SUPERVISOR'S OPINION OF FINAL THESIS

I. IDENTIFICATION DATA

Thesis name:	**Indoor SLAM using architectural plans**
Author's name:	**Jakub Havlíček**
Type of thesis :	master
Faculty/Institute:	Faculty of Electrical Engineering (FEE)
Department:	Cybernetics
Thesis supervisor:	Prof. Dr.-Ing. Hartmut Bruhm
Supervisor's department:	Dept. of Engineering, Technische Hochschule Aschaffenburg (Germany)

II. EVALUATION OF INDIVIDUAL CRITERIA

Assignment   **challenging**
Evaluation of thesis difficulty of assignment.
Multitude of competencies and tools required: SLAM under ROS, Gazebo simulations, image matching.

Satisfaction of assignment   **fulfilled with minor objections**
Assess that handed thesis meets assignment. Present points of assignment that fell short or were extended. Try to assess importance, impact or cause of each shortcoming.
Goals achieved:
- Localization capability of the robot relative to inventory plan
- Enhances occupancy grid (EOG) = Fusion of inventory plan and occupancy grid from LIDAR sensor
- Stabilization of the SLAM process in the presence of odometry errors.
Shortcomings:
- Software documentation not contained in thesis.
- Perspectives of how to use the EOG not discussed / exploited.
- Details of testing procedure not fully described (e.g. path followed by the robot during the test?)s

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Activity and independence when creating final thesis   **C - good.**
Assess that student had positive approach, time limits were met, conception was regularly consulted and was well prepared for consultations. Assess student's ability to work independently.
In the final phase of the project the student has shown his ability to work independently and intensively. In the beginning, however, progress was scarcely visible.

Technical level   **C - good.**
Assess level of thesis specialty, use of knowledge gained by study and by expert literature, use of sources and data gained by experience.
Technical level altogether is sound. More intensive testing with different scenarios would have been desirable.

Formal and language level, scope of thesis   **A - excellent.**
Assess correctness of usage of formal notation. Assess typographical and language arrangement of thesis.
The student was confronted with the difficulty that some important documents were available on German language only. He mastered this situation very well. The formal quality of the thesis is excellent.

Selection of sources, citation correctness   **C - good.**
Present your opinion to student's activity when obtaining and using study materials for thesis creation. Characterize selection of sources. Assess that student used all relevant sources. Verify that all used elements are correctly distinguished from own results and thoughts. Assess that citation ethics has not been breached and that all bibliographic citations are complete and in accordance with citation convention and standards.

Only few, but highly relevant sources have been cited. The citations are formally correct.

Additional commentary and evaluation

Present your opinion to achieved primary goals of thesis, e.g. level of theoretical results, level and functionality of technical or software conception, publication performance, experimental dexterity etc.

From the feedback I received in the regular meetings with the student I conclude that work on the assignment was started much too late. My impression is that the student has an excellent potential, which he could not fully exploit due to the sub-optimal time management.

III. OVERALL EVALUATION, QUESTIONS FOR DEFENSE, CLASSIFICATION SUGGESTION

Summarize thesis aspects that swayed your final evaluation.

I evaluate handed thesis with classification grade **B - very good.**

Date: **2.6.2019**   Signature:

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Type of thesis :	master
Faculty/Institute:	Faculty of Electrical Engineering (FEE)
Department:	Department of Control Engineering
Thesis reviewer:	Doc. Ing. Tomáš Svoboda, PhD
Reviewer's department:	Department of Cybernetics

II. EVALUATION OF INDIVIDUAL CRITERIA

Assignment   **easy**
Evaluation of thesis difficulty of assignment.
2D SLAM from Lidar measurements is a well investigated problem with many papers and codes available which ease the start. Using floor plans for stabilizing 2D SLAM algorithms is also not new.

Satisfaction of assignment   **fulfilled with major objections**
Assess that handed thesis meets assignment. Present points of assignment that fell short or were extended. Try to assess importance, impact or cause of each shortcoming.
Only basic a approach has been implemented and tested. Experiments were conducted in a simulator only. Problem of scene dynamics was only scratched not really investigated and evaluated. No work on matching scene segments has been presented. Overall, not much has been done.

Method of conception   **correct**
Assess that student has chosen correct approach or solution methods.
The student chose a correct approach, at least as a start.

Technical level   **E - sufficient.**
Assess level of thesis specialty, use of knowledge gained by study and by expert literature, use of sources and data gained by experience.
The main problem is that only very little has been done. Floor plans are converted to edge images and wall pixels are converted to a sparse set of 3D points. This data are added to the simulated Lidar data and an existing ICP based algorithm is evaluated within the Gazebo simulator. The amount of work does not correspond to a master thesis. The author's own contribution is not described in enough technical detail.

Formal and language level, scope of thesis   **E - sufficient.**
Assess correctness of usage of formal notation. Assess typographical and language arrangement of thesis.
The text is readable. English is solid. The thesis is very compact, contains many short paragraphs.

Selection of sources, citation correctness   **E - sufficient.**
Present your opinion to student's activity when obtaining and using study materials for thesis creation. Characterize selection of sources. Assess that student used all relevant sources. Verify that all used elements are correctly distinguished from own results and thoughts. Assess that citation ethics has not been breached and that all bibliographic citations are complete and in accordance with citation convention and standards.
The state of the art section is correct but very compact. Few papers dealing with combining floor plans with Lidar measurements are cited but not really compared to the presented work. What was the reason for a new approach? Why none of the previous work was adopted?

Additional commentary and evaluation

Present your opinion to achieved primary goals of thesis, e.g. level of theoretical results, level and functionality of technical or software conception, publication performance, experimental dexterity etc.

My main criticism stems from the fact that only a basic, simplistic, approach is presented. Even worse, the presentation does not offer enough technical detail about the parameters of the algorithm. None of the more advanced goals, like dynamic scenes, scene part matching, or long-term stability was investigated.

III. OVERALL EVALUATION, QUESTIONS FOR DEFENSE, CLASSIFICATION SUGGESTION

Summarize thesis aspects that swayed your final evaluation. Please present apt questions which student should answer during defense.

The thesis is weak and on just acceptable level. The author demonstrated skills to tackle a complex engineering problem. However, he did not do much, or at least he did not present much in the thesis. That's why I cannot give higher than the lowest acceptable grade.

I evaluate handed thesis with classification grade **E - sufficient.**

Date: **4.6.2019**   Signature: