

I. IDENTIFICATION DATA

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| Thesis title: | Simulation of Automated Cayenne Porsche in the CARLA Simulator |
| Author's name: | Miroslav Matějček |
| Type of thesis : | bachelor |
| Faculty/Institute: | Faculty of Electrical Engineering (FEE) |
| Department: | Department of Cybernetics |
| Thesis reviewer: | Ing. Tomáš Kozák |
| Reviewer's department: | Porsche Engineering Services |

II. EVALUATION OF INDIVIDUAL CRITERIA

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| Assignment | challenging |
| <i>How demanding was the assigned project?</i> | |
| The scope of this thesis is quite wide and challenging for a bachelor student. It requires familiarization with multiple systems and understanding them to be able to create working interfaces. It also requires some knowledge about vehicle modeling and control and understanding how various sensors work. | |

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| Fulfilment of assignment | fulfilled |
| <i>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.</i> | |
| Goals assigned to the student were reached successfully as working simulations of several maneuvers were created. Simulation results were compared with the measurements from experiments with real car and the whole process was well documented with pointers to possible problems for people trying to replicate it. The thesis is a little vague with regards to the physical model of the car used for simulations and its parameters. On the other hand, lidar implementation is quite detailed. | |

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| Methodology | correct |
| <i>Comment on the correctness of the approach and/or the solution methods.</i> | |
| Solutions of the problems encountered were chosen reasonably well and architecture of the whole system is logical. | |

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| Technical level | A - excellent. |
| <i>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?</i> | |
| The technical level of this thesis is high. Solutions were implemented using appropriate methods and in a professional way. Source code is easy to read and coding best practices were followed. Static code analysis is performed to ensure compliance to standards. | |

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| Formal and language level, scope of thesis | A - excellent. |
| <i>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?</i> | |
| The thesis is structured in a logical way and is easy to understand. The formal language level is very high with no notable mistakes. Coverage of all essential topics is extensive enough for a bachelor thesis. | |

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| Selection of sources, citation correctness | A - excellent. |
| <i>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?</i> | |
| Sources of information are well selected and used correctly. Citations meet all the requirements. | |

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.

The overall quality of this thesis is very good and it shows that student put in some serious effort to make everything work. As it is connected to project JUPITER, which is still actively worked on in Porsche Engineering Services, after some tweaks the simulation environment presented here could be used in further development. As an added value of the work done here I see the merge request created in the CARLA project with the suggested solution of incorrectly displayed cardinal directions.

As the scope of this thesis was rather wide, I do not consider discrepancies in behavior between model and real car to be a big issue. Student himself states in the conclusion that increasing simulation accuracy would be the direction of the future work.

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. Pose questions that should be answered during the presentation and defense of the student's work.

The student proved that he is able to work individually on an assigned project and find solutions to the problems encountered on the way to the goals specified. He can also present the whole process in an easily understandable way. From the technical point of view there is nothing to complain about and I can recommend this thesis for defense.

Question 1:

What physical model was used for the car for simulation purposes?

Question 2:

In the figure 4.4 it looks like there are much more points provided by the simulated lidar than the real one. If so, what is the reason for it and how can it affect simulation precision?

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

Date: **12.6.2023**

Signature: