

Education

UNIVERSITY OF CALIFORNIA, SAN DIEGO September 1997 - September 2006
Ph.D. in Computer Science, 2006
Research Area: [Computer Graphics](#)
Advisor: Henrik Wann Jensen
Dissertation: "Towards Realistic Image Synthesis of Scattering Materials"
M.S. in Computer Science, 2004
B.S. in Computer Engineering, 2001 (*magna cum laude*)

Experience

DEEPMIND March 2018 - Present
DeepMind Science
Engineering lead for DeepMind's [Science Team](#). Directed teams of engineers applying machine learning and advanced computational techniques to solve real-world scientific problems. Developed foundational and transformative infrastructure for research and engineering groups, facilitating collaborations between teams with various senior stakeholders. Contributed across multiple disparate domains in the natural sciences, including computational biology (protein folding, e.g., [AlphaFold](#)), quantum chemistry, and physics. Developed shared infrastructure for leaderboarding now used across Alphabet. Investigated, invented, and applied novel techniques to advance various disciplines, scaling and productionizing research.

GOOGLE October 2014 - March 2018
Cardboard / Daydream
Founding member of [Google Cardboard](#) team, and later [Daydream](#). Initially led Google's VR SDK engineering with multiple public releases in Java and C++. Became Engineering Lead for VR platforms and system software, directing engineering in [Google Cardboard](#), [Daydream](#), VR-related implementations in Android OS, and a custom OS for standalone hardware. Worked with external partners to create Daydream-ready devices, including Samsung, Huawei, LG, Motorola, ASUS, Qualcomm, and ARM. Helped found [OpenXR](#) effort. Directed development of new VR devices and form-factors, unified multiple VR-related platform software efforts, designed and implemented foundational features in Android OS and a custom OS for standalone devices to support high-performance mobile VR.

GOOGLE October 2012 - October 2014
Google Earth
Engineer on [Google Earth](#), developing various rendering techniques, and extended Google infrastructure to support poly-platform products, Led an effort to unify the rendering engines of Google Earth, Google Maps, and Google StreetView. Started Project [Ion](#).

LEOLUX September 2009 - September 2012
Principal Research Scientist
Research coupling computer graphics and biology focused on advanced appearance modeling, appearance acquisition, and biological modeling. Designing custom software to client's specifications, including simulation and analysis tools, user interfaces, and other technical packages.

COLUMBIA UNIVERSITY October 2007 - September 2009

Postdoctoral Research Scientist, Department of Computer Science

Host: Ravi Ramamoorthi

Research in computer graphics focused on advanced appearance modeling, measurement techniques, complex light transport, and global illumination.

[UNIVERSITY OF CALIFORNIA, SAN DIEGO](#) September 2006 - September 2007

Postdoctoral Researcher, Department of Computer Science and Engineering

Host: Henrik Wann Jensen

Research in computer graphics focused on appearance modeling, complex light transport, and global illumination.

[WETA DIGITAL LTD.](#) November 2006

Consultant, Shaders and Rendering Group

Development and implementation of advanced shading techniques for materials such as skin and leaves. Results used in the movie *Avatar*.

[UNIVERSITY OF CALIFORNIA, SAN DIEGO](#) October 2002 - September 2006

Graduate Student Researcher, Department of Computer Science and Engineering

Assisted in the design and construction of the Graphics and Vision Lab. Performed research in the areas of interactive full global illumination rendering, appearance modeling, and light transport simulation. Administrator of Linux and Windows machines, including multi-node clusters.

[CALIT²](#) June - September 2003

Graduate Student Researcher, Center for Research in Computing and the Arts

Implemented high-end content creation tools for the creation of a digital immersive environment.

[SAN DIEGO SUPERCOMPUTER CENTER](#) June 1999 - June 2003

Graduate Student Researcher, Visualization Lab

Assisted in the design and construction of a tiled display, developed tools for display super high-resolution images and movies.

[SHELDON BROWN, INC.](#) July 2001 - April 2002

Lead Programmer

Designed and implemented an immersive 3D environment engine, and design tools for content production. Project is currently on display at the Ruben H. Fleet Science Center in San Diego's Balboa Park.

[SAN DIEGO SUPERCOMPUTER CENTER](#) June 1999 - July 2000

Undergraduate Student Researcher, Visualization Lab

Developed drivers for 3D input devices, designed and implemented a parallel visualization tools.

[KNOWLEDGE ADVENTURE/DAVIDSON & ASSOC.](#) June - August 1998

Lead Programmer

Lead development of an educational software package for children.

Research Interests

At DeepMind, I am exploring applying computational methods and machine learning towards solving problems in the natural sciences.

In the past my core focus was on computer graphics rendering [3,5,7,11,13] and appearance modeling [1,6,9,10,12], developing algorithmic models that succinctly describe the appearance of the natural world. Real-world materials, like milk, hair, and skin, scatter light within their volume. Simulating this complex interaction has a high computational cost, thus efficient models are necessary. These models are useful not only for generating realistic imagery, but also for medical diagnosis [1,2], studies on appearance (e.g. health, beauty, age of skin) [3,9], and for investigating the optical properties of materials [1,5,6,8,14,15].

Honors and Awards

- Proceedings Front Cover Image, *SIGGRAPH Asia*, 2010
- Proceedings Front Cover Image, *SIGGRAPH Asia*, 2008
- Proceedings Front Cover Image, *Graphics Hardware*, 2003
- Best Paper of Conference Award, *Graphics Hardware*, 2003

Peer-Reviewed Journal Articles

- [1] V. Bapst, T. Keck, A. Grabska-Barwińska, **C. Donner**, E.D. Cubuk, S.S. Schoenholz, A. Obika, A.W.R. Nelson, T. Back, D. Hassabis, and P. Kohli, *Unveiling the predictive power of static structure in glassy systems*. *Nature Physics*, 16(4):448–454, 2020
- [2] **C. Donner** and H. W. Jensen. *Rapid simulation of steady-state spatially-resolved reflectance and transmittance profiles of multi-layered turbid materials*. *J. Opt. Soc. Am. A*, 23(6):1382–1390, 2006
- [3] N. Joshi, **C. Donner**, and H. W. Jensen. *Noninvasive measurement of scattering anisotropy in turbid materials by nonnormal incident illumination*. *Opt. Lett.*, 31:936–938, 2006

SIGGRAPH/ToG Papers

- [4] J. Jimenez, T. Scully, N. Barbosa, **C. Donner**, X. Alvarez, T. Vieira, P. Matts, V. Orvalho, D. Gutierrez, T. Weyrich. *A practical appearance model for dynamic facial color*. *ACM Trans. Graphic.* (Proceedings of SIGGRAPH Asia 2010), 29(6):141:1–10, 2010
(Proceedings front cover)
- [5] R. Overbeck, **C. Donner**, R. Ramamoorthi. *Adaptive wavelet rendering*. *ACM Trans. Graphic.* (Proceedings of SIGGRAPH Asia 2009), 28(5):140:1–12, 2009
- [6] **C. Donner**, J. Lawrence, T. Hachisuka, H. W. Jensen, S. Nayar, R. Ramamoorthi *An Empirical BSSDF Model*, conditionally accepted to *ACM Trans. Graphic.* (Proceedings of SIGGRAPH 2009), 28(3), 2009
- [7] **C. Donner**, T. Weyrich, E. d’Eon, S. Rusinkiewicz, and R. Ramamoorthi. *A layered, heterogeneous reflectance model for acquiring and rendering human skin*. *ACM Trans. Graphic.* (Proceedings of SIGGRAPH Asia 2008), 27(5):140:1–12, 2008
(Proceedings front cover)
- [8] W. Jarosz, **C. Donner**, M. Zwicker, and H. W. Jensen. *Radiance Caching for Participating Media*. *ACM Trans. Graphic.*, 27(1):1–11, 2008
- [9] S. G. Narasimhan, M. Gupta, **C. Donner**, R. Ramamoorthi, S. Nayar, and H. W. Jensen. *Acquiring scattering properties of participating media by dilution*. *ACM Trans. Graphic.* (Proceedings of SIGGRAPH 2006), 25:1003–1012, 2006
- [10] T. Weyrich, W. Matusik, H. Pfister, B. Bickel, **C. Donner**, C. Tu, J. McAndless, J. Lee, A. Ngan, H. W. Jensen, and M. Gross. *Analysis of human faces using a measurement-based skin reflectance model*. *ACM Trans. Graphic.* (Proceedings of SIGGRAPH 2006), 25:1013–1024, 2006
- [11] **C. Donner** and H. W. Jensen. *Light diffusion in multi-layered translucent materials*. *ACM Trans. Graphic.* (Proceedings of SIGGRAPH 2005), 24(3):1032–1039, 2005

Peer-Reviewed Conference Papers

- [12] **C. Donner** and H. W. Jensen. *Rendering translucent materials using photon diffusion*. In *Rendering Techniques (Proceedings of the Eurographics Symposium on Rendering)*, pages 243–251, 2007
- [13] **C. Donner** and H. W. Jensen. *A spectral BSSRDF for shading human skin*. In *Rendering Techniques (Proceedings of the Eurographics Symposium on Rendering)*, pages 409–417, 2006
- [14] T. J. Purcell, **C. Donner**, M. Cammarano, H. W. Jensen, and P. Hanrahan. *Photon mapping on programmable graphics hardware*. In *Graphics Hardware*, pages 41–50, 2003
(Proceedings front cover and awarded best paper of conference)

Other Publications

- [15] W. Jarosz, **C. Donner**, M. Zwicker, and H. W. Jensen. *Radiance Caching for Participating Media*. In *ACM SIGGRAPH Sketches and Applications*, 2007
- [16] **C. Donner**. *Towards Realistic Image Synthesis of Scattering Materials*. Ph.D. Dissertation, University of California at San Diego, 2006
- [17] **C. Donner** and H. W. Jensen. *A spectral shading model for human skin*. In *ACM SIGGRAPH Sketches and Applications*, 2006
- [18] B. Bickel, T. Weyrich, W. Matusik, H. Pfister, **C. Donner**, C. Tu, J. McAndless, J. Lee, A. Ngan, H. W. Jensen, and M. Gross. *Processing and editing of faces using a measurement-based skin reflectance model*. *ACM SIGGRAPH Sketches and Applications*, 2006
- [19] **C. Donner**. *Photon mapping methods on programmable graphics hardware*. Master's thesis, University of California at San Diego, 2004
- [20] **C. Donner** and H. W. Jensen. *Faster GPU computations using adaptive refinement*. In *ACM SIGGRAPH Sketches and Applications*, 2004

Teaching

ACM SIGGRAPH

SIGGRAPH 2009 Course, *Scattering*: Instructor

SIGGRAPH 2008 Course, *Advanced Global Illumination*: Guest Instructor

UNIVERSITY OF CALIFORNIA, SAN DIEGO

CSE 168, *Rendering Algorithms*, Spring 2004: Teaching Assistant/Lecturer

CSE 167, *Introduction to Computer Graphics*, Fall 2003: Teaching Assistant/Lecturer

CSE 190B, *Advanced Topics in Computer Science*, Spring 2002: Teaching Assistant/Lecturer

CSE 167, *Introduction to Computer Graphics*, Spring 2001: Teaching Assistant

CSE 167, *Introduction to Computer Graphics*, Spring 2000: Teaching Assistant

CSE 30, *Computer Architecture*, Fall 1998: Tutor/Teaching Assistant

Professional Activities

Technical Papers Committee Member: Eurographics Symposium on Rendering 2008, 2009, 2010, 2012, Eurographics 2012.

Reviewer: ACM SIGGRAPH, ACM Journal of Graphics Tools, ACM Transactions on Graphics, Computer Graphics Forum, Eurographics, Eurographics Symposium on Rendering, IEEE Transactions on Visualization and Computer Graphics, IEEE Computer Graphics and Applications, Journal of the Optical Society of America A, Optics Express, Optics Letters, Applied Optics.

Academic References

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