February 16, 2020

# B A C H E L O R   T H E S I S

## Constrained Optimal Coverage Control of a Multi-Agent System

Problem description:

Coverage control of a multi-agent system is targeted to achieve an optimal coverage in a convex bounded region using several mobile robots [1]. This project intends to design an optimal coverage control scheme with input constraints and evaluate [2] its performance on a set of mobile robots. The project includes both theoretical syntheses, design of the coverage control method, and practical implementation, an experimental demonstration of the proposed method. The highlight of this project is the distributive structure, both the control method and the hardware implementation, and the integration of input saturation constraints. Therefore, the student is firstly expected to design a mobile robot based on the unicycle prototype, which is supposed to execute the distributed computation routine and exchange sensory information with other agents. Agile motion and compact structure are required for the mobile robot platform. Then, the student should design a optimal coverage control with input constraints and validate it on the robot systems.

Tasks:

- 1st-2nd months: Design and validation of the prototype of the mobile robot;
- 3rd-4th : Formulation and analysis of the optimal coverage control scheme;
- 5th week: Conduct the experiment and evaluate the results.
- 6th month: Writing the report.

Bibliography:

[1] Qingchen Liu, Mengbin Ye, Zhiyong Sun, Jiahu Qin, and Changbin Yu. Coverage control of unicycle agents under constant speed constraints. *IFAC-PapersOnLine*, 50(1):2471–2476, 2017.
[2] Cheng Song, Lu Liu, and Gang Feng. Coverage control for mobile sensor networks with input saturation. *Unmanned Systems*, 4(01):15–21, 2016.

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| Supervisor: | Qingchen Liu, Zengjie Zhang |
| Start: | 2.3.2020 |
| Intermediate Report: | 12.6.2020 |
| Delivery: | 18.9.2020 |

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