

# Analysis of the Feasibility of Pathtracing in Interactive Media

*Or: How Much Noise Is Too Much?*

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A thesis presented for the degree of  
*Bachelor of Computer Science*



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# Abstract

As part of the quest for ever-improving game graphics, researchers, graphics hardware developers and video game developers alike have been coming up with more and more convoluted and technically challenging ways of improving the graphics in interactive media such as games in order to give users a deeper sense of immersion or to provide special effects artists with faster feedback.

While rendering techniques are currently shifting from the traditional fixed pipeline approach towards the new, fully programmable approach that lets developers implement deferred renderers that can more closely mimic reality by using multiple combined shading and lighting algorithms, the fundamental concept of rasterization-based rendering has remained the same.

The real world photon-collecting approach that actual cameras has so far not been adopted for interactive media by the industry in any capacity because the computational cost has historically been prohibitively expensive. This paper presents the results of my research about the feasibility of using a physically-based technique called **path tracing** in lieu of classical techniques in interactive media. I present the idea, algorithm and complexity behind path tracing and extrapolate feasibility according to the current state of technology and trends. As part of the research, I have implemented a path tracing 3D engine in C++.

In general, I have found path tracing to be a viable rendering solution on commodity hardware in about 6 years.

# Acknowledgements

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Furthermore, none of this would have been possible without the incredible efforts and love of my parents who have supported me throughout the years and enabled me to live a carefree life until I was ready to fend for myself.

Last, but certainly not least, I would like to declare my gratefulness to Alisa, whose endless love has given my life a new meaning.

*We all make choices in life, but in the end, our choices make us.*

*Andrew Ryan*

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## **Part I.**

# **Current State of Technology**

# 1. Introduction

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## 2. Another Chapter

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### 2.1. Conclusion and Outlook

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