Aim:

Make a wireless remote controlled machine, powered by an IC engine, which can race against other opponents on an off-road dirt track with many obstacles.

Machine Specifications:

- Machine should fit in a box of dimensions 700mm x 500mm x 600mm at any moment of time during the race. The external device which is used to control the machine is not included in the size constraint.
- The machine should be controlled by a wireless remote control mechanism throughout the race (Band Spectrum around 2.4 GHz).
- The machine must not be made from Lego parts, or any ready-made assembly kits other than the parts mentioned below. Readily available chassis layouts are not allowed. Any machine found having a readymade chassis will be disqualified.
- The machine parts may be roughly classified into structural and functional parts: Functional parts - Gears, differential gear, engine, springs, shock absorbers, servo motors (non propulsion purposes only), batteries, wheels and wheel hub can be directly used as available in the market. Structural parts - Chassis, steering mechanism, shock towers and suspension (excluding upper suspension arm, suspension spring and shock absorbers) have to be built by the participants themselves.
- Judging for the same will be strict and the participant will be immediately disqualified if any of the above structural components are found to be ready-made.
- Silicone capped or coated tires are not permitted. No metal rigid plastic or synthetic spikes or sections may be added to the tires. The tires must have a minimum diameter of 3 inch. No more than 1/16” of wheel rim may be exposed on the outside of the wheels.
- The IC engine is to be the sole source of power for propulsion purposes. DC Motors and Servos can be used for steering and any other control system used in the car.
- The maximum allowed capacity of IC engine to be used is 4.6 cc.
- The judges and the organisers will exercise full authority in disqualifying a team who fail to comply with the guidelines.

Arena:

The track will be an all-terrain track with sharp turns and big jumps. The car should be able to cross bumps, rough patches on the track and outdo the opponent’s car while maintaining its stability and not compromising with its pace. The track will be an off road track. Most parts of the track will be made up of mud, however at a few places wood and jute mat can be used.

- The width of the track will be around 2.4m for most of the part. The track allows for gradient (slope) in certain segments along with perpendicular turns, hairpin turns, multiple turns etc.

- A control stand will be provided along the track for the driver to position himself to control his vehicle during the run. The height of the stand will be around 2m. The controlling of machine has to be done from this stand only.
- The changes in obstacles, if any, will be duly addressed to you through mail.
- Despite organizer's efforts to keep the track's quality intact, the track is subjected to undergo wear and tear as machines run over it. The machine is expected to be able to perform on such a weakened track as well.
- Multiple machines will race 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.
- Track will consist of following obstacles.

Qualifying Round:

- The speed and braking attributes of the car would be put to test in this round.
- Each team will be getting 4 laps out of which the faster lap will be considered. Note that these laps will have to be taken successively.
- The cars will be racing one at a time.
- A car making two invalid attempts would undergo automatic disqualification.

Main Round:

- The track for the second round would be full blown dirt racing circuit with a variety of features that will challenge the speed, control and robust prowess of the cars.
- The format of the round would be knockout. Seeding system will be followed while deciding the initial draw. The draw would be based on the first round ranking.
- No of cars competing each time will be revealed before the race.
- Each race would be of 6 laps. Cars successfully finishing all the six laps will be considered as completed.

Figure 1: Half bump of height 0.5m and width 2.4m

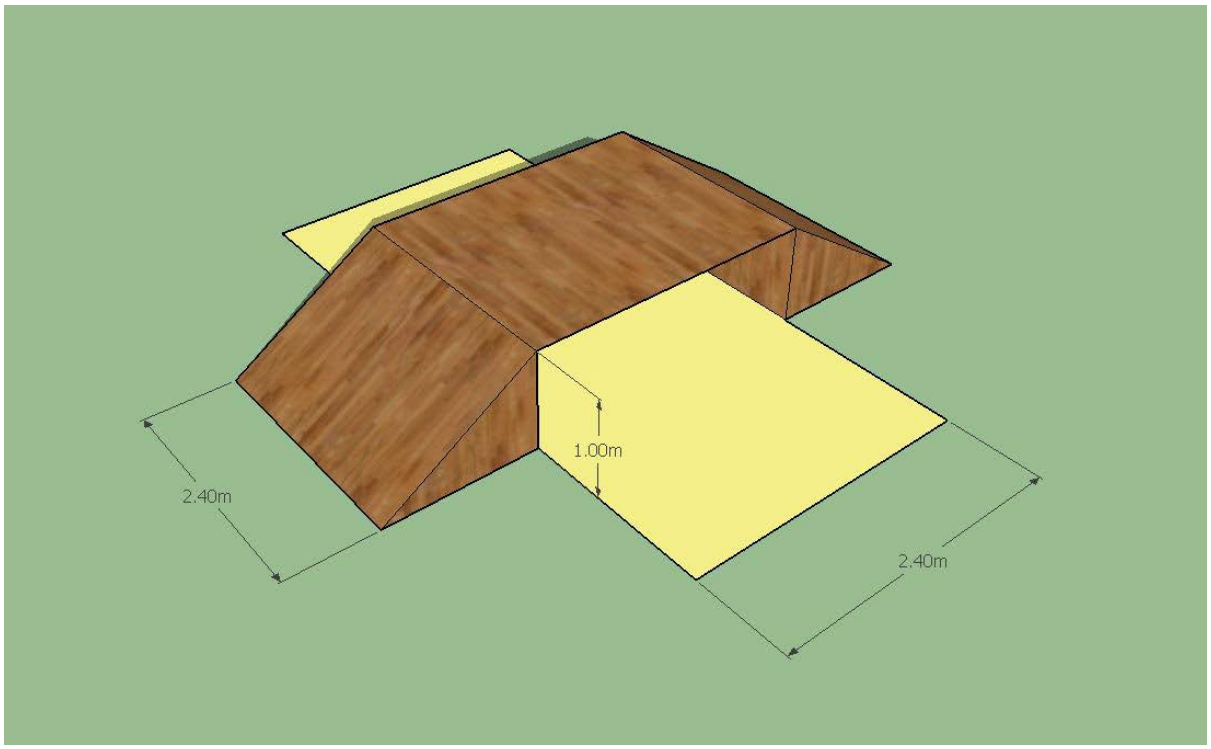


Figure 2: Bridge of width 2.4m and height 1m

Figure 3: Smooth Full Bump of height 0.5m and width 2.4m

Figure 4: 90 Degree Sharp Turn

Figure 5: Tunnel of height 0.75m and width 2.40m

Figure 6: Steep bump of width 1m in middle of track

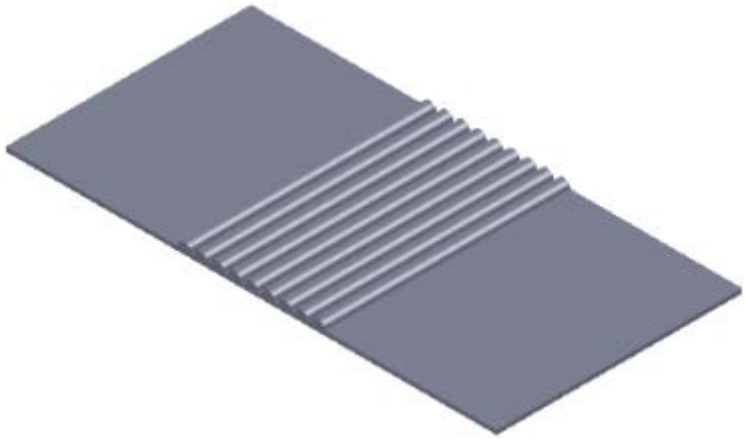


Figure 6: Small Bumps

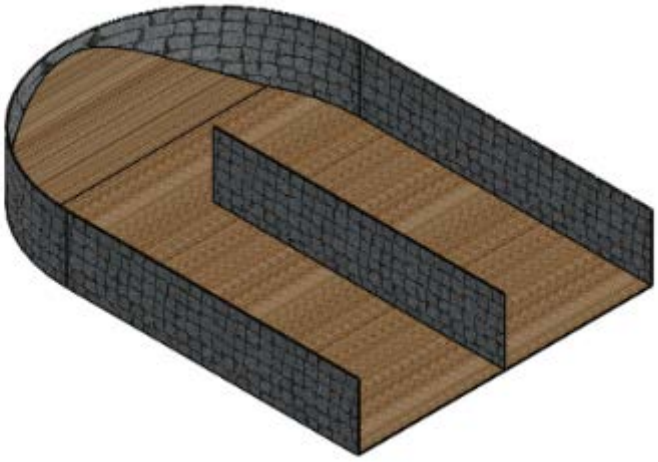
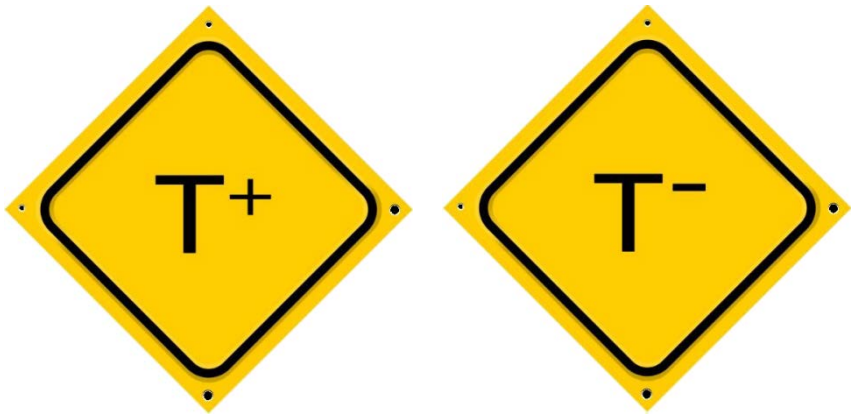


Figure 7: U-Turns with Angle of Banking 30 Degrees



Note: Apart from this, there would be many other obstacles, which would be placed and removed based on the rounds.

General Rules:

- The team will have a maximum of 5 students.
- There will be a qualifying session with each team getting 4 laps out of which the faster lap will be considered. Note that these laps will have to be taken successively.
- The top teams from the qualifying rounds will make it to the second round.
- After the qualifying round, there will be races between multiple cars at a time. So the participants must use a remote with frequency of band spectrum 2.4 GHz.
- The track will have check points at regular intervals. If a machine tumbles, halts or goes off the arena at any point on the track, one of the team members is allowed to lift it up and place it at the nearest checkpoint behind that point. The time shall still be running in the meantime.
- Team members are not permitted to touch either their machines or those of their opponents once the race begins (unless there is need to lift the machine as stated in fourth point). The penalty for doing so is disqualification
- In the qualification round, a maximum of two team members are allowed from a team in the racing arena while in the final round only one of the team member will be in the racing arena except the controller on the stand.
- 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.

- Teams are not allowed to purposefully damage the machine of the opponent's team. If found doing so on track (while racing), the concerned team will be disqualified. Execution of last three rules will be subjective and relies completely on judges' and organisers' discretion.
- All rounds of the event will be held at IIT Kharagpur during Kshitij 2016.

Abstract Submission:

Teams registered for Racepulse have to submit an abstract on their car prior to the event. The abstract along with the video submitted will then be evaluated on various criteria to shortlist the finalist teams. The shortlisted teams will be informed via email of their selection. The submission deadline is till **15th December,2015.**

The content of the abstract should include the following:

- A detailed description of the steering mechanism, suspension mechanism, braking mechanism and the chassis layout which as mentioned earlier have to be self fabricated. Images of the same have to be attached.
- Photographs of empty chassis (in the current state) have to be attached.
- The specifications of all the components used, including engine, suspension springs, remote controller etc have to be mentioned.
- The abstract can be in the form of a PDF file in a CD or on paper along with the video*. If sent through courier, the address to be provided is Kshitij Office, Technology Students' Gymkhana, IIT Kharagpur, Postal Code-721302.
- Online submission is to be made by mailing the abstract minus the video to the email id: race.pulse@ktj.in. The URL of the video uploaded should be mentioned thereby.
- Each team is allowed to make one submission only. In case of multiple submissions, the last submission before the deadline will be considered.
- Kshitij is not responsible for any delay in the delivery of couriers. Participants are advised to send their abstracts well in advance to be on the safe side.

*** The video should be an unedited clip at least 1 minute long in which the car should be shown running at least 20 meters or more making sudden stops and turns as and when required. The video should be preferably in AVI format. If any other unusual format is used, please attach appropriate video plug-ins to ensure that the organizers can run the video properly. The organisers do not expect any commentary by the team members in the submitted video.**

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