

# Robotics Association of Nepal[RAN]

Talchikhel  
Lalitpur, Nepal

## Yantra International Robotics Competition 2023: Creating Robotics Industry of Nepal by 2030

**YANTRA Warz : Fight to the Death**



*This rulebook is prepared for Yantra Warz, Robotics Association of Nepal[RAN]*

## **Theme:**

This is an open robot competition, similar to a fight to the death, in which Good must fight evil and safeguard the earth from the terrifying effects of Climate Change, as evils are spreading all over the world, depleting the earth's natural resources in the form of war robots. The proportions of the robot will be 60 cm x 60 cm x 75 cm, with a weight limit of 30 kg, so that participants can demonstrate their inventiveness with larger dimensions. The battle has begun; let us see who will emerge victorious--Good or Evil. May the good continue.

## **Task:**

Design and construct a remote controlled robot capable of fighting a one on one Tournament.

## **Specifications:**

Dimensions and Fabrications :

1. The machine should fit in a box of dimension 600mm x 600mm x 750 mm (l x b x h) at any given point during the match.
2. The minimum height of the robot should be 150mm.
3. The weight of the machine should not exceed 30\* kg. Only 2%(0.6 KG/600 gms) tolerance will be considered. All pneumatic tanks/source and batteries should be on board. Weight of the remote controller will not be counted.
4. The minimum weight of the robot should be 15\* kg.

## **Mobility:**

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

1. Rolling (wheels, tracks or the whole robot).
2. Manually operated Jumping and hopping are allowed. However, the maximum height of any part of the machine should not exceed 6ft during any stage of its jumping/hopping and any damage caused due to this mechanism is solely the responsibility of the team.
3. Flying (using airfoil, helium balloons, ornithopters, etc.) is not allowed.

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4. The robots should not secure themselves on the ring surface by using suction cups, diaphragms, sticky treads, glue or other such devices.

### **Robot Control Requirements:**

1. The machine can be controlled through a wireless remote only. Power supply should be on board only. Refer below for further details on battery and power.

2. There should be binding capability between transmitters and receivers and they must connect between polycarbonate, metal bars barriers. Remotes with such a facility will only be allowed.

3. The case of any interference in the wireless systems will not be considered for rematch or results.

5. Nonstandard or self-made remote control systems must first be approved by the organizers.

6. Team should pair up the wireless remote with the machine before putting it into the arena.

### **Battery and Power:**

1. The machine can be powered electrically only. Use of an IC engine in any form is not allowed. On board batteries must be sealed.

2. The electric voltage between 2 points anywhere in the machine should not be more than 52V DC at any point of time.

3. All efforts must be made to protect battery terminals from a direct short and causing a battery fire, failure to do so will cause direct disqualification.

4. Use of damaged, non-leak proof batteries may lead to disqualification.

5. Special care should be taken to protect the on-board batteries. If judges found that the battery is not properly protected, then the team will be disqualified immediately.

6. Change of battery will not be allowed during the match.

7. Only bots with on board batteries are allowed.

**\*Note : It is suggested to have extra battery ready and charged up during competition so that on advancing to the next level, you don't have to wait or suffer due to an uncharged battery.**

### **Pneumatics:**

1. Robots can use pressurized non-flammable gasses to actuate pneumatic devices. Maximum allowed outlet nozzle pressure is 12 bar. The storage tank and pressure regulators used by teams need to be certified and teams using pneumatics are required to produce the Safety and Security letters at the Registration Desk at the venue. Failing to do so will lead to direct disqualification.

2. Participants must be able to indicate the used pressure with integrated or temporarily fitted pressure gauge. Also there should be provision to check the cylinder pressure on the bot.

3. The maximum pressure in the cylinder should not exceed the rated pressure at any point of time.

4. You must have a safe way of refilling the system and determining the on board pressure.

5. All pneumatic components on board a robot must be securely mounted. Care must be taken while mounting the pressure vessel and armor to ensure that if ruptured it will not escape the robot. The terms 'pressure vessel, bottle, and source tank' are used interchangeably.

6. Entire pneumatic setup should be on board, no external input (from outside the arena) can be given to the robot for functioning of its pneumatic system.

### **Hydraulics:**

1. Robots can use non-inflammable liquid to actuate hydraulic devices e.g. cylinders.

2. All hydraulic components on-board must be securely mounted. Special care must be taken while mounting pump, accumulator and armor to ensure that if ruptured direct fluid streams will not escape the robot.

3. All hydraulic liquids are required to be non-corrosive and your device should be leak proof.
4. Maximum allowed pressure is 12 bars.
5. Participants must be able to indicate the used pressure with integrated or temporarily fitted pressure gauge.
6. The entire hydraulic setup should be on board, no external input (from outside the arena) can be given to the robot for functioning of its hydraulic system.

### **Weapons Systems:**

Robots can have any kind of magnetic weapons, cutters, flippers, saws, lifting devices, spinning hammers etc. as weapons with following exceptions and limitations:

1. Liquid projectiles.
2. Any kind of inflammable liquid.
3. Flame-based weapons.

### **Rules:**

#### **Bot Verification:**

**These are to be followed strictly**

- 1) The bots should be available to the organizers for inspection 10 days before the event.
- 2) The bots should be tested in our arena 7 days before the event.
- 3) Verification of the bots should be done 4 days before the event.

Failing to comply with the above rules might lead to immediate disqualification.

#### **Video Submission**

Participants have to submit a portfolio of their machine, consisting of a written abstract and a video (if possible) of the working model before the competition. The teams can do an online submission, mailing us a video of your robot at [yantra@ran.org.np](mailto:yantra@ran.org.np).

**Last date for portfolio submission is 20 days before the event.**

### **Video Details:**

1. The video should be of at least 1 minute with the unedited clip showing the machine performance to the fullest. All destructive mechanism(s) being used must be shown working. The last date for submission for the video was **20 days before** .

2. It is not necessary to explain the mechanisms in the video. All portfolios will be used strictly for seeding purposes. The elimination procedure will be objective and the

evaluation of every participant will be published on the website. We assure total privacy of the matter submitted to us. The portfolio of your machine will be helpful in future as an evidence of your hard-work along with determining your position for the competition. **Hence, please pay adequate attention to it.**

3. All submissions must be made online before the deadline.

Please note that this video and written abstract will be the criteria for selection of your robot. Thus even if you are not able to meet the requirements asked in the portfolio, please send us the portfolios based on the current state of your machine before the deadline. That means even if your machine is incomplete, please send the portfolios anyway, instead of not sending them or sending them late.

### **Criteria for Victory:**

1. A robot is declared victorious if its opponent is immobilized.

2. A robot will be declared immobile if it cannot display linear motion of at least one inch in a timed period of 30 seconds. In case both the robots remain mobile after the end of the round then the winner will be decided subjectively.

3. A robot that is deemed unsafe by the judges after the match has begun will be disqualified and therefore declared the loser. The match will be immediately halted and the opponent will be awarded a win.

4. If a robot is thrown out of the arena the match will stop immediately, and the robot still inside the arena will automatically be declared as the winner.

5. Robots cannot win by pinning or lifting their opponents. Organizers will allow pinning or lifting for a maximum of 20 seconds per pin/lift then the attacker robot will be instructed to

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release the opponent. If, after being instructed to do so, the attacker is able to release but does not, their robot may be disqualified. If two robots become entangled or a crushing or gripping weapon is employed and becomes trapped within another robot, then the competitors should make the timekeeper aware, the fight should be stopped and the robots separated by the safest means.

6. If draw occurs points will be given on the basis of aggression, damage, control and strategy.

7. Aggression – Aggression is judged by the frequency, severity, boldness and effectiveness of attacks deliberately initiated by the robot against its opponent. If a robot appears to have accidentally attacked an opponent, that act will not be considered Aggression.

8. Control – Control means a robot is able to attack an opponent at its weakest point, use its Weapons in the most effective way, and minimize the damage caused by the opponent or its weapons.

9. Damage – Through deliberate action, a robot either directly or indirectly reduces the functionality, effectiveness or defensibility of an opponent. Damage is not considered relevant if a robot inadvertently harms itself. Also, if a pressure vessel or a rapidly spinning device on a robot fragments, any damage to the opponent will not be considered "deliberate".

10. Strategy – The robot exhibits a combat plan that exploits the robot's strengths against the weaknesses of its opponent. Strategy is also defined as a robot exhibiting a deliberate defense plan that guards its weaknesses against the strengths of the opponent.

11. If any robot falls in the pit then the robot will be declared as disabled.

### **Safety Rules:**

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.

1. Special care should be taken to protect the on-board batteries and pneumatics, robots without proper protection will not be allowed to compete.

2. If you have a robot or weapon design that does not fit within the categories set forth in these rules or is in some way ambiguous or borderline, please contact the event organizers. Safe innovation is always encouraged, but surprising the organizers with your brilliant exploitation of a loophole may cause your robot to be disqualified before it even competes.

3. Each event has safety inspections. It is at their sole discretion that your robot is allowed to compete. As a builder you are obligated to disclose all operating principles and potential dangers to the inspection staff.

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

5. All weapons must have a safety cover on any sharp edges.

6. 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 to not hurt yourself or others when building, testing and competing. Any kind of activity (repairing, battery handling, pneumatics systems 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 organizers. Not following this rule may result in disqualification.

7. All the resources provided at the time of competition from the organizers should be strictly used only after the consent of the organizers.

8. Once the robots have entered into the arena, no team member can enter into the arena at any point of time. In case if a fight has to be halted in between and some changes have to be done in the arena or condition on the robot(s), it will be done by organizers only.

### **Team Specification:**

1. Any team can participate in Yantra Manual Akhada. A team may consist of a maximum of 5 participants. These participants can be from the same or different institutes.

2. Team Name: Every team must have a name which must be unique. We reserve the right to reject entries from any Team whose name it deems inappropriate, offensive or conflicting. Organizers must be notified when a Team's name has been changed.

3. Team Representative: Each team must specify their Team Representative (Leader) at the time of registration on the website. All important communications between Yantra and the registered

teams will be done through their Team Representative. The Team representatives must submit valid contact details (phone no., email ID etc.) at the time of registration.

( **NOTE:** During any kind of conversation, registration, communication, mails or submissions the team must identify themselves by their Team ID only provided at the time of registration and not by your team name. Please do not use your team name as your identification in any kind of communication with us. Follow this rule very strictly.)

### **Certificate Policy:**

1. Certificate of Appreciation will be given to all the winners.
2. Certificates of Participation will be given to all the teams participating in the competition.
3. If any team is sponsored by a college or organization, that organization will also get the certificate of participation. **Teams need to verify the name of their sponsors (if any) during the time of registration to claim this certificate.**
4. The teams which get disqualified due to disobeying any of the competition rules will not be considered for the certificate.

### **REGISTRATION DETAILS**

- Early bird : Rs. 8000 only (-)
- Normal : Rs. 12000 only (-)
- Late : Rs. 15000 only (-)

The registration will close 2 weeks before the event. The above mentioned registration amount is refundable but with T&C applied.

### **ARENA:**

The arena will consist of a square base with cage-like structure. The square base's dimension is 14 ft x 14 ft. While the height of the cage will be 8 feet(10 feet from the ground).

**NOTE: COMPETITION DATE WILL BE PUBLISHED ONE MONTH BEFORE THE EVENT. THE ABOVE RULES ARE SUBJECTED TO BE CHANGED BY THE ORGANIZERS.**

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