

I. IDENTIFICATION DATA

Thesis title:	Learning Unknown Objects with ARI Robot
Author's name:	Zderadička Martin
Type of thesis :	bachelor
Faculty/Institute:	Faculty of Electrical Engineering (FEE)
Department:	Department of Cybernetics
Thesis reviewer:	Karel Zimmermann
Reviewer's department:	Department of Cybernetics

II. EVALUATION OF INDIVIDUAL CRITERIA

Assignment	challenging
<i>How demanding was the assigned project?</i>	
In general, the incremental learning in robotics is extreme challenging unresolved problem. However proposing just a solution is doable within the bachelor thesis.	

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>	
Please insert your comments here.	

Methodology	correct
<i>Comment on the correctness of the approach and/or the solution methods.</i>	
Please insert your comments here.	

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>	
Please insert your comments here.	

Formal and language level, scope of thesis	B - very good.
<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>	
<ul style="list-style-type: none"> Is "o_sc" (page 12)and "sc_o" (page 10) the same thing (classification score?) The mathematics is a bit confusing, for example equation at page 12 Should not the right-hand-side term "o_sc" contains variables you are summing over? $a_k = \sum_{o \in O, l_o = k} o_{sc}$ Similarly, "K" is used for 3x3 matrix with intrinsic parameters, however in text it is referred as "K". The small "K" is then used for denoting the sequence of all labels (without any explanation). 	

Selection of sources, citation correctness	Choose an item.
<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>	
<ul style="list-style-type: none"> Missing citations e.g. "/citefew-shot-incremental" (page 17), or "[?,48]" (page 25) 	

Additional commentary and evaluation (optional)
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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.

Please insert your comments here.

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 work is essential step forward in incremental and adaptive learning for robotics. Student carefully solved both the engineering part related to real-time implementation of the 3D object detection and localization on the real robot as well as the theoretical part including the visuo-text embedding into the existing approach. Since the experimental evaluation is conducted on the real robotic platform (ARI), relatively low number of well distinguishable objects is used, which makes it hard to judge which changes wrt to existing solutions really helps. Nevertheless, it is understandable considering the limited time a student can spend with real experiments during the bachelor thesis. Also some equations and citation could benefit from careful checking (see Formal language for details).

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

Question for the discussion:

1. In the proposed solution to the "object localization/3D_segmentation" and the "robot localization" these two problems are solved independently. Would it be possible to estimate both things simultaneously (e.g. by considering the alignment of object detections/segmentations as an additional measurement for the underlying SLAM optimizer such as GraphSLAM or EKF)?
2. How would you continue in order to make the experimental evaluation more conclusive?
3. What about moving/non-rigid objects (cars, pedestrians, animals ...)
4. What about objects that changes their appearance substantially (e.g. traffic lights, glass of water or reflective surfaces)

Date: **6.2.2024**

Signature: