THESIS REVIEWER'S REPORT

I. IDENTIFICATION DATA

Thesis title:	**Spanning Tree Coverage Algorithm on Large Spaces for Multi-UAV Systems**
Author's name:Jan Chleboun	**Jan Chleboun**
Type of thesis :	bachelor
Faculty/Institute:	Faculty of Electrical Engineering (FEE)
Department:	Department of Cybernetics
Thesis reviewer:	Ing. Petr Váňa
Reviewer's department:	Department of Computer Science

II. EVALUATION OF INDIVIDUAL CRITERIA

Assignment **challenging**

How demanding was the assigned project?

The thesis assignment is challenging because the student has to combine methods from several fields. First, he had to implement and extend an existing coverage algorithm. Furthermore, the student was asked to implement an adequate smoothing method, consider obstacles, conduct experiments with real robots, and compare results with the existing algorithm.

Fulfilment of assignment **fulfilled**

How well does the thesis fulfil the assigned task? Have the primary goals been achieved? Which assigned tasks have been incompletely covered, and which parts of the thesis are overextended? Justify your answer.

Even though the thesis assignment is challenging, the student has fulfilled all the requirements. He has proposed all the required methods and evaluated them in simulated environments and using real robots.

Methodology **correct**

Comment on the correctness of the approach and/or the solution methods.

The methodology used in the thesis is correct, and most of the definitions are detailed in Section 3.1, which helps the reader to understand the text easily.

Technical level **A - excellent.**

Is the thesis technically sound? How well did the student employ expertise in the field of his/her field of study? Does the student explain clearly what he/she has done?

The technical level is sound, and all the methods are clearly described.

Formal and language level, scope of thesis **A - excellent.**

Are formalisms and notations used properly? Is the thesis organized in a logical way? Is the thesis sufficiently extensive? Is the thesis well-presented? Is the language clear and understandable? Is the English satisfactory?

The thesis is well organized, and the text is clear and well understandable. The extent of the bachelor's work is superior. Also, all figures are of high quality.

Selection of sources, citation correctness **A - excellent.**

Does the thesis make adequate reference to earlier work on the topic? Was the selection of sources adequate? Is the student's original work clearly distinguished from earlier work in the field? Do the bibliographic citations meet the standards?

The student references existing work adequately for any considered method, and the references meet all the standards. Also, the student's contributions are distinguished clearly.

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III. OVERALL EVALUATION, QUESTIONS FOR THE PRESENTATION AND DEFENSE OF THE THESIS, SUGGESTED GRADE

Although the thesis assignment is challenging, the resulting bachelor's thesis is of high quality. The thesis contains many different contributions. First, the student implemented the existing AWSTC algorithm and proposed its extension to remove redundancy in the coverage. Secondly, he proposed a new CGWEP algorithm based on cycle growing. Finally, a method TSULSS for trajectory, based on least-squares optimization, has been introduced. These three contributions are all interesting, and they seem to have publication potential. Moreover, the proposed method has been evaluated using real robots.

Qustions:

1. The main criterion for trajectory smoothing is *Turn intensity* in the thesis. It is defined in (3.12) for a discrete trajectory connecting multiple points by straight line segments.
   a) How does the number of points *p* influence this criterion, and is it necessary to have segments with equal lengths?
   b) How would you compare the smoothness of discrete trajectories provided by the proposed TSULSS method with continuous trajectories provided by existing methods (like Bézier curves, cubic splines, B-splines, ...)?
2. Existing smoothing methods (e.g., B-splines) often allow not to visit points of the original trajectory precisely and thus significantly shorten the trajectory in tight corners. Is it possible to extend the proposed TSULSS to behave similarly?

The grade that I award for the thesis is **A - excellent.**

Date: May 31, 2022 Signature: