ROB 498/599 Fall 2024: Mini Project #4

Due on Tuesday, December 17th, at 11:59pm, on Canvas.

Submission Instructions: MP4 has an oral (video) presentation component, and a written (slides and report) component. Submit a zip file containing:

(i) A report (in pdf) that describes your project, i.e., including the problem statement, the adopted approach and solution, the simulation results, and conclusions/thoughts for future research; you can think of it as writing a technical paper.

(ii) A set of slides (in ppt or pdf) that present your project, i.e., the problem statement, approach and solution, results, conclusions and future ideas; you can think of it as preparing the technical presentation of your accepted paper at a conference.

(iii) A video (no more than 15 minutes long) of your presentation; where you will be describing your project based on the prepared slides and report; you can think of it as giving the presentation at the conference!

Label the file as **[UNIQUENAME]_MP4.zip** and upload to Canvas.

The deadline is indicated above. This is a firm deadline and there will be no extensions. Make sure to allow yourself enough time to upload your zip file to Canvas. There is a 15 minute grace period during which the Canvas site will remain open to accommodate for any last-minute network difficulties etc. Past this grace period, the site will close and no submissions will be accepted.

Note that using solutions and presentations from earlier offerings of the course is **not** allowed.

Objectives: In MP4, you can work on your own or with up to one teammate. Sign up your team here as soon as possible, and no later than November 25th. The objective of each team is to:

1. Propose a problem that ideally **combines more than one topics covered in the course**, and get it approved by the instructor (by November 25th). Once you have a suggestion on a project, email the instructor or stop by office hours to discuss and approve the topic.
2. Develop the mathematical problem statement, the approach and the solution to the problem, as well as simulation results.
3. Prepare a **written report** (in pdf) that includes the problem statement, your approach and solution to the problem, and accompanying simulation results. Prepare also a set of **slides** (in ppt or pdf) that presents the project, and a **video presentation** of the slides.

Example: Just as an idea, your project might involve the assignment of robots to formation locations according to some optimality criterion, and the control of the formation among obstacles, in the presence of disturbances or malicious attacks. Alternatively, your project may consider a multi-level mission for a team of robots/autonomous vehicles, where at the higher-level the team has to decide how to explore/cover an area, and on the lower-level the team has to generate the trajectories so that the agents explore according to the higher-level plan. Another option could be to create a project by (properly) synthesizing solutions to complementary problems from the literature, or by trying to develop a new solution or extension to an existing problem or paper.

Tips: Make sure you form your team and start working on your project as early as possible, so that you have enough time to formulate the problem, develop the solution, run simulation results, and prepare the written report, the slides and the video presentation of your work.

Make sure you practice your presentation talk to keep it no longer than 15 minutes.

For the written report, there are no strict requirements on the length or the format of the report, but a reasonable guideline would be to have 4-6 double-column pages in the IEEE format. You can download the latex template here.

Grading: The grade of MP4 (100 points) will be based both on the video presentation and slides (50 points) and on the technical report (50 points). For the video presentation and slides, factors that will be taken into account are: the clarity of the explanations and the overall presentation, the thoroughness of the problem description, the approach and the results, and the timely presentation. Don't worry about making fancy animations in your slides; these won't count towards your grade :-) My intention is that you prepare a set of slides and a presentation with which you will be able to explain your project effectively to an audience that is familiar with the overall area of multi-robot systems (e.g., your classmates) but knows nothing about your own specific project beforehand! For the written report, factors that will be taken into account are the accuracy and clarity of the technical writing (e.g., make sure you define all your variables!) and the thoroughness of the problem description, the approach and the results.