

INTERNATIONAL FULL THROTTLE

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(Version 1.0)

TASK

Design an RC 1:16 Electric Buggy which can race against other opponents on an off-road dirt track

DESIGN SPECIFICATIONS

Radio Equipment

- Changing frequencies by interchanging transmitter and receiver crystals ("reversed frequencies") is prohibited.
- Radio Systems are limited to the use of two channels for operating two servos.
- 2.4GHz DSM/DSS systems or any frequency are allowed but should notify the transmission technology, crystal frequency to Techfest.
- No advancement in radio apart from bot controlling/regulating/fine tuning/trimming will be entertained.

Brakes and Specifications

- Vehicle batteries must be securely mounted
- All vehicles must be equipped with a working brake system capable of stopping the vehicle and holding it motionless with the motor running.

Motor Specifications

Restarts are permitted if the Race Director believes one or more drivers have gained an unfair advantage.

"Roll-over" antennas are allowed in on-road classes only, not in any oval or offroad classes. The exposed ends of such antennas must be fitted with a button or ball having a diameter of at least 5/16". For those electric classes where a "straight axle" is specified, the following definition applies: In a straight axle design, there must be a fixed relationship between the axle and the motor. No relative movement is allowed between the rear axle bearings and the motor case, and all suspension action must be applied to the motor, transmission and both rear wheels as a unit.

General

1. Sensor-based or sensorless motors are allowed in all-electric classes.
2. The owner shall be able to easily replace the rotor, bearings and front-end bell using commonly available tools. These parts shall be available for separate purchase. Ball bearings are allowed.
3. If the motor is sensored: It must use a six-position JST ZH connector model number ZHR-6 or equivalent connector with 6 JST part number SZH-002T-PO.5 26-28 AWG contacts or equivalent. Wire sequence must be as follows:

Pin #1- ground potential

Pin #2- phase C

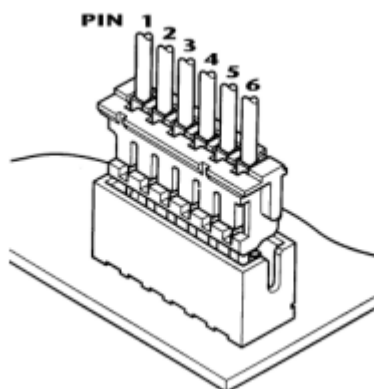
Pin #3- phase B

Pin #4- phase A

Pin #5- temp control, 10 k Thermistor referenced to ground potential

Pin #6- + 5.0 volts \pm 10%

For clarification pin #1 is on the left-hand side of the above connector with the wires exiting the top of the connector and the plastic tangs that hold the contacts in the housing are facing forward. See the drawing below.



Sensored type compatible speed controls must use the six position JST header part number X-6BZRSMX-TK (where X denotes the style of the header) or equivalent. The power motor wire connections must be clearly marked A, B, C on both speed control and motor. A for phase A B for phase B C for phase C 8.5.1.4 All motors must have the original manufacturer's logo or name molded, engraved or etched into the end bell. ROAR Stock, Super Stock and Spec motors must have a distinguishing feature or mark not easily removed/alterd on the stator stack or collection ring designating the wind number Any active (powered) motor cooling (such as Peltier devices and liquid cooling) other than a single standard 30mm fan are strictly prohibited. Motor heat sink devices directly contacting/attached to the motor must be made of cast aluminum only, no other materials are allowed. Air scoops, ventilation slits, and other passive cooling efforts are allowed. Motor must be at ambient or higher temperature before the start of the race.

1/10 Scale Electric Off-Road Buggy

Dimensional Specifications:

Item	Limit	Specification
Length (B)	Maximum	Free Size
Width	Maximum	Free Size
Height (measure with suspension fully compressed)	Maximum	Free Size

Tires (Rubber only)

- No tires created for other vehicle types, even if they meet the specifications, will be allowed.
- Cutting or modifying the tread is allowed.
- Trimming the mounting bead of a tire in order to fit a legal rim is allowed.
- Cutting tires from same class to fit wheels of same is not allowed, regardless of whether it fits minimum tire dimensions or not.

- Cutting tires from one class to another class is not allowed regardless of dimensions.

Battery Rules

Batteries may not be charged or changed during a standard-length race. Batteries may be changed during an Endurance race.

All batteries and connectors inspection will be done prior to bashing.

Drivers are responsible for the proper disposal of batteries that are no longer usable. No batteries should be discarded in ordinary trash containers, and may not be abandoned at race sites. It is recommended that tracks promote safety and non-pollution by providing an approved disposal container for unusable batteries.

Lithium Polymer battery packs may be used to power electric racing cars if a Certification of Compliance has been received and accepted by ROAR from the manufacturers of the battery packs.

Transmission and drive

- Single speed transmissions only
- 2WD (two-wheel drive) or 4WD
- Rear suspension: Independent.
- Body Style: Buggy or other off-road style body that resembles an actual off-road racing type vehicle.
- All the specification will be verified by Techfest. Also Techfest will not be responsible for any unavoidable disqualification due to behavioral or technical ambiguity.

Radio/servo rules

- No traction control system, only steering servo and throttle servo will be operated by radio, any miss lead will lead to disqualification and will have to pay a penalty of destruction.
- Vehicles should have a fail-safe system that will positively return the vehicle's throttle to an idle position if the vehicle loses electrical power or its radio signal

COMPETITION DETAILS

Team Specifications

- Any team can participate in International Full Throttle conducted by Techfest, IIT Bombay. A team may consist of a maximum of 4 participants. These participants can be from the same or different institutes.
- Team Representative: Each team must specify their team representative (leader) at the time of registration on website. All the important communications between Techfest and the registered teams will be done through their team representative. The team representative and other members must submit valid contact details (phone number, email ID, etc.) at the time of registration.

Registrations

- Last date for Abstract Submission and Registration is 23th December, 2023.
- **Since there might be updates to the Problem Statement (see the closing section “Important Note”), Techfest organizers will make sure that the registrants are informed about any updates through email/SMS.**

Submission of Abstract

Participants have to submit a portfolio of their car, consisting of various details and a video of the working model before the competition. This portfolio will be used to seed teams for the competition. Only the shortlisted teams will be eligible for “International Full Throttle” at Techfest 2023. The teams are required to submit all the details in the mentioned Google Form along with the link for the video of your car. Any other submissions won't be entertained. Last date for portfolio submission is 23th December, 2023.

Details regarding the abstract:

Written Abstract (Google Form):

- All the team have to fill the mentioned form before **23th December, 2023**, 11:59 pm.
- The form will consist of engine details, fuel details, radio details, battery specification, car chassis details, tires, servo system, etc.
- The form will be used for better understanding of the drivers technical product, identification of the car/model/device/products going into the individuals cars/system, to monitor all the Engine rules, fuel rules or miscellaneous rules.
- Link for the form: [Abstract Submission Form](#)
- If any team, wants to change any of the filled details or want to add few more features to the car, can write us a mail at fullthrottle@techfest.org before 23th December, 2023 with subject: “International Full Throttle: Car Specification Form”

Video Abstract:

- The video should be of at least 1 minute with the unedited clip showing the car performance to the fullest. We may demand another clip at a later stage from the participants who qualify this round. Instructions for the same will be mailed to team leader of the team. Last date for submission for the first video is **23th December** along with the Form (you have to add the link for the video in the form).
- Participants are not required to explain the mechanism in the video. All the portfolios will be used strictly for seeding purposes.

All the submissions should be made in the Google Form before the deadline.

NOTE: Please note that this video abstract will not be the sole criteria for selection of your team to perform at International Full Throttle, Techfest 2023. Judges will go very thoroughly over the video and written abstracts and then shortlist the teams which would be allowed to perform in the competition. The portfolio is meant to assess the efforts put in by the participants. Thus, even if you are not able to meet the requirements asked in the portfolio, please fill the form with other specifications before the deadline. **That is, even if your car is not ready, please send the portfolios anyway, instead of not sending them or sending them late.**

Certificate Policy

- Certificate of Excellence will be given to top 3 teams
- Teams which will get disqualified due to disobeying any of the competition rules will not be considered for the certificate.

Prizes

- Prize money will be awarded for Top 3 winners of National Round
- Prizes worth INR 1,30,000 consists of prizes for best designs, engineering, skills, reimbursement for selected teams outside Indian subcontinent and other subjective criterion (subject to discretion of judges), in ratio 1:1 for other prizes to selected (outside Indian subcontinent) team reimbursements.

The Prize money will be awarded via NEFT and will be processed within 30 days after receiving the prize money from sponsors. The Winners will have to mail the following information (immediately after announcement of results) to akshat@techfest.org, strictly in the following format

1. Subject: International Full Throttle, Team ID- your position (example- International Full Throttle, IFT1003- 3rd Position)
2. Body of mail:
 - a. Account Holder's Name
 - b. Account Number
 - c. Bank name and Branch name
 - d. IFSC Code
 - e. Photo of Bank Passbook as proof

COMPETITION STRUCTURE AND RULES

Qualifying Heats

- Each qualifying heat will have 'n' slots of 'x' duration each. There will be 'd' drivers in each slot (values of 'd', 'x' and 'n' will vary with respect to number of teams selected by Techfest)
- A race will be conducted in each slot amongst 'd' drivers of duration 'x'. **The timings of the fastest 3 consecutive laps would be considered for qualification for next heat/further rounds.**
- Timings of drivers will be displayed after each qualifying heat and selected teams will qualify for next heat/further rounds.
- All teams must be present near the track in their slot. If any team will not be present at the assigned time, then that team will be disqualified

The Detailed structure/schedule including the heats/rounds of the races would soon be updated on the problem statement

PIT lane rules

- All drivers entering Pit lane should be cautious of the in-front buggy, any intentional dashing will lead to a driver penalty or even disqualification of the driver
- No over speeding in the pit lane will be entertained by the judges.
- No nitro should be over filled resulting into spilling all over the pit lane. Spilling of fuel over the pit lane will lead into penalization of "drive through pit on announcement" and if not done so will result into the time penalty of 5+ seconds.
- All driver should be accompanied with the Pit Crew if not so do talk with the organizer who will try and make available the same. "PIT CREW" is a pit refilling person.
- There will be exactly one Pit Crew for every team in the pit lane.
- A buggy can enter pit lane any number of time but if found any forgery will lead to a penalty of 10+sec and will be added to the final circuit time.

Driver Stand

- All drivers while racing will be accommodated in the driver stand which will be spacious but it is the drivers responsibility to hold straight and be co-operative with the neighboring drivers.
- Any misleading activity/sledging/abusive language once reported will lead to driver penalty and will not be recognized by the organizer for International Full Throttle.

Execution of some of the PIT lane and Driver stand rules will be subjective and relies completely on judges' and organizers' discretion.

General Rules

- The machines are not allowed to leave any loose parts on any part of the arena. Any machine disintegrating during the race will be disqualified.
- If any of the machines starts off before the flag is waved, the counter would be restarted and the machines will get a second chance. However, if any machine starts off before the waving of flag (or countdown) for a second time, it will be disqualified. No rematch will be held for the second time.
- **In case of any disputes/discrepancies, the organizers' and judges' decision will be final and binding.**

TIMELINE

Last Date for Registration	23th December 11:59 pm
Last Date for Abstract Submission	23th December 11:59 pm
Registration/Verification and Practice Session	25th December, 2023 (Second half)
Race Event	Between 27th - 29th December, 2023

More detailed Timeline with timings of practice session and heats spanning over 3 days would be updated soon.

TRACK SPECIFICATIONS

- The track will be an off-road dirt track
- Exact arena design will not be disclosed before Techfest.
- Pit lane along with Drivers stand will be provided on one side of the track
- Multiple machines will race, in some or all of the rounds, on a single lane track at a time.
- A lap of the track is completed when the machine comes back to the start-finish line.
- Despite organizer's efforts to keep the track's quality intact, the track is subjected to undergo wear and tear as cars run over it. The car is expected to be able to perform on such a weakened track as well.

AN IMPORTANT NOTE:

These rules may change any time, even without explicit notification to teams. However, the document uploaded here is to be followed as the latest problem statement for all the rules and design specifications. Any change can be observed in the name of the document which will contain a higher version (v2.0, say) if updated. The teams acknowledge that they have responsibility to read, understand and abide by the rules and

Techfest, IIT Bombay reserves the right to prevent any team from competing at any time for any reason (including but not limited to the reasons specified elsewhere in this document). However, we shall inform all registrants in case an updated version comes up (all the registrant till date of revision). In case of any queries, participants are encouraged to contact Techfest, IIT Bombay.