Techfest 20-21

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.
- The bot can be wired or wireless. In case the bot is wired, there should be at least 2 meters of wire, so that it always remains slack. If the participants use wireless mechanisms they have to use either dual frequency remote, bluetooth or Wifi.

BOT SPECIFICATIONS:

- The dimensions of the bot should be less than or equal to 30 cm X 20 cm X 30 cm (lxbxh) 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%/-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 Wifi.
- 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.
- Maximum of **5 minutes** will be given for each team for each run.
- The arena has **4 checkpoints**, In case the bot gets stuck at any place, then the Object 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 the respective checkpoint.
- 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.

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.

GAMEPLAY:

- The bot must start from the 'START'mark (the rear end of the bot must be touching the Start line).
- 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 and deposit the object in Deposit Zone 2.

- After that, it has to pick up Object 3and arrive at the ‘Checkpoint C’along with the Object.
- Then Object 3 has to be placed in the Deposit Zone 3’.
- After that, the bot has to pick up Object 4, traverse the circular arcs and place Object 4 in the Deposit Zone 4.
- The run ends when the bot has placed Object 4 cleanly and completely inside deposit Zone 4.
- In total, the track has 3 checkpoints with 4 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

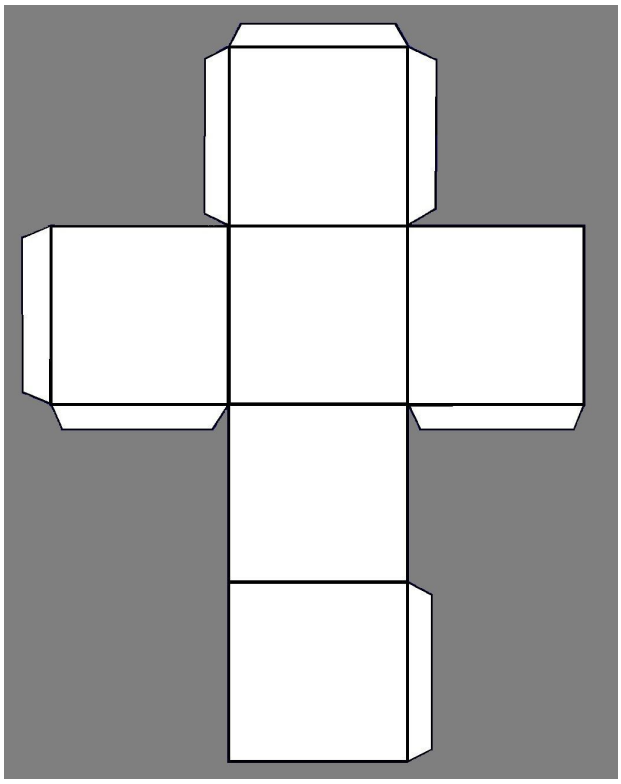
Since the runs will be conducted online, you are expected to construct this track at your homes. Find a room with plane flooring and negligible slope with about 4m×4m of free space. Given the condition of the world, changes have been made to ensure that this track can be set up from readily-available, 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.

ITEMS REQUIRED:

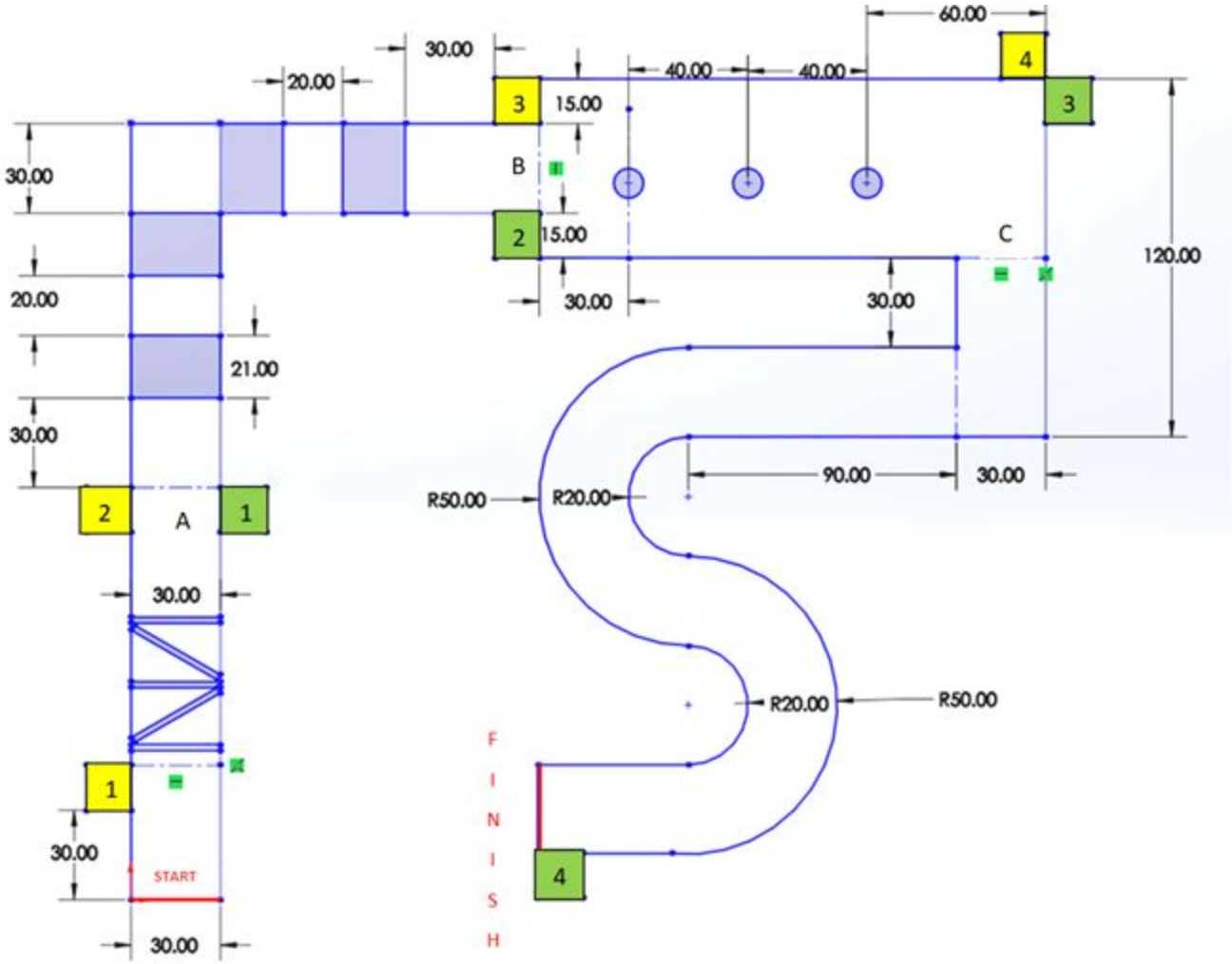
- Some newspapers
- 5 Registers (29.7cm×21cm), 120 pages each
- 4 water glasses, preferably steel (diameter about 5-8 cm)
- Some thick chart papers (any color)
- Markers (or sketch pens or felt-tip pens), preferably black and thick.

THE OBJECTS:

- Object 1: A cardboard cube of dimensions 12cm×12cm(±2cm)
- Object 2: A cardboard cube of dimensions 5cm×5cm(±1cm)
- Object 3: A cardboard cylinder of radius 4cm(±1cm) and height 10 cm.
- Object 4: A standard tennis ball.



Disclaimer: Make sure the cardboard is thick so that it doesn't collapse when it is lifted by the gripper.



Note:

1. The Pickup Zones are shown as Yellow Boxes with the corresponding number.
2. The Deposit Zones are shown as Green Boxes with the corresponding number.
3. The checkpoints are shown by broken 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.

THE TRACK:

The track consists of 4 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). They can be easily found at the nearest stationers for 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 (or negligible).

General Instructions*:* On the chart paper stuck firmly on the floor, use your markers to make the boundaries of the track are expected to 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 15cm × 15 cm square. 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 the each object is placed completely inside its respective Deposit Zone.

Hurdle 1:

- 5 speed breakers of length 30 cm arranged in the shape as shown. The smaller angle between any two non-parallel breakers is to be π/6 radians(30 degrees).
- **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:

- Procure 5 identical registers (29.7cm×21cm), 120 pages each and stick 4 of them in the way shown (with the broader side perpendicular to the direction of the bot). Make sure the spine(the side with stapler pins) faces the direction of approach of the bot. The distance between 2

consecutive notebooks is to be 20 cm except where the track turns through π/2 radians(90 degrees).

- You can also use 140 pgs registers. However, if you are unable to get hold of Classmate registers, make sure the ones you get have thick sheets and approximate dimensions.
- Keep the one extra register as a check, which you will be asked to show before the run to make sure it satisfies the required specifications.

Hurdle 3:

- After Checkpoint 2, the track broadens symmetrically to 50 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 3.
- 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.

Hurdle 4:

- You are expected to complete the S-shape. It is constructed by joining the end of two circular arcs. The outer radius is 50cm and the inner is 20cm making sure the bot has enough space to traverse the turns. Penalties will be awarded if any of the tires go out of the boundaries of the track. You will be asked to verify the radii and the width of the arcs prior to the run. Please keep your ruler handy.

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.
- **20 points** will be awarded for successfully crossing hurdles between the Checkpoint B and the Checkpoint C.

- **20 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).
- You will be penalized 5 points if the bot gets stuck while climbing over each of the notebooks, and a nudge is needed for it to get on top (in such a case, the bot need not be repositioned at the Checkpoint A).
- Upon displacement of the water glasses by greater than 2 cm, a penalty of 4 points will be awarded.
- 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 two semicircular arcs (under all other situations, minor overstepping will be ignored).

Abstract Submission

Participants have to submit a complete abstract with design of the device/project. The qualifying teams will be eligible for the final round to be conducted in Techfest 2020-21.

Submission must consist of:

- Design as a soft copy along with detailed description of device/project
- Unique Selling Point (USP) of the device
- Estimation of the total cost of the device with all its components
- Photographs of Bot from different angles.

The Abstract and the zip file containing the photographs have to be sent by email to **cozmo@techfest.org** with the team details clearly mentioned in the email. The Team ID should be explicitly mentioned in the email subject and the abstract file must be in the form of '**TeamID_TeamLeaderName**'.Any other name for abstract file will not be accepted Last date for Abstract Submission is 10th November

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.

TIMELINE

Last date of registration	13 November
Abstract submission	13 November
Final Rounds	12/13/14 December

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 certificate of excellence, and top 60% participants will get certificate of participation. Winners have to mail the following information (immediately after the announcement of results) to shubhamgautam@techfest.org

FORMAT OF MAIL :

Subject: Cozmoclench, team id, Position - (example - Cozmoclench, CC191003 - 3 rd 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