

## I. PERSONAL AND STUDY DETAILS

Student's name: **Hassan Dana Tayser** Personal ID number: **473055**  
 Faculty: **Faculty of Biomedical Engineering**  
 Study program: **Biomedical and Clinical Technology**  
 Branch of study: **Biomedical Engineering**

## II. EVALUATION OF THE MASTER THESIS

Masters's thesis title in English:

**Methods for evaluation of gait of children with Cerebral Palsy**

	<b>Evaluation criteria</b>	<b>N. of points</b>
1.	Fulfillment of the aim of the thesis and suitability of the structure of the thesis with respect to the topic (compliance with the assignment). (0 - 30)* Each assignment, or rather any part or sentence from the assignment has to be dealt with, 20 points can only be given for a fully fulfilled assignment. Reduce the number of points with respect to the part of the assignment that is not adequately dealt with. Stating the aim in the introduction is compulsory and if the student fails to state the aim, he/she loses 10 points. The total of 30 points can be granted only to a flawless and precisely prepared thesis.	23
2.	Theoretical level and application of accessible sources. (0 - 30)* The role of the reader is very important here. It is as follows: if most of the text is adopted, then the student gets only 5 points. If everything is written by the student, in his/her own words, he/she may get maximum 15 points. Additional maximum 15 points can be added for appropriate and complete processing of accessible sources, i.e. state of the art is described in an independent chapter (5 points), important and relevant sources are commented on including the description of the selection process (selection strategy 5 points). All sources are adequately cited. The composition of the cited sources is also judged, i.e. whether they reflect the state of the art and are related to the topic, general sources such as mathematical formulas etc. are not included in full-bodied citations. The ratio of these sources can be calculated i.e. useful / not useful sources and the ration has to have impact on the evaluation (5 points).	25
3.	Scope of experimental work (SW, HW) and applied knowledge, quality of the methodology and conclusions of the thesis. (0 - 30)* If the thesis is a combination of theoretical deductions (4 points - can be replaced by a paper in English), modelling and simulation (4 points), SW implementation (4 points) and technical realization (4 points - can be replaced by a patent or utility model) and 4 points for functionality of both SW and HW - then the student can get up to 20 points. If the thesis has the correct structure including the discussion (5 points - at least 2 A4 pages) and conclusions (5 points - at least one A4 page) then another 10 points can be added. It means 30 points for a complex and flawless thesis which includes some outcomes in projects, papers, patents or utility models.	20
4.	Formal requisites and layout of the thesis (writing mastery, structuring, graphs, tables, citations in the text, list of references etc.). (0 - 10)* Currently, students have materials explaining how to prepare a professional text on PC, they have all knowledge and skills; therefore it is not necessary to make allowances for the quality of PC processing. The list of contents of the thesis should have decimal system. Consider references between the individual parts including numbering of equations, pictures, tables and graphs (1 point), quality of pictures (1 point), number of spelling mistakes (1 point for just a few), whether it contains important features with respect to the type of the thesis (2 points). Only standard terminology should be used especially in the English language (ability to express oneself with the use of professional language - 2 points), if graphs are according to the rules (see tolerance and influence of statistical processing - 1 point), if there are relevant captions for graphs and tables and everything is readable (1 point), observance of citation rules ISO690 and ISO690-2 (1 point).	3
5.	<b>Total points</b>	<b>71</b>

\* Verbal evaluation should be part of the Comments

### III. PROPOSED QUESTIONS FOR THE DEFENSE (OPTIONAL)

1. Which parameters do you find the most important for further studies of the topic and why? If possible, discuss briefly the clinical importance of the parameters.

2. How long did the robot-assisted gait training of the examined patients last?

3.

### IV. THE OVERALL ASSESSMENT OF THE LEVEL OF THE MASTER THESIS

Grade**:	A (excellent)	B (very good)	C (good)	D (satisfactory)	E (sufficient)	F (failed)
Number of points:	100 - 90	89 - 80	79 - 70	69 - 60	59 - 50	< 50
	<input type="checkbox"/>	<input type="checkbox"/>	X	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

\*\* in case of F (failed) please explain in detail

I give the above grade to the master thesis and I recommend/~~do not recommend~~ it for the defence.

### V. COMMENTS

The topic of the diploma thesis is the motion analysis of children with cerebral palsy. The thesis investigates the influence of robot-assisted gait training on selected parameters in order to define the parameters suitable for the description of improvement in gait pattern. The core of the thesis deals with the statistical difference in the parameter values before and after the gait training.

The Introduction is reasonably structured and deals accordingly with both the clinical and technical part of the problem. There is, nevertheless, a gap between the state of the art and the aims of the thesis: The objectives of the work (or research questions) do not arise clearly from the state of the art, although the overall meaning of the work and its clinical context are rather apparent.

The section of the Methods that describes study preparation, experimental protocol, and data collection is well described and organized. On the other hand, in section 2.4 (Gait Data Analysis) I did not find focused and comprehensive definitions and descriptions of methods and parameters selected for further evaluation. Merely their listing is presented, although, admittedly, some typical parameters and indexes are presented in the Introduction and in the Discussion, including equations. Statistical tests that were used (Jarque-Bera test of normality and Wilcoxon sign-rank test) are appropriate. Given the non-significant results in some parameters and relatively low number of participants, it might have been interesting to examine the power of tests.

The Discussion is detailed and the relation between statistical and clinical significance is presented; however, the practical applicability of outcomes of the thesis is not apparent. Conclusions of the work are vague and do not clearly summarize which parameters should be utilized in further studies or clinical practice. Limitation of the study should have been presented in the Discussion rather than in the Conclusions.

Formal issues:

A reference to Appendix 1 (Ethical board review) is missing in the Methods. Many figures are not referenced from the text or there is a mismatch in their numbering. Resolution of many images is poor and it is difficult to read them. The list of bibliographical references is wrongly formatted: A year of publication is usually missing as well as the type of document, therefore it is difficult to evaluate the novelty of the sources. There are Czech words, most likely as a result of Czech software or online service used for formatting. Matlab source code was available to the reviewer, but not the data files, so the reproduction of the calculations was difficult.

Summary:

In this thesis, the student demonstrated a good ability to process biomedical data, draw conclusions based on the processing, and set them into a wider clinical context. Although the presented report has many shortcomings, it fulfills its guidelines to the extent that I recommend the thesis for defense.

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