



NATIONAL ENGINEERING ROBOTICS CONTEST 2019



THEME: ROBOWARS CATEGORY

National Engineering Robotics Contest
A joint venture of NUST and STEM Careers Programme (HEC)
Organized by:

**Department of Mechatronics Engineering,
College of Electrical and Mechanical Engineering.**

Contact: nerc@ceme.nust.edu.pk
Telephone: +92-51-54444450



ROBOWARS

Robowars, is synonymous with carnage, demolition, mayhem, destruction; not to mention the rave atmosphere. A night you will cherish. The teams are required to design and fabricate a reliable robot which has brutal yet effective offense; well armoured defence and uncompromising nimbleness. All in the pursuit of bragging rights and the title of the best fighting bot in the nation.

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Rules

- The Contest judges may stop any robot at any time if they feel that it is performing, or is about to perform, any action that is dangerous or hazardous to people or equipment.
- All Electronic Circuitry must be designed and fabricated by the Contestants themselves.
- Combat robotics is dangerous. All participants build and operate robots at their own risk. Please take care to not hurt yourself or others when building, testing and competing.
- Maximum effort in the design and fabrication of the robot should be generated by contestants themselves.
- In all matters of interpreting the rules before and during the Contest and in any issues not covered by these rules, the decisions of the Contest Judging Committee will be final. • Additional information regarding the contest rules and regulations may be found in the FAQs and will be considered as part of the theme and rules. New FAQs are uploaded frequently so keep watching the FAQ corner for new information.
- Any correspondence with the NERC officials via e-mail telephone or any other means will not be considered as part of the rules.



Robot Operation

The qualifying teams will compete with each other in a knockout format. In each match two teams will compete against each other, fighting their robots side by side in the contest arena. Teams will be declared as a red team or blue team based on the coin toss before every match. Robots will be maneuvered by wireless Remote- control of any sort, without any intervention of human body. Contestants are NOT allowed to touch their robots or enter the Contest Arena after startup. If the contestants enter the arena during the match, it would automatically be counted as a timeout. After the blow of whistle, the robot would have 5 minutes to complete with other robot .

The robot must place on the define point on the arena before fighting . The team can take timeout if the robot is stuck on the arena . Maximum of 2 timeouts are allowed during a fight. Allowed timeout will be of 1 minute duration. Team will be knockout if it is unable to fix the fault.

Fighting Rules

- For a particular match, both teams would face the same conditions . Winning would be dependent on maximum damage to the opponent.
- Any team that damages the arena will be disqualified.
- The robot must not use any harmful substances such as oil, petrol etc. in its operation that can damage the arena.
- The Robot CANNOT split after start of the fight, only one Robot is allowed to compete with opponent.
- During its operation robot is NOT allowed to extend any extension/support for any purpose, the area of the robot should remain the same throughout the operation i.e. it should fit in 3x3x3 feet.
- The Robot must use some destructive or dangerous weapon to knock down the opponent.
- The robot is not allowed to climb over the walls of the arena.
- The fight will be over when a robot completely crushes the opponent .

Robot size and weight

The robot must fit within 3x3x3 feet cube at all times of it operation it is not allowed to extend any extensions at any time of its operation . All robots will be carefully measured. All weapons on the robot will be counted as part of the robot's total dimensions. If contestants want to add a flag, hat or other purely decorative, non- functional items to the robot, they may do so. The decorations may be removed for measurement purposes. The weight of robot excluding decorations must not exceed 45 kg. Penalties as detailed in Section below will be levied if the robot does not fulfill the size and/or weight criteria.

Mobility



All robots must have easily visible and controlled mobility in order to compete. Methods of mobility include:

- Walking (linear actuated legs with no rolling or cam operated motion).
- Rolling (wheels, tracks or the whole robot)
- Ground effect air cushions (hovercrafts)
- Shuffling (rotational cam operated legs)
- Flying (airfoil using, helium balloons, ornithopters, etc.) is NOT allowed.
- Jumping and hopping is allowed.

Proper activation and deactivation of robots is critical. Robots must only be activated in the arena, testing areas, or with expressed consent of the safety officials.

All robots must be able to be FULLY deactivated, which includes power to drive and weaponry, in less than 20 seconds by a manual disconnect.

All robots not in an arena or official testing area must be raised or blocked up in a manner so that their wheels or legs cannot cause movement if the robot is turned on.

Robot Control Requirements

All robot radio systems must have a way to change frequencies or coded channels to prevent radio conflicts.

Having at least two frequencies or coded channels available is recommended.

You will be required to send the frequency that you are using prior to the event so that any overlap of frequencies can be avoided.

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.
- Devices using inflammable or combustion-supporting gases are banned.
- Untethered projectiles are not allowed.
- 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).
- The circular saws, carbon or steel cutting discs can be used.
- Commercial blades - e.g. bayonets - must not exceed 20cm/8inches in length.



- All sharp edges of weapons, including fixed weapons - e.g. spikes -and robot bodywork In general that is sharp, **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).
- Any moving or swinging arms - whether or not they hold sharp and/or rotating weapons - **MUST** be fitted with a visible locking pin that shows the arm(s) is securely locked into place.

Electronics

All electronic circuitry must be designed and fabricated completely by the participants themselves. Circuits should not be fabricated by the help of any professional developers. Only the modules specified in the components list may be bought directly.

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.

Motor drive circuits should be designed and fabricated by participants themselves and made from discrete components like Transistors and logic circuitry. H-bridge IC's like L297 or L298 are not allowed.

All other components can be used in your circuitry. In case of any query, questions shall be emailed to NERC Coordinator. The FAQs section on the website shall be considered part of the theme.

Power Supply

- The robot must be battery-powered.
- The robot must not have any wired connections with its surroundings. • 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 that shows its main power is activated.

Teams



The Robots can be built by teams of currently registered students from Engineering Institutions, Polytechnic Institutions, schools etc. Each team can comprise of Maximum 6 members.

If the students from two different Institutes/Universities join hands and form a team in collaboration then the name of the Institute/University with maximum number of students in such a team would be registered.

Duration of Match

- Each match will be of maximum 5 minutes duration.
- Teams will be given 1 minute for setting up the Robot at the start.
- Robot can start at the instant when the start signal is given and a whistle is blown. Robot must be constructed so that it can be started in minimum possible steps.
- Once the Robot starts, team members will not be allowed to touch the Robot or enter the Contest Arena.
- Timing shall start once the start signal is given and the whistle is blown.
- If none of the team is able to disarm, stuck or crush the opponent in the allocated 5 minutes, the team having more points at that time would win the match.
- If both the teams have scored same points in allocated time slot, decision of the winner will be on judges.

Timeout

- If the robot is strayed due to some reason, timeouts are allowed.
- There is limitation of 2 numbers of timeouts within the 5 minutes duration of the match. 5 Points will be deducted for timeouts.
- Each team would be provided a flag of their respective team color. If a team wants to take a timeout, the flag bearer must raise the flag and say clearly “timeout”.
- Once the referee announces a timeout, the team will restart its robot from the start zone. This can be done by any of the members of the team.
- If a team wants to stop their robot during the match, the flag bearer must raise the flag and say “stop”. The team can then turn off their robot but they must not move it.
- For each timeout, robots must be started again from the Start Zone.
- Maximum of 1 minute time is allocated on each timeout for fixing the fault..
- Changing the microcontroller or reprogramming the robot is Not Allowed. A team may change the batteries of the robot if required.

Points

Point scoring is shown in the table below:



1. Pushed opponent's robot out of the arena from specified point 5 Points
2. Pushed opponent's robot into the dead zone on the arena 5 Points
3. Turning opponent's robot upside down 10 Points
4. Taking off any part of opponent's robot 15 Points
5. Pushing robot to platform weapons (if any) 10 Points
6. Getting into platform weapons 8 Points
7. Hitting the opponent's robot with weapons 2 pts. 2Points

Deduction of Points

The deduction of points are described in the table below:

1. The robot fits in an area of 3 X 3 X 3 feet cube No Penalty
2. Oversize Robot 5 Points
3. Oversize Robot (exceeding 3.5 X 3.5 X 3.5 feet cube) Devaluation of 5 points
4. Robot weighs less than 40 kg No Penalty
5. Overweight Robot (Weight between 40 and 45 kg) 5 Points
6. Overweight Robot (Weight exceeding 45 kg) Devaluation of 5 points per 2.5 kg
7. Damaging the arena/wall/platform weapons Disqualification

Disqualification

The following behavior shall be considered for disqualification by the referee and the team could possibly be disqualified:

- Attempting to damage the game field.
- Performing any act that fails to comply with the spirit of Fair Play