

## I. IDENTIFICATION DATA

<b>Thesis title:</b>	Using ROS 2 for High-Speed Maneuvering in Autonomous Driving
<b>Author's name:</b>	Martin Endler
<b>Type of thesis :</b>	bachelor
<b>Faculty/Institute:</b>	Faculty of Electrical Engineering (FEE)
<b>Department:</b>	Department of Cybernetics
<b>Thesis reviewer:</b>	Ing. Michal Sojka, Ph.D.
<b>Reviewer's department:</b>	CIIRC, ČVUT

## II. EVALUATION OF INDIVIDUAL CRITERIA

<b>Assignment</b> <i>How demanding was the assigned project?</i>	<b>challenging</b>
The assignment is challenging because it includes many different aspect from low-level programming to setting up software stacks of the embedded platform up to experimenting with a physical scaled-down model car and evaluation of the experiments.	

<b>Fulfillment of assignment</b> <i>How well does the thesis fulfill 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.</i>	<b>fulfilled with minor objections</b>
The student successfully completed the initial part of the assignment, namely porting the software stack from ROS 1 to ROS 2. The later part about high-speed maneuvers was not completed. This is partially caused by the fact that high-speed maneuvering was a planned topic of student's internship at University of Pennsylvania, but in the end, the actual topic was different. However, the part about porting to ROS 2 was more complex than it was initially envisioned and the student did actually more work than the assignment required, such as writing a new firmware for the Teensy board, because the original implementation of rosserial client turned out to be inefficient and unreliable.	
The part related to evaluation of latencies and overheads was partially implemented, but is not documented in the thesis. The code of that part is available in student's public GitHub repository.	
To conclude, the assignment was not completely fulfilled, but the actual amount of work done is more than sufficient for a bachelor thesis.	

<b>Activity and independence when creating final thesis</b> <i>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.</i>	<b>A - excellent.</b>
The student worked very actively and independently. During our consultations, he was coming with a lot of ideas of how to solve various problems. From my side, it was not necessary to steer the student towards different solutions, because his proposals were always very well thought out and backed by detailed study of the problems.	

<b>Technical level</b> <i>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?</i>	<b>B - very good.</b>
The solutions implemented by the student are of very high quality. The student showed that he has a lot of experience with development of complex software systems. His code is written cleanly and very well documented. Unfortunately, the results of physical experiments are not documented in the text of the thesis. I saw the results during the demonstration and can confirm that things work as written.	

**Formal level and language level, scope of thesis**

**C - 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?*

The thesis is written in very good English and is easy to read. The graphical design is good, the student correctly applies typographical rules that are often ignored by typical students. The only downside is that Chapter 6 is incomplete and other chapters could contain more information about the achieved results.

**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 references are selected adequately, and are properly cited.

**Additional commentary and evaluation (optional)**

*Comment on the overall quality of the thesis, its novelty and its impact on the field, its strengths and weaknesses, the utility of the solution that is presented, the theoretical/formal level, the student's skillfulness, etc.*

N/A

### 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.*

The presented thesis solves the most important part of the assignment – migration of ROS 1 software stack to ROS 2. The add-on parts related to latency analysis and high-speed maneuvering were solved only partially. I don't consider this as a critical problem, because the student clearly showed that he is perfectly capable of solving difficult engineering problems. Unfortunately, he is less capable of properly organizing his time, always working on many projects in parallel. As a part of the work on his thesis, he was at an internship and the University of Pennsylvania. I'm sure his performance there was excellent, but not compatible with having enough time for completing his thesis as he would like. Due to the above, I award the thesis with grade **C - good**.

Date: **31.8.2022**

Signature: