THESIS REVIEWER'S REPORT

I. IDENTIFICATION DATA

Thesis title:	**Efficient sampling for computing complex illumination in real-time**
Author's name:	**Karel Tomanec**
Type of thesis :	master
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?

The project deals with advanced real-time ray tracing algorithms presented in recent years.

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.

Methodology **correct**

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

Technical level **A - excellent.**

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?

The student presented a profound understanding of the relevant parts of the light transport theory. The explanation is clear and technically sound.

Formal and language level, scope of thesis **A - excellent.**

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?

The thesis is well organized and well written, with a very good English. The number of typos or formal errors is minimal.

Selection of sources, citation correctness **A - excellent.**

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?

The work contains adequate selection of previously published literature relevant to the topic. Sources are correctly referenced in the text, however few of them (e.g. [WP21]) do not fully meet the standards.

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.

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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 general introduction to recent research in the field of interactive global illumination computation. Then, it takes a close look on the algorithm known as reservoir-based spatio-temporal importance resampling (ReSTIR) with focus on resampling of the direct illumination. Part of the thesis is a practical implementation of this method, with a comprehensive performance evaluation on six scenes of varying geometric and lighting complexity. Based on the results, conclusions about the usefulness of the method are drawn.

In addition, the student presented a prototype implementation of an extension of the method beyond the scope of the assignment, ReSTIR for global illumination, with promising preliminary results.

Overall, I rate highly the clear and readable presentation of the topic, which could easily serve as a practical reference for future implementers of the method. The implementation seems to be of a good quality, it is accelerated on the GPU and in conjunction with modern hardware, it provides interactive to real-time performance.

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

Questions:

1. What was the algorithm and its parameters to obtain the "Offline Reference", used for the qualitative evaluation presented in Tab. 5.2?
2. Although the temporal reuse plays a significant role in the algorithm, as far as I can tell, the qualitative evaluation considers only a singular frame. Could you pinpoint the typical temporal (like the one presented in Fig. 4.6), or other significant artifacts produced by the method and provide at least a subjective opinion on their impact on the output with respect to a human perception?

Date: **12.6.2023** Signature: