

## I. IDENTIFICATION DATA

<b>Thesis name:</b>	<b>Measuring Arterial spin labeling MRI – calibration from M0-scans with background suppression</b>
<b>Author's name:</b>	<b>Yeva Prysiazhniuk</b>
<b>Type of thesis :</b>	master
<b>Faculty/Institute:</b>	Faculty of Electrical Engineering (FEE)
<b>Department:</b>	Computer Science
<b>Thesis supervisor:</b>	Jan Petr
<b>Supervisor's department:</b>	External – Helmholtz-Zentrum Dresden-Rossendorf

## II. EVALUATION OF INDIVIDUAL CRITERIA

<b>Assignment</b>	<b>challenging</b>
<i>Evaluation of thesis difficulty of assignment.</i>	
<p>The main challenging aspect of the thesis is the technical background of it. While the problem itself and methodology of the solution are of a moderate difficulty, the topic is highly specialized. The candidate needs to study and understand basic principle of MRI imaging and signal formation, and needs to understand the details of specialized perfusion imaging with arterial spin labeling to fully understand the context of the studied problem of background suppression and calibration of perfusion imaging. While basic of MRI are taught in the course "Medical imaging", the required knowledge here goes much further.</p>	

<b>Satisfaction of assignment</b>	<b>fulfilled</b>
<i>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.</i>	
<p>Ms. Prysiazhniuk fulfilled all the assignments. She has performed a literature search and described all relevant findings on the same topic in the thesis. She has prepared the theoretical framework for solving the issue and quantitatively evaluating the results. She has worked in close collaboration with the clinical partner in securing the data for the use in the thesis according to the initial plan. While evaluating data from 30 subjects was initially planned, only data from 5 subjects were finally evaluated. This was, however, caused by limited data availability and was not the fault of the student. The smaller dataset was sufficient for assessing the results of the work and since all data processing and evaluation was automated, it is without doubt that Ms. Prysiazhniuk would have been more than able to evaluate the data from a larger dataset would they have been available. Lastly, according to the assignment, Ms. Prysiazhniuk familiarized herself with the processing pipeline ExploreASL and wrote the necessary scripts for data processing and evaluation using this pipeline.</p>	

<b>Activity and independence when creating final thesis</b>	<b>A - excellent.</b>
<i>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.</i>	
<p>Despite the extraordinary circumstances and the necessity for collaborating with all project partners only remotely, Ms. Prysiazhniuk has managed to fulfill all the project goals without any unnecessary delays. She had a pro-active approach in consulting the project details and in communicating with the project partners when more information about the data was needed. She actively sought to contact the supervisor also outside of the regular meetings when necessary, and she proved a high-level of independence when solving unforeseen issues.</p>	

<b>Technical level</b>	<b>B - very good.</b>
<i>Assess level of thesis specialty, use of knowledge gained by study and by expert literature, use of sources and data gained by experience.</i>	
<p>As explained in the first section, the topic of the thesis was highly specialized, most of its challenges lying in the complex background of the problem and handling of the data. By studying the problem background, Ms. Prysiazhniuk has gained a lot of knowledge on the background of MRI imaging and perfusion imaging specifically. She has also gained a lot of insight in handling medical imaging data and the challenges connected to that, which go far beyond processing normal camera images and will surely be indispensable to her in her planned doctoral studies in medical imaging at 2<sup>nd</sup> MF UK.</p>	

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

**B - very good.**

*Assess correctness of usage of formal notation. Assess typographical and language arrangement of thesis.*

If I would have to identify the weakest skill of Ms. Prysiazhniuk that she should focus on in further studies, then this would be scientific writing. I am glad that the thesis was written in English and the grammar was on a very good level, however, the student at first struggled with properly structuring the text of the thesis and with clear formulation of the goals. On the other hand, Ms. Prysiazhniuk progressed a lot during the writing of the thesis and writing is probably the domain where she has learned the most during the thesis. The final text is therefore free of any major issues, clear and understandable with a very good level of quality, and covering all the necessary aspect of the problem background, motivation, and presentation and discussion of the results.

**Selection of sources, citation correctness**

**A - excellent.**

*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.*

Contrary to the issues with the structuring and clarity of writing presented above, I have not noticed any issues with use of sources and citations in the thesis of Ms. Prysiazhniuk. All relevant sources are correctly cited, own results are clearly separated from previous published work and the entire thesis meets the highest citations conventions and standards.

**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.*

Ms. Prysiazhniuk met all the primary goals of the thesis, and additionally to the assignment, she was able to implement and check the model of mixed signal from different tissues. In that sense, she fulfilled more than she was supposed to. The results are of sufficient quality with the experiments well performed. Still some work might need to be done on improving the correction model before applying it to practice, but this mostly relies on further input from MRI sequence developers and the quality of the results with the information Ms. Prysiazhniuk had at hand when writing the thesis is thus high. The results of the thesis were summarized and submitted to the ESMRMB conference.

**III. OVERALL EVALUATION, QUESTIONS FOR DEFENSE, CLASSIFICATION SUGGESTION**

*Summarize thesis aspects that swayed your final evaluation.*

I evaluate handed thesis with classification grade **A - excellent**.

Date: **16.6.2021**

Signature: Jan Petr

