



University Category Task

PRELIMINARY ROUND

WELCOME TO THE ROBOGAMES 2023!

We are thrilled to announce the upcoming RoboGames competition, featuring two thrilling rounds: the Preliminary round and the Final round. Our primary objective is to foster robotics knowledge and provide an exciting platform for robot enthusiasts to showcase their skills and innovations.

In the Preliminary round, participants will have the chance to compete and demonstrate their capabilities using the Webots robots simulation platform. From there, a select number of teams will advance to the prestigious Final round, where the participants will be required to program a given physical robot to complete the final task.

For any questions or clarifications, please contact:

RoboGames Coordinator - Supun Gamlath

Email : supung.20@cse.mrt.ac.lk

WhatsApp: +94766318625

Stay tuned for further announcements and exciting developments in the world of RoboGames!

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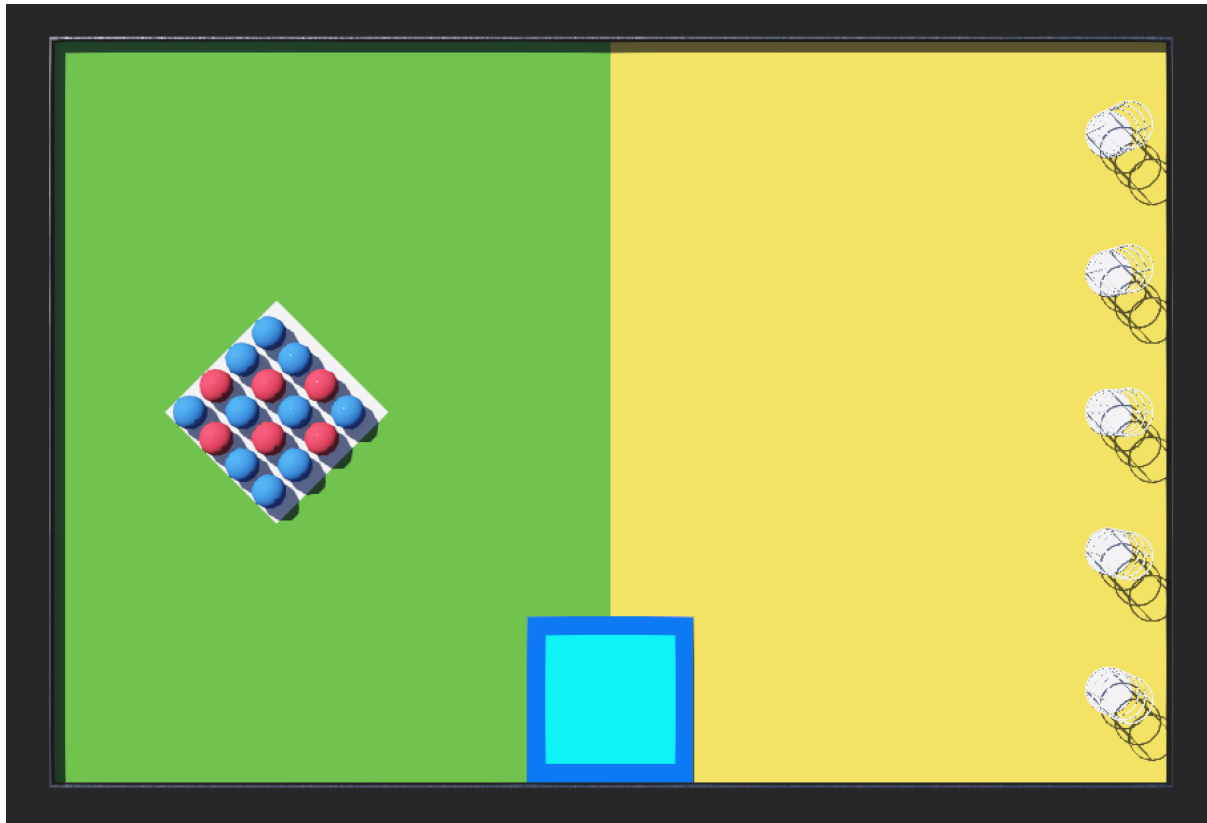
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GENERAL RULES

1. A team can consist of a maximum of **5 members** and a minimum of 1 student. All students must be from the same university / institute.
2. All teams will be provided with a **Webots environment** which includes the arena. The teams should design a in this environment to perform the given task
3. The teams that will pass the preliminary round will be selected based on the score and the time taken to complete the task.
4. Plagiarism is a serious offence and will cause a team to be disqualified. The judge panel may carry out a viva if solutions provided by a team are suspected to be plagiarised.

Note: The decision of the judges will be final.

THE ARENA



- This arena is in the given Webots environment inside the “RoboGames 2023 University Category.wbt” Webots world file.
- There are **16 balls with 19 cm diameter** arranged in a square grid on a white square with **1 cm spacing between them** as shown. Balls will be colours of either **Red (#F4364C)** or **Blue (#307FE2)**. They **CAN** be moved by the robot anywhere in the arena.
- There are **5 hollow White (#FFFFFF) towers with a diameter of 25 cm and a height of 42.5 cm** in the red area, they **CANNOT** be moved by the robot.
- Initially, the robot should start from the light blue area. The light blue area has a size of **70 cm x 70 cm** and the dark blue area has a size of **90 cm x 90 cm**.
- The positions of the towers will **NOT** be changed when evaluating your code.
- However the positions of the balls (both the arrangement of the balls in the white area and also the position of the white area) will be changed when evaluating your code.

THE TASK

The objective for this round is to pick up the balls placed in the white area and stack them inside the hollow towers as fast as possible.

Each tower can hold a maximum of **3 balls** as shown below.

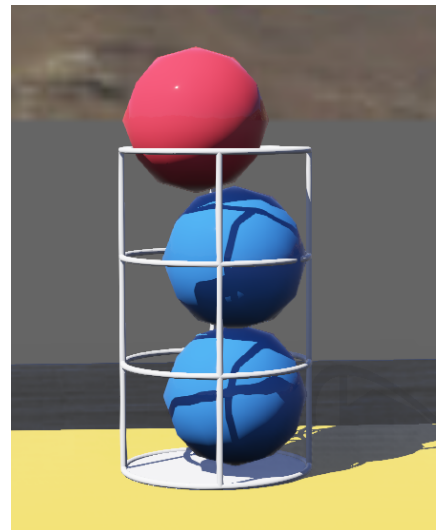
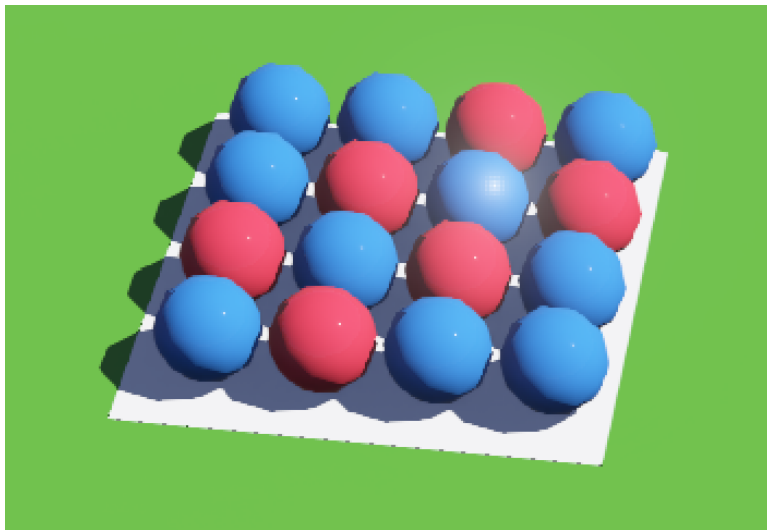
A tower is considered fully stacked with the correct pattern when it has **3 balls with a Red ball at the top.**

The robot should fill the towers such that there is always a **Red ball at the top.**

At any given time, the robot is only allowed to carry a **maximum of 2 (two) balls.**

The score will be calculated as explained in the scoring section.

The goal is to get the maximum score possible in **5 minutes.**



THE ROBOT

Your robot should satisfy the following specifications:

- The robot should fit within dimensions of **70 cm X 70 cm X 70 cm** at the start of the task.
- The robot should not exceed dimensions of **90 cm X 90 cm X 90 cm** during the execution of the task.
- The robot **should be designed by the team members** incorporating any cameras, sensors, mechanisms and actuators as they see fit.
- Use of **PROTO robots inbuilt into Webots is allowed** if they fit within the dimension constraints.
- Use of the Webots **Camera node is allowed without the Recognition node**. Teams are expected to implement their own image recognition algorithms.
- The robot **design should be realistic** with mechanisms that can be built physically.
- The robot must maintain contact with the arena at all times and **CANNOT be a flying robot**.
- The robot **CANNOT split into separate parts** or subsections during operation.

VIOLATIONS

1. Modification of the environment including changing positions of the towers and changing positions of the coloured squares is a violation.
2. A robot that does not fit within the dimension constraints is considered a violation.
3. The robot carrying more than 2 (two) balls at a time is considered a violation.
4. Manipulating / editing the video demonstration intended to mislead the judges is a violation. The code you submit will be executed and checked against the video submission and any discrepancy will be investigated.
5. Using the **Webots Recognition node** is a violation.

Any violation will cause the submission to be rejected.

SCORING

- The score will be calculated as follows. Each box place in a tower will have a score:

Condition	Score
A tower completely stacked in the correct pattern	100
A tower completely stacked but in an incorrect pattern	40
A tower with 2 balls stacked	20
A tower with only 1 red ball stacked	15
A tower with only 1 blue ball stacked	5

- The total score that a team is able to acquire within a **time duration of 5 minutes** will be considered the score of the team
- The time duration will start at the moment the robot begins any motion.
- Any balls stacked **after 5 minutes will not be counted** towards the score.

SUBMISSION

1. The submission period **starts at 12:01 am on 1st of October and ends at 11:59 pm on 10th of October 2023.**
2. Participants will receive the submission link via email, and it will also be shared in the WhatsApp group.
3. A submission should be a zip file including the following contents:
 - a. The code of the robot controller
 - b. A video demonstrating the robot performing the task
 - c. A short video introducing the team members and their contributions