SUPERVISOR'S OPINION OF FINAL THESIS

I. IDENTIFICATION DATA

Thesis name:	**LIDAR-Based Lane Tracking using KalmanFiltering and its Fusion with Camera-Based Lane Data**
Author's name:	**Daniel Veškrna**
Type of thesis :	master
Faculty/Institute:	Faculty of Electrical Engineering (FEE)
Department:	Department of Control Engineering
Thesis supervisor:	Nuri Kundak
Supervisor's department:	Porsche Engineering Services s.r.o.

II. EVALUATION OF INDIVIDUAL CRITERIA

Assignment	**challenging**
Evaluation of thesis difficulty of assignment.	

Using LIDAR only data from a real dataset and designing lane estimation on such data is not a typical or commonly studied problem as opposed to another similar task such as dynamic object tracking with LIDAR data. This required finding labeled dataset for lane points, preprocessing, and working with the real data and defining the evaluation task and comparing the data against the ground truth.

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.	

The thesis satisfies the primary criterion which is preparing real road lane markings LIDAR measurements and estimating those with a model and benchmarking different methods systematically. However, the model selection and the estimation problem were kept simple to stationary models and didn't explore expected variety of models and methods.

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.	

The student has a positive approach, carefully received, and used feedback from the supervisor, and he initially progressed well and at a good pace. He came forward with his ideas at times. However, later the meetings and progress were inconsistent at different times. He could have done better if he consulted the supervisor and especially the other experts available to him at Porsche Engineering more frequently to overcome blockers faster.

Technical level	**D - satisfactory.**
Assess level of thesis specialty, use of knowledge gained by study and by expert literature, use of sources and data gained by experience.	

The student made a decent effort to study the literature, had a good academic approach to the problem. While in some areas he focused more and performed better, he came short in other areas. The selection and assessment of different lane models and tracking needed more in-depth study and discussions. This wasn't achieved due to late progress. He should have started writing the thesis and started working on the estimation problem earlier to incorporate better guidance and feedback from the advisor to achieve more comprehensive results.

Formal and language level, scope of thesis	**C - good.**
Assess correctness of usage of formal notation. Assess typographical and language arrangement of thesis.	

Preparation and presentation of data was good almost all the time. The usage of language and notation is acceptable. Reference frames could have been explained better. The text of the thesis is of varying quality. However, some obvious errors or confusions in the language could have been avoided if he had attempted earlier. Usage of the terms "line" and "lane" for example is used in an inconsistent and confusing manner and this could have been avoided. The assumptions are not explained as clearly as needed.

SUPERVISOR'S OPINION OF
FINAL THESIS

ČVUT
ČESKÉ VYSOKÉ
UČENÍ TECHNICKÉ
V PRAZE

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.	
Usage of citations is acceptable. It is sufficiently available in some parts of the thesis however a few sections miss citation or explanation in sufficient detail. The contribution of thesis could be better explained and stressed.	

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.
The primary goal of the thesis is achieved with the aforementioned reservations. The student is expected to take the feedback for the thesis to improve the quality and content of the current material to aim for a publication. It is necessary to have more comprehensive results for the submission of a paper to a relevant academic conference.

III. OVERALL EVALUATION, QUESTIONS FOR DEFENSE, CLASSIFICATION SUGGESTION

Summarize thesis aspects that swayed your final evaluation.

Daniel Veškrna demonstrated the ability of independent engineering work. He satisfied the primary expectation from the thesis work. However, a more comprehensive evaluation in terms of dynamic lane models and additional estimation methods is missing.

I evaluate handed thesis with classification grade **C - good.**

Date: **30.1.2024**   Signature: