# TECHFEST 2021-22

# COZMO CLENCH

## TASK

Teams have to build a manually controlled bot which can do simple tasks of gripping objects and putting them in target zones so that it can complete the route by overcoming the hurdles in its path.

## BOT SPECIFICATIONS

- The dimensions of the bot should be less than or equal to 30 cm × 20 cm × 30 cm (l×b×h) failing which the team will be disqualified from the competition (this excludes the dimension of gripper but includes tyres). The bot can, however, extend its dimension once the run starts. An error of (±5% ) is permitted.
- The bot must be controlled manually.
- Teams can use both wired as well as wireless control mechanisms. In case of wired bots, the length of wire should be minimum 2 meters so that the wire remains slack at any instant of time. If the participants use wireless mechanisms they have to use either dual frequency remote, bluetooth or Wi-Fi.
- The dimensions of the remote are not included in the size constraint of the bot.
- The bot must have an onboard power supply in any case.
- Participants are not supposed to use any readymade Lego components or readymade gripping mechanism. However, the participants are allowed to use readymade gear assemblies.
- Irrespective of the mechanism used, only one person will be allowed to control the bot.
- Failure to meet any of the above specifications will lead to immediate disqualification.

## POWER SUPPLY

The participants should use an on-board electric or non-electric power supply i.e. the power source should be on the bot itself. The power source must be non-polluting and must satisfy the safety constraints determined by the organizers. In case of the non-electric power supply, the participants must get it approved from the organizers beforehand via email. Organizers are not responsible for the inconvenience if the approval is not sought.

In case of an electric power supply, the voltage between any two points should be less than or equal to 24V DC at all times during the run.

## RULES

- The bot should be checked for safety before starting the run.
- Only one team member is allowed to handle the bot. No other team member is allowed near the arena.
- The bot is **not allowed to slide the objects** against the ground except for fine adjustments in the Deposit Zone.
- The arena has **4 checkpoints (0,A,B,C)** - in case the bot gets stuck at any place, then the objects that it is carrying (if any) will be repositioned at its initial position and the bot will be kept at the checkpoint corresponding to that zone. There will be no extra penalty for this.
- The time will be stopped when the bot is removed from the ground and started again when both the bot and the object are placed at their respective checkpoints.
- The timer won't be stopped until the object is deposited completely inside its **Deposit Zone**.
- In case of any disputes/discrepancies, the organizer's decision will be final and binding.
- The organizers reserve the right to change any or all of the above rules as they deem fit.
- Change in rules, if any will be highlighted on the website and notified through mail to the registered teams.

## GAMEPLAY

- The bot must start from the **'START'** mark (the rear end of the bot must be touching the Start line).
- The **'START'** mark or **Checkpoint 0** is the starting point for the run.
- The bot must pick up Object 1 from Pickup Zone 1.
- The bot has to arrive at **'Checkpoint A'** by crossing the obstacles in between while carrying Object 1. The bot has to put Object 1 in Deposit Zone 1.
- The bot has to then pick up Object 2 from Pickup Zone 2.
- The bot has to arrive at the **'Checkpoint B'**. After crossing the obstacles. Then Object 2 has to be placed in the Deposit Zone 2.
- After that, it has to pick up Object 3 and arrive at the **'Checkpoint C'** along with the Object.
- Then the bot has to cross the obstacle to reach Checkpoint C.
- Then Object 3 has to be placed in the Deposit Zone 3.
- After that, the bot has to pick up Object 4, cross the 'Rice box' obstacle, traverse the circular arcs and finally by crossing the last obstacle, it has to place Object 4 in the water glass in Deposit Zone 4.
- The run ends when the bot has placed Object 4, the marker pen cleanly and completely inside the glass at Deposit Zone 4.
- In total, the track has 4 checkpoints with 6 sets of obstacles between them, 4 Deposit Zones and 4 Pickup Zones for each of the 4 objects.

- When the run starts, all 4 objects will be placed in their respective **Pickup Zones** (you have to strictly follow the order) and your goal is to get each of them in their respective **Deposit Zones** in the least amount of time and incur as few penalties as possible.
- Each Team will get 2 runs. If the team chooses to run for a second time, points of the second run will be considered.

## THE ARENA

Since the runs will be conducted online, you are expected to construct this track at your homes. Find a room with plain flooring and negligible slope with about 2m×2m of free space. Changes have been made to ensure that this track can be set up from readily-available, inexpensive materials and objects. The following sections will take you through a detailed description of the track. You must follow these instructions to the letter. We can ask you to measure any dimension in your track before the run and your team will be subject to immediate disqualification if any flaws or blunders are found. Surface where the bot touches the ground must be covered with paper (chart paper or A4 sheets).

## ITEMS REQUIRED

- Some newspapers
- 4 water glasses, preferably steel (diameter about 5-8 cm)
- Some thick chart papers or A4 sheets to cover the track
- Markers (or felt-tip pens), preferably black and thick.
- A handful of Rice.
- 4 Erasers
- Cotton Handkerchief (Large size, roughly 30×30 cm)

## THE OBJECTS

- **Object 1**: A cardboard cube of dimensions 7cm×7cm (±2cm)
- **Object 2**: Plastic light Water Bottle with 500ml water
- **Object 3**: A standard tennis ball
- **Object 4**: Thick Marker to be deposited in a glass

## THE TRACK
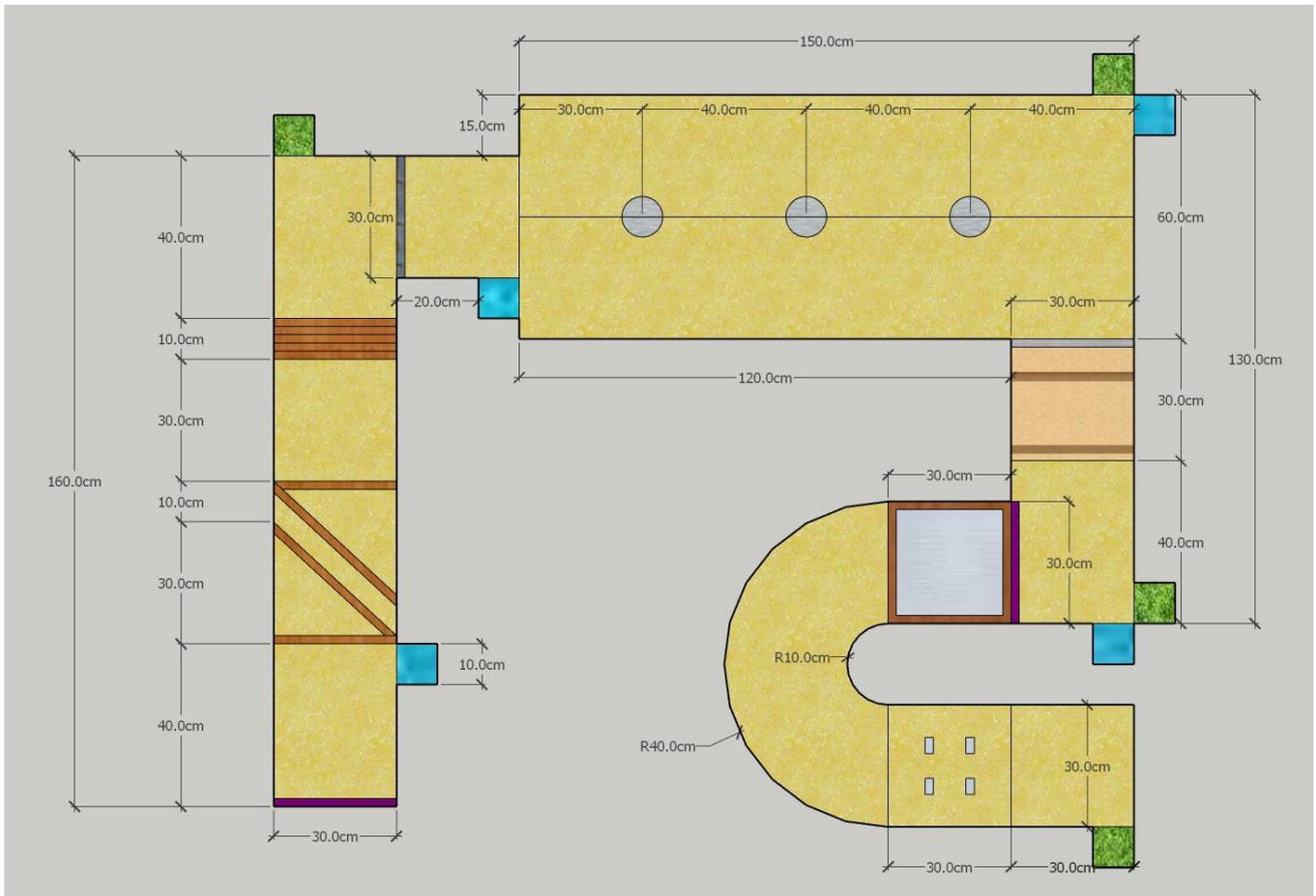


*Complete Track (Top View)*

**Note**
- The **Pickup Zones** are shown as **Blue Boxes** with the corresponding number.
- The **Deposit Zones** are shown as **Green Boxes** with the corresponding number.
- The **Checkpoints** are shown by **Purple and Grey Lines**. The bot will have to return to just before the last crossed checkpoint line if it fails to clear the obstacle ahead, gets stuck or experiences technical failure. Colour coding for checkpoints:
  - Checkpoint 0- Purple
  - Checkpoint A- Grey
  - Checkpoint B- Grey
  - Checkpoint C- Purple

## TRACK SPECIFICATIONS

The track consists of 6 hurdles designed to test the structural integrity, maneuverability, control of the bot and the grip of the jaws/fingers using easily available objects. Each participant will get 2 chances to attempt the arena. But the points of the second trial will be considered to be final.

**The terrain:** To ensure a common terrain, all teams must cover the entire length of the track with chart papers (the thick ones, any available color) or A4 sheet. They can be easily found at the nearest stationery at a nominal amount. Use adhesive tape to stick them firmly on a plane surface. Best suited for this will be an empty room with a solid floor. Make sure that there isn't any slope to the floor.

**General Instructions:** On the chart paper stuck firmly on the floor, use your markers to make the boundaries of the track. Reciprocate all details in your track such as Checkpoints, Deposit and Pickup zones etc. Use a standard ruler or measuring tape to take measurements and make sure the margin of error is absolutely negligible. **Keep the ruler handy during your run**, you will be asked to verify that your track design and measurements are exactly the same as in this problem statement. As for the hurdles, there are specific checks in place to make sure the competition is fair and square and you must follow them. Failure to comply will lead to immediate disqualification.

**Pickup and Deposit Zones:** There are 4 deposit and 4 pick up zones on the track. Each of them is a 10 cm × 10 cm square except one deposit zone is glass. They are to be marked at either side of the track and their boundaries should be made conspicuous using thick markers. You are not allowed to proceed in your run unless each object is placed completely inside its respective Deposit Zone.

**Hurdle 1:** 4 full- speed breakers need to be arranged in the shape as shown. The angle between any two non-parallel breakers is fixed at 45 degrees by the length and the distances as shown.

**Construction:** Take 8 sheets of newspaper, place them perfectly on top of each other and roll them up completely. Paste the ends firmly using appropriate adhesive or tape. Stick these as shown on the chart paper firmly using adhesive/ tape.

**Note:** A "sheet" here corresponds to 4 sides of the newspaper (like the middle sheet of your bound notebook).

**Hurdle 2:** These are the "Bridge-breakers". These are speed breakers of length 30cm laid one after the other with no space between them. You have to cover a width of 10cm with these breakers. (Normally you will need 5-7 of them).

**Construction:** Use sheets of newspaper exactly as in Hurdle 1. Tape all of them directly adjacent to each other with no space between them. The bridge-breakers must occupy 10cm width in total.

**Hurdle 3:** After Checkpoint 1, the track broadens symmetrically to 60 cm in width. Place the three water glasses at specified intervals. The bot is supposed to move across the glasses alternatively (right-left-right or left-right-left) and then deposit the cylinder in Deposit Zone 2. None of the teams are allowed to stick the water glasses down by any means. You will be asked to pick them up as a check. To ease measurement of distance, make sure you draw the circumference of glasses with your markers on the charts. Please keep your ruler handy.

**Hurdle 4:** Use a large cotton handkerchief for this task, approximately 30cm×30cm. Place this handkerchief symmetrically at the turn as shown. Do **not** stick the handkerchief to the track by any means. You are also allowed to use a cotton cloth of these dimensions if a handkerchief is not available.

**Hurdle 5:** This is the Ricebox. Use 4 strips of cardboard to make 30cm×30cm square boundaries of the Ricebox. Make sure it is atleast 5 mm in height above the ground. Fill the inside of this boundary completely with rice.

**Hurdle 6:** In the 30cm×30cm square as shown, stick the 4 erasers symmetrically with tape or adhesive. Make sure it does not come out as the bot will pass over it.

**JUDGING CRITERIA**:
- **10 points** each will be awarded for successfully picking up each of the objects at one go (2 or more tries will not be awarded any points).
- **20 points** each will be awarded for successfully placing each of the objects completely inside their respective Deposit Zones (inside the Deposit Zone, you are permitted to slide the object along the floor to make sure it is inside the boundaries).
- **30 points** will be awarded for successfully crossing hurdles between the START mark and the Checkpoint A.
- **30 points** will be awarded for successfully crossing hurdles between the Checkpoint A and the Checkpoint B.
- **30 points** will be awarded for successfully crossing hurdles between the Checkpoint B and the Checkpoint C.
- **30 points** will be awarded for successfully crossing hurdles between the Checkpoint C and the Finish Line.
- You will be penalized if the bot gets stuck at any of the speed breakers, and a nudge is needed for it to go over (in such a case, the bot need **not** be repositioned at the Start Line).
- On displacement of water glasses by more than 2 cm, a penalty of 4 points will be given.
- A penalty of 2 points will be awarded each time one of the tires of the bot goes over the boundaries of the track while traversing the semicircular arc (under all other situations, minor overstepping will be ignored).

# STRUCTURE

## ROUND 1: ABSTRACT SUBMISSION

Participants have to submit a complete abstract with the design of the device/project. The qualifying teams will be eligible for the final round to be conducted in Techfest 2021-22. The Abstract must consist of the following:

| Description of device/project | 1 page |
|---|---|
| List of components used | Table |
| Gripper Mechanism used by you | 1 page |
| Photographs **OR** CAD model of the bot | All angles |

**Submission Details:**
- The abstract must be submitted in PDF format.
- Create a separate folder for the **photographs/ CAD model** of the bot.
- The Abstract and this folder must be sent via email to **cozmo@techfest.org**.
- Subject of the mail: **"Cozmo_TeamID"**
- Filename of the abstract PDF: **"Abstract_TeamID"**
- Mention your team details clearly in the mail.

The Abstract submission round is just a soft selection round. However, it is necessary to submit the abstract before the deadline to qualify for the 2nd round of the competition, which will have the actual track runs.

The last date for Abstract Submission is **21 November.**

## ROUND 2: FINAL RUNS

This is the second and final round of the competition. The teams will have to make the track according to the details provided. This round will be held in online mode. Further details will be communicated to the qualifying teams. The team with the highest score will be declared the winner of Cozmo Clench 2021-22.

## COMPETITION TIMELINE

| Last Date of Registration | 21 November |
|---|---|
| Abstract Submission Deadline | 21 November |
| First Round Results Announcement | 24 November |
| Final Round | 5 December |

## SCORING:
A = Points scored
P = Penalties
T = (300 -Time taken in seconds)

**Total points scored = A + T - P**
The team with maximum points will be declared as the winner.

## TEAM SPECIFICATIONS:
● A team may consist of a maximum of 4 members.
● Students from different educational institutes can form a team.

**Eligibility:** All students with a valid identity card of their respective educational institutes are eligible to participate.

## PRIZE

The prize money will be awarded to top 3 winners via **NEFT** and will be processed within 30 working days after receiving the prize money from sponsors. Top 10 participants will get a **certificate of excellence**, and top 60% participants will get a certificate of participation. Winners have to mail the following information (immediately after the announcement of results) to kunal@techfest.org.

**Format of Mail :**

Subject: Cozmoclench, Team Id, Position  (example - Cozmoclench, CZ211003, 3rd Position)

**Body of mail:**

1.  Account Holder's Name
2.  Account Number
3.  Bank name and Branch name
4.  IFSC Code
5.  Photograph of Bank Passbook as a proof