

I. IDENTIFICATION DATA

Thesis title:	Vision-Based SLAM for Robust Localization in Outdoor Mobile Robots
Author's name:	Anirudh Sosale
Type of thesis :	master
Faculty/Institute:	Faculty of Electrical Engineering (FEE)
Department:	Department of Control Engineering
Thesis reviewer:	Ing. Varun Burde
Reviewer's department:	Czech Institute of Informatics, Robotics, and Cybernetics

II. EVALUATION OF INDIVIDUAL CRITERIA

Assignment	challenging
<i>How demanding was the assigned project?</i>	
This project aims to study, experiment, and evaluate the integration of a vision-based Simultaneous Localization and Mapping (SLAM) algorithm in outdoor mobile robots. The project was demanding, requiring a good understanding of various Visual SLAM techniques, sensor fusion principles (specifically Kalman filtering), and their practical implementation.	

Fulfilment of assignment	fulfilled with minor objections
<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>	
The student has fulfilled the guidelines set out in the assignment, covering the implementation of Visual SLAM, the exploration of mapping approaches, and the analysis of sensor fusion. However, the fulfillment of these tasks feels largely superficial. While the practical steps were executed, the thesis often reads more like a log of actions taken rather than an academic thesis. The comparison of methods relies heavily on descriptive observations of trajectories rather than a deep algorithmic analysis of why specific failures occurred, leading to a result that meets the requirements but lacks the depth expected of a Master's thesis.	

Activity and independence when creating final thesis	C - good.
<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>	
The student engaged in regular consultations during the phase of the thesis. The final report was shared only a few days prior to the submission deadline; consequently, there was unfortunately insufficient opportunity for me to provide detailed feedback or for the student to implement necessary improvements before the final handover.	

Technical level	D - satisfactory.
<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>	
The technical level of the thesis presents a sharp contrast between practical application and theoretical understanding. On the engineering side, the student successfully deployed a mobile robot to map a solar farm and generated ground truth data using LiDAR for benchmarking. However, the theoretical depth is insufficient. The treatment of the Extended Kalman Filter (EKF) is superficial, merely listing standard motion model equations without providing necessary derivations or explaining how the noise covariance matrices were tuned for this specific sensor setup. Consequently, the analysis remains qualitative, describing phenomena observed in plots without providing critical insight into the internal mechanics of the SLAM algorithms. Furthermore, the data visualization is flawed, trajectory starting points are frequently not aligned for direct comparison nor scaled appropriately to reveal detailed behavior. These visualization issues, combined with ambiguities regarding the testing methodology raise significant doubts about whether the evaluation was conducted properly.	

Formal level and language level, scope of thesis	E - sufficient.
<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 formal language level of the thesis is its weakest point. The writing style is excessively narrative, often lacking the precision and formal tone required for academic writing. There is several typos random, capitalization of characters phrases is frequently repetitive, and the text often feels more like a non-technical writing. The structure of the document is also loose, for example, the literature review reads as a list of abstracts rather than a synthesized critique of the field. Additionally, the visual presentation leaves much to be desired, with many figures appearing as raw screenshots or pictures without adequate annotation or professional formatting.

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 student has selected an adequate range of sources, referencing key state-of-the-art papers relevant to the field, such as those for ORB-SLAM3 and RTAB-Map. The citations are generally formatted correctly and used paper from top conferences and Journals.

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.

I appreciate the student's dedication and strong desire to see this project through to completion. The student's hard work in conducting experiments and traveling to solar farm test sites shows strong dedication and commitment to learn.

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.

While the student experimented with SLAM and EKF techniques, demonstrating an ability to implement and run existing algorithms on collected data, the thesis does not clearly show expertise on the topic within the provided text. It remains unclear if the student possesses the necessary conceptual understanding to adapt these systems to different environments. These ambiguities, compounded by significant deficiencies in formal writing, a lack of clarity on key parameters, and poor overall readability, ultimately hide the main technical contributions. This failure to properly document and justify the work leads me to award a lower grade

The grade that I award for the thesis is **D - satisfactory**.

Date: **18.1.2026**

Signature: