

I. IDENTIFICATION DATA

Thesis title:	Intelligent Cell Spray System
Author's name:	Jan Andrys
Type of thesis :	master
Faculty/Institute:	Faculty of Electrical Engineering (FEE)
Department:	Dept. of Circuit Theory
Thesis reviewer:	Jiří Hozman
Reviewer's department:	Dept. od Biomedical Technology (17110), CTU FBME

II. EVALUATION OF INDIVIDUAL CRITERIA

Assignment	extraordinarily challenging
<i>How demanding was the assigned project?</i>	
Thesis assignment was extraordinary complex, wide and time consuming because of it consists of HW and SW part solutions.	

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>	
The whole thesis assignment was fulfilled and all goals have been achieved. Part concerning the design, development and testing versions of the experimental/functional sample was overextended.	

Methodology	correct
<i>Comment on the correctness of the approach and/or the solution methods.</i>	
In case of validation there is required to describe the whole procedure in detail including results and all used devices and tools. In some cases, it's missing. When there is used 3D printing, there is required to specify all details about 3D printers, technology, used materials, parameters of the printing and so on. In case of this thesis it's very important with respect to the disinfection procedures. There is very important that there is included feedback from the testing and validation. But in majority of cases it's performed only as comment within the thesis text.	

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 thesis is in accordance of the contemporary level of the development trends in the field. As regards relationship of the thesis topic and student field of study, it was very closed and student proved that is able to use properly all obtained knowledge. Within the thesis there was clearly explained what he was done. In some selected schematic diagrams aren't available all required labels on the electronic elements.	

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>	
Thesis has standard content and extent. English is at average level. The majority of the thesis content is understandable. In some cases there would be more suitable to use different terms from the point of view English and formal text (see specification versus assignment, image versus figure and so on). The Czech version of the abstract contents grammar errors.	

Selection of sources, citation correctness	B - very good.
<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>	

There were used 37 up-to-date and relevant references to all aspects of the thesis. But I am not sure if student used the majority of additional sources. There is required to use PMC PUBMED Central (<https://www.ncbi.nlm.nih.gov/pmc/>). There is available very relevant article "Advances in spray products for skin regeneration" from 2022 (see <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8965724/>). New idea, how to solve the mentioned topic is included within the article <https://iopscience.iop.org/article/10.1088/1758-5090/ab6413>. Other relevant article is <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7042907/>. From the point of view of the suitable usage there is very important to take into account relevant FDA documents. From this follows that the SOTA wasn't performed systematically. Student's original work was clearly distinguished from earlier work in the field. In case of the online sources there has to be used technical standard ISO 690-2 for proper citation.

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 am very appreciating that student performed all requested steps (SOTA, design and development of HW and SW, testing and validation) and some additional, i.e. preliminary testing with surgeons within the Finland and Czech Republic.

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

Final grading A-excellent follows from the overall findings that there was extraordinary complex assignment and there was performed wide range of activities and relatively huge effort.

Questions:

1. What will be key features of the next generation of the intelligent cell spray system experimental sample? What about the idea that selected part will be sterile device for single use only?
2. How disinfection under the Czech Republic hospital conditions will be addressed?
3. If it was a medical device, what risk classification class would it be placed in?
4. What all processes or procedures would have to be fulfilled if it was a medical device under MDR 745/2017 and relevant ISO standards (try to find selected relevant ISO standards)?

Date: **5.6.2023**

Signature: