

## Full Throttle Problem Statement

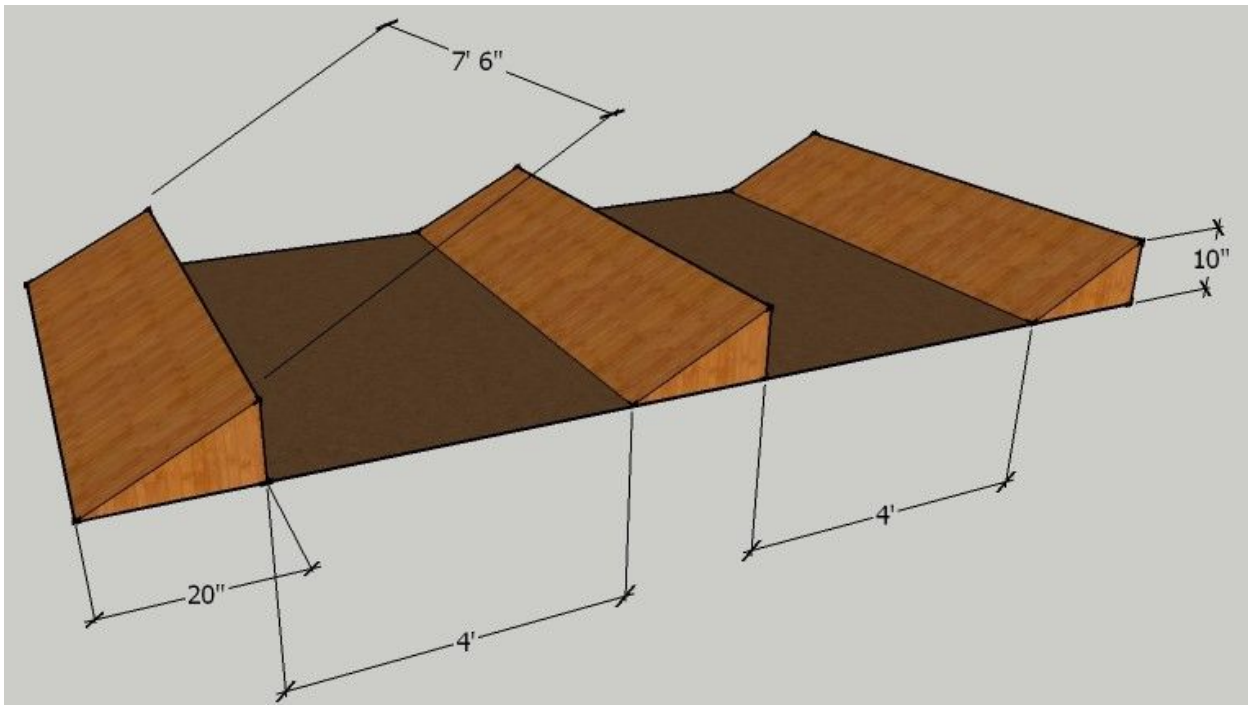
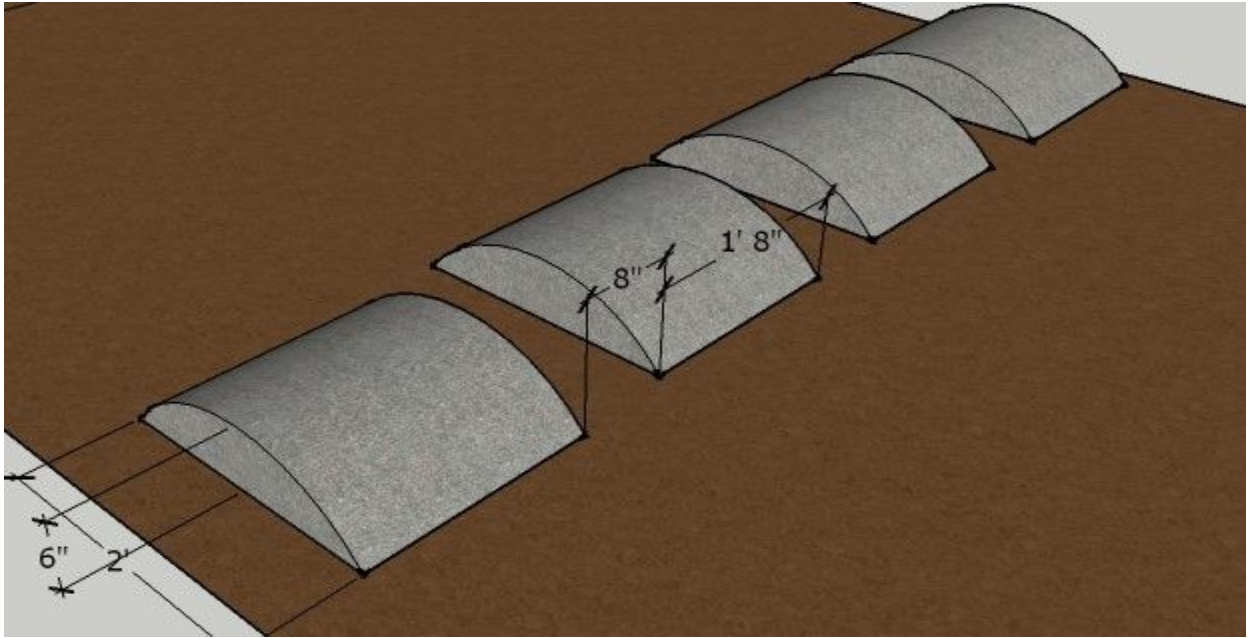
### **Task :**

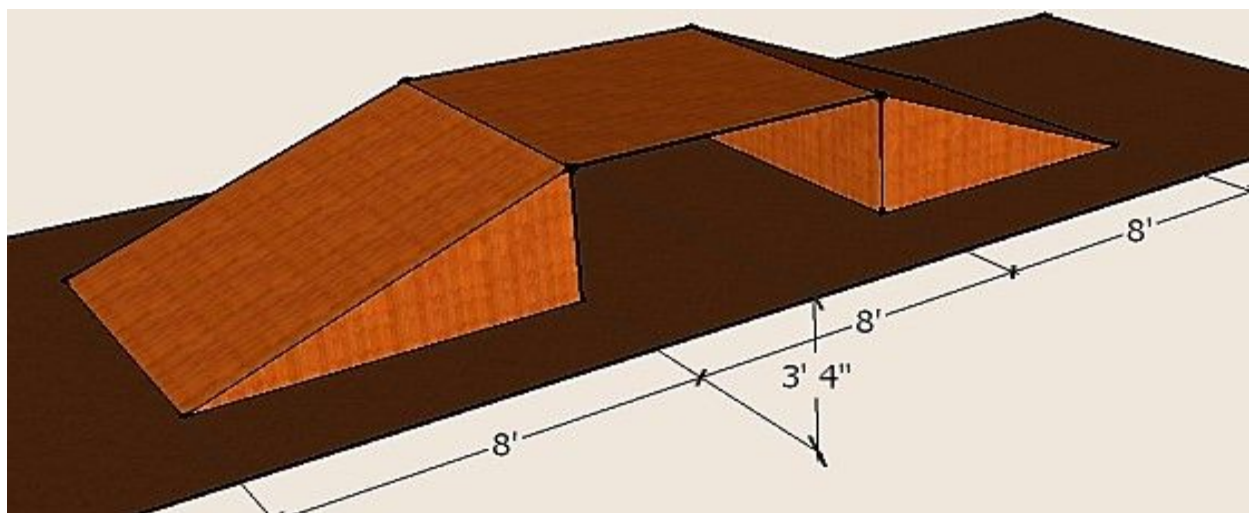
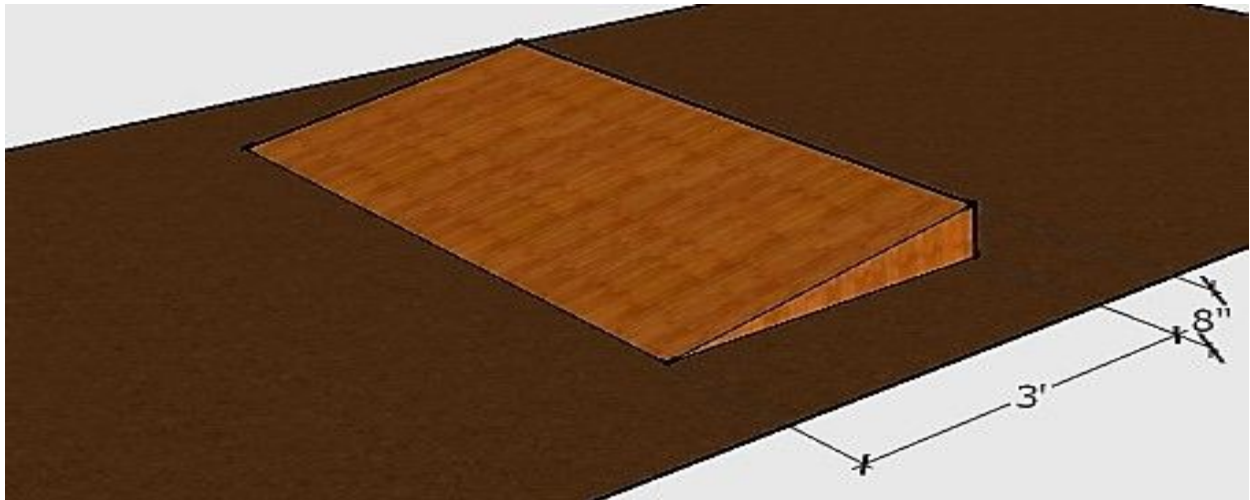
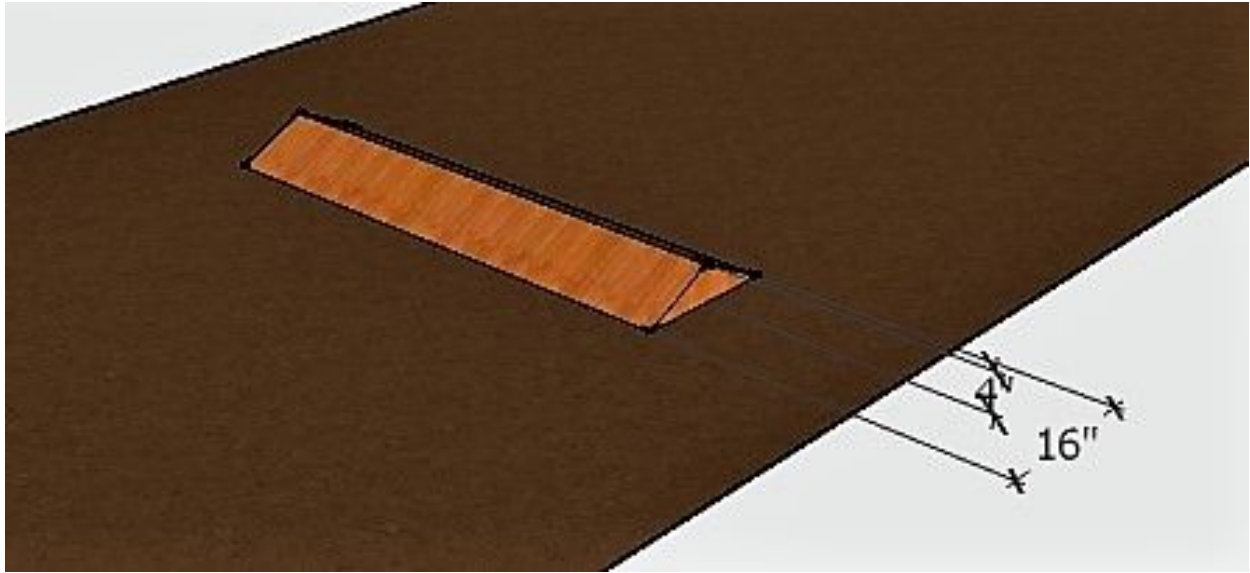
Make a wireless remote controlled machine, powered only by an IC engine, which can race against other opponents on an off-road dirt track with many obstacles.

### **Arena :**

The track will be an all-terrain track with sharp turns and big jumps. In this edition of Full Throttle, both speed and control will be important. 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.

1. The width of the track will be around 9 feet for most of the part.
2. 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 8 feet. The controlling of machine has to be done from this stand only.
3. The changes in obstacles, if any, will be duly addressed to you through mail.
4. 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.
5. Multiple machines will race on a single lane track at a time.
6. A lap of the track is completed when the machine comes back to the start-finish line.
7. Track will consist of following obstacles.
8. Along with the obstacles mentioned in the given problem statement, there will be a surprise obstacle present during the main event.





**Note:**

- 1) Trees of width 1-2 feet may be present obstructing the vision of driver.
- 2) Note: +/- 5% error dimensional error may be there in actual track.

**Machine Specification:**

1. 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.
2. The machine should be controlled by a wireless remote control mechanism throughout the race.
3. 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.
4. 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.
5. 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.
6. The tires must have a minimum diameter of 3 inch. You are advised to use tires of good width for better performance on dirt tracks

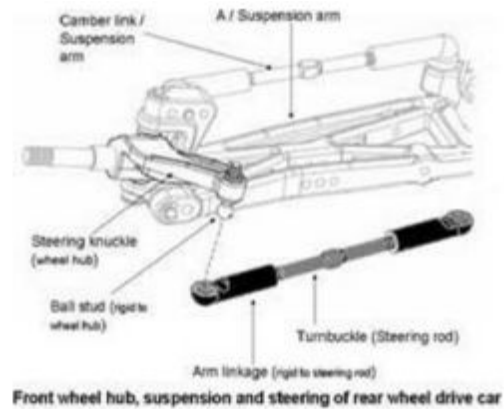
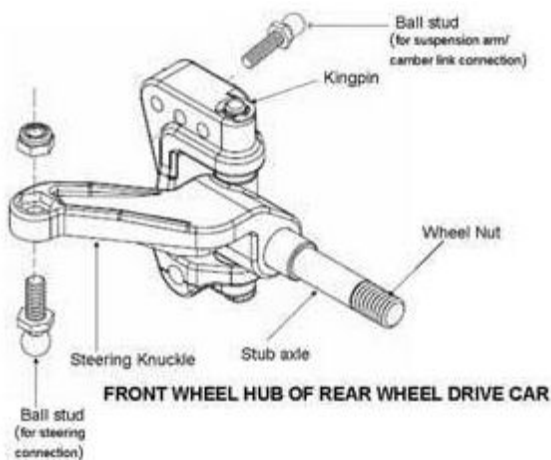


7. **Brake Mechanism:** It is compulsory to incorporate braking mechanism in the car. Any other part used in braking mechanism (including the brake disk) can be readymade.





8. **Wheel Hub:** Any part rigidly attached to the wheel hub will be considered as a part of it and hence can be readymade. An example here is that of the ball stud.



9. **Steering Mechanism:** Any part which is connected to steering rod rigidly i.e. has no degrees of freedom with respect to steering rod (example: heim joint [http://en.wikipedia.org/wiki/Heim\\_joint](http://en.wikipedia.org/wiki/Heim_joint)) will be considered as part of steering rod.

10. **Suspension mechanism:** Any part rigidly connected to suspension arms or one with no degrees of freedom with respect to suspension arm will be considered as its part. For example both the heim joint for the upper suspension arm and the stud rigidly connected to the wheel hub can be bought from the market.





11. If there are parts used in the concerned joint which are neither rigidly connected with suspension or the hub, steering system or hub; they can be used readymade from the market.
12. The above pictures are just sample pictures for you to understand the rules easily.

#### **Propulsion & Steering:**

1. The machine must use only mechanical power generated by an internal combustion (IC) engine for propulsion. Only one IC engine should be used in the machine. Use of any other sources such as chemicals, compressed gas, rockets etc. is not allowed.
2. Any machine which uses DC Motors for propulsion will be disqualified. However DC motors and servos can be used for steering mechanisms or any other control mechanisms apart from propulsion.
3. The machine must have an on-board power supply to run any mechanism requiring electric power.
4. The maximum allowed capacity of IC engine to be used is 4.6 cc (i.e. Participants can also use 2.5 cc, 3 cc, 3.5 cc or any other IC engine lower in capacity).
5. The electric voltage anywhere in the machine should not exceed 12V at any point of time.
6. There shall be a countdown preceding the start of the race. No participant is allowed to touch the machine during the countdown period.
7. Providing a clutch mechanism between the engine and the wheel would prove useful, as it would prevent the engine from dying out at any stage of the race.
8. Participants are advised to use a proper cooling mechanism to prevent overheating of the engine.
9. Participants are advised to use sway bars for better control and stability.
10. The participants are advised to use proper air filters as dirt might cause serious problems to the engine.
11. Readymade wheels are allowed.
12. The machine will be inspected and if found to be dangerous, the team will be disqualified. This decision rests solely with the judges and the organizers.

## Game Rules:

### Rules to be followed while assembling your machine :

1. The teams are expected to self-assemble the machine. Team will be disqualified if the complete machine is found to be ready made and purchased.
2. Team leader is expected to sign on every part of the machine before assembling the machine. Team will be disqualified if the signature is not found on the parts. Decision of the authority will be final and binding on all.
3. Any team with completely purchased machine found participating will be disqualified
4. The team must submit two photos of the machine 1) before assembling 2) after assembling

### General Rules :

1. There will be a qualifying session with each team getting 2 laps out of which the faster lap will be considered. Note that these laps will have to be taken successively.
2. The top teams from the qualifying rounds will make it to the second round.
3. 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.
4. The track will have checkpoints 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.
5. 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
6. 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.
7. 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.
8. 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.
9. 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.

**The written abstract should be prepared on the following lines:**

1. The steering mechanism, suspension mechanism, braking mechanism, the chassis layout, must be explained in detail along with proper diagrams. Ready-made kits are not allowed. Picture(s) showing all the three should be attached.
2. Photographs of empty chassis have to be attached. The chassis has to be built by the participants themselves. If participants have already proceeded building their chassis, they are requested to take photographs of their machine in current state. These photographs are required for verifying that the machine has been indigenously built.
3. The specifications of ALL the components used, including engine, suspension springs, remote controller etc. have to be mentioned.
4. This abstract can be attached as a PDF file to the video and a CD can be prepared; or the abstract can be submitted on paper. The CD and the papers have to be couriered in a single envelope to the postal address of Techfest given below: Techfest Office Students' Gymkhana IIT Bombay, Powai Mumbai – 400076 Or you can email the portfolio minus the video to email-id [full\\_throttle@techfest.org](mailto:full_throttle@techfest.org).
5. In case of online submission of abstract, URL of the video you have uploaded should be sent in the same submission
6. An email will be sent to the team leader confirming the reception of the entry.
7. Each team is allowed to make one submission only. In case of multiple submissions, the last submission before the deadline will only be used for judging purposes.
8. Techfest 2016 is not responsible for any postal/courier delays, so participants are encouraged to send their entries well in advance to ensure receipt before the last date.

**Video Submission:**

The video should be an unedited clip, at least 1 minute long, showing the machine running at least 10-15 meters and performing a U turn on and off road dirt area. The clip 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. It is not necessary to explain the mechanisms in video. The last date of submitting the abstract is 1st November, 2016.

**Note:**

**All the portfolios will be used strictly for the elimination purposes. The elimination procedure will be objective and the evaluation of every participant will be published on the website. Techfest takes the responsibility that no information will be made available to any third party. The portfolio of your machine will be helpful everywhere in future as an evidence of your hard-work, along with determining your position for the competition. The portfolio is meant to assess the efforts put in by participants. 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 requesting permissions for sending them late.**