

I. IDENTIFICATION DATA

Thesis name:	Visualization of human's body internal tissues using shaders in simulation medicine
Author's name:	Nikoai Spiridonov
Type of thesis:	master
Faculty/Institute:	Faculty of Electrical Engineering (FEE)
Department:	Department of Computer Science
Thesis supervisor:	Karel Frajták
Supervisor's department:	Department of Computer Science

II. EVALUATION OF INDIVIDUAL CRITERIA

Assignment	extraordinarily challenging
<i>Evaluation of thesis difficulty of assignment.</i>	
<p>Modern real-time 3D applications are very complex and sophisticated software. Especially difficult is the development of software for medical simulators. Developers try to improve the performance of their software trying to infinitely optimize their programs. However, sooner or later there comes a point when optimization does not give significant advantages. In such cases, they should look for other resources that can increase system performance.</p> <p>The diploma thesis main goal was to develop and provide a way for developing such algorithms to use free resources (graphics card) for calculations used in the visualization process.</p>	

Satisfaction of assignment	fulfilled with minor objections
<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>The author describes the aspects of the laparoscopy visualization with real images as examples. The author proposes a pipeline combining multiple rendering components (blood, coagulations spots, contrast fluid) to render the final image using the shaders that can help in laparoscopic surgery training. The goal of the thesis was to develop the algorithms that can move the heavy calculations from CPU to GPU with the help of shaders. However, the author is not selling his idea properly – he does not describe the algorithms in detail (the block diagram is not sufficient, and neither is pointing to an appendix part with source code) and how this change, moving from CPU to GPU, improves the visualization. This change also the development – shader code is different from C++ code – which is not addressed as well. Also, the author did not describe the background of the problem, he arguments that using the GPU and shaders is beneficial for the visualization but does not provide an evidence for that claim. Were not shaders used for visualization before?</p>	

Technical level	A - excellent.
<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>	
The author proved his knowledge of medical visualization and used it to solve such difficult task.	

Formal and language level, scope of thesis	C - good.
<i>Assess correctness of usage of formal notation. Assess typographical and language arrangement of thesis.</i>	
<p>Although the thesis is 100 pages long, the actual text ends on page 56 followed by a short list of references, and the rest is the content of the C++ source files. I don't think it's necessary to put these into the printed version of the thesis (think of the paper required to print it). The text is well structured and quite well organized. The styling is not consistent – on some pages there are paragraphs with different spacing. Language level is below normal, the long sentences are hard to follow, and I had to read them more than once to understand what the author is speaking about. Although the work is interesting, it is not well presented.</p>	

Selection of sources, citation correctness	C - good.
<i>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</i>	

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.

All resources were properly cited. The author could have cited more related works published recently.

III. OVERALL EVALUATION, QUESTIONS FOR DEFENSE, CLASSIFICATION SUGGESTION

Questions for defense:

- *A list of resources was provided at the beginning, but none of them was cited in the text. Why?*
- *What was the frame per second rate (fps) achieved during the simulation?*

I evaluate handed thesis with classification grade **B - very good**.

Date: **4.6.2018**

Signature:

