tathva'22
NIT Calicut

TATHVA ROBOWARS RULEBOOK

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tathva'22
NIT Calicut

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Foreword

Welcome to Tathva Robowars 2022

This updated Rulebook has been formulated by the Tathva Robowars committee for the 2022 season, considering insights gained from the T'19 ROBOWARS. It is a detailed compendium, that entails all specifications and procedures participants must follow. In the best interest of contenders and the event itself, we have strived to develop a set of guidelines bereft of ambiguity.
It is also to be noted that all robots are to participate at their own risk and the Tathva Robowars committee will not be responsible for any damage incurred to the bots during the event.

Tathva Robowars Program Objective

Tathva Robowars is an engineering design competition for engineering aspirants. The objective of the competition is to simulate real-world engineering design projects and their related challenges. The participants must function as a team to design, engineer, build, test, promote and compete with a bot within the limits of the rules.

Rules and Regulations

Rules Authority

The Tathva Robowars Rules are the responsibility of the Tathva Robowars Rules Committee and are issued under the authority of the Tathva Robowars Organizing Committee. Official announcements from the Tathva Robowars Organizing Committee shall be considered part of and have the same validity as these rules. Ambiguities or questions concerning the meaning or intent of these rules will be resolved by the Tathva Robowars Rules Committee, Technical Inspectors, or Organizing Committee during the competition onsite.

Rules Validity

The newest version of the Tathva Robowars rules on the ROBOWAR website that is dated for the calendar year of the competition are the rules in effect for the competition. If any revisions are to be made in the guidelines, a revised version will be released accordingly and updated on the website.
Rules sets dated for other years or older versions of the current year are invalid. The Revision number can be used for reference in this regard.

Rules Compliance

By entering a Tathva Robowars competition, the team members agree to comply with and be bound by, the rules and all rules' interpretations or procedures issued or announced by the Tathva Robowars Rules Committee and the Organizing Committee. All team members and other representatives are required to cooperate with, and follow all instructions from competition organizers, officials, and judges.

Rules Comprehension

Teams are responsible for reading, understanding, and comprehending the rules in their entirety for the competition in which they are participating. The section and paragraph headings in these rules are provided to facilitate reading: they do not fully explain all the paragraph contents. Questions regarding rules may be submitted by registered teams through mail.

Duplication

The Organizing Committee/Technical Evaluation Team will answer questions that are not already answered in the rules or FAQs or that require new or novel rule interpretations. For example, if a rule specifies a minimum dimension for a part, the Technical Evaluation Team will not answer questions asking if a smaller dimension can be used.

Submission

If a registered team has any Questions regarding rules, it can submit the inquiry through mail.

Documentation

Teams submitting questions are required to bring copies of the questions and answers with them to technical inspection.

Response Time

Please allow a minimum of three (3) days for a response. The Organizing Committee/Technical Evaluation Team will respond as quickly as possible. However, responses to questions presenting new issues, or of unusual complexity, may take more than three days.

Please keep in mind that the final operating approval of any bot can only be given onsite at the competition.

Loopholes

A set of rules cannot be comprehensive enough to cover all possible questions about the bot design parameters or the conduct of the competition. Please keep in mind that safety remains paramount during ROBOWAR, so any perceived loopholes should be resolved in the direction of increased safety of the competition.

Protests and Appeals

It is recognized that hundreds of hours of work are put into the design and construction of a robot. In the heat of competition, emotions may peak, and disputes can arise. Tathva Robowars Organizing Committee will make every effort to fully review all questions and resolve problems quickly and efficiently.

Preliminary Review

If a team has a question about scoring, judging, policies, or any official policies it must be brought to the attention of the Convener/Joint Convener (this may be designated) of the Tathva Robowars for an informal preliminary review.

DESIGN SPECIFICATIONS

- **Dimensions :** The bot should fit inside a **800mm*800mm*800mm**(l*b*h)box.
- **Weight :**
  There will be two weight categories
  1. **60kg – 132.67 lbs.**
  2. **15kg - 33.07 lbs.**

  The weight of the machine includes all pneumatic, hydraulic, mechanic or electrical weapon system and source or tanks, batteries(on boarded), and only excludes the weight of the remote controller.

  Wireless: The robot should be remotely controlled and must not have any wired/connected system outside the main body.
  A bot can be comprised of two or more multi-bots forming a cluster formation. There are no individual limitations on weights and dimensions of these mini-bots, but the total weight and overall dimension of the structures are subject to previously mentioned conditions.
  All sensitive elements of the assembly, like batteries, high pressure tanks, fuel tanks, fuel lines etc. must be sufficiently protected.
  Certain materials are not allowed to be used anywhere on the bot. These may include (but are not limited to) : radioactive substances, asbestos, toxic materials (exception in case of battery), inflammables (except for

mobility purposes) etc. Check with event managers if you are unsure about a material.

A camera can be mounted on the bot. It should NOT serve any purpose besides capturing footage or photos. The weight of the camera will be included for weight restriction.

Mobility

Each robot must have easily visible and controlled mobility.

The bot can have mobility including (but not limited to) walking, rolling, hopping, slithering, sliding.

Any mobility other than the ones stated above should be informed to the event in-charge in prior and permissions must be taken.

Manually operated jumping and hopping are allowed. However, the maximum height of the jump/ hop should not exceed 2 meters (6 feet 6.74 inches). Any damage caused due to this is solely the responsibility of the team.

Flying or hovering is not allowed.

Attaching itself to any part of the arena using suction cups, diaphragms, tapes, glues or other mechanisms are not allowed.

At no point during the fight, should the bot be out of contact with the ground for more than 10 seconds.

The robot can disintegrate or disassemble into multiple parts during any point of the fight.

Robot Control

- All controls of the robot should be done remotely with all the power supply on board.
- It is the responsibility of the participants to ensure that their control system equipment does not interfere with the systems of any other bot.
- The controller must be able to remotely disable all the functions of a bot at any time. Although autonomous functions within the bot are acceptable, there should be a master switch/kill switch that can shut off all power and mobility of the bot on demand.
- The transmitters and receivers should be able to connect between barriers such as metal sheets, bars, wood, polycarbonate glass (12mm), etc. Any reception problems faced by the teams will not be the responsibility of the event managers.
- The team must have at least four-frequency wireless remote-control circuit of two dual control circuits which maybe interchanged before the start of the race to avoid frequency interference with other teams.
- Any remote-control system purchased from the the market may be used as long as it satisfies the above-mentioned criteria. Any ambiguity arising in the case of controls system will be finalized and approved by the event managers.

Teams should pair up the wireless remote with the machine before putting it into the arena. No extra time will be provided for this once the bot enters the arena and not connecting the remote prior to the entry may call for a penalty.

If any of the weapons have control systems outside the main control frame of the bot, a special tool or device should be provided to disable the functioning without physical touch.

The team members should not be intoxicated before or during the time of control of the bot.

Pneumatics

- A bot can use pressurized non-flammable gases for a pneumatic system. These systems can use dinitrogen gas, compressed air, or any other non-flammable gas.
- Carbon dioxide (CO_2) cannot be used.
- The gas cannot be deliberately heated or cooled.
- The maximum allowed outlet nozzle pressure is 800 psi (55.

1581 bar). The storage tank and pressure regulators used

by teams need to be certified.

- Teams using pneumatics are required to produce safety

and security letters at the time of reporting for offline registration.

- No Refilling stations will be provided at the venue for refilling the pneumatic systems.

- You must have a way to shut off or purge the pneumatic system as part of the deactivation procedure.
- The pressure level should be indicated with an integrated or temporarily fitted pressure gauge, before entering the arena during the technical inspection.
- If the participants are bringing a refilling system, it should be done safely, and the onboard pressure should be indicated using a pressure gauge.
- The entire pneumatic system should be on board
- No external input from outside the arena can be given during the time of a match.

Hydraulics

- A robot can use non-inflammable liquid to actuate hydraulic devices, like cylinders.
- The maximum allowed system pressure should be not more than 800 psi (55.1581 bar).
- The liquid should be non-corrosive, of moderate to low toxicity and the device should be leak proof.
- Special care must be taken while mounting the pump, accumulator and armor to ensure that if ruptured, direct fluid streams will not escape the bot.
- Participants must be able to indicate the used and storage pressure with integrated or temporarily fitted pressure gauge.
- The liquid used cannot be deliberately heated or cooled.

- No refilling stations will be provided at the venue, for the hydraulic system.
- You must have a way to shut off or purge the hydraulic system as part of the deactivation procedure.
- The entire hydraulic system must be on board. No external input from outside the arena can be given during the course of a match.

Battery and Power

- The machine must be powered electrically using batteries such as (including but not limited to) gel cells, Nicad cells, lithium ion, NIMH dry cell, LiFePo4 etc.
- The use of damaged, non-leak proof batteries may lead to disqualification.
- The maximum allowed voltage used for the weapon and motion systems is 60V. However, any usage of voltage higher than 60V may be allowed with specific reasons as long as it is pre-approved by the Event managers.
- Any failure to meet the safety standards will result in immediate disqualification.
- Participants should protect the battery terminals from a direct short which may cause a battery to catch fire.
- Special care should be taken to protect the onboard batteries. If it is found that the batteries are insufficiently protected, the team will be disqualified immediately.

- Change of battery will not be allowed during the match.
- Teams are suggested to have at least one extra battery ready and charged up during competition so that on advancement to the next level, no delay occurs.

Weapon System

- A bot can have one or more active weapon systems, including (but not limited to), hammers, saws, spinners, flippers,cutters, magnetic weapons, lifters, etc. All the weapon systems should qualify the criteria mentioned below.
- Fouling devices such as glues, nets, fishing lines, etc. are prohibited.
- All kinds of projectile weapons (solids, foam, liquefied gases, acids, nets) are prohibited.
- EMP generators, RF jammers, electrical weapons, Tasers, etc. are prohibited.
- Lasers, flame throwers, bright lights, etc. that are distracting or dangerous to the vision are prohibited.
- Deliberate smoke generators or any other mechanisms which blinds the arena or the bots for the opposition, judges or viewers will lead to disqualification.
- Weapons causing entanglement of the opponent's weapon (chains, ropes, fabrics etc.) are prohibited.

- Weapons that damage the other bots by the self-destruction of any of their part are prohibited.

- Any weapon that uses any form of explosives for damage is prohibited.

- A weapon can be used as a means to support the mobility of the bot when the main mobility system is damaged.

- Weapons that can cause deliberate damage to the arena or foul/ litter the arena are banned. Failure to comply with any of the stated rules will lead to direct disqualification.

- Any weapon using lifters or magnets can have physical contact with the opponent as long as the connection/ contact is broken in 10 seconds

- If a bot is thrown or launched into the air, which causes it to cross the jumping/hopping limit of 2 meters by the opponent, it will NOT lead to any form of disqualification /de-grading and will be excused.

- The weapon is not required to be powered / or have motion.

- The weapon can be a retractable one, and during the use of the weapon, the lengthwise, breadth wise of height-wise limits can be excused. However, when the bot is powered off, the all the dimensions limits should be followed.

- **Bots have to undergo technical inspection before each fight. Only the bots that pass the inspection will be allowed to enter the arena.**

Team Specification

Any team can participate in the International Robowars, NIT Calicut, without any age restrictions other than the fact that at least one member must be above the age of 18. A team may consist of up to a maximum of 5 people. The participants in can be from any institute, club, school, college, a Robotic interest group etc.

Each team as well as their bot should have a unique name. If there are multiple teams or bots with the same name, the team who registered first will be given the benefit and the other teams having same name will be required to come up with an alternative name.

Any name deemed inappropriate or offensive will be rejected by the event manager during registration/entry.

Each team should have a team leader/representative whose name has to be specified at the time of registration. The teams are required to communicate via the team representative to the event organizers. The team representative should submit valid contact details (email .id, phone - no, social media profiles, LinkedIn profile, etc.) at the time of registration.

Each team will be provided with a unique Team ID. None of the teams are supposed to disclose any of their other information, other than the team ID.

All conversations, emails and any sort of contact with event managers will be done by identification with your team ID.

A group can bring multiple bots. However, a particular team registered with a particular bot cannot control any other bot.

Team name in above scenario can be a common one, but the team members for each bot should be unique as well as the Robot name should be unique too.

Criteria for Victory

A robot is declared victorious if:

- Its opponent is immobilized. (Immobility is declared when the robot cannot display linear motion of at least 10cm in 10 seconds.)
- In case more than one robot remain mobile after the end of the round, the winner will be decided subjectively based on aggression, damage, quality of the bot, control system etc.
- At any point during the fight, if any of the robots are deemed unsafe by the judges or any of the event managers, the bot will be disqualified and declared the loser. The match will be halted and the remaining

opponents will continue the fight, after the unsafe bot is removed from the arena.

- If a robot is thrown out of the arena, it will be declared the loser and disqualified.
- Robots cannot win by pinning their opponent. Pinning will be allowed for a maximum of 20 seconds per pin. If a robot is pinned, the immobility criteria of 10 seconds - 10 cm will not be considered.
- If at any point it appears that a robot is moving uncontrollably, a timeout can be called and the team can be directed to move the bot in a straight line specified by the event managers. If the bot fails to do so, it will be disqualified.
- If a team is found violating a tournament rule, or is not reporting for a fight even after 3 calls which include a final call (at an even interval of 5 minutes each-total 15 minutes wait time), the team will be disqualified.
- If multiple bots or all bots in the arena are immobilized the bot that was immobilized last will be deemed the winner. If there is any ambiguity in deciding the last Immobilized robot, the winner will be selected subjectively by the judges.
- It is not necessary that a fight should have a winner. All robots in a fight can be disqualified based on the performance of the robot and the judging criteria.

A match can have multiple winners too. Although Robowars Tathva will try to avoid such circumstances of

multiple winners as much as possible, any difficulty in deciding a winner may to lead to multiple winners/ qualifiers. The decision shall be taken by the judges and
will not be challenged in any way.

Match Procedures

- Prior to the start of the match, all bots must be in position with no mobility till match starts. All weapon systems and external components must be motionless as well.
- Each game will start after a countdown of 5 seconds. In cases of technical difficulties, verbal confirmations shall be given for the starting of match.
- Due to any technicalities, a restart of certain matches can be called at any point of the time during the match.
- If the restart of match is being called instead of continuing the previous fight, all the gradings recorded till that the moment will be discarded.
- Event managers won't be responsible for damages caused during the discarded match.

Timeouts:
Timeouts can be called at any time only by the judges of the event or event managers to check the conditions of the robots or for any other reason. All operations must be killed via the kill switch within 20 seconds of timeout call.
If a bot gets stuck in the arena, the timer will be stopped and the bot will be placed back into the arena.

- Due to any reason, if it is found difficult or not possible to unentangle/detract a robot within 100 seconds, the judges will decide the match winner if enough time has lapsed or restart may be called.

- A team is allowed to prepare for the time subsequent match for a period of 45 minutes. The time is calculated from an instance when the bot leaves the arena after its previous match.

- Match will consist of an active fight of 4 minutes, excluding any timeouts. It is advised to keep the battery capacity in such a way as to sustain a 4-minute fight.

- Matches can be a one-on-one head-on between the robots or combat between more than 2 robots simultaneously, based on the registrations, fixtures, delays, etc. This will be decided by the event managers/judges and can vary at any instant.

Submission of Abstract

- Participants have to submit a portfolio of their machine, consisting of a written abstract and a video of the working model before the competition. The portfolio will be used to seed the teams for the competition. The teams can submit their team logo if any. **The written and video abstract should be submitted on or before 17th October 2022 via mail to *robowars@tathva.org* .**

- Before the event, a list of short-listed teams will be prepared. Only the short-listed teams will be allowed to participate.

- The teams are required to submit the abstract online, emailing the soft copy in pdf format along with the video, after registration.
- The teams are required to use their team id for identification while submitting the abstract and video.

Details regarding the abstract:

Written abstract:

- The weapon system and power supply method must be explained in detail, with proper pictures and diagrams.
- The functioning of a wireless remote or any other wireless module used for wireless remote and its frequency must be explained in detail.
- A description of any unusual advantageous mechanisms used must be given. The permission for the use of such a mechanism will be decided solely by the event managers.
- The specifications of all the components used including motors, suspension springs, remote controller, wires, battery etc. have to be mentioned.
- The written abstract can be emailed prior to the video abstract so that the shortlisting can take place before the deadline. An email will be sent to the team leader confirming the receipt of the entry.
- Only submissions via mail will be considered. In case of multiple submissions, only the final submission will be used for judging purposes.

- A soft copy of the safety and security permission regarding pneumatic and hydraulic capacity must be mailed to us before the deadline. A hardcopy of the permission must be brought along to the competition.
- If any safety issues arise & and the teams are not able to produce these permissions, will be disqualified instantly.
- Instructions for the final submission date of abstract along with safety permissions will be supplied later to the registered candidates via mail.
- If any details in the abstract are found to be not acceptable or any necessary changes have to be made, the team will be informed and provided with an extended deadline. Failure to provide the abstract may lead to disqualification on the specified detail to be omitted for permission to participated.

Video abstract

- The video should be at least 1 minute long with unedited clips showing the machines performance to the fullest.

- All weapons, mobility mechanisms, destructive mechanisms and special abilities have to be shown in the video. Another clip may be demanded from the participants at a later stage.

- Participants are not required to explain any mechanisms in the video. All portfolios will be used strictly for seeding purposes.

- Tathva assures complete privacy of every material submitted.
- The portfolios are meant to assess your bots capabilities as well as the effort put in by the participants. Even if the participants are not able to meet the requirements asked in the portfolio or if the construction procedure is yet to be completed,please send the portfolios so that an extension of deadlines or a change in the guidelines can be implemented, if any required.

Arena Design

- The arena will be a fully enclosed, 30 feet X 30 feet rectangle, raised 2 feet off the ground.
- The arena may or may not be evenly levelled and may contain traps and obstacles (the inclusion of traps will be decided at a later stage after consultation with the judges and safety departments). The overall details of each trap will be provided later.
- Arena may also contain certain debris and/or have damage from previous matches. Competitors are encouraged to use the traps and debris / damages to their advantage.
- Any damage caused by the debris, traps or the arena to the bot will be considered as part of the match. The event managers are not responsible for any such damages.
- The arena will be protected by polycarbonate walls of thickness 6mm - 12mm (excluding the top). The top will either be protected by polycarbonate sheet or metallic grills or any other type of enclosure.

Safety rules

Handling safety

- Any sharp edges/corners on the bot that could cause injury must have a removable protective cover that cannot be accidentally knocked off. They must be mechanically fastened and not be held on by friction or gravity.
- If a weapon or any other part of a deactivated bot can move such that it could injure a person, it must have some built-in or external method to prevent such movements.
- Although Tathva will provide hand-truck or dolly for transportation of your bot, the availability of it will be subjective, based on the number of participants registered. It is advisable to bring your own hand-truck or dolly if feasible.

Build safety

- Special care should be taken to protect the onboard batteries and pneumatics. Bots without proper protection will not be allowed to compete.
- If you have a robot or weapon design that does not fit as per the guidelines (even having some elements that are not mentioned as allowed/prohibited in the rulebook), or is somehow ambiguous, contact the organizers and ask for clarifications at the earliest. Safe innovations are always encouraged, but surprising the organizers with exploitation of a loophole may cause your bot to be disqualified before it even competes.

- Each event has safety inspections. Each team will be allowed to compete at the sole discretion of Tathva Robowars authorities, to whom you are obligated to disclose any or all operating principles and potential dangers.
- Proper activation and deactivation of robots are critical. Robots must only be activated in the arena, testing site or with the proper consent of the event managers.
- All participants build and operate robots at their own risk. Combat robotics is inherently dangerous. There is no amount of regulation that can encompass all the dangers involved. Please take care not to hurt yourself or others while building, testing or competing. Any kind of activity (repairing, battery handling etc.), which may cause damage to the surroundings during the stay of the teams in the competition area should not be carried out without the consent of the organizer.
- All resources provided at the time of competition from the organizers should be strictly used only after the consent of the organizers.
- Once the robots have entered the arena and the arena door is closed, no member can enter into the arena. In case if a fight has to be halted and some changes have to be done, the event managers will handle it or instruct the team member to carry it out.
- Compliance with all event rules is mandatory. It is expected that competitors stay within the rules and procedures of their own accord and do not require constant policing.

Prohibited Activities:

- Unruly behavior - Fighting, belligerence, threats or any form of unruly behavior, including abusive physical contact with another team, their bot or with any of the organizers or audience will result in immediate expulsion. As per the severity of the action, legal consequences may be attracted.
- No team member shall deliberately touch, handle or otherwise come in contact with other robots, parts or equipment without verbal authorization from a member of the other team.
- Smoking/Alcohol or illegal Drug use: Use of tobacco, nicotine contained substances, vaping devices, alcohols, illegal drugs, etc. are prohibited at all places inside the campus and residencies provided by Tathva. If any participant is found using or is already under the influence of such substances, the team as a whole will be disqualified and proper action will be taken against them.
- Firearms and Explosives: No firearms, explosives or any dangerous materials (radioactive substances, acids, etc.)of any kind may be possessed or brought to any tournament location by any team member or anyone other than an authorized law enforcement personnel.
- Lasers: Deliberate pointing of any kind of laser at any other person at the venue will not be tolerated and may result in the immediate expulsion of the entire team.
- No pets: Participants shall not bring any pets along with them to the tournament.

Judging criteria

Points will be given on the basis of aggression, control, damage and strategy

- Aggression: When a robot deliberately attacks its opponent, aggression is judged by the frequency, severity, boldness and effectiveness of the attack. If a robot appears to have accidentally attacked an opponent, that act will not be considered as aggression.
- Control: Control means a robot is able to attack an opponent at its weakest point, use its weapons in the most effective way, avoid opponents attacks and arena traps and minimize the damage caused by the opponent or its weapons.
- Damage - Through deliberate action, a robot either directly or indirectly reduces the functionality, effectiveness or defensibility of an opponent using the available arena traps. Damage is not considered relevant if a robot inadvertently harms itself or if the damage to the opponent is not deliberate.
- Strategy - The robot exhibits a combat plan that exploits the robot's strengths against the weaknesses of its opponent. A robot's conscious use of defensive strategies to guard against the strength of the opponent is another way to characterize a strategy. It also includes using arena traps for one's own benefit.

Prize Distribution

The prize distribution for Tarthva'22 Robowars is as follows :

- Total Prize Money for the event - 8 Lakh Rupees (~10,000 USD)*

- For the 60 kg Category :
  Total Prize Money - 5 Lakh Rupees (~6200 USD)*
  First Prize - 2.5 Lakh Rupees (~3100 USD)*
  Second Prize - 1.3 Lakh Rupees (~1600 USD)*
  Third Prize - 80,000 Rupees (~1000 USD)*
  For Positions 4 to 8 (All the teams that qualify for the Quarter finals) - 8,000 Rupees (~100 USD)* each.

- For the 15 kg Category :
  Total Prize Money - 3 Lakh Rupees (~3800 USD)*
  First Prize - 1.3 Lakh Rupees (~1600 USD)*
  Second Prize - 80,000 Rupees (~1000 USD)*
  Third Prize - 50,000 Rupees (~620 USD)*
  For Positions 4 to 8 (All the teams that qualify for the Quarter finals) - 8,000 Rupees (~100 USD)* each.

[* based on the assumption that 1 USD = 80 INR (original value may vary as per exchange rates)]

Rule modification during competition

If a rule is found to cause a significant negative impact on the competition, the rule may be discarded or improvised under the following condition:

- Rules won't be changed in the middle of a match.
- Rules will be changed only for crucial problems as a last resort.
- The change must be approved by the majority of the team leaders present.

Final authority: Tathva Robowars event managers shall have the final authority over the interpretation and implementation of all rules. All decisions regarding the rules shall solely be made by the event organizers. The decision made by the judges/event managers shall be final and immune to challenge and appeal.

Note: These design rules may change at any time with or without specific notice to the participants. Any changes made to these rules will be noted in a revised design rule document, if updated. The teams must acknowledge that they have the responsibility to read, understand and abide by the rules. It is strongly encouraged that the participants go through all the design rules thoroughly, any deviation from it might affect their opportunity to compete in the tournament. Any modification made to the design rules will be informed to participants via email. Tathva Robowars reserve the right to disqualify any team from the tournament at any time, for any reason. In case of any queries, participants are encouraged to contact Tathva, NIT Calicut.

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