoy watching the robots battle it out in a high-tech arena.

*The term "Robot" refers to a combat robot that has been selected to potentially participate in the Tournament. The term "Robot" can also be used to indicate a "Multi-Bot".*

## Draws:

The competition organizers will conduct a draw to determine the matchups for the tournament. Draws will be announced based on the following criteria:

- **Universities**: Teams from different universities will be matched up against each other.
- **Cities**: Teams from different cities will be matched up against each other.
- **Robot** types: Teams with different types of robots will be matched up against each other.

The organizers will prioritize matchups to ensure that no two teams from the same city are initially matched up against each other. If this is not possible, the organizers will ensure that the teams are not from the same university. Additionally, the teams' weapon types will be considered, and teams with different weapon types will be initially matched up against each other.

**Fixtures**: Once the matchups have been announced, the organizers will create fixtures that include the date, time, and location of each match. These fixtures will be communicated to all teams in advance, and any changes will be communicated promptly.

By following these guidelines, the competition organizers can ensure that the matchups are fair, and all teams have an equal opportunity to compete. Additionally, teams will be able to plan and prepare for their matches in advance, which will promote a high level of competition throughout the tournament.

## Robot Specifications:

- The robot should fit in a dimension 3 ft x 3 ft x 3 ft (L x W x H) when at rest position
- The weight of the robot should not exceed 60 kg. (with all batteries, weapons etc. loaded)
- The robot may fold and unfold itself to follow the dimension rules.
- The robot must use an only onboard power supply.
- No external off-board power supply is allowed.
- Each team shall prepare its own power supply for all its machines.
- The robot can take power from a DC source with a rating, not more than 48 volts. Only dry-type sealed batteries are allowed, i.e. Li-Poly, Ni-MH, Li-ion, and other maintenance-free sealed packed batteries are allowed.
- Human operators are not permitted to enter the Court once the competition has started. They need to operate the robot from outside the court using their remote controls.
- The teams can use ready-made microcontroller boards/ready-made sensor kits.
- Weapons must always remain connected to the machine during operation, i.e. if any weapon is released out from the body of the robot either intentionally or unintentionally, the robot will be immediately disqualified upon the decision of the judges' panel.
- Any weapon that can pose an injury risk to the spectators is not allowed e.g. loosely fitted spinning weapons etc. The teams which use such a robot will be asked to remove such a weapon before the contest. If they fail to remove the weapon, the team will be disqualified.

For more detailed specifications read here.

## Game Rules:

- The objective is to damage, destroy, flap upside down, or push the opponent's robot out of the arena.
- If your robot is stuck in difficulties or unable to move itself from its position it will be considered a timeout. Max 2 timeouts are available for a robot, after 2 timeouts it will be considered a knockout.
- Unless a match terminates early, the match will last for 3 minutes of fighting time. The time limit does not include any time elapsed as a result of timeouts. The teams with maximum points will win the round.
- If the robot is disabled or cannot move it will be considered a time out from the match.
- If the robot is pushed by the opponent out of the arena & cannot move itself inside the arena it will be considered a time out from the match.
- If at any time during a Match, a robot or Multi-Bot Segment becomes Stuck on the Arena floor, and cannot free itself after 20 seconds, the referees can call a timeout.
- Two or more penalty regions will be marked across the arena. Entering and staying in the penalty regions for more than two seconds will result in 5 points being deduced.

## Points Distribution:

Point scoring is shown in the table below:

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| Damaged any part of an opponent robot | 10 points |
| Disabled the opponent robot (timeout taken by opponent) | 15 points |
| Pushed the Robot out of the arena | 10 points |

## Damage:

Damage will only be counted for visible parts of the robot that are damaged or torn out. Scratches or superficial marks will not be counted as damage. However, any part of the robot such as metal or sheet that is taken out of the robot will be counted as damage. Additionally, any damage caused to the robot's functions such as weapons, motors, or wheels will also be considered as damage. The judges will assess the damage at the end of the match.

## Overweight robots:

Robots weighing more than 60kg will incur a penalty of 2 points per kg for any additional weight. For example, a robot weighing 62kg will have 4 points deducted from its score. If a robot's weight exceeds 65kg, it will be disqualified from the competition.

The disqualified robot may be allowed to reduce its weight within a given time frame, failing which it will not be allowed to participate further. It is the responsibility of the team to ensure that their robot meets the weight requirements and that any modifications made during the competition do not cause the robot to exceed the weight limit. The weighing of the robots will be done before the start of the competition, and the weight limit will be strictly enforced.

## Underweight robots:

Robots that weigh under 45kg will be awarded 10 additional points at the start of the match. This rule is designed to encourage the development of smaller, more agile robots that can compete with larger, heavier robots.

The additional points will be added to the robot's starting score and will not affect the scoring system during the match. It is important to note that the weight of the robot will be determined before the start of the match, and any modifications made during the competition that cause the robot to exceed the weight limit will result in disqualification. The additional points for robots under 45kg are intended to level the playing field and provide an incentive for teams to develop smaller, more efficient robots.

## Timeouts:

If a team calls a timeout, they will be allowed to enter the arena for a period of two minutes, during which they cannot bring any tools inside. The team can use this time to reset the robot, unstick it or fix some minor parts with their hands. Once the two minutes have been completed, the referee will start a 10-second countdown. If the team fails to start the robot within these 10 seconds, the second timeout will be called.

The second timeout can only be called once during the match, and any time taken for the second timeout will not be added to the overall time of the match. It is important to note that during the timeout, no modifications or repairs can be made to the robot, except for the resetting or fixing of minor parts using hands.

## Other Detailed Specifications about Robots:

**WEAPONS**:

- All pyrotechnics: explosives, flames, firearms, corrosives, liquids, electronic devices e.g., radio jamming, heat-guns, Tesla coils - are banned.
- Small, non-offensive pyrotechnics - e.g., flash puffs - may be allowed at the judge's discretion.
- Tethered projectiles are allowed, but the tether may not exceed 2.5m (approx. 3 ft) in length, (measured from the center of the robot to the tip of the projectile).
- Circular saws, carbon or steel cutting discs can be used.
- Commercial blades - e.g., bayonets - must not exceed 2Ocm/8inches in length.
- All sharp edges of weapons, including fixed weapons - e.g., spikes -and sharp robot bodywork in general, MUST be fitted with adequate protection that must be in place at all times except in the arena. (These guards are not included with the overall weight of the robot).

**FORBIDDEN WEAPONS:**

- Untethered projectiles are not allowed.
- Heat and fire weapons are NOT allowed.
- Flammable liquids or gases.
- Explosives or flammable solids such as: DOT Class C devices.
- Gunpowder / Cartridge Primers
- Military Explosives, etc.
- Light and smoke-based weapons that impair the viewing of robots by an Entrant, Judge, Official or Viewer.
- Smoke or dust weapons
- Lights such as external lasers above 'class I' and bright strobe lights which may blind the opponent.
- Hazardous or dangerous materials are forbidden from being used anywhere on a robot where they may contact humans, or by way of the robot being damaged (within reason) contact humans.
- Entangling weapons are NOT allowed at this event.
- Liquid weapons are NOT allowed at this event.
- Powdered material or chaff weapons are NOT allowed at this event.

**ELECTRONICS**:

- Microcontrollers specified in the component list must be used for controlling your robots. You can also use Microcontroller development boards specified in the list only.
- Microprocessors and Single Board Computers are not allowed.

**POWER SUPPLY:**

- The robot must not have any wired connections with its surroundings.
- The voltage of the machine's electrical power source must not exceed 48-volt DC.
- Power sources that are considered dangerous or unsuitable by the contest Officials shall not be permitted.
- All efforts must be made to protect battery terminals from a direct short and causing a battery fire.
- All Robots must have a light, easily visible from the outside of the robot hat shows its main power is activated.

## General Guidelines:

**Robot Requirements**: Each participating robot must adhere to the specifications outlined in the competition rules, including weight, size, and functionality.

**Safety**: Safety must be a top priority throughout the competition. All robots and equipment must meet safety requirements, and all participants must wear appropriate safety gear.

**Conduct**: All participants must maintain a high level of professionalism and respect for one another. This includes avoiding unsportsmanlike behavior, such as taunting, jeering, or gloating.

**Discipline**: All participants must follow the rules and guidelines set forth by the competition organizers. Failure to do so may result in penalties or disqualification.

**Sportsmanship:** Good sportsmanship is expected of all participants, including congratulating opponents after a match, offering assistance if needed, and displaying positive attitudes throughout the competition.

**Judging:** Judges will evaluate robots based on a predetermined set of criteria, and their decisions will be final. Participants must respect the judges' decisions and refrain from arguing or disputing their rulings.

**Maintenance**: Participants must ensure their robots are in good working order throughout the competition, including regular maintenance and repairs as needed.

By following these rules, participants can ensure a fair, safe, and respectful competition that promotes robotics innovation and collaboration.

*To ensure fair play and consistency across all Robowars events, this rulebook has been designed by Shah Fahad Ahmed on March 18, 2023. By establishing clear guidelines and regulations, this rulebook aims to create a level playing field for all participating teams and provide a framework for the safe and organized conduct of the competition. The rules and regulations contained within this rulebook will be enforced throughout all Robowars events, ensuring that all teams compete under the same set of guidelines and with equal opportunities to succeed.*