

AIITRA Robotics Challenge **2021**

General Rules:

Teams should consist of max 4-5 members. It is encouraged to have a team that has students from different disciplines.

During the first round of competition, teams have to prepare a detailed proposal which should include things which are mentioned below.

Based on the points in the first round, Top 25 teams will be selected for the next and final round which will have a live presentation. These Selected Teams will be given a modified problem statement with more tasks added (these tasks will be defined later). Teams will have to explain their strategies and design decisions during the final presentation.

Problem Statement:

Multi-robot coverage planning for cleaning robots.

Design a robot with appropriate sensors which will cover the area to the maximum extent. Design a multi-agent coverage planning system that will ensure that all the robots cover the area in the least amount of time.

- All agents have the same hardware and software. For simplicity, consider robots with size equal to $0.35\text{m} \times 0.35\text{m} \times 0.4\text{m}$.
- Multiple robots will be deployed in an environment. All the robots will be given the same map and path to clean.
- Agents can be deployed at different times.

Estimate the best minimum number of agents which can be used for a given map.

Total Points: 100

Prepare a proposal along with a working simulation which includes:

Proposal Guidelines

Title	Points	Comments
Design of the robot	10	<ul style="list-style-type: none"> How stable is the simulated design (consider important mechanical factors like toppling, slippage, skidding, turning) How many factors have you considered in the design of the robot (since this is a cleaning robot, keep in mind that this will contain fluids inside) Number and type of sensors used in the robot and the utility of those sensors
Multi-agent Planning strategy for given world	60	<ul style="list-style-type: none"> 15 points/map for successful coverage using algorithm Successful coverage is $\geq 90\%$ of total area is cleaned <ul style="list-style-type: none"> At least 2 agents are required for a map
Optimal Number of agents per map and Time taken to clean a map	30	How efficient is(are) your algorithm(s)? How much time does it take for cleaning, how many agents are required for cleaning a map scenario? (less is better)

The proposal document, simulation video(s), robot model, and any other files need to be uploaded for the proposal submission

Problem Statement Maps

