

RNDr. Martin Šik, Ph.D.

CONTACT INFORMATION

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EDUCATION

Charles University in Prague - Faculty of Mathematics and Physics,
Prague, Czech Republic

Doctoral degree, Computer graphics and image analysis, January 2019

- Supervisor: doc. Ing. Jaroslav Krivánek, Ph.D.
- Thesis topic: *Global exploration in Markov chain Monte Carlo methods for light transport simulation*

Master's degree, Software systems, September 2012

- Graduated cum laude
- Excellence scholarships granted during the studies
- Specialization: Computer graphics
- Thesis topic: *Guide hair interpolation*
Analysis and implementation of a procedural hair generator, which communicates with Maya Stubble hair plugin and 3Delight renderer. Also accepted as *rigorous thesis* in 2014.

Bachelor's degree, Computer Science, September 2010

- Excellence scholarships granted during the studies
- Specialization: Programming
- Thesis topic: *Particle systems*
Analysis and implementation of particle systems library, which handles real-time interactions among particles and off-line simulation.

Gymnázium Nad Alejí Secondary Grammar School, Prague, Czech Republic
Graduation Exam, May 2007

PROFESSIONAL EXPERIENCE

Chaos Czech a.s., Prague, Czech Republic

Senior developer/researcher, **February 2016 - Present**
specialized at light transport simulation

- Working on the Corona renderer core, solving both light transport related and unrelated issues
- Working on the Corona renderer plugin for 3ds Max
- Programing in C++ for Microsoft Windows.
- Worked on caustics solver, complete heterogenous media support, subsurface scattering, hair/skin shader, memory-friendly displacement, tonemapping, speed enhancements of a path tracer, procedural maps, etc.

Pixar Animation Studios, Seattle, WA, USA

Intern, **July 2014 - December 2014**

- Implementing new light transport algorithms in **RenderMan** (Pixar's rendering software)
- The algorithms I implemented were released to the customers.
- Programing in C++ for Linux.

Charles University in Prague, Computer Graphics Group, Prague, Czech Republic

PhD Student/Researcher, **October 2012 - January 2019**

- Researching new light transport algorithms (see Projects/Papers section for details)
- Programing in Python/C++ for Microsoft Windows.
- Funded by GAČR and GAUK grants.

Universal Production Partners, Prague, Czech Republic

*Software engineer,
specialized at computer graphics*

March 2012 - May 2013

- Analysis and implementation of programs for movies post-production, visual effects, modeling and animating of 3D scenes.
- Programing in C++ for Microsoft Windows and Mac OS.

Hewlett-Packard, Prague, Czech Republic

Software engineer, web developer

September 2008 - February 2012

- Analysis and implementation of non-web/web applications using .NET (ASP, VB, C#), MSSQL and JavaScript.
- Creating web pages using XHTML and CSS.

PROJECTS/PAPERS

Advances in Monte Carlo rendering: The legacy of Jaroslav Krivánek

*Alexander Keller, Pascal Gautron, Jiří Vorba, Iliyan Georgiev, **Martin Šik**, Eugene d'Eon, Pascal Grittmann, Petr Vévoda, and Ivo Kondapaneni. SIGGRAPH 2020 (course).*

SIGGRAPH course focused at research done in collaboration with my former supervisor Jaroslav Krivánek, who has recently passed away.

MIS Compensation: Optimizing Sampling Techniques in Multiple Importance Sampling

*Ondřej Karlík, **Martin Šik**, Petr Vévoda, Tomáš Skřivan, and Jaroslav Krivánek. ACM Trans. Graph., SIGGRAPH Asia 2019.*

Optimizing one sampling technique with respect to multiple importance sampling.

Implementing One-Click Caustics in Corona Renderer

***Martin Šik** and Jaroslav Krivánek. Eurographics Symposium on Rendering - Industry Track, 2019.*

A fully automatic caustics rendering solution in Corona Renderer. The algorithm is transparent to the user, requires no settings and has minimum overhead compared to path tracer.

Survey of Markov Chain Monte Carlo Methods in Light Transport Simulation

***Martin Šik** and Jaroslav Krivánek. Accepted to IEEE Transactions on Visualization and Computer Graphics, 2018*

Robust Light Transport Simulation via Metropolised Bidirectional Estimators

***Martin Šik**, Hisanari Otsu, Toshiya Hachisuka, and Jaroslav Krivánek. ACM Trans. Graph., SIGGRAPH Asia 2016.*

A new Markov chain Monte Carlo algorithm for light transport simulation with superior global exploration, which is achieved by utilizing spatial regularization with path reuse, replica exchange and stratified camera subpaths.

Improving Global Exploration of MCMC Light Transport Simulation

***Martin Šik** and Jaroslav Krivánek. ACM SIGGRAPH 2016 Posters.*

Improving global exploration in Markov chain Monte Carlo algorithms by tempering of light transport simulation and applying new replica exchange strategies/moves.

A Spatial Target Function for Metropolis Photon Tracing

*Adrien Gruson, Mickael Ribardiere, **Martin Šik**, Jiří Vorba, Rémy Cozot, Kadi Bouatouch, and Jaroslav Krivánek, ACM Trans. Graph. 2016.*

A new algorithm for distributing photons in a scene in order to achieve uniform image error. The photons are distributed using Markov chain Monte Carlo with carefully selected target function.

Unifying Points, Beams, and Paths in Volumetric Light Transport Simulation

Jaroslav Křivánek, Iliyan Georgiev, Toshiya Hachisuka, Petr Vévoda, **Martin Šik**, Derek Nowrouzezahrai, and Wojciech Jarosz. *ACM Trans. Graph., SIGGRAPH 2014*.

A new light transport algorithm for scenes with participating media. The algorithm combines bidirectional path-tracing with various biased estimators using generalized multiple importance sampling.

On-line Learning of Parametric Mixture Models for Light Transport Simulation

Jiří Vorba, Ondřej Karlík, **Martin Šik**, Tobias Ritschel, and Jaroslav Křivánek, *ACM Trans. Graph., SIGGRAPH 2014*.

A new light transport algorithm that uses several photon passes to train radiance and importance distributions. These distributions are used for guiding light and eye paths during rendering.

Fast Random Sampling of Triangular Meshes

Martin Šik and Jaroslav Křivánek. *Pacific Graphics, Short Papers, 2013*.

New fast random sampling algorithm used for hair distribution and sampling of complex luminaire. The paper was also presented at **CESCG 2012** conference, where it received an award for the third best paper.

Stubble, C++, 2011/2012

I was part of a team responsible for development of a hair modeling plugin for Maya and 3Delight. The project was done in cooperation with **Universal Production Partners**. My role in the team was to create a procedural hair generator and connect our plugin with 3Delight renderer. I was also a lead project designer.

COMPUTER SKILLS **Programming languages** C/C++, C#.NET, Python

Databases MySQL, MSSQL

Frameworks/Libraries Maya API, Photoshop API, 3ds Max API, RenderMan API, CUDA, QT, Embree

Operating systems Microsoft Windows, GNU/Linux

Development tools Visual Studio, QT creator, SVN, Git

Other L^AT_EX, Mathematica, Matlab

LANGUAGE SKILLS **English** advanced

German basic knowledge of the language

Czech native speaker

MISCELLANEOUS driving license category B

First Certificate in English (University of Cambridge ESOL Examinations)

PERSONAL QUALITIES Team player, flexible, reliable, hard worker, open-minded.

HOBBIES Computer graphics, LEGO, squash, fitness, jogging, movies, music and travelling.