Problem Statement XLR8
2015

Robotics Club presents XLR8, the opening event of the club, for freshmen. The event will be held on 22nd and 23rd August 2015 i.e. Saturday and Sunday.

Task: To build a manually controlled car capable of negotiating different kinds of obstacles and completing the designated track.

Teams:

- Maximum number of members in a team is 4.
- Only freshmen entries will be considered for prizes.
- The teams must register online through the link provided on this website : http://www.stab-iitb.org/robotics-club/event/XLR8-2015/student_reg Registration open till 11.59 pm of 10th August'15. Registrations starts Saturday i.e. 8th Aug'15.

We hold no responsibility to allot any time slot or provide mentorship facility to unregistered teams.

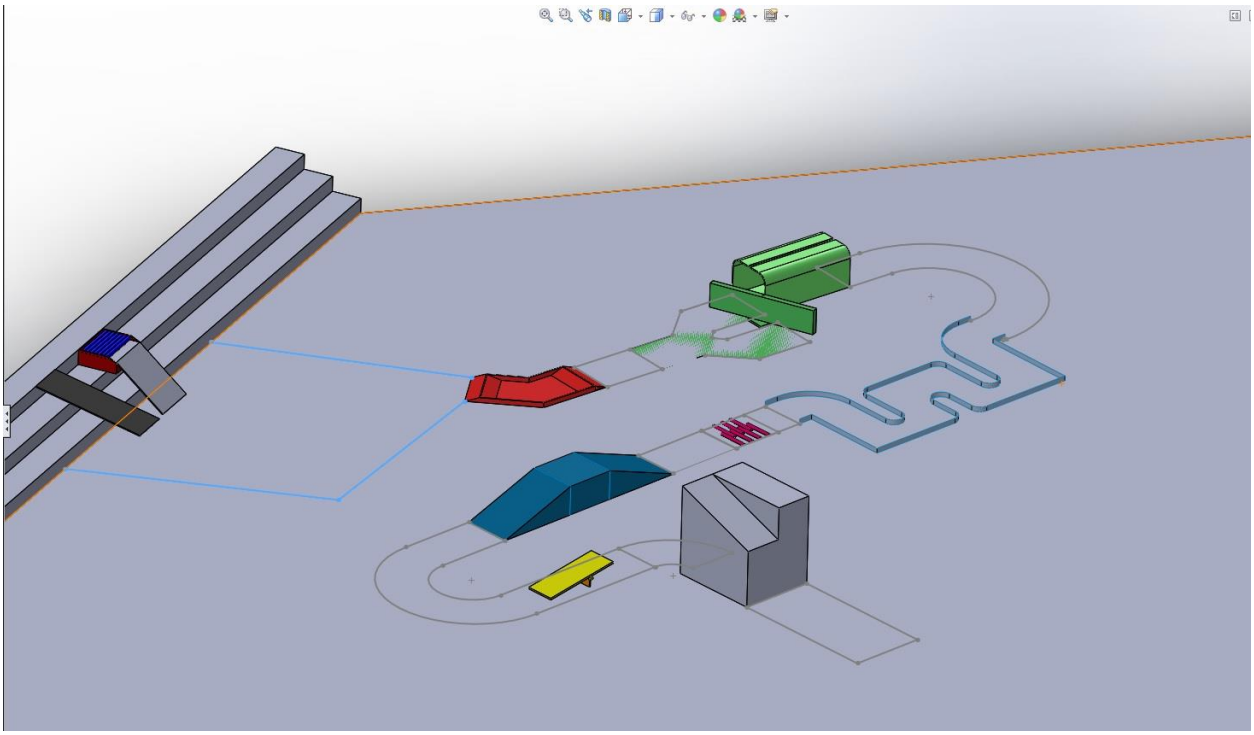
Venue:
The competition will be held in Shailesh J. Mehta School of Management (SOM) Well. Please note that that the arena may possibly be wet.

Machine Specifications:

- The entire bot must fit within a box of size 25cm x 25cm x 25cm at all points of time during the run. This does not include the remote control and external power supply (if any).
- If the power supply is onboard, then it must fit into the above mentioned box along with the machine at all points of time during the run.
- There are no weight-restrictions on the machine.
- The machine can be wired or wireless. Power supply can be external or onboard. No points would be deducted for off board battery.
- Voltage between any two points on the machine should not exceed 12 V at any point of time during the race.
- No readymade steering mechanisms are allowed. Readymade gears, shafts however may be used.
- Lego kits are not allowed.

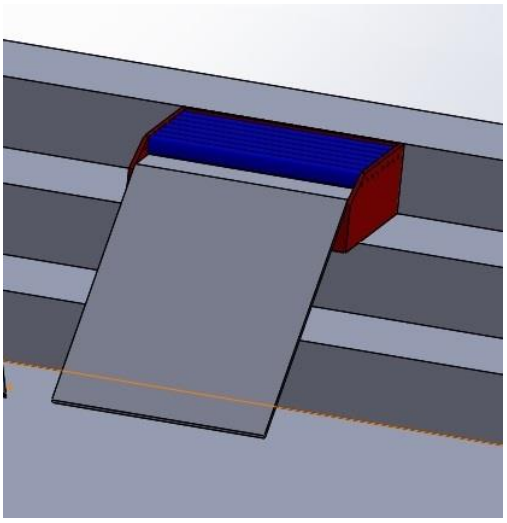
Arena Specifications:

- The teams will have to compete with their cars on a track designed for the competition. The track will either be bounded on both the sides by tyres or will be clearly defined by some other means. The width of the track will be between 40cm and 50cm. Staying on the track is compulsory failing which you will be disqualified.
- The track surface, on which the teams will have to race their cars, will be SOM Well floor, except the inclined tracks which are made up of plywood and the marble-pit. There will be covering of sand paper on some parts of plywood.

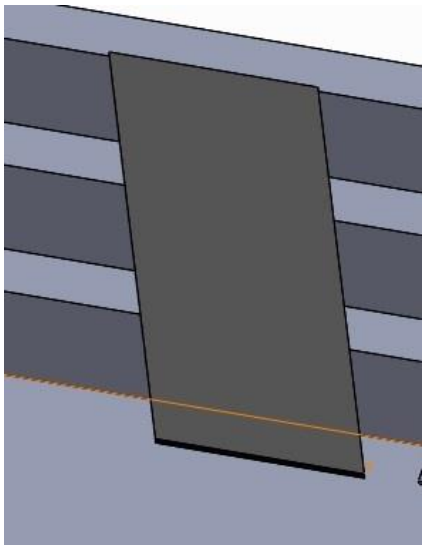


- **Obstacles:**

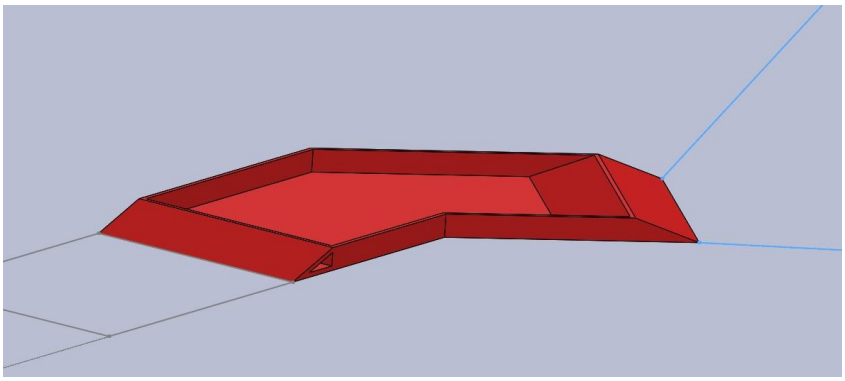
    a. High Rollers: A bunch of free-to-rotate rollers would be present in the track. The car has to go over these rollers and then down an incline.



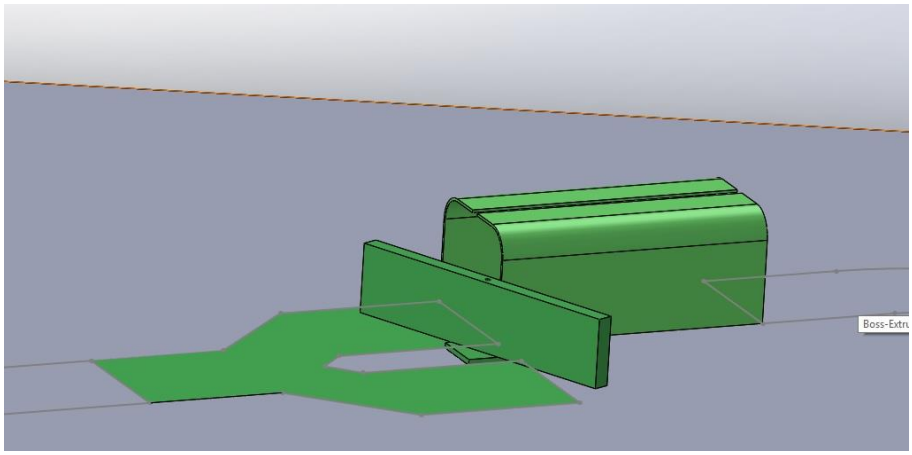
    b. The Skid Slope: The bot has to come down an obliquely-oriented slope.



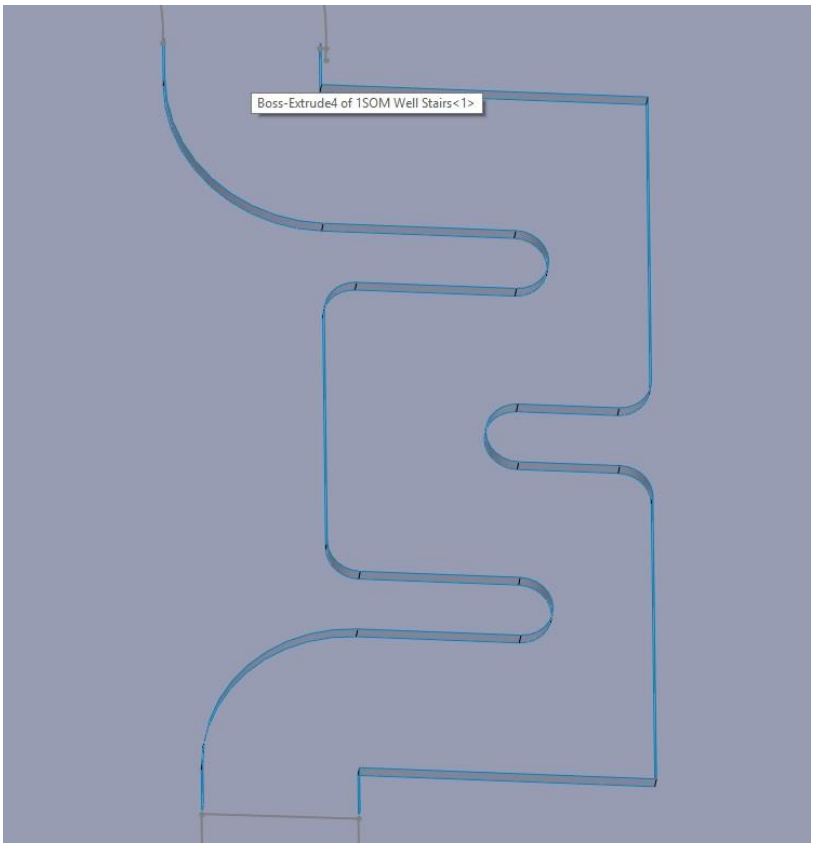
c. Marble Dash: This will be an area where small and medium sized marbles and/or pebbles will be put. The bot must trudge its way out without getting stuck. The angle of turn is 45 degree.



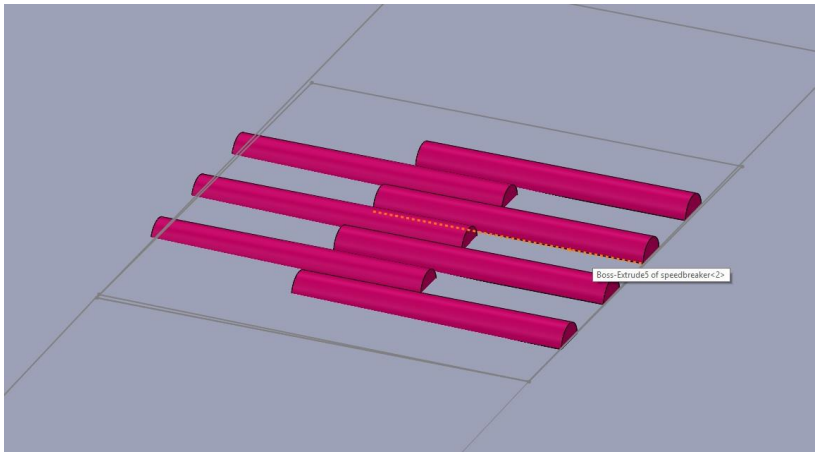
d. Knock Knock and Infy Tunnel: The track will be blocked by a rotating ‘door’ which can be opened by pushing against the far end of the door. Once the door is rotated,the bot needs to return back onto the main track to continue. This track will lead to a tunnel. The tunnel will have a length of around 1 meter, and will have a narrow slit at the top just adequate for the wire of a wired car to pass.



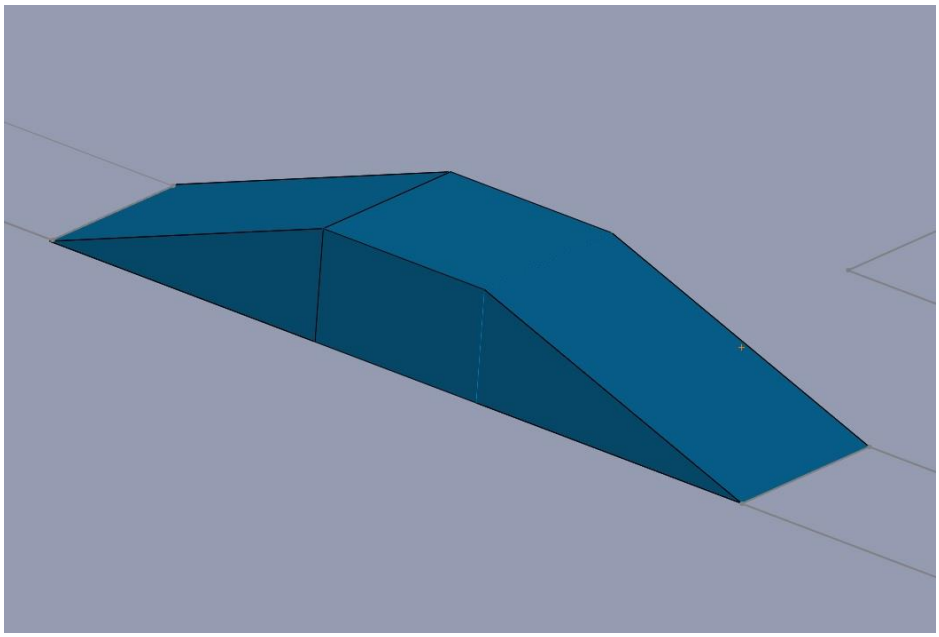
e. Snake Windings: Manoeuvre your bot through the zigzag turns, without spending too much time.



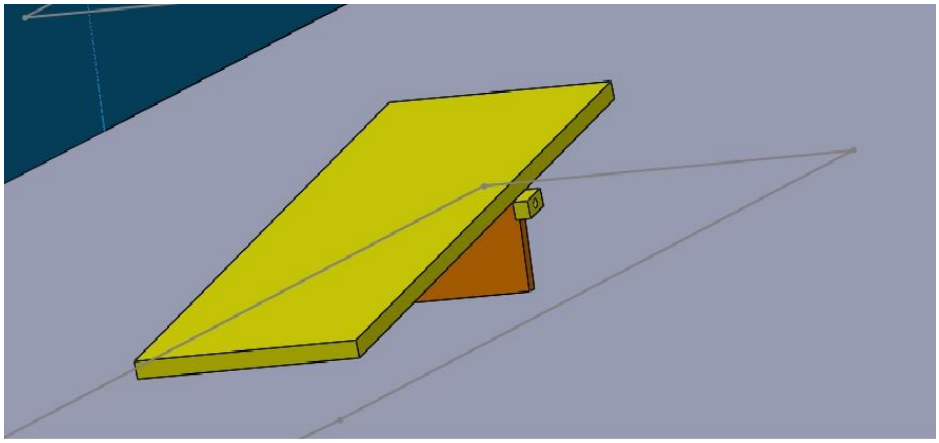
f. Bumpy Bumpy : The car needs to sail through a patch of bumpy speed breakers of same dimensions, maintaining its orientation successfully.



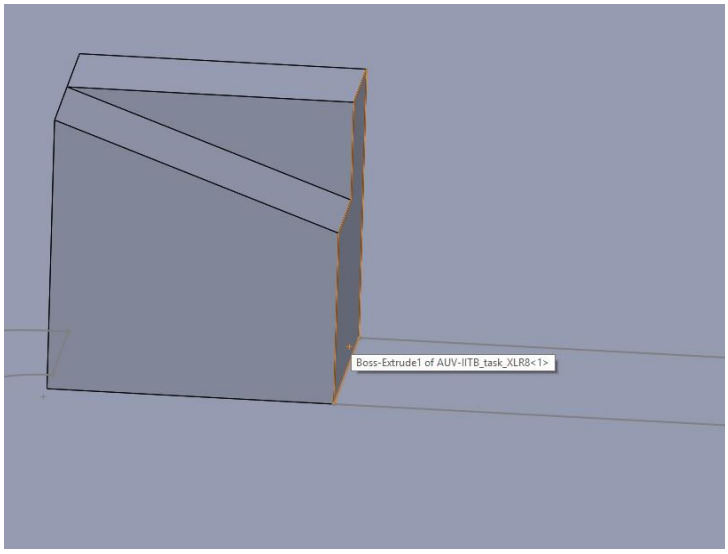
g. Sameer Hill: There will be a hill which the bot has to cross by going over it. The hill will have an incline of 20 degrees on both sides.



h. Walk the Plank: A plank kept at an angle of 19 degrees while moving up and lengths of both the halves are different, the upward incline being smaller in length. Thus the car has to move to the center to switch the direction of incline and then climb down from it.



i. AUV-IITB task: The task is to make the bot do a flip (front or back depending on your choice) from a high ramp. The bot is required to do at least a 180 degrees flip and land (unharmed of course) on its wheels. The stable landing is to be done without resetting i.e. without touching the bot. There will be a layer of foam on the floor to prevent the bot from breaking.



j. Surprise Me: Be prepared to tackle an additional element which will serve as a surprise! Keep guessing!!

k. City Lights: Also, we will be having traffic lights to stop you in your course. To the uninitiated, the traffic light will toggle between red and green signals in certain time intervals. The car can cross the light only when the light is green (unlike the normal roads). So be aware of the time taken for an obstacle. The car will be disqualified if it jumps the signal.

Scoring:

Obstacle	Credits
High Rollers	4
The Skid Slope	4
Marble Dash	4
Knock Knock and Infy Tunnel	6
Snake Windings	4
Bumpy Bumpy	No Credits
Sameer Hill	5
Walk The plank	5
AUV obstacle	8
Surprise Me	4

So, each team will be given a grade of AA or CD or FR, where AA corresponds to 10, CD corresponding to 5 and FR corresponding to 0. These grades will be based on the time taken to cross that particular obstacle. There will be lines indicating the end of an obstacle. The obstacle will be considered crossed if the whole of the car crosses the whole of the line. The end of one obstacle will imply the start of time for the next one. If the bot does not clear an obstacle it will score a FR for that as well as all the other obstacles after that one. However, just clearing the

obstacle ensures you at least a CD grade in it. If you manage to excel in crossing that obstacle by doing it within a certain time limit, then you will be awarded with a AA.

Additionally, there will be two more elements taken into account, namely **Total Time** and **Technical Creativity**. Total Time will be a 6 credit element and Technical Creativity will be a 4 credit element. In these, the team will be allotted 5 grades right from 0 to 10. So the total credits sum up to **50**.

The grades in the Total Time element will be based on the time taken to complete the track (excluding the AUV obstacle). Please note that the credits for Total Time will be allotted only if the bot manages to clear all obstacles till just before the AUV obstacle i.e. the complete track. If the bot is unable to complete the track up till that, a FR grade will be allotted for the Total Time element. The grades in the Technical Creativity element will be given keeping in mind the technical uniqueness, improvisations and innovations done by you in your bot. These grades will be allotted by the organisers and their allotment will be final.

On the basis of these grades, the team's Cumulative Performance Index (CPI) will be calculated (upto the second decimal place) by using credits from the above table. The team with the highest CPI will be declared winners. The CPI will be calculated as the weighted average of the grades depending on the credits. So a grade in a better credit obstacle will amount to more CPI than the same grade in a lower credit obstacle.

General Rules:

- Maximum of 2 team-members will be allowed to control the car at a time.
- Teams will not get any extra time for practice, testing or calibrations on the arena before the final run.
- There will be certain number of checkpoints on the track, which will be informed to the participants before the start of the run. If a machine falls from a height off the track or gets stuck, then it will be placed back on the last checkpoint the machine has passed. This will be done by the organizers. Teams are not allowed to touch the machines during the run (except if the team announces time-out as per rule)..
- The timer will keep running during this process. No Strategic timeout advantages will be permitted, any team attempting to do so will be disqualified.
- There will be a time-out allowed per team exactly once during the round. If the team calls for a time-out, the timer for that round will be paused and the team will get a maximum of a minute to place the car back at the last reset point it has crossed after which the timer will be un-paused and the car must complete the rest of the track from the previous checkpoint.
- If a car is unable to move for more than 30s then it will be assumed that the car has failed and that round will be considered to have ended.(Time would pause and resume after application and removal of timeout respectively).

- Wires (if any) must remain slack at all points of time during the competition. Severe time penalties will be imposed for the intentional/unintentional violation of this rule.
- Other communication devices are not allowed (including other RC remotes) near the arena while the competition is on. This includes remote control of your car while some other team's run is on. The organizers hold the right to check for these devices and their usage.
- Machines found damaging the arena will be liable for disqualification.
- No extra points will be awarded for completing the same hurdle more than once.
- Each team will get 2 laps, out of which best will be considered for final scoring.
- All the teams are requested to be present for their runs during their respective time slots. The organizers do not hold the guarantee of reallocating a new time slot for latecomers.
- The time measured by the organizers will be final and will be used for scoring the teams. Time measured by any contestant by any other means is not acceptable for scoring. In general, the decision of the organizers will be final and binding in all circumstances.