THESIS REVIEWER'S REPORT

I. IDENTIFICATION DATA

Thesis title:	**Direct rendering of procedural models**
Author's name:	**Alexander Temnyakov**
Type of thesis :	bachelor
Faculty/Institute:	Faculty of Electrical Engineering (FEE)
Department:	Department of Computer Graphics and Interaction
Thesis reviewer:	Ing. Martin Káčerik
Reviewer's department:	Department of Computer Graphics and Interaction

II. EVALUATION OF INDIVIDUAL CRITERIA

Assignment	**challenging**

How demanding was the assigned project?

Workflow described in this thesis consists of various tasks, such as Open Street Map data processing, mesh generation, ray tracing, procedural texturing or scene rendering under specific lighting conditions.

Fulfilment of assignment	**fulfilled**

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.

All specified requirements are met.

Methodology	**correct**

Comment on the correctness of the approach and/or the solution methods.

Goal of the thesis can be achieved in many ways, chosen approach being one of them.

Technical level	**B - very good.**

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?

Overall, technical level of the thesis is very good. Exception is quite confusing explanation of shading and skydome lighting contribution in chapter 2.4, showing slight misunderstanding of rendering equation.

Formal and language level, scope of thesis	**B - very good.**

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?

Content is well-structured and presented in a logical way. Thesis is written in English, chosen language is clear and contains almost no typos. However, sentence building feels clumsy at times.

Selection of sources, citation correctness	**B - very good.**

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?

List of used literature is quite extensive and well referenced in text, although the chosen style is a bit disarranged.

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.

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.

This thesis presents a way of rendering 3D imagery based on real-world data provided by Open Street Map project. Result consists of two standalone applications. First one preprocesses Open Street Map data to proposed intermediate data structure. Second application then reads this data, performs on-the-fly generation of 3D scene and renders it using custom path tracing based algorithm. Performance is measured in comparison to rendering application, which uses precomputed polygonal models of the same scene.

Minor drawback is usage of skydome in shading algorithm, described in chapter 2.4.1, which I consider incorrect. According to text, some sort of diffuse reflection is considered, leading to issue shown in figure 2.4. Workaround for this issue then breaks basic assumption, where light source with zero emission should contribute zero energy to final image, as shown in figure 2.5. Anyway, with carefully chosen values, results are still plausible.

Multiple heuristics are introduced to improve perceived quality of results. Although rather ad-hoc in nature, they serve well for the artistic approach to visuals. Also, I appreciate extensive performance evaluation and provided user manual.

The grade that I award for the thesis is **B - very good.**

However, all mentioned shortcomings are rather formal in nature. With respect to scope of the work, thorough evaluation and nice visual output, I am open to grade improvement.

Questions:
1. Related to reasoning above, what would be the better way of handling emissive materials (like skydome), allowing for more physically correct (and in my opinion expected) behavior?
2. What algorithm is used to place street lamps to generated scenes?

Date: **9.6.2021**   Signature: