

## EDUCATION

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### Ph.D. in Computer Science

DECEMBER 2010

MAX-PLANCK INSTITUTE FOR COMPUTER SCIENCE, SAARBRÜCKEN, GERMANY

**Summa Cum Laude.** Advisors: Karol Myszkowski & Hans-Peter Seidel

Dissertation: *Human Visual System Models in Computer Graphics*

### M.S. in Computer Science

FEBRUARY 2005

GEORGIA INSTITUTE OF TECHNOLOGY, ATLANTA, USA

**High Honors.**

### B.S. in Civil Engineering

MAY 2003

İSTANBUL TECHNICAL UNIVERSITY, İSTANBUL, TURKEY

### Diploma in Natural Sciences and Mathematics

JUNE 1999

İSTANBUL HIGH SCHOOL, İSTANBUL, TURKEY

## RESEARCH SUMMARY

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My current research primarily focuses on image and video processing problems that address various movie production challenges, such as natural matting, green-screen keying, color grading, edge-aware filtering, and temporal coherence, among others. I have also been interested in analyzing visual content in terms of visual quality and aesthetic plausibility by utilizing knowledge of the human visual system. In my work I tend to utilize High Dynamic Range, Stereoscopic 3D, and High Frame-rate content, in addition to standard 8-bit images and videos.

## CURRENT POSITION

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### Research Scientist

DISNEY RESEARCH, ZÜRICH, SWITZERLAND

FEBRUARY 2015 – CURRENT

Responsibilities: Developing novel video processing technologies and transferring them to relevant business units within the Walt Disney Company. Supervising students, interns, and engineers.

## EMPLOYMENT HISTORY

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### Associate Research Scientist

DISNEY RESEARCH, ZÜRICH, SWITZERLAND

FEBRUARY 2013 – FEBRUARY 2015

### Post-Doctoral Researcher

DISNEY RESEARCH, ZÜRICH, SWITZERLAND

FEBRUARY 2011 – FEBRUARY 2013

### Researcher

MAX PLANCK INSTITUTE FOR COMPUTER SCIENCE, SAARBRÜCKEN, GERMANY

MAY 2006 – FEBRUARY 2011

### Software Engineer

TEKNOMAKS, İSTANBUL, TURKEY

MARCH 2005 – OCTOBER 2005

### Research Intern

TUBITAK (TURKISH NATIONAL RESEARCH COUNCIL), KOCAELI, TURKEY

SUMMER 2004

### Network Engineer (Part-time)

BTEGITIM, İSTANBUL, TURKEY

NOVEMBER 2002 – JULY 2003

## AWARDS

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### EUROGRAPHICS PhD Award

2012

"... for his strong and fundamental contributions in the area of high-dynamic-range (HDR) algorithms which are aware of the human vision system".

Full citation at: <https://www.eg.org/wp/phd-award/>

## FILM CREDITS

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**Lucid Dreams of Gabriel**, Credited as: *Researcher*

2014

**Planes: Fire & Rescue**, Credited as: *Research Scientist (Visual Effects)*

2014

## SKILLS

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**Coding:** Until recently I have been primarily using Matlab for prototyping research ideas, mixed with C++ and CUDA whenever performance became a limiting factor. More recently I have been gradually switching to a Python/ NumPy/ PyTorch workflow. Other than that I try to maintain a basic level of Lisp knowledge, mostly for customizing Spacemacs. For web-based side-projects I infrequently use Javascript and Jekyll/Liquid.

**Training/Seminars:** I attended various seminars and workshops on leadership and presentation skills during my Ph.D. studies that were offered at the local university. During my undergraduate studies I participated in the Cisco Networking Academy Program (2001-2003) and obtained a Cisco Certified Networking Professional certificate.

**Languages:** English (Fluent), German (Intermediate), Turkish (Native)

## PUBLIC SOFTWARE

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**Image and Video Quality Metrics Online** <http://metrics.mpi-inf.mpg.de/>

This web service provides a platform for running state-of-the-art automatic quality assessment metrics on user provided images and videos through a convenient web interface. The design and implementation of the system was done by a team led by me consisting of an intern and a Master's student. The website is currently being maintained by the Max Planck Institute for Computer Science.

## SUPERVISION

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Yağız Aksoy (PhD) – *Matting, Green-screen keying, Soft color segmentation*

Samir Mahmalat (PhD) – *HDR/WCG video*

Alexandre Chapiro (PhD) – *Stereoscopic 3D to multiview conversion, Continuous dynamic range video*

Daniel Saner (PhD) – *Video Color Grading*

Pelin Doğan (Master's) – *Video filtering, Scribble propagation*

Jonathan Gan (Master's) – *In progress*

Daniel Luginbühl (Bachelor's) – *Efficient chroma coding*

Raphael Weibel (Bachelor's) – *Visual camouflage and applications*

Andreas Enz (Bachelor's) – *Mobile HDR video*

Jingwei Tang (Bachelor's) – *In progress*

Lidia Freitas (Intern) – *Deep learning, Video Matting*

Jing Liu (Intern) – *Display chromatic calibration*

Paul Johnson (Intern) – *Visual saliency estimation*

Miguel Granados (Intern) – *Exposure fusion, alignment of multiple image exposures*

Simone Croci (Research Engineer) – *HDR video tone mapping, Film restoration, Video filtering*

## PUBLICATIONS

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### JOURNAL ARTICLES

- [1] Yağız Aksoy, **Tunç Ozan Aydın**, Marc Pollefeys. “Designing Effective Inter-Pixel Information Flow for Natural Image Matting”. *arXiv:1707.05055 [cs.CV]* 2017.
- [2] Yağız Aksoy, **Tunç Ozan Aydın**, Aljoša Smolič, Marc Pollefeys. “Unmixing-Based Soft Color Segmentation for Image Manipulation”. *ACM Transactions on Graphics (TOG)* 2017 (SIGGRAPH 2017). doi: 10.1145/3002176
- [3] Simone Croci, **Tunç Ozan Aydın**, Nikolce Stefanoski, Markus Gross, Aljoša Smolič. “Advanced Tools and Framework for Digital Film Restoration”. *Journal of Electronic Imaging* 2017. doi: 10.1117/1.JEI.26.1.011021
- [4] Yağız Aksoy, **Tunç Ozan Aydın**, Marc Pollefeys, Aljoša Smolič. “Interactive High-Quality Green-Screen Keying via Color Unmixing”. *ACM Transactions on Graphics (TOG)* 2016 (SIGGRAPH 2017). doi: 10.1145/2907940
- [5] Alexandre Chapiro, **Tunç Ozan Aydın**, Nikolce Stefanoski, Simone Croci, Aljoša Smolič, Markus Gross. “Art-directable Continuous Dynamic Range video”. *Computers and Graphics* 2015. doi: 10.1016/j.cag.2015.08.006
- [6] **Tunç Ozan Aydın**, Aljoša Smolič, Markus Gross. “Automated Aesthetic Analysis of Photographic Images”. *IEEE Transactions on Visualization and Computer Graphics (TVCG)* 2015. doi: 10.1109/TVCG.2014.2325047
- [7] **Tunç Ozan Aydın**, Nikolce Stefanoski, Simone Croci, Markus Gross, Aljoša Smolič. “Temporally Coherent Tone Mapping of HDR Video”. *ACM Transactions on Graphics (TOG)* 2014 (SIGGRAPH Asia 2014). doi: 10.1145/2661229.2661268
- [8] Alexandre Chapiro, Simon Heinzle, **Tunç Ozan Aydın**, Steven Poulakos, Matthias Zwicker, Aljoša Smolič, Markus Gross. “Optimizing Stereo-to-Multiview Conversion for Autostereoscopic Displays”. *Computer Graphics Forum (CGF)* 2014 (EUROGRAPHICS 2014). doi: 10.1111/cgf.12291
- [9] Manuel Lang, Oliver Wang, **Tunç Ozan Aydın**, Aljoša Smolič, Markus Gross. “Practical Temporal Consistency for Image-Based Graphics Applications”. *ACM Transactions on Graphics (TOG)* 2012 (SIGGRAPH 2012). doi: 10.1145/2185520.2185530
- [10] Robert Herzog, Martin Čadík, **Tunç Ozan Aydın**, Kwang In Kim, Karol Myszkowski, Hans-Peter Seidel. “NoRM: No-Reference Image Quality Metric for Realistic Image Synthesis”. *Computer Graphics Forum (CGF)* 2012 (EUROGRAPHICS 2012). doi: 10.1111/j.1467-8659.2012.03055.x
- [11] **Tunç Ozan Aydın**, Martin Čadík, Karol Myszkowski, Hans-Peter Seidel. “Video Quality Assessment for Computer Graphics Applications”. *ACM Transactions on Graphics (TOG)* 2010 (SIGGRAPH Asia 2010). doi: 10.1145/1882261.1866187
- [12] **Tunç Ozan Aydın**, Martin Čadík, Karol Myszkowski, Hans-Peter Seidel. “Visually Significant Edges”. *ACM Transactions on Applied Perception (TAP)* 2010 (Applied Perception in Graphics and Visualization 2010). doi: 10.1145/1823738.1823745
- [13] **Tunç Ozan Aydın**, Karol Myszkowski, Hans-Peter Seidel. “Predicting Display Visibility under Dynamically Changing Lighting Conditions”. *Computer Graphics Forum (CGF)* 2009 (EUROGRAPHICS 2009). doi: 10.1111/j.1467-8659.2009.01356.x
- [14] **Tunç Ozan Aydın**, Rafał Mantiuk, Karol Myszkowski, Hans-Peter Seidel. “Dynamic Range Independent Image Quality Assessment”. *ACM Transactions on Graphics (TOG)* 2008 (SIGGRAPH 2008). doi: 10.1145/1360612.1360668

### CONFERENCE PAPERS

- [15] Mattia Ryffel, Fabio Zünd, Yağız Aksoy, Alessia Marra, Maurizio Nitti, **Tunç Ozan Aydın**, Bob Sumner. “AR Museum: A Mobile Augmented Reality Application for Interactive Painting Recoloring”. *International Conference on Game and Entertainment Technologies* 2017.

- [16] Yağız Aksoy, **Tunç Ozan Aydın**, Marc Pollefeys. “Designing Effective Inter-Pixel Information Flow for Natural Image Matting”. *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)* 2017. doi: 10.1109/CVPR.2017.32
- [17] Samir Mahmalat, Nikolce Stefanoski, Daniel Luginbühl, **Tunç Ozan Aydın**, Aljoša Smolič. “Luminance Independent Chromaticity Preprocessing for HDR Video Coding”. *IEEE International Conference on Image Processing (ICIP)* 2016. doi: 10.1109/ICIP.2016.7532586
- [18] Simone Croci, **Tunç Ozan Aydın**, Nikolce Stefanoski, Markus Gross, Aljoša Smolič. “Real-time Temporally Coherent Local HDR Tone Mapping”. *IEEE International Conference on Image Processing (ICIP)* 2016. doi: 10.1109/ICIP.2016.7532485
- [19] Pelin Doğan, **Tunç Ozan Aydın**, Nikolce Stefanoski, Aljoša Smolič. “Key-frame Based Spatiotemporal Scribble Propagation”. *Proceedings of the Eurographics Workshop on Intelligent Cinematography and Editing (WICED)* 2015. doi: 10.2312/wiced.20151073
- [20] Steven Poulakos, Rafael Monroy, **Tunç Ozan Aydın**, Oliver Wang, Aljoša Smolič, Markus Gross. “A Computational Model for Perception of Stereoscopic Window Violations”. *International Workshop on Quality of Multimedia Experience (QoMEX)* 2015. doi: 10.1109/QoMEX.2015.7148125
- [21] Jing Liu, Nikolce Stefanoski, **Tunç Ozan Aydın**, Anselm Grundhöfer, Aljoša Smolič. “Chromatic Calibration of an HDR Display Using 3D Octree Forests”. *IEEE International Conference on Image Processing (ICIP)* 2015. doi: 10.1109/ICIP.2015.7351621
- [22] Miguel Granados, **Tunç Ozan Aydın**, J. Rafael Tena, Jean-Francois Lalonde, Christian Theobalt. “HDR Image Noise Estimation for Denoising Tone Mapped Images”. *Conference on Visual Media Production (CVMP)* 2015. doi: 10.1145/2824840.2824847
- [23] Miguel Granados, **Tunç Ozan Aydın**, J. Rafael Tena, Jean-Francois Lalonde, Christian Theobalt. “Contrast-Use Metrics for Tone Mapping Images”. *IEEE International Conference on Computational Photography (ICCP)* 2015. doi: 10.1109/ICCPHOT.2015.7168364
- [24] Martin Čadík, **Tunç Ozan Aydın**, Karol Myszkowski, Hans-Peter Seidel. “On Evaluation of Video Quality Metrics: an HDR Dataset for Computer Graphics Applications”. *Proc. of SPIE, Human Vision and Electronic Imaging* 2011. doi: 10.1117/12.878875
- [25] Dawid Pająk, Martin Čadík, **Tunç Ozan Aydın**, Makoto Okabe, Karol Myszkowski, Hans-Peter Seidel. “Contrast Prescription for Multiscale Image Editing”. *The Visual Computer* 2010. doi: 10.1007/s00371-010-0485-3
- [26] Dawid Pająk, Martin Čadík, **Tunç Ozan Aydın**, Karol Myszkowski, Hans-Peter Seidel. “Visual Maladaptation in Contrast Domain”. *Proc. of SPIE, Human Vision and Electronic Imaging* 2010. doi: 10.1117/12.844934
- [27] **Tunç Ozan Aydın**, Rafał Mantiuk, Hans-Peter Seidel. “Extending Quality Metrics to Full Dynamic Range Images”. *Proc. of SPIE, Human Vision and Electronic Imaging* 2008. doi: 10.1117/12.765095

#### BOOK CHAPTERS

- [28] Martin Čadík, **Tunç Ozan Aydın**. “High Dynamic Range Video - Chapter 5: Video Metrics”. 2017. doi: 10.1016/B978-0-12-809477-8.00005-4
- [29] Alessandro Artusi, Francesco Banterle, **Tunç Ozan Aydın**, Daniele Panozzo, Olga Sorkine-Hornung. “Image Content Retargeting: Maintaining Color, Tone, and Spatial Consistency”. 2016. doi: 10.1201/9781315372624-3

#### REFEREED COURSES

- [30] Francesco Banterle, Alessandro Artusi, **Tunç Ozan Aydın**, Piotr Didyk, Elmar Eisemann, Diego Gutierrez, Rafał Mantiuk, Karol Myszkowski, Tobias Ritschel. “Mapping Images to Target Devices: Spatial, Temporal, Stereo, Tone, and Color”. *EUROGRAPHICS Tutorials* 2012. doi: 10.2312/conf/EG2012/tutorials/t1

[31] Francesco Banterle, Alessandro Artusi, **Tunç Ozan Aydın**, Piotr Didyk, Elmar Eisemann, Diego Gutierrez, Rafał Mantiuk, Karol Myszkowski. “Multidimensional Image Retargeting”. *SIGGRAPH Asia Courses* 2011. doi: 10.1145/2077434.2077447

## THESES

[32] **Tunç Ozan Aydın**. “Human Visual System Models in Computer Graphics”. *PhD Thesis* 2011. doi: 10.2312/8235

## PATENTS

[33] **Tunç Ozan Aydın**, Nikolce Stefanoski, Aljoša Smolič, Mark Arana. “Saliency-weighted video quality assessment”. 2017. Patent: US20170154415 A1 <https://www.google.com/patents/US20170154415A1>

[34] Daniel Luginbühl, Nikolce Stefanoski, **Tunç Ozan Aydın**, Aljoša Smolič. “Perceptual color transformations for wide color gamut video coding”. 2016. Patent: US20160323556 A1 <https://www.google.com/patents/US20160323556A1>

[35] **Tunç Ozan Aydın**, Simone Croci, Nikolce Stefanoski, Aljoša Smolič. “High Dynamic Range Tone Mapping”. 2015. Patent: US20170070719 A1 <https://www.google.com/patents/US20170070719A1>

[36] Alexandre Chapiro, **Tunç Ozan Aydın**, Nikolce Stefanoski, Simone Croci, Aljoša Smolič, Markus Gross. “Methods for Creating and Distributing Art-Directable Continuous Dynamic Range Video”. 2015. Patent: US20160353164 A1 <https://www.google.com/patents/US20160353164A1>

[37] **Tunç Ozan Aydın**, Aljoša Smolič, Nikolce Stefanoski, Jing Liu, Anselm Grundhöfer. “Chromatic Calibration of an HDR Display Using 3D Octree Forests”. 2015. Patent: US20160225342 A1 <https://www.google.com/patents/US20160225342A1>

[38] Miguel Granados, J. Rafael Tena, **Tunç Ozan Aydın**, Jean-Francois Lalonde, Christian Theobalt, Iain Matthews. “High Dynamic Range and Tone Mapping Imaging Techniques”. 2014. Patent: US9275445 B2 <https://www.google.com/patents/US9275445B2>

[39] **Tunç Ozan Aydın**, Simone Croci, Aljoša Smolič, Nikolce Stefanoski, Markus Gross. “Temporally Coherent Local Tone Mapping of High Dynamic Range Video”. 2014. Patent: US9378543 B2 <https://www.google.com/patents/US9378543B2>

[40] Alexandre Chapiro, **Tunç Ozan Aydın**, Steven Poulakos, Simon Heinzle, Aljoša Smolič. “Depth Modification for Display Applications”. 2014. Patent: US20150348273 A1 <https://www.google.com/patents/US20150348273A1>

[41] **Tunç Ozan Aydın**, Aljoša Smolič. “Image Aesthetic Signatures”. 2012. Patent: US9013497 B2 <https://www.google.com/patents/US9013497B2>

## ACADEMIC SERVICE

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### COURSES & INVITED TALKS

Extracting Transparent Image Layers for High-quality Compositing, INVITED TALKS ON VISION, GRAPHICS, AND SPEECH, FACULTY OF INFORMATION TECHNOLOGY, BRNO UNIVERSITY OF TECHNOLOGY (2017)

New Methods for Visual Content Creation, SIGNAL AND IMAGE PROCESSING DAYS, ANKARA, TURKEY (2017)

Advanced Methods in Computer Graphics, ETH ZÜRICH GRADUATE COURSE (2013, 2016)

Mapping Images to Target Devices: Spatial, Temporal, Stereo, Tone, and Color, EUROGRAPHICS TUTORIALS (2012)

Human Visual System Models in Computer Graphics, NVIDIA, SANTA CLARA, CA, USA (2012)

Multidimensional Image Retargeting, SIGGRAPH ASIA COURSES (2011)

Human Visual System Models in Computer Graphics, ETH ZÜRICH, SWITZERLAND (2010)

Image Quality Assessment, SHARP LABORATORIES OF AMERICA, PORTLAND, OR, USA (2009)

Image Quality Assessment in High Dynamic Range, MPI INFORMATIK, SAARBRÜCKEN, GERMANY (2007)

## COMMITTEES

Expressive - Symposium on Computational Aesthetics, Sketch-Based Interfaces and Modeling, Non-Photorealistic Animation and Rendering, Program Chair (2018)

ACM Symposium on Applied Perception (SAP), Program Committee (2012, 2013, 2015, 2017)

Eurographics 2011 HDR Area Program, Papers Chair (2011)

ACM Symposium on Applied Perception in Graphics and Visualization (APGV), Program Committee (2011)

## REVIEWER (SELECT)

*Journals:* ACM Transactions on Graphics (TOG), ACM Transactions on Applied Perception (TAP), IEEE Transactions on Visualization and Computer Graphics (TVCG), Computer Graphics Forum (CGF), IEEE Transactions on Image Processing (TIP), IEEE Transactions on Multimedia, IEEE Transactions on Affective Computing, Journal of Electronic Imaging

*Conferences:* ACM SIGGRAPH, ACM SIGGRAPH Asia, IEEE Conference on Computer Vision and Pattern Recognition (CVPR), EUROGRAPHICS, ACM Symposium on Applied Perception (SAP)

*Grants:* Vienna Science and Technology Fund (WWTF)

## PRESS & MEDIA COVERAGE

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“This Disney AR app could be a stealth play for smart coloring books”. *TechCrunch*

<https://techcrunch.com/2017/08/23/this-disney-ar-app-could-be-a-stealth-play-for-smart-coloring-books/>

“Disney Algorithm Makes Green-Screen Visual Effects Even Easier”. *Gizmodo UK*

<http://www.gizmodo.co.uk/2016/11/disney-algorithm-makes-green-screen-visual-effects-even-easier/>

“Disney Research Creates Keying Algorithm, AI See ’n Say”. *TVTechnology*

<http://www.tvtechnology.com/news/0002/disney-research-creates-keying-algorithm-ai-see-n-say/279853>

“Green-screen keying method cuts time, boosts quality in film compositing”. *phys.org*

<https://phys.org/news/2016-11-green-screen-keying-method-boosts-quality.html>

“Interactive Green-screen Keying”. *Two Minute Papers*

<https://www.youtube.com/watch?v=343n8xwozJI>

“Disney Research makes HDR videos work better on regular TVs”. *engadget*

<https://www.engadget.com/2014/12/05/disney-research-hdr-video/>

“Disney Engineers Invented a Groundbreaking Method for Processing HDR Video”. *NoFilmSchool*

<http://nofilmschool.com/2014/12/disney-engineers-invented-groundbreaking-method-processing-hdr-video>

“Disney’s Local Tone Mapping Technique Gives HDR Video Finer Detail”. *NDTV*

<http://gadgets.ndtv.com/cameras/news/disneys-local-tone-mapping-technique-gives-hdr-video-finer-detail-630832>

“Natural HDR In Films – Disney’s New Algorithm Is Taking Us One Step Closer”. *DIY Photography*

<http://www.diyphotography.net/natural-hdr-films-disneys-new-algorithm-taking-us-one-step-closer>

“Ghost busting HDR”. *IBC Daily (Sept. 13, 2015)*

[http://zurich.disneyresearch.com/tyaydin/\\_resources/media/ibc\\_vtm.jpg](http://zurich.disneyresearch.com/tyaydin/_resources/media/ibc_vtm.jpg)

“Tone mapping technique creates ’hyper-real’ look”. *phys.org*

<https://phys.org/news/2014-12-tone-technique-hyper-real.html>

“Tone Mapping Quality Evaluation”. *hdrlabs*

<http://www.hdrlabs.com/news/index.php?published-max=2008-09-11T22%3A09%3A00.000-07%3A00>