

Optimizing multi-robot systems

Record number : OPR-516

Overview

RESEARCH DIRECTION

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Engineering

INFORMATION

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ADMINISTRATIVE UNIT(S)

Faculté de génie
Département de génie électrique et de
génie informatique

LEVEL(S)

2e cycle
3e cycle

LOCATION(S)

Campus principal

Project Description

Large teams of small robots can now perform complex collaborative tasks such as land-mine clearance, exploration missions, and skimming accidental chemical spills. To do this, algorithms lead agents to make intelligent choices by optimizing several objectives to accomplish their tasks. To date, the literature mainly considers the problems in which agents optimize various functions with equal priorities; however, there exist several cases the objectives may have different importance depending on the state of the system. For instance, a team of robots may want to explore different regions of an area, or agents may have different priorities during their exploratory tasks, i.e., minimizing energy and time. To meet these needs, the research project aims to develop distributed multiobjective optimization techniques to make multi-robot (multiagent) systems more efficient and adapted to accomplish their tasks, saving lives, time, and energy.

More precisely, the techniques to be developed will be based on exploring the Pareto Front, distributed intelligence, including swarm intelligence.

Research activities also include creating software packages and implementing the developed techniques on test benches of several small robots such as Kilobots. The developed techniques target many applications in the military field but also apply to energy management in smart-grids

Required profile :

- Undergraduate degree in electrical engineering, computer engineering, or robotics;
- Interest in mathematics.

Training environment :

I am a member of the Interdisciplinary Institute of Technological Innovation (3IT). The 3IT is an environment that fosters sharing and has state-of-the-art physical infrastructures and equipment. The 3IT will allow you to interact with specialists in disciplines complementary to the research project, such as specialists in mechatronics, intelligent systems, and green energy resources. You will also have access to supercomputers to test your algorithms.

If interested :

- Starting date: when you are available
- Necessary documents: CV, motivation letter, and transcripts. Please send the documents to maude.josee.blondin@usherbrooke.ca and put the following email subject : Interested student.
- Funding: Yes.

I am committed to promoting equity, diversity, and inclusion. I encourage and welcome those who would help diversify my lab, including, but not limited to: women, visible minorities, First Nations people, and people with disabilities.

| Discipline(s) by sector | Funding offered |
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| Sciences naturelles et génie | Yes |
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Génie électrique et génie électronique

The last update was on 12 March 2024. The University reserves the right to modify its projects without notice.