

ELECTRONICS & ROBOTICS CLUB XLR8

PROBLEM STATEMENT

Electronics and Robotics Club (ERC) presents **XLR8**, our flagship event! Get ready to push the limits of your creativity, vision and precision while learning a lot in your first Engineering project at IIT Bombay. XLR8 is the ultimate platform to showcase your innovation and battle for glory. So, let us get a glimpse of what you will be facing in this competition!

Task: Design and construct an IMU sensor-controlled car to tackle a challenging, obstacle-laden track crafted by ERC

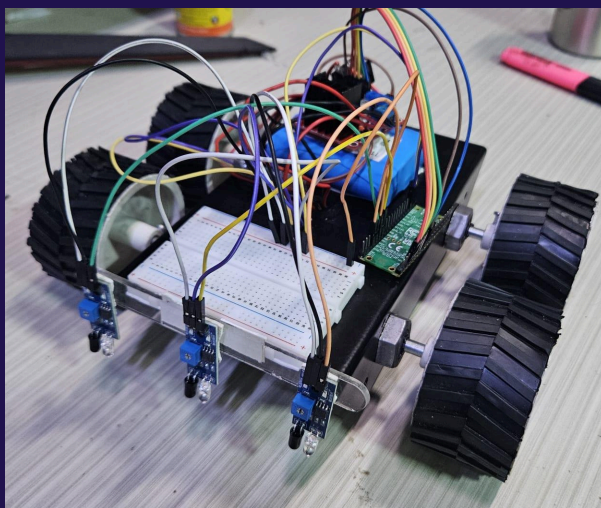
OPTIONAL ADD-ON:

- **Line Follower Module:** Teams may add a **line-following system** using three IR sensors on the bot, enabling it to switch from **gesture-control mode to line-follower mode** when needed. This

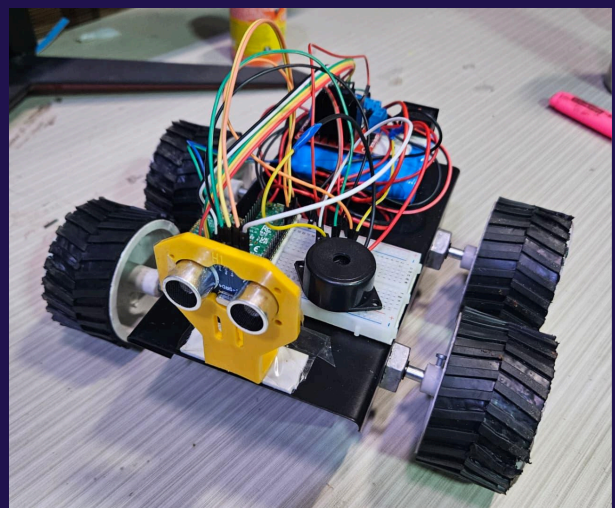
flexibility can help in efficiently crossing several obstacles where line guidance is available, and teams implementing this feature will be awarded **bonus points**.

- **Ultrasonic Obstacle Detection Module:** An **ultrasonic sensor** can be added on the car along with a buzzer which will buzz if the car detects an object at a particular distance . This feature is helpful when the bot is not visible to the driver. Use this to navigate smartly with the controller and with it get awarded with **bonus points**.

NOTE- Both the add on will have an **upper edge** in navigating through certain obstacles over the track than a normal bot without the add-ON. All the components for the add-on will be **provided as a choice** In the mechanical KIT.



LINE FOLLOWER



ULTRASONIC

Winning Criteria: Track completion with the highest score and shortest time. The final score will be determined based on obstacle credits and time taken. It's recommended to prioritize obstacle clearance over speed for a better score.

Tentative Date:

Final run will be on **30th and 31st August** (Saturday & Sunday) tentatively.

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.
- The **onboard power supply must also fit** within the 25cm x 25cm x 25cm box, along with the machine, at all times during the run.
- There are **no weight restrictions** on the machine.
- Only **onboard batteries** are permitted. Please do not keep it off-board!
- The voltage between any two points on the machine **must not exceed 12 V** at any point of time during the race.
- **No readymade steering mechanisms** are allowed. Ready-made gears, shafts, however, may be used.
- Lego kits are not allowed.

- All components provided in the kit must be used, but **innovative and out-of-the-box ideas** are highly encouraged and warmly welcomed.
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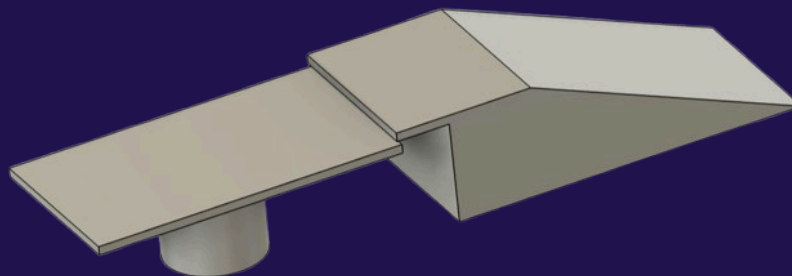
Arena Specifications:

Teams will compete on a track specifically designed for the event, clearly, defined by tyres or other markers and **averaging 40cm** in width. Cars must **Stay on the track** at all times; failure to do so will require a **restart from designated checkpoints**. The track surface will include SOM Well flooring, plywood, and marble sections.

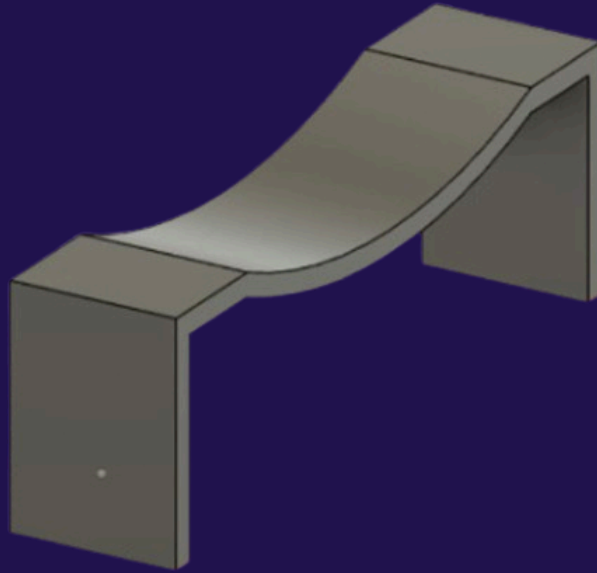
Obstacles:

Here are some obstacles you might or might not face :)

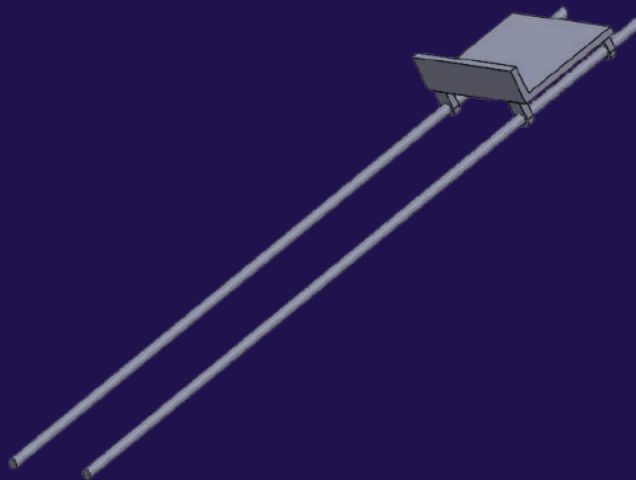
1. **Spinning Planks:** Cross a rotating plank suspended in mid-air. Time your steps carefully to stay balanced and cross the moving path.



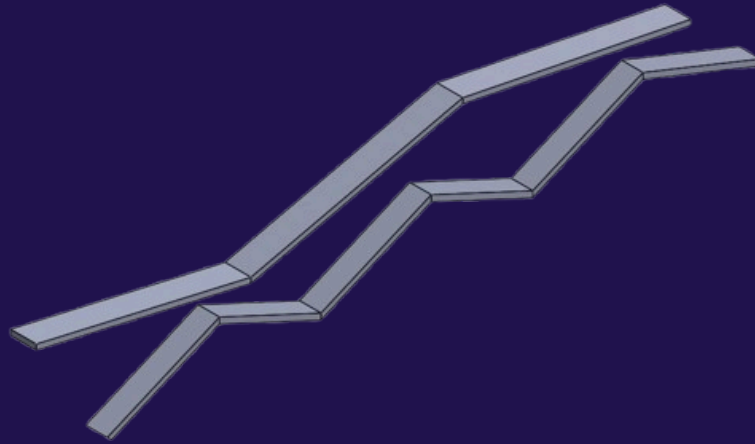
2. **Slacky Bridge:** Participants must demonstrate their balancing skills while crossing a slack, bamboo bridge.



3. **Slider:** Place your bot on our raft smoothly and swiftly and then slide through the decline Wooooooo!!!

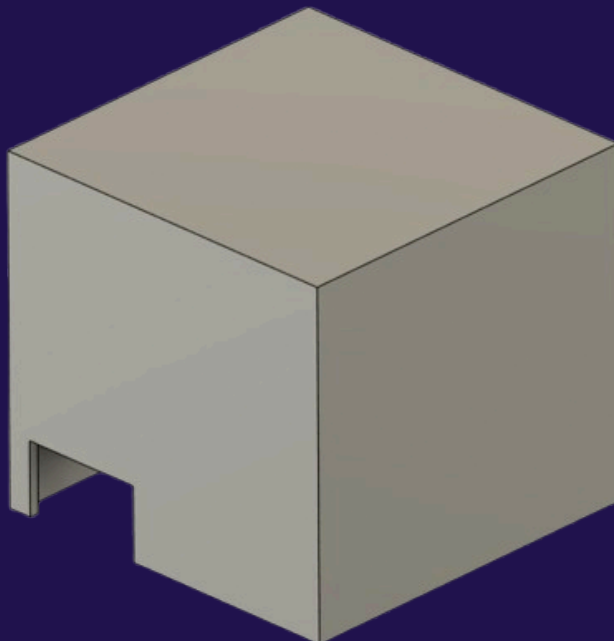


4. **Crissy Crossy:** There are two rails running both parallelly and anti-parallelly at the same time :)

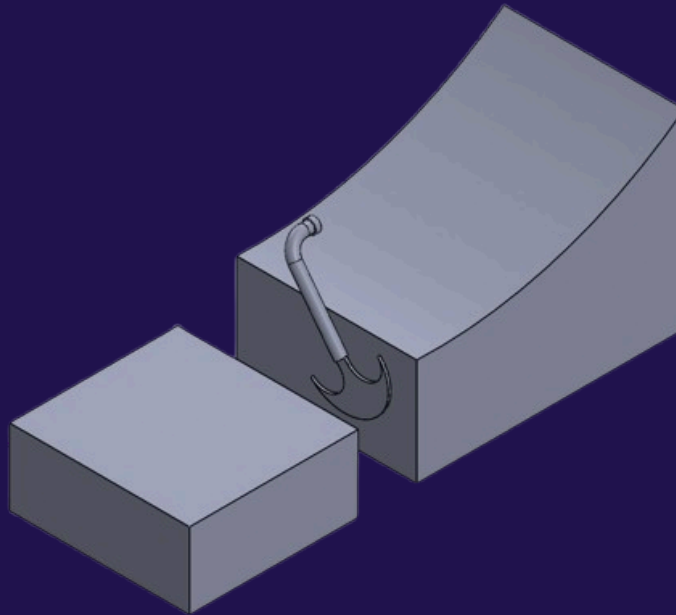


5. **Black Box:** A lot of surprises inside a black wooden box.

- First, a lot of obstacles are placed so as to open up a path.
- Second, a black line which covers that path.



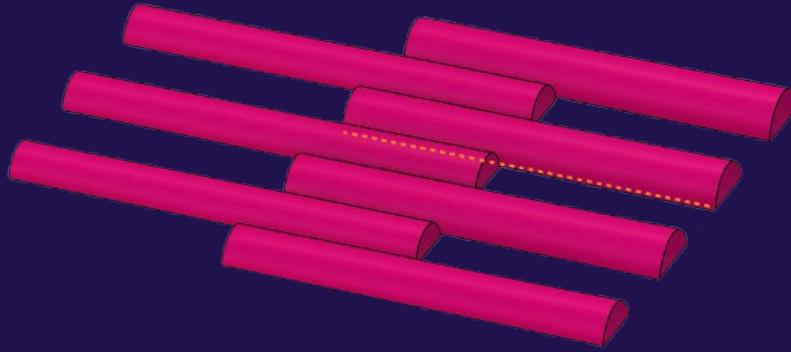
6. **Avoid Ex:** From a particular height you will get enough speed to pass through the obstacle just need to launch at the perfect movement ? yeah but will it be easy ? hell naah .



7. **Upside U:** A special hurdle to go up just to come down.



8. **Bumpy road:** Don't worry there is also some easy stuff.



9. **Surprise Twist:** Get ready for unexpected twists and turns that will keep you on your toes! Embrace the challenge and adapt to the surprises that await!

When everything is going wrong in your life but you're used to it



General Rules:

- A maximum of **two team members** are allowed to control the cart at any given time.
- There will be a certain number of **checkpoints** on the track, which will be informed to the participants before the start of the run. If a car falls from the track or gets stuck or goes off-track, it will be **placed back at the last checkpoint** crossed by the car. The timer will continue running during this process. Any attempts to use strategic time-outs to gain an advantage will result in disqualification.
- Teams are **not allowed to touch** their machines during the run, except when announcing a time-out as per the rules.
- Each team is permitted two **time-outs** during their run. When a time-out is called, the timer will be paused for up to one minute to reposition the car to the last checkpoint. After one minute, the timer will resume, and the car must complete the remainder of the track from the previous checkpoint.
- If a car is unable to move for more than 30 seconds, it will be deemed to have failed, and the round will be considered ended. Time will pause and resume according to the application and removal of the time-out.
- Machines causing damage to the arena will be liable to disqualification.
- **No extra points** will be awarded for completing the same hurdle more than once.

- Each team will have **two laps**, with the best lap time considered for final scoring.
 - The time measured by the conveners will be final and used for scoring; times measured by contestants or other means will not be accepted. **The conveners' decisions will be final and binding.**
 - Teams **will not be given extra time** for practice, testing, or calibrations on the arena before the final run. Teams **must be present** for their runs during their scheduled time slots. The organizers do not guarantee the allocation of new time slots for latecomers.
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Got questions? Drop us a line anytime! Good luck in the competition, and we can't wait to see you bring your A-game on run day! 🏆🏎️

