I. IDENTIFICATION DATA

Thesis title:	**Multi-Goal Path Planning for Spray Writing with Unmanned Aerial Vehicle**
Author's name:	**Arseniy Tkachev**
Type of thesis :	bachelor
Faculty/Institute:	Faculty of Electrical Engineering (FEE)
Department:	Department of Electrical Power Engineering
Thesis reviewer:	Ing. Robert Pěnička
Reviewer's department:	Department of Cybernetics

II. EVALUATION OF INDIVIDUAL CRITERIA

Assignment	**ordinarily challenging**

How demanding was the assigned project?

I consider the assignment as ordinarily challenging for a bachelor thesis. Goal of the thesis was to develop a suitable multi-goal path planning for spray writing of text using Unmanned Aerial Vehicle (UAV). It required to study existing methods for multi-goal path planning, propose suitable motion primitives (font) for the considered vehicle, and finally develop and verify planning method for spray writing with UAV.

Fulfilment of assignment	**fulfilled with minor objections**

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.

The assignment of the thesis was fulfilled. However, I have minor objections regarding the testing of the performance of the proposed planning method. The thesis introduces well its objectives, describes the multi-goal planning challenges, and also largely review the existing fonts and propose a new font suitable for the path planning with UAV. The developed method is based on decomposition of the letters into individual curves that are used to form the generalized traveling salesman problem (GTSP). The created GTSP instances are solved using existing Lin-Kernighan-Helsgaun (LKH) algorithm. The evaluation of the method is, however, quite small and it would be better to test the method on more instances and with different parameter configurations.

Activity and independence when creating final thesis	**C - good.**

Assess whether the student had a positive approach, whether the time limits were met, whether the conception was regularly consulted and whether the student was well prepared for the consultations. Assess the student's ability to work independently.

In my opinion the student had positive approach for solving the topic of the thesis. However, the ability to meet deadlines was limited as well as independent work and coming up with own ideas.

Technical level	**C - good.**

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

The technical level of the thesis is good. The solved problem is well explained, however, the thesis lacks from the missing deeper evaluation of the method.

Formal level and language level, scope of thesis	**B - very good.**

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?

Notations and formalisms are used properly in the thesis. It is well organized and its extent is sufficient. Some parts of the thesis are less understandable, but in general the final version of the thesis is well readable.

Selection of sources, citation correctness	B - very good.
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 literature overview is sufficient for the bachelor thesis. All important sources are cited and the citations meet the bibliographical standards.	

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

Summarize your opinion on the thesis and explain your final grading.

I evaluate the reviewed bachelor thesis as good. Student implemented planning method meant for text spray writing with Unmanned Aerial Vehicle. The problem being solved is well explained and a deep overview of existing fonts and a new font for the spray writing are presented. The targeted planning is then formalized as the Generalized Traveling Salesman Problem (GTSP) and solved using existing heuristic approach. My main and only small objections are regarding the rather small evaluation of the proposed method, clarity of some thesis parts and the ability of coming up with own ideas.

The grade that I award for the thesis is **C - good.**

Date: **4.6.2020**   Signature: