



TECHNOXIAN
WORLD ROBOTICS CHAMPIONSHIP

DRONE

CHALLENGE

RULE BOOK 2023

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1.0 Competition Overview

The drone industry is now having exponential growth. Here at TechnoXian Drone Challenge, students learn, explore and evolve along with the applications of today and discoveries of tomorrow. The challenge has been designed to build drones and encourage participants for creativity, teamwork, critical thinking, and enjoyment.

2.0 The Team

Tournament Teams and Team members are subject to the following:

2.1.0. Team Name

All Team names must be approved by TechnoXian. The Team name must be unique and not be identical or very similar to the name of a previously-registered Team. The name also cannot be identical or very similar to any commercially-trademarked name. TechnoXian reserves the right to require the renaming of any Team whose name it deems inappropriate, offensive or conflicting. Once a Team has been accepted for entry into the Tournament, the Team's name cannot be changed, unless they receive written permission from TechnoXian.

2.2.0. Drone Pilot

An individual may participate or construct a team of maximum 10 members. The member who flies drone is called Drone Pilot

2.3.0. Team Technical Expertise

One member or a combination of members of the Team must have knowledge and understanding of all of the technical aspects of the Drone.

3.0 The Flying Zone

3.1.0. Field Dimensions

The field area would be approx. 2500 M2.. There are marked/specified regions/spots to take off and land the drone. Hurdles will be placed at a different location in the Flying Zone and also have arrows marked to depict the manoeuvring path. Specific checkpoints will be defined in the arena for changing the batteries, adjusting gains, calibration of sensors, etc.

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4.0 The Drone

The team has to design and construct a drone (Tri, Quad, or Hexa) as per given specifications. Commercial water drone kits won't be allowed. Following specifications and rules address many well-known safety issues of drone, but are not expected to cover all design possibilities. The team should give thought to their designs and use common sense, and be aware that inspection team will inspect and assess drone for compliance with the safety requirements on the day of the competition.

- The complete Drone (including Battery and landing gear) should be of length minimum 40cm*40cm*40cm and maximum 75cm*75cm*75cm (LxBxH)
- Drone weigh including battery should not be more than 2Kg.
- There is no restriction on the use of any frame material or specification of the BLDC Motors, Electronic Speed Controllers, Propellers, Batteries, and Weight of the Drone.
- The Drone must be electrically powered only

5.0.0 Competition Structure

During official competition play, there are key positions must be filled.

5.1.0. Referee

Each round of competition is controlled by the referee. He has full authority to enforce the rules of the competition to which he has been appointed. Referees observe and supervise the Competitors before, during and after challenges and to give final scoring and making decision. The referee is encouraged to use the designated walking area next to the field. The decisions of the referee regarding facts connected with play are final.

The referee may only change a decision on realizing that it is incorrect or, at his discretion, on the advice of an assistant referee, provided that he has not restarted play.

The referee is not held liable for any kind of injury suffered by an official or spectator, any damage to property of any kind nor any other loss suffered by an individual, club, organization, institution or other body.

The captain is the only team member that may talk to the referee.

Duties

- The general duties of Referees are Starting Competition, Stopping Competition early, declaring a win, Declaring and administering Timeouts, watching for safety violation The referee ensures a safe competition for all participants and drones. The referee ensures a fair competition according to the rules.
- The referee ensures that there is no interference by unauthorized persons or team members.
- If at any time before or during a competition, a Referee observes disruptive or other inappropriate behaviour by any Operator or Team support person in or around the area of competition, the Referee has the authority to require that person to leave the area immediately.

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5.2.0. Assistant Referee

The assistant referee supports the referee wherever he can. He is encouraged to use the designated walking area, opposite the referee. No team members are allowed to talk to the assistant referee.

Duties

- The assistant referee indicates when misconduct or any other incident has occurred out of the view of the referee.
- The assistant referee discusses unclear situations with the referee

5.3.0. Drone Piolet

Before the start of the competition, every team has to designate Drone Piolet and Team Captain if any.

5.4.0. Competition Preparation

All people that fill a role in the competition have to be ready at least 10 minutes before the start of the competition to allow the referee to make the following preparations

- **Competition Result Sheet:** The referee obtains a competition result sheet along with ball from the organizing committee. After the competition, the referee fills in the final score, collects the required signatures and submits the sheet to the organizing committee.
- **Choosing Team Colours:** The referee asks the captain of the teams about their preferred team colour (either blue or yellow). The sticker of the same colour will be given to teams to put on their Drone.
- **Game Kick-off:** Schedule of teams to play will be announced day 1 of the competition. Teams should be available as per their scheduled time.
- **Designating Drone:** The referee asks drone piolet to use inspected drone only.

6.0.0 Flying Coordination

6.1.0. Countdown to Start: The Referees will determine when each Team is ready to start, at which time a Drone Piolet from each Team will show a green card to indicate their Team's readiness to begin the competition.

6.2.2 Fault: If a Referee or Judge notices premature actions or any other violation of starting procedure, he or she may declare a Fault, and require a Restart.

6.3.2. Timeouts: Any Referee can call for a Timeout to stop the Competition. Team must immediately stop the movement. The subsequent actions of the Referees, TechnoXian Officials will depend upon the circumstances that resulted in the Timeout.

7.0. Winning the Challenge (Game Play)

7.1.0. Pre-Game setup:

- The Drone will be evaluated on various parameters such as design, construction, and innovation.
- Every aspect of the Drone will be observed for scoring which includes the connection of various parts, fixing of components, materials used, aeromodelling, etc.

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Game Clock: The game clock starts as soon as the referee commands the beginning of the round and stops as soon as the maximum access time (5 Minutes) of that round elapse.

Run Time: Run time starts as soon as the game clock starts/the drone takes/off and stops when the drone lands successfully.

Flight time: The flight time will be the official time taken by each drone.

Run Time: Run time starts as soon as the game clock starts/the drone takes/off and stops when the drone lands successfully.

Flight time: The flight time will be the official time taken by each drone.

$$\text{Flight time} = (\text{Total Access time for the round}) - (\text{Run time})$$

7.2.0. Round 1 (Elimination Round)

TAKE OFF AND LANDING:

- In this round, the team will be given a maximum of two attempts to complete the challenge. The best score out of the two attempts will be considered the official score for the round.
- The maximum time allotted to each team to complete the round is 5 minutes.
- The challenge is to take off from a specific location and land within the boundary of a predetermined circular landing spot in the minimum time possible and before the access time elapses
- Points will be awarded based on the smoothness of taking off and landing, distortion in quad, vibrations and control accuracy, etc.
- Teams unable to complete this task or having low scores will be eliminated.
- If the drone crashes negative points will be awarded and the run time of the flight will reset but the game clock continues to run.
- The top 15 teams to complete the circuit with the best timings will move to the final round.

7.3.0. Round 2 (Showcase Round)

Dance Performance

- 3 to 4 teams to perform a dance in the air. An area of around 1000 SqM will be allocated to fly drones.
- The referee gives a green signal. Within 10 sec. the drone should leave the base.
 - Most critical and maximum number of acts within 5min of fly will score maximum points.

7.4.0. Round 3 (Safety Round)

Search and Rescue Task

The team will be informed about a rescue area. The following tasks are to be accomplished:

- Drone to pick food packets (weight appx 100gm), reach to rescue area, and drop the packets.
- Further Drone to identify casualties. Pick a body (appx weight 150 to 200 gm) and drop it at to rescue camp.

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7.5.0. Round 4 (Final Round)

Drone Prix

- A maximum of two attempts will be provided to complete the challenge. The circuit needs to be completed without avoiding any of the hurdles. The best score out of the two attempts will be considered the official score for the round.
- The maximum time allotted to complete the round is 5 min.
- This stage is to evaluate the perfection in the stability of the Drone and the controlling ability of the pilot.
- During this stage, the Drone has to travel through the gaps in the various hurdles, perform maneuvers and complete the circuit in the minimum time possible.
- Points will be awarded for each hurdle and will be scored based on the perfection in control of flight and the time taken to complete the circuit.
- The team completing the round in the minimum time to complete the round and scoring the maximum point will be nominated as the winner of the competition.
- If the drone crashes negative points will award and the run time of the flight will reset but the game clock continues to run.

7.6.0. Radio Control:

Radio control requirements:

Radio systems MUST NOT cause interference to other frequency users. At drone, only the 2.4ghz DSS (Digital Spread Spectrum) frequencies are allowed. Radio telemetry is permitted on 433MHz and 2.4GHz.

8.0. General Rules of Tournament

8.1.0. Prohibited Activities: TechnoXian expects all Competitors to act in a safe and legal manner. The actions of a single Team member may be grounds for Disqualification or Expulsion of the entire Team. The following activities are prohibited; violation of any of these terms may result in Competitor and/or Team Disqualification, as determined by TechnoXian. and/or Producer in their sole and absolute discretion.

- **Unruly Behaviour:** Fighting, belligerence, threat of physical violence or other unruly behaviour, including abusive physical contact with any TechnoXian Official, will not be tolerated and can result in the immediate Expulsion of the offending Team member's entire Team from the Tournament.
- **Vehicles in Pit Areas:** Scooters, bicycles, skateboards, skates and similar vehicles cannot be used in any of the Pit Areas. In addition, powered vehicles such as Segways, hoverboards or powered scooters cannot be used or stored in the Pit Areas. The only exceptions are wheelchairs (manual and powered) occupied by disabled persons, and vehicles used by authorized personnel for Tournament operations.
- **Running and Playing:** Running in the Pit Area, except in an emergency, is not allowed. Running while carrying a charged pneumatic tank, or any sharp or otherwise dangerous part, may result in the revoking of the Pit Pass of the offender. Engaging in horseplay, tossing balls or other items, or operating remote-control vehicles or equipment in the Pit Area is also not allowed.

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- **Team Property:** No Team member may deliberately touch, handle or otherwise come in contact with any Drone, parts, tools or other equipment belonging to another Team, without the explicit verbal authorization from a member of the other Team
- **Smoking:** Use of either tobacco products, nicotine vapor devices (e-cigarettes) or similar non-nicotine delivery devices is specifically prohibited in any of the Pit Areas, and in any other indoor or nearby outdoor area that is marked as “No Smoking”.
- **Alcohol Use:** No alcohol may be consumed at the Tournament by any Team member at any time. In addition, no alcoholic beverage may be brought into any of the Pit Areas. A Team member under the influence of alcohol is not allowed in any of the Pit Areas, and cannot participate in any activity involving the preparation, transport or operation of any Rocket at the Tournament.
- **Illegal Drugs:** No possession of illegal drugs or other substances or any use thereof will be tolerated at any time or place during the entire production, on camera or off. Penalty is immediate dismissal of the entire Team of the offender from the Competition and Program.
- **Firearms and Explosives:** No firearms, weapons, explosives or other dangerous items or materials of any kind may be possessed or brought to any Tournament location by any Competitor or anyone else other than authorized law enforcement personnel.
- **Lasers:** Deliberate pointing of any laser at any other person at the Tournament will not be tolerated and may result in the immediate Expulsion of the offending Team member's entire Team from the Tournament.
- **No Pets:** No pets of any kind are allowed anywhere at the Tournament. The only exception is a certified service dog being used to assist a disabled person

8.2.0. Prize: Winner of the tournament will be awarded cash prize, certificate and trophy. TechnoXian reserve the right to make changes to the total prize pool amount and/or the prize pool allocation prior to the commencement of the Tournament.

- **Prize Forms:** Each Team Member will be required to fill out and sign his/her Team's Team Member & Prize Allocation Form prior to commencement of the Tournament. The Team Member Prize & Allocation Form specifies how that Team wants its prizes (if any) allocated amongst the Team Members. Only Team members listed on the Team Member & Prize Allocation Form are eligible to receive a prize (if any). Additionally, prior to the awarding of any Tournament prizes, each Team member entitled to part of the prize will be required to execute a Prize Acceptance Form outlining the amount of the total prize that the Team is entitled to, and portion of the Team prize to which the individual Team member is entitled.

8.3.0. Rule Changes During Competition: Rule changes between years can have unforeseen consequences. If a rule is found to cause significant negative impact to the competition, the rules may be adapted under the following conditions:

- Only between phases of the competition
- Only for major problems, as a last resort.
- The change must be approved by all team leaders (by an unanimity vote)

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8.4.0. Final Authority: TechnoXian organizer shall have final authority over the interpretation and application of all Rules and decisions regarding the Rules shall be made by TechnoXian in their sole and absolute discretion. Decisions by TechnoXian in regards to the interpretation and application of the Rules, the Tournament and the Program shall be final and not subject to challenge or appeal.

NOTICE

These Design Rules may change at any time with or without specific notice to you. Any changes made to these rules will be noted in a revised Design Rules document with a higher Rev number. You acknowledge and agree that it is your responsibility to read, understand, and comply with any and all rules provided herein or otherwise by TechnoXian. It is strongly encouraged that you check these Design Rules often for any changes that may affect your design, build, and/or ability to compete in the Tournament. TechnoXian reserves the right to remove any Team from the Tournament at any time for any reason (including, without limitation, failure to meet safety and/or technical requirements) in its sole and absolute discretion