Disney Research Zürich
Stampfenbachstrasse 48
8006 Zürich Switzerland

Tunç Aydın

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Curriculum Vitae

Education

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

Summary

I currently lead research project teams addressing specific technology needs of the live-action studio segments of the Walt Disney Company. My research primarily focuses on developing new machine learning approaches that address various image and video processing problems relevant to the challenges of movie post-production. I also have a background in analyzing visual content in terms of visual quality and aesthetic plausibility by utilizing knowledge of the human visual system.

Current Position

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

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, Istanbul, Turkey — November 2002 – July 2003

Awards

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

Lucid Dreams of Gabriel, Credited as: *Researcher* 2014
Planes: Fire & Rescue, Credited as: *Research Scientist (Visual Effects)* 2014

Skills

Coding: Currently I mostly use Python/Tensorflow for prototyping research ideas. In the past I have been using Matlab, mixed with C++ and CUDA whenever performance became a limiting factor. Other than that I try to maintain a basic level of Lisp knowledge, mostly for customizing my Emacs. 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

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

Yağız Aksoy (PhD) – *Matting, Green-screen keying, Soft color segmentation*
Samir Mahmalat (PhD) – *HDR/WCG video*
Alexandre Chapiro (PhD) – *Stereoscopic 3D to multiview conversion, Continious dynamic range video*
Daniel Saner (PhD) – *Video Color Grading*
Pelin Doğan (Master's) – *Video filtering, Scribble propagation*
Jonathan Gan (Master's) – *Deep deblurring using Burst Photographs*
Jingwei Tang (Master's) – *Learning-based Sampling for Matting*
Vojtech Kabelka (Master's) – *Ongoing - Reinforcement Learning based Image Restoration*
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*
Lídia 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*
Yang Zhang (Associate Research Scientist) – *SDR to HDR Conversion*

Publications

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] Jingwei Tang, Yağız Aksoy, Cengiz Öztireli, Markus Gross, **Tunç Ozan Aydın**. "Learning-based Sampling for Natural Image Matting". *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)* 2019.

[16] 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.

[17] 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

[18] 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

[19] 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

[20] 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

[21] 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

[22] 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

[23] 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

[24] 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

[25] 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

[26] 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

[27] 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

[28] **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

[29] Martin Čadík, **Tunç Ozan Aydın**. "High Dynamic Range Video - Chapter 5: Video Metrics". 2017. doi: 10.1016/B978-0-12-809477-8.00005-4

[30] 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

[31] 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

[32] 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

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

Patents

[34] Samir Mahmalat, Tunç Aydın, Aljoša Smolič. "Pipeline for high dynamic range video coding based on luminance independent chromaticity preprocessing". 2019. Patent: US10462334 B2 https://www.google.com/patents/US10462334B2

[35] Samir Mahmalat, Tunç Aydın, Aljoša Smolič. "Luminance Comfort Prediction and Adjustment". 2019. Patent: US10380973 B2 https://www.google.com/patents/US10380973B2

[36] Alexandre Chapiro, **Tunç Ozan Aydın**, Nikolce Stefanoski, Simone Croci, Aljoša Smolič, Markus Gross. "Methods for Creating and Distributing Art-Directable Continious Dynamic Range Video". 2019. Patent: US20160353164 A1 https://www.google.com/patents/US20160353164A1

[37] Miquel Angel Farre Guiu, Aljoša Smolič, Marc Junyent Martin, Asier Aduriz, Tunç Aydın, Christopher Eich. "Thumbnail generation for video". 2018. Patent: US20180197577 A1 https://www.google.com/patents/US20180197577A1

[38] Tunç Aydın, Florian Scheidegger, Michael Schaffner, Lukas Cavigelli, Luca Benini, Aljoša Smolič. "Edge-aware spatio-temporal filtering and optical flow estimation in real time". 2018. Patent: US20180324465 A1 https://www.google.com/patents/US20180324465A1

[39] Alexandre Chapiro, **Tunç Ozan Aydın**, Steven Poulakos, Simon Heinzle, Aljoša Smolič. "Depth Modification for Display Applications". 2018. Patent: US20150348273 A1 https://www.google.com/patents/US20150348273A1

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

[41] 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

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

[43] **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

[44] 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

[45] **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

[46] **Tunç Ozan Aydın**, Aljoša Smolič. "Image Aesthetic Signatures". 2012. Patent: US9013497 B2 https://www.google.com/patents/US9013497B2

Academic Service

Courses & Invited Talks

Mathematical Foundations of Computer Graphics and Vision (Guest Lecture), ETH Zürich Graduate Course (2017, 2018)

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

International Conference on Computer Graphics and Applications (Pacific Graphics), Papers Chair (2019)

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, 2019)

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

"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/~aydin/_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