

# Curriculum vitæ – Oskar Elek

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## Personal Data

### Address:

Faculty of Mathematics and Physics, Charles University  
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## Professional Interests

Computer graphics (physically-based image synthesis aka rendering, computational fabrication, forward and inverse appearance modelling, Monte Carlo methods, participating media, light scattering, shading languages, GPU programming), computer games, optics

## Languages

- English – fluent, full professional proficiency
- Slovak – mother-tongue
- Czech – bilingual proficiency
- German, French – elementary proficiency

## Education

**June 2015 – Sep 2018 (exp.)** PhD in Computer Science at Charles University in Prague, Czech Republic, within the European Commission's Marie Skłodowska-Curie Innovative Training Network "DISTRO"

- thesis topic: Physically-accurate Appearance Prediction and Fabrication
- advisor: Jaroslav Křivánek

**Oct 2011 – May 2015:** Dr-Ing (PhD equivalent) in Computer Graphics, at Max Planck Institute for Informatics and MMCI Cluster of Excellence at Saarland University, Saarbrücken, Germany

- thesis topic: "Efficient Methods for Physically-based Rendering of Participating Media"
- advisors: Tobias Ritschel, Hans-Peter Seidel

**Oct 2008 – Sep 2011:** Mgr (MSc equivalent) in Software Systems, at Faculty of Mathematics and Physics, Charles University in Prague, Czech Republic

- specialization: Computer Graphics
- thesis topic: "Physically-based Clouds Rendering on GPU" (advised by Alexander Wilkie)
- graduated *summa cum laude*

**Oct 2005 – Sep 2008:** Bc (BSc equivalent) in Programming, at Faculty of Mathematics and Physics, Charles University in Prague, Czech Republic

- thesis topic: "Rendering Planetary Atmospheres in Real-Time" (advised by Petr Kmoch)

## Employment and Positions

- Visiting researcher at NVIDIA Research Helsinki (10/2017–03/2018)
- Visiting researcher at Institute of Science and Technology Austria (03–05/2017)
- Visiting researcher at Max Planck Institute for Informatics (04–06/2016)
- Post-doctoral researcher at Charles University in Prague under the Marie Skłodowska-Curie ITN "DISTRO" (06/2015–09/2018)
- Researcher at Max Planck Institute for Informatics (10/2011–05/2015)
- Quality assurance at Bohemia Interactive Simulations (07/2010–08/2011)
- Research and engineering intern at Saarland University in Saarbrücken (08–09/2010)
- Junior C++ Programmer at Laboratory Imaging (07/2007–10/2008)
- Math and physics tutoring (2005–2010)

## Skills and Experience

### Active technical skills:

C/C++, Matlab, Mathematica, GPU programming (CUDA, HLSL/GLSL, DirectX/OpenGL), source management (SVN/Git),  $\LaTeX$ , HTML/CSS

### Passive technical skills:

Python, Java, OOP, compilers construction (Flex, Bison), non-procedural languages (Prolog, Haskell), RenderMan, Unix Shell

### Non-technical skills:

- writing advanced technical texts, typesetting, visual elements authoring
- giving lectures, talks and other oral presentations (both expert and non-expert audiences)
- managing small teams of collaborators, programmers and non-programmers, student supervision
- co-organization of events (conferences, consortium meetings, workshops)

Conference and Journal Publications	<ul style="list-style-type: none"> <li>• Herholz S, Zhao Y, <b>Elek O</b>, Nowrouzezahrai D, Lensch H, Křivánek J: <i>Zero Variance-based Adaptive Sampling for Volume Path Guiding</i>. ACM Transactions on Graphics (conditionally accepted), <b>2018</b></li> <li>• <b>Elek O</b>, Křivánek J: <i>Towards a Principled Kernel Prediction for Spatially Varying BSSRDFs</i>. Proc. of Eurographics Workshop on Material Appearance, <b>2018</b></li> <li>• Herholz S, <b>Elek O</b>, Schindel J, Křivánek J, Lensch H: <i>A Unified Manifold Framework for Efficient BRDF Sampling based on Parametric Mixture Models</i>. Proc. of Eurographics Symposium on Rendering, <b>2018</b></li> <li>• <b>Elek O</b>, Sumin D, Zhang R, Weyrich T, Myszkowski K, Bickel B, Wilkie A, Křivánek J: <i>Scattering-aware Texture Reproduction for 3D Printing</i>. ACM Transactions on Graphics (Proc. SIGGRAPH Asia) 36(6), <b>2017</b></li> <li>• Herholz S, <b>Elek O</b>, Vorba J, Lensch H, Křivánek J: <i>Product Importance Sampling for Light Transport Path Guiding</i>. Computer Graphics Forum (Proc. EGSR) 35(4) (3rd Best Paper award), <b>2016</b></li> <li>• <b>Elek O</b>, Bauszat P, Ritschel T, Magnor M, Seidel H-P: <i>Progressive Spectral Ray Differentials</i>. Proc. of International Workshop on Vision, Modeling and Visualization (VMV), <b>2014</b></li> <li>• <b>Elek O</b>, Ritschel T, Dachsbacher C, Seidel H-P: <i>Principal-Ordinates Propagation for Real-Time Rendering of Participating Media</i> (extended version). Computers and Graphics 45, <b>2014</b></li> <li>• <b>Elek O</b>, Bauszat P, Ritschel T, Magnor M, Seidel H-P: <i>Spectral Ray Differentials</i>. Computer Graphics Forum (Proc. EGSR) 33(4) (Best Student Paper award), <b>2014</b></li> <li>• <b>Elek O</b>, Ritschel T, Dachsbacher C, Seidel H-P: <i>Interactive Light Scattering with Principal-Ordinate Propagation</i>. Proc. of Graphics Interface (Best Student Paper award), <b>2014</b></li> <li>• <b>Elek O</b>, Ritschel T, Seidel H-P: <i>Real-Time Screen-Space Scattering in Homogeneous Environments</i>. IEEE Computer Graphics &amp; Applications 33(3) (Special Issue “Scattering”), <b>2013</b></li> <li>• <b>Elek O</b>, Ritschel T, Wilkie A, Seidel H-P: <i>Interactive Cloud Rendering Using Temporally-Coherent Photon Mapping</i> (extended version). Computers &amp; Graphics 36(8), <b>2012</b></li> <li>• <b>Elek O</b>, Ritschel T, Wilkie A, Seidel H-P: <i>Interactive Cloud Rendering Using Temporally-Coherent Photon Mapping</i>. Proc. of Graphics Interface, <b>2012</b></li> <li>• <b>Elek O</b>, Kmoch P: <i>Real-Time Spectral Scattering in Large-Scale Natural Participating Media</i>. Proc. of Spring Conference on Computer Graphics, <b>2010</b></li> </ul>
Other Publications	<ul style="list-style-type: none"> <li>• Iser T, <b>Elek O</b>: <i>Real-time Light Transport in Analytically Integrable Quasi-heterogeneous Media</i>. Proc. of Central European Seminar on Computer Graphics, <b>2018</b></li> <li>• <b>Elek O</b>: <i>Efficient Methods for Physically-based Rendering of Participating Media</i>. PhD thesis at Max Planck Institute for Informatics and Saarland University in Saarbrücken, <b>2016</b></li> <li>• <b>Elek O</b>: <i>Rendering Natural Phenomena</i>. In <i>Encyclopedia of Color Science and Technology</i>, Springer, Luo Ronnier (Editor-in-chief), <b>2015</b></li> <li>• Cover image and summary of <i>Principal-Ordinates Propagation</i>. In <i>Informatik Spektrum</i> 38(2), April <b>2015</b></li> <li>• <b>Elek O</b>: <i>Physically-based Cloud Rendering on GPU</i>. MSc thesis at Charles University in Prague, <b>2011</b></li> <li>• <b>Elek O</b>, Wilkie A: <i>Layered Materials in Real-Time Rendering</i>. Proc. of Central European Seminar on Comp. Graph., <b>2010</b></li> <li>• <b>Elek O</b>, Kmoch P: <i>Rendering Parametrizable Planetary Atmospheres with Multiple Scattering in Real-Time</i>. Proc. of Central European Seminar on Computer Graphics, <b>2009</b></li> <li>• <b>Elek O</b>: <i>Rendering Planetary Atmospheres in Real-Time</i>. BSc thesis at Charles University in Prague, <b>2008</b></li> </ul>
Teaching and Supervision	<ul style="list-style-type: none"> <li>• Supervision of BSc (Tomáš Iser, CUNI, defended 06/2017; Antonín Teichmann, CUNI, ongoing) and MSc students (Federico Forti, CUNI, defended 02/2018)</li> <li>• Teaching assistant for “Interactive Global Illumination” advanced seminar (SS 2014 at Saarland University in Saarbrücken, lead by Tobias Ritschel)</li> </ul>
Academic Service	<ul style="list-style-type: none"> <li>• Reviewer for TOG (2017), Computers and Graphics (2017, 2018), CGF (2017), TVCG (2016), Eurographics (2014, 2016), SIGGRAPH (2015), Graphics Interface (2013, 2014, 2015), GRAPP (2014), Pacific Graphics (2012)</li> <li>• Co-organization of Autumn School of CG (IST Austria, 2017) for the researchers of the DISTRO ITN</li> <li>• Student volunteer and photographer at Eurographics Symposium on Rendering 2011 in Prague</li> <li>• Reviewer for several Bc and MSc theses at Charles University in Prague</li> </ul>
Awards and Honours	<ul style="list-style-type: none"> <li>• <b>2016</b>: 2nd Best Paper award at EGSR</li> <li>• <b>2014</b>: Best Student Paper award at EGSR</li> <li>• <b>2014</b>: Michael A.J. Sweeney Award for Best Student Paper at Graphics Interface</li> <li>• <b>2011</b>: MSc studies finished <i>summa cum laude</i></li> <li>• <b>2010</b>: Best SCCG Presentation Award</li> <li>• <b>2009</b>: Extraordinary studying results scholarship at Charles University</li> <li>• <b>2009</b>: Best CESC Paper Award</li> <li>• <b>2009</b>: Best CESC Presentation Award</li> </ul>
Other Projects	<p><b>Pepr3D</b>, a student software project in cooperation with the Prusa Research company</p> <ul style="list-style-type: none"> <li>• topic: 3D painting tool for geometric editing and automatic segmentation of multi-material prints for the FDM technology (to be incorporated in the company's supplied software toolkit)</li> <li>• team: 4 developers</li> <li>• role: supervision, consulting, printer hacking</li> <li>• started in Spring 2018</li> </ul>

**HotEye simulation**, an industry research project developed for the Sairstahl company in collaboration with Saarland University in Saarbrücken and German Institute for Artificial Intelligence research

- topic: development of a software simulation of an optical scanning system used for the detection of mechanical and structural defects on steel cables used in civil engineering
- team: 3 developers and one 3D artist
- role: design and development of the simulation, calculation and measurement of the physical properties of the real setup, development of auxiliary mathematical models, partial coordination of the team
- developed over the course of 9 weeks in August and September 2010
- the system produces images which are qualitatively equivalent to those produced by the real scanner

**Flying Samurai**, a World War I combat flight simulator for the Software Project course at Charles University

- supervised by: Otakar Nieder
- team: 4 programmers and several external contributors
- role: graphics programmer, joint team leadership with Jan Beneš, managing external contributors
- developed over the course of approximately 15 months from specification to hand-in (2009–2010)
- defended with extra ECTS credits award in June 2010

**AtmoVision**, real-time planetary atmospheres renderer, accompanying application for my bachelor and master theses at Charles University

- first version developed over the course of approximately 6 months (2007–2008)
- further development until 2011

Hobbies

Sports (mountain/road biking, body-weight workout, bouldering, skiing, running, swimming, skating, surfing, powerbocking), travelling, literature, drawing, photography, cinematography, computer games, scuba/free diving, cooking, complaining about hot weather and drinking coffee

Prague, July 31, 2018