SLIIT UNI

THE KNOWLEDGE UNIVERSITY


Annual SLIIT

# Robot Competition

## University Category – Preliminary Round
## Technical Specification

**Organized By**
**Faculty of Engineering**
**Sri Lanka Institute of Information Technology**

# ROBOFEST 2021

The Faculty of Engineering of Sri Lanka Institute of Information Technology is holding its annual robotic festival, **ROBOFEST 2021.**

ROBOFEST 2021 is open to students from schools and universities. Students will be given a chance to participate in the competition by combining the practical application of science and technology with fun, intense energy, and excitement of a championship-sporting event.

## Timeline

**23rd August 2021**

Publishing the Preliminary round Technical Specification

**12th September 2021**

Deadline to register teams for the competition

**12th September 2021**

Deadline to submit for the Preliminary Round files

**15th September 2021**

Announcing the teams selected to the Final Round

Publishing the Technical Specification of the Final Round

**25th September 2021**

Submission deadline for Robot and code of final task.

**30th September 2021**

Virtual Final Round Competition

## University Category Awards

| | |
|---|---|
| Gold Award and the First Prize | **- Rs. 50,000** |
| Silver award and the second prize | **- Rs. 30,000** |
| Bronze award and the third prize | **- Rs. 20,000** |

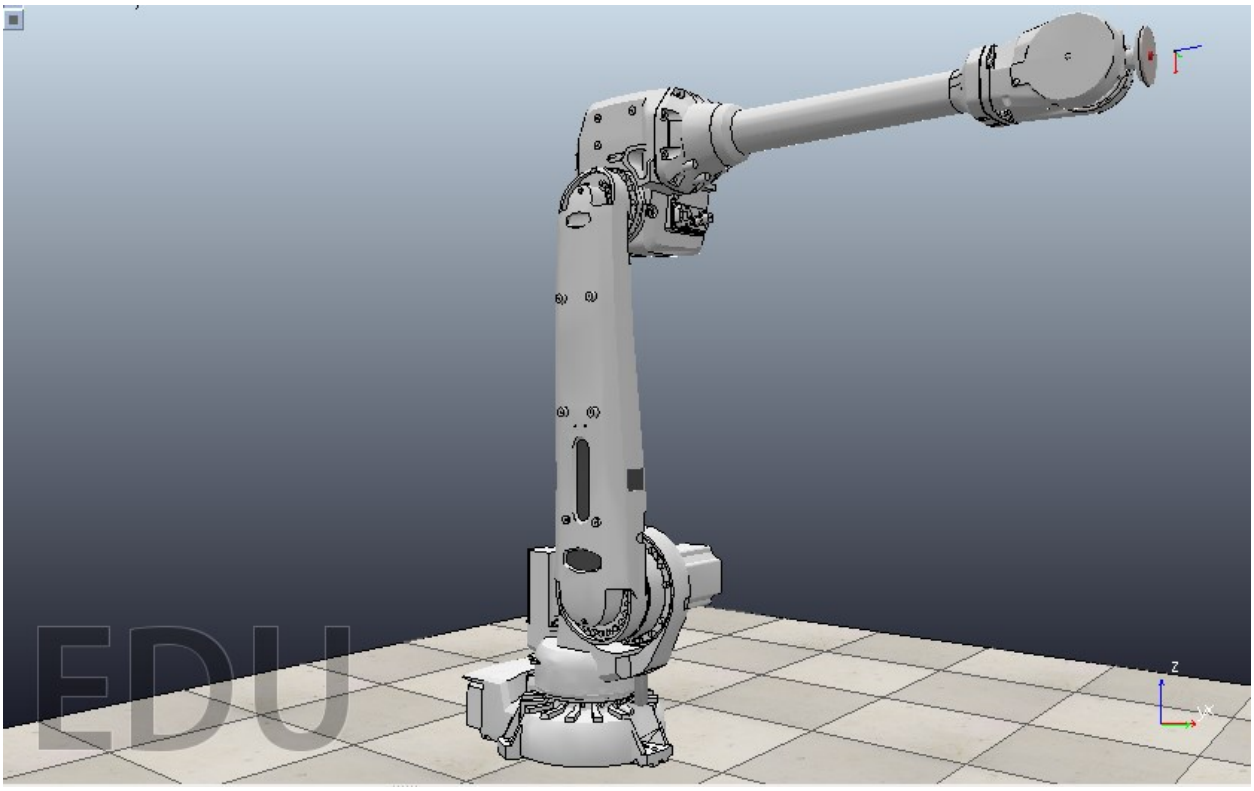
2 complementary cash prizes will be awarded

# Platform

Teams will have to use the Robot Simulator, CoppeliaSim EDU (Formerly known as V-rep) for the completion of the task. It is a software which is ideal for multi-robot application simulation and the controllers can be written in C/C++, Python, Java, Lua, Matlab or Octave. The Software is compatible with Windows, macOS, and Linux. The EDU version of the software can be downloaded by visiting the manufacturers website.
**(https://www.coppeliarobotics.com/)**

# Robot Specifications

The Participants are required to use the “ABB IRB 4600-40-255” robot to complete the tasks. An inbuilt robot model is readily available in the CoppeliaSim EDU Software.




The robots specifications are as follows:

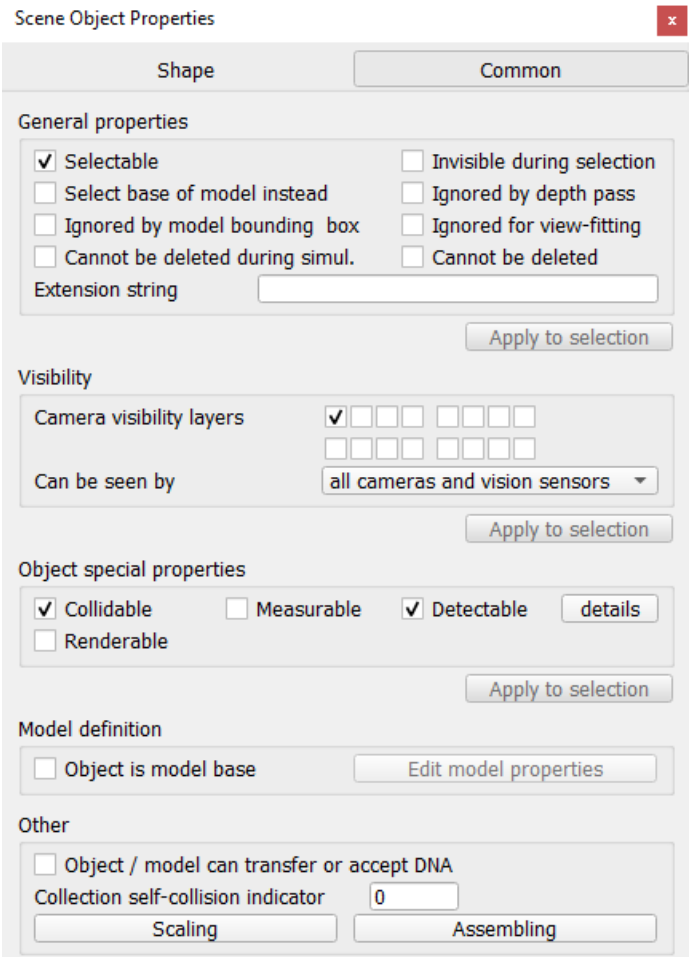
| | |
|---|---|
| Brand | ABB |
| Model | IRB 4600 |
| Type | 6 DoF |
| Axes | 6 |
| Payload | 40kg |
| Reach | 2550mm |
| Repeatability | 0.060mm |

The Contestants may design and modify the robot controller using any preferred coding language – C/C++, Java, MATLAB, and Python.

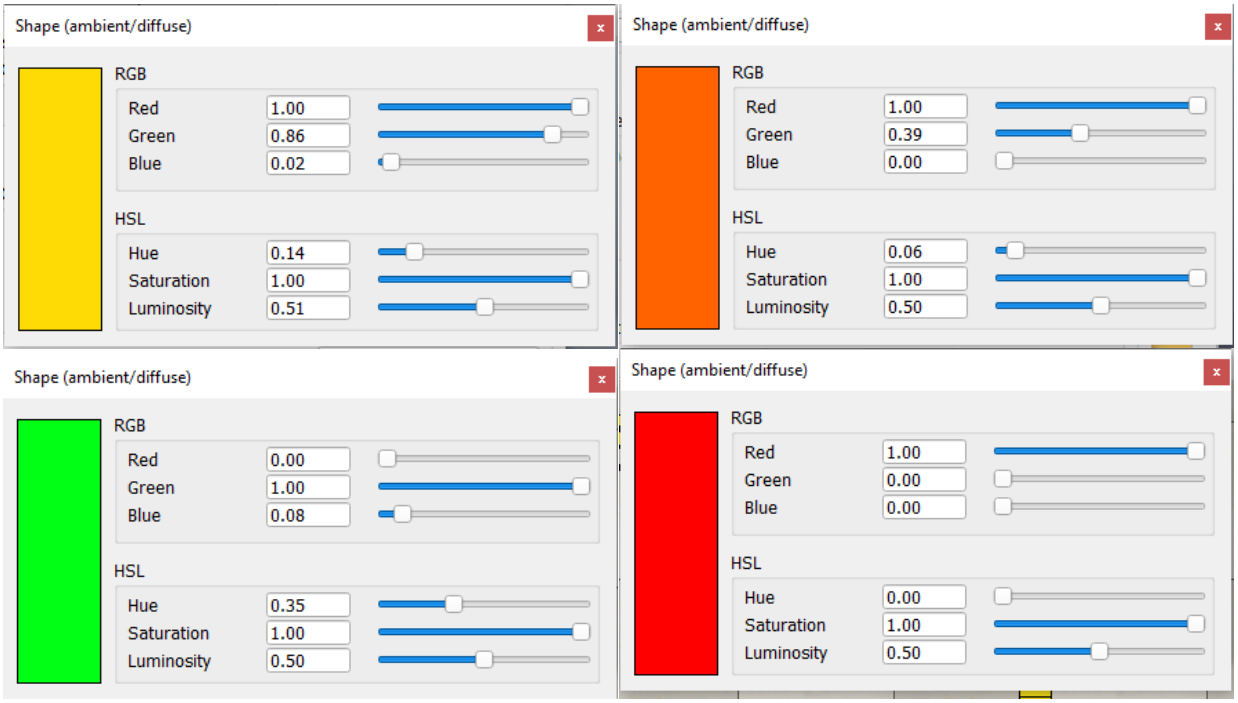
## Object Specifications

A flag design should be made using **cuboids** having a size within the limit of (10 x 10 x 10) $cm^3$ maximum. Using a higher number of smaller sized cuboids would increase the images resolution but you will need to be aware about the time taken to complete as well.

You need to make sure that the object properties are set according to the requirements using the object properties menu.



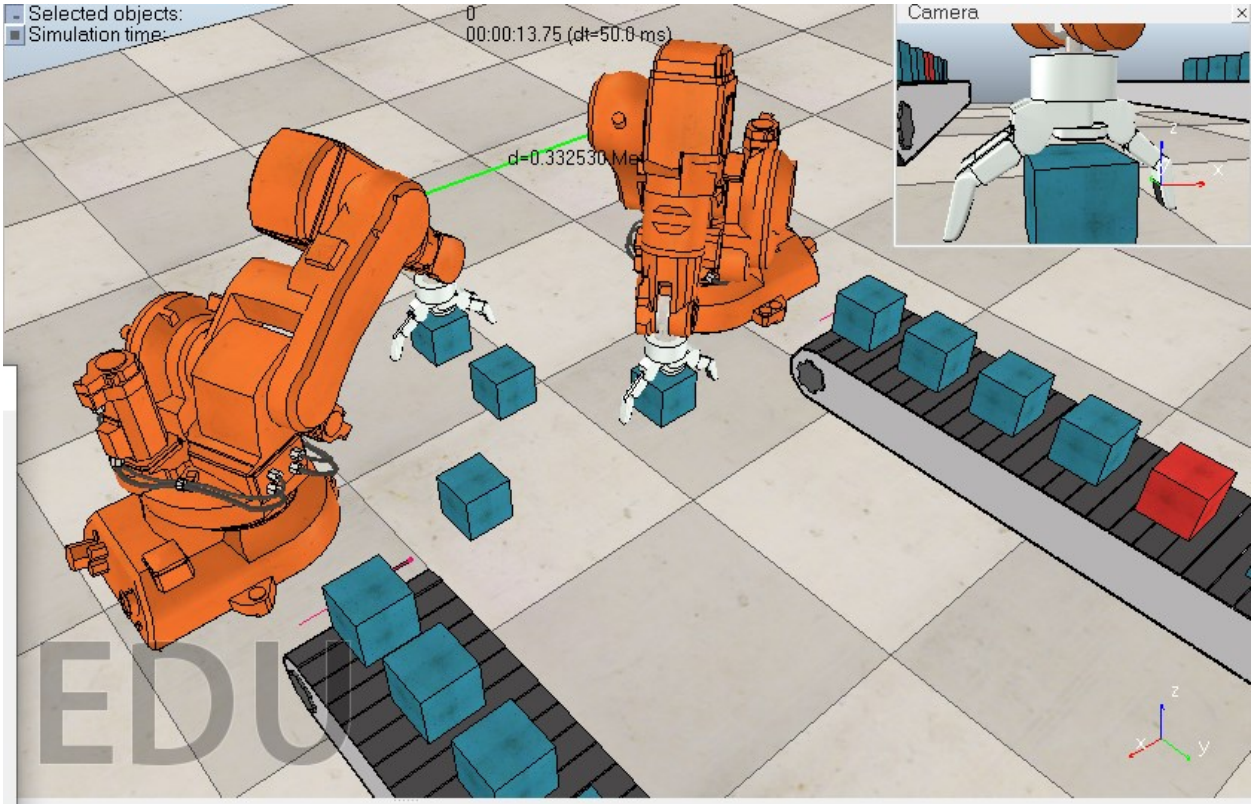
The suggested RGB colour values for the required 4 colours are as follows:



# Task 01

In the task 01, the contestants will be required to develop a collaborative manipulator robot system which involves object detection, colour detection, pick and place and sorting of objects using **two manipulator robots**. The Process has been described below;

1. There will be geometrically identical objects of four colours (Red, Yellow, Orange and Green) placed randomly. These could be placed on a table or on the ground based on the contestants choice.
2. The first robot will pick these objects and categorize them into containers (or baskets) which could be designed according to the user's preference, **based on their colour**.
3. The second robot will pick the objects from these baskets and arrange them in such a way that the placed objects would represent a pixelated view of the Sri Lankan National flag.



# Robot and Code Submission

## 1. CoppeliaSim scene file

You need to submit the coppeliaSim scene file (Project file) the process you have created. It will be in the format of .ttt.

Instructions: Go to: File => Save Scene as => CoppeliaSim Scene

Save the file in the following format: *RoboArm_Task 1_Team Name.ttt*

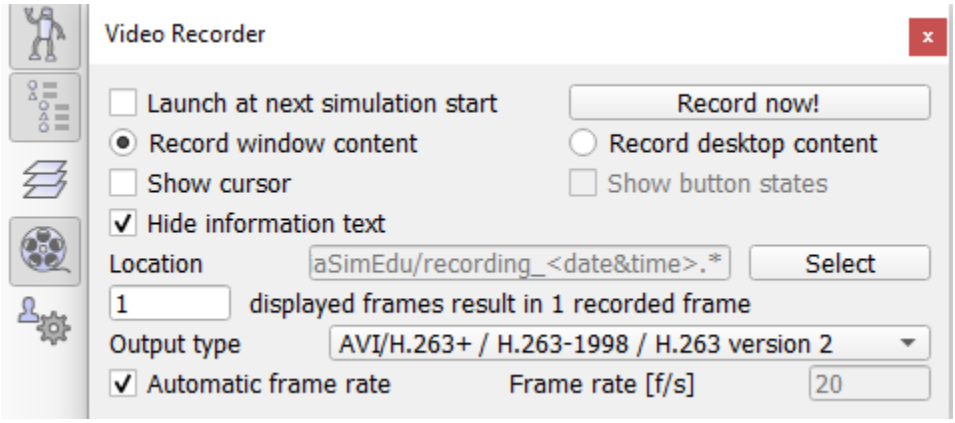
## 2. Code Text file

You are required to submit a text file of your code.

Save the file in the following format: *RoboArm_Task 1_Team Name.txt*

## 3. Process Recording Video

You also need to record the simulation using the record tool available in the software.

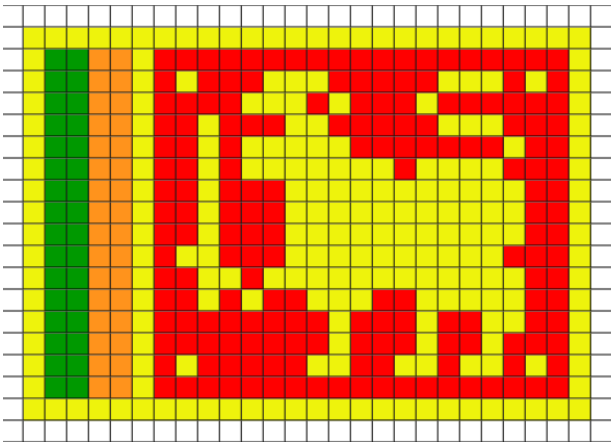



Rename your video file in the following format: *RoboArm_Task 1_Team Name*

## Evaluation Criteria

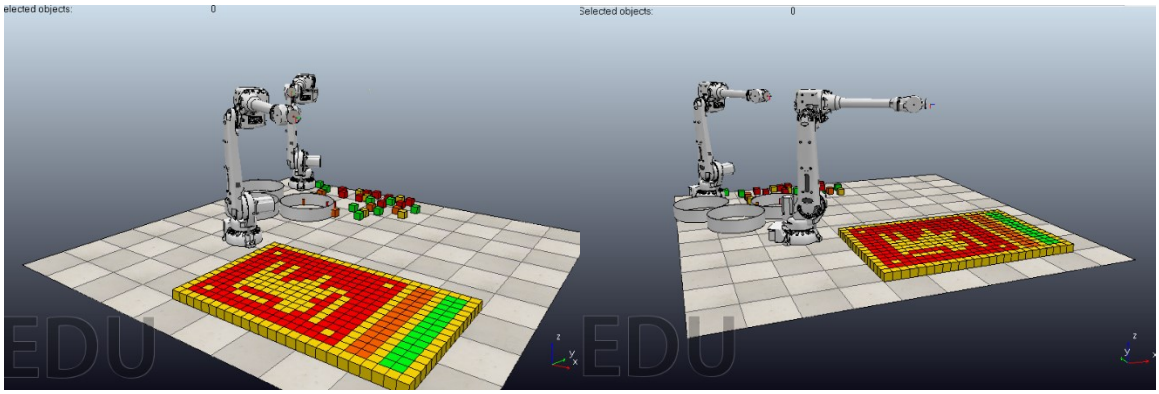
The below mentioned criteria will be considered for the evaluation process.

- Cell Layout Design and placement of the components.
- Trajectory optimization and duration taken to complete the task.
- Pick and Place.
- Sorting of Objects.
- Final Outcome (Flag Design)



The above shown image is just an example of the expected final outcome of this task. Since this is a case-based task, extra marks will be given to creativity, innovativeness. The only constraints are the object size range and the robot module. The participants have the full liberty to optimize the design to get the best outcome.

Shown below is an example layout which has been designed for the prescribed task.



# Guidelines for file submission of Task 1

**Submission Summary:**

The participants must complete and submit Task 1 on or before the 12th of September through the links that will be provided. In summary, the submissions are as follows:

1. Task 1 Submission
    a. CoppeliaSim Scene file (.ttt file)
    b. Code text file (.txt file)
    c. Video Recording of the process. (Preferably recorded using the CoppeliaSim recorder.)

**It is compulsory for all teams to submit all files as mentioned in this section.**

**Please note that all files (video and project files) need to be zipped into one file before making the submission.**

**The zipped file needs to be renamed in the following format:**

***Team Name_University Name.zip***

**Example: Pheonix_SLIIT.Zip**

**You may use the University Name abbreviations as the name.**

**Example: ElectroBot_UoM**

**Teams may make several submissions. However, the last submission will be considered as the final submission for the competition.**

## Submission link for the Zip file: https://shorturl.at/dKLP9

Deadline for submission of the zip file is 12th September 2021.

# Team Organization

This section provides teams with the necessary information on how to form a team, fill the following form to register for the event.

## Forming a Team

1. Create a Team with a maximum of **five members**.
2. Make up your own **Team Name.**
3. Students must submit a colour photo to confirm their identity. Headshots are ideal for the member's photograph. The photos must be in JPG format.
4. The applicants should have contact details of their Heads of Department (e-mail and contact number), or else applicants will not be able to register.

## Registration https://forms.gle/mvbbLBAb8zYJxR4S9

For further details visit www.robofest.lk and **https://www.facebook.com/RobofestSLIIT**

## Contact Us

For more information and clarifications please contact:

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