



Alexandre Chapiro

I am interested in perception and computer graphics, especially anything involving computational display and psychophysics. Prior work involved perceptual metrics, brightness and color, stereo 3D, and display topics like virtual and augmented reality, frame rate, high dynamic range, and more.

Professional Experience

2025-now **Meta Reality Labs | Imaging Experiences Architecture Team**

Sr. Staff Researcher Leading perception-first architecture, development, and strategy for hardware and software for Meta displays. Driving the industry forward via standards & publications.

2023-2025 **Meta Reality Labs | Applied Perception Science Team**

Staff Technical lead working on a range of product-oriented research projects. Perception-first focus for hardware and algorithm design.
Researcher

2020-2023 -

Senior Researcher Advance understanding of perception through targeted research and publications.
Apply learnings to product paths, work cross-functionally to support product needs

2018-2020 **Apple Inc., Cupertino | Core Display Incubation Team**

Senior Display Engineer Helped identify and cultivate future display technologies and associated experiences to surprise and delight Apple product users

2017-2018 **Dolby Laboratories | Applied Vision Science Group**

Researcher Conducted research and obtained experimental results on perceptual factors, mainly focusing on cinema and home theater applications

2016-2016 -

Intern Conducted research on the human visual system guided by business unit needs

2011-2016 **Disney Research, Zurich | Stereo and Displays Group**

Student Researcher In parallel with my doctoral studies, worked on industry display and perception topics resulting in four patent applications and several publications

Education

2011-2015 **PhD in Computer Science | Computer Graphics Laboratory**

institution Federal Institute of Technology Zurich (ETHZ), Zurich, Switzerland

thesis title *Perceptual Enhancements for Novel Displays*

supervisors Prof. Markus Gross. Co-Advisor: Dr. Aljoša Smolić

2010-2011	Masters' Degree in Applied Mathematics Visgraf Laboratory
institution	Institute of Pure and Applied Mathematics (IMPA), Rio de Janeiro, Brazil
thesis title	<i>Improving Mobile Video</i>
supervisors	Prof. Paulo Cezar Pinto Carvalho. Co-Advisor: Prof. Luiz Velho
2007–2009	Undergraduate Degree in Mathematics
institution	Federal University of Juiz de Fora (UFJF), Juiz de Fora, Brazil
thesis title	<i>An Introduction to Degree Theory</i>
supervisors	Prof. Luiz Faria, Marcelo Bernardes Vieira

Mentorship

- 2025** Intern manager for Yunxiang Zhang (New York University)
Ongoing
- 2024** Returning intern manager for Kenneth Chen (New York University)
Resulting in a SIGGRAPH 2025 paper
- 2023** Intern manager for Kenneth Chen (New York University)
Resulting in a SIGGRAPH 2024 paper, best paper award honorable mention
- 2022** Intern manager for Taimoor Tariq (University of Lugano)
Resulting in a SIGGRAPH Asia 2023 paper
- 2021** Intern manager for Krzysztof Wolski (Max-Plank Institut)
Resulting in a SIGGRAPH Asia 2022 paper

Standards

Document Editor	2025 SMPTE 10E-ST2144-Visible Difference Predictors: A Class of Perceptual-Based Metrics (in development)
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Academic Service

Chairing	2026 IS&T HVEI, conference co-chair 2023 ACM Symposium on Applied Perception, conference program co-chair
Organizing	2025 IS&T HVEI, Perception in Augmented/Virtual/360° Env., session chair 2024 IS&T HVEI, Perception of XR session co-chair 2023 ACM Transactions on Applied Perception, journal special edition guest editor 2023 IS&T HVEI, AR/VR special session co-chair
Coordination	2025 SIGGRAPH Asia Conflict of Interest Coordinator 2025 SMPTE Journal Award Committee
Defenses	2025 Doctoral dissertation committee for Sandeep Mishra (UT Austin, ongoing) 2024 Doctoral dissertation committee for Avinab Saha (UT Austin)
Conference committees	<i>Eurographics IPC (2025, 2024), IS&T HVEI IPC (2025, 2024, 2023), SIBGRAPI Journal Track IPC (2025, 2021, 2019), SIBGRAPI IPC (2018)</i>

Reviewing *SIGGRAPH* (2025, 2024, 2023, 2022, 2021, 2019, 2017, 2015), *SIGGRAPH Asia* (2024, 2022, 2016, 2015), *Transactions on Graphics* (2023), *Eurographics* (2025, 2024, 2020, 2019, 2018), *Nature Scientific Reports* (2025), *HVEI* (2026, 2025, 2024, 2023), *Transactions on Applied Perception* (2025, 2024), *IEEE TVCG* (2022, 2015), *IEEE TIP* (2020, 2019, 2017, 2016), *SIBGRAPI* (2021, 2019, 2018), *Pacific Graphics* (2017, 2014), *Graphics Interface* (2016), *JOSA* (2016), *ICIP* (2015), *IEEE CG&A* (2015), *CG Forum* (2014), *3DV* (2012)

Invited Talks, Panels, and Presentations

- panel **Industry Panel on Human Factors in Imaging.**
discussion: Optica Imaging and Applied Optics Congress 2025, Seattle/USA, invited by Francisco Imai
invited talk: **Predicting Visible Differences in Virtual and Augmented Reality.**
Optica Imaging and Applied Optics Congress 2025, Seattle/USA, invited by Francisco Imai
keynote **Predicting Visible Differences in Virtual and Augmented Reality.**
presentation: IS&T HVEI 2025, Burlingame/USA, invited by Damon Chandler and Rafal Mantiuk
invited talk: **Visible Difference Predictors: Metrics Based on Perception Science.**
Display Week 2024, San Jose/USA, invited by William Klein and David Hoffman
invited talk: **Visible Difference Predictors: Metrics Based on Perception Science.**
Frontiers in Optics 2023, Tacoma/USA, invited by Kaan Akşit and Douglas Lanman
panel **Best Practices for Assessing Quality in Near-Eye Displays.**
discussion: SPIE Photonics West 2023, San Francisco/USA, hosted by Ryan Ong
invited talk: **Perceptual Modeling for AR/VR Applications.**
IS&T Imaging for XR workshop 2023, San Francisco/USA, hosted by Bennett Wilburn
panel **XR Display Visual Quality.**
discussion: IS&T Imaging for XR workshop 2023, San Francisco/USA, hosted by Abhijit Sarkar
panel **Special session on AR/VR.**
discussion: IS&T HVEI 2023, San Francisco/USA, hosted by Nicko Caluya
paper talk: **Critical Flicker Frequency (CFF) at high luminance levels.**
IS&T HVEI 2023, San Francisco/USA (featured in EI 2023 highlights)
paper talk: **Realistic Luminance in VR.**
SIGGRAPH Asia 2022, Daegu/South Korea
invited talk: **VR-HDR.**
Frontiers in Optics 2022, Rochester/USA, invited by Kaan Akşit and Douglas Lanman
invited talk: **Echoes of SIGGRAPH'20.**
IMPA 2020, Rio de Janeiro/Brazil, hosted by Luiz Velho
paper talk: **A Luminance-Aware Model of Judder Perception.**
SIGGRAPH 2020, online conference
invited talk: **Perceptual Enhancements for Novel Displays.**
TU Delft 2019, Delft/Netherlands, hosted by Elmar Eisemann
invited talk: **Cinematic Motion.**
NAB show 2018, Las Vegas/USA, invited by Jaclyn Pytlarz

- invited talk: **Perceptual Enhancements for Novel Displays.**
 IBM 2017, Rio de Janeiro/Brazil, hosted by Emilio Vital Brazil
- invited talk: **Computer Graphics, (popular lecture).**
 IF Sudeste MG 2017, Juiz de Fora/Brazil, hosted by Elena Konstantinova
- invited talk: **Computer Graphics, (popular lecture).**
 IF Sudeste MG 2016, Rio Pomba/Brazil, hosted by Lucas Lattari
- invited talk: **Perceptual Enhancements for Novel Displays.**
 Dolby Laboratories 2016, Sunnyvale/USA, hosted by Timo Kunkel
- invited talk: **Perceptual Enhancements for Novel Displays.**
 Technicolor 2015, Rennes/France, hosted by Erik Reinhard
- invited talk: **Perceptual Enhancements for 3D Displays.**
 Max Planck Institut 2015, Saarbrucken/Germany, hosted by Piotr Didyk
- paper talk: **Stereo from Shading.**
 EGSR 2015, Darmstadt/Germany
- paper talk: **Perceptual Evaluation of Cardboarding in 3D Content Visualization.**
 SAP 2015, Vancouver/Canada
- paper talk: **Optimizing Stereo-to-Multiview Conv. for Autostereo. Displays.**
 Eurographics 2015, Strasbourg/France

Publications

Resolution limit of the eye: how many pixels can we see?

Nature Communications 2025

Ashraf, Chapiro, Mantiuk

Supra-threshold Contrast Perception in Augmented Reality

SIGGRAPH Asia 2025, conference track

Kim, Ashraf, Chapiro, Mantiuk

Training Neural Networks on RAW and HDR Images for Restoration Tasks

NTIRE 2025

Ke, Luo, Xiang, Fan, Ranjan, Chapiro, Mantiuk

What is HDR? Perceptual Impact of Luminance and Contrast

SIGGRAPH 2025, conference track

Chen, Matsuda, McElvain, Zhao, Wan, Sun*, Chapiro* (* = equal contribution)

FaceExpressions-70k: A Dataset of Perceived Expression Differences

SIGGRAPH 2025, conference track

Saha, Chen, Bazin, Hane, Katsavounidis, Chapiro, Bovik

Subjective and Objective Quality Assessment of Rendered Human Avatar Videos in VR

Transactions on Image Processing 2024

Chen, Saha, Chapiro, Hane, Bazin, Qiu, Zanetti, Katsavounidis, Bovik

FaceMap: Distortion-Driven Perceptual Facial Saliency Maps

SIGGRAPH Asia 2024, conference track

Jiang, Venkateshan, Nam, Chen, Bachy, Bazin, Chapiro

AR-DAVID: Augmented Reality Display Artifact Video Dataset

SIGGRAPH Asia 2024, journal track [**Best paper award honorable mention**]

Chapiro, Kim, Asano, Mantiuk

ColorVideoVDP: A visual difference predictor for image, video and display distortions

SIGGRAPH 2024, journal track

Mantiuk, Hanji, Ashraf, Asano, Chapiro

PEA-PODs: Perceptual Evaluation of Algorithms for Power Optimization in XR Displays

SIGGRAPH 2024, journal track [**Best paper award honorable mention**]

Chen, Wan, Matsuda, Ninan, Chapiro*, Sun* (* = equal contribution)

castleCSF - A Contrast Sensitivity Function of Color, Area, Spatio-Temporal Frequency, Luminance and Eccentricity

Journal of Vision, 2024,

Ashraf, Mantiuk, Chapiro, Wuergler

Perceptually Adaptive Real-Time Tone Mapping

SIGGRAPH Asia, 2023, conference track

Tariq, Matsuda, Penner, Jia, Lanman, Ninan, Chapiro

Skin-Screen: A Computational Fabrication Framework for Color Tattoos

SIGGRAPH 2023, journal track

Piovarci, Chapiro, Bickel

Critical Flicker Frequency (CFF) at High Luminance Levels

IST Human Vision and Electronic Imaging (HVEI), 2022

Chapiro, Matsuda, Ashraf, Mantiuk

Modelling Contrast Sensitivity of Discs

IST Human Vision and Electronic Imaging (HVEI), 2022

Ashraf, Mantiuk, Chapiro

Geo-metric: A Perceptual Dataset of Distortions on Faces

SIGGRAPH Asia 2022, journal track

Wolski, Trutoiu, Dong, Shen, MacKenzie, Chapiro

Realistic Luminance in VR,

SIGGRAPH Asia 2022, conference track

Matsuda*, Chapiro*, Zhao, Smith, Bachy, Lanman (* = equal contribution)

stelaCSF-A Unified Model of Contrast Sensitivity as the Function of Spatio-Temporal Frequency, Eccentricity, Luminance and Area,
SIGGRAPH 2022, journal track
Mantiuk, Ashraf, Chapiro

FovVideoVDP: A visible difference predictor for wide field-of-view video
SIGGRAPH 2021, journal track
Mantiuk, Denes, Chapiro, Kaplanyan, Rufo, Bachy, Lian, Patney

A Luminance-Aware Model of Judder Perception,
ACM Transactions on Graphics, Presented at SIGGRAPH 2020
Chapiro, Atkins, Daly

Influence of Screen Size and Field of View on Perceived Brightness
ACM Transactions on Applied Perception (TAP) , 2018
Chapiro, Kunkel, Atkins, Daly

Unfolding the 8-bit Era,
European Conference on Visual Media Production 2015
Zund, Berard, Chapiro, Schmid, Ryffel, Bermano, Gross, Sumner

Art-Directable Continuous Dynamic Range Video
Computers & Graphics, Elsevier, 2015
Chapiro, Aydin, Stefanoski, Croci, Smolic, Gross

Video Content and Structure Description Based on Keyframes, Clusters and Storyboards
IEEE International Workshop on Multimedia Signal Processing, Xiamen-China, 2015
Junyent, Beltran, Farre, Pont-Tuset, Chapiro, Smolic

Stereo from Shading
Eurographics Symposium on Rendering, Darmstadt-Germany, 2015, E&I track
Chapiro, O'Sullivan, Jarosz, Gross, Smolic

Perceptual Evaluation of Cardboarding in 3D Content Visualization,
ACM Symposium on Applied Perception, Vancouver-Canada, 2014, short paper
Chapiro, Diamanti, Poulakos, O'Sullivan, Smolic, Gross

Optimizing Stereo-to-Multiview Conversion for Autostereoscopic Displays
Eurographics, Strasbourg-France, 2014
Chapiro, Heinze, Aydin, Poulakos, Zwicker, Smolic, Gross

Towards Mobile HDR Video,
Eurographics, Llandudno-UK, 2011. (Extended abstract)
Castro, Chapiro, Cicconet, Velho

Detection of High Frequency Regions in Multiresolution

International Conference on Image Processing, Cairo-Egypt, 2009
Mota, Perez, Castro, Chapiro, Vieira

High Frequency Assessment from Multiresolution Analysis

International Conference on Computational Science, Baton Rouge-USA, 2009
Castro, Perez, Mota, Chapiro, Vieira, Freire

Other

Visible Difference Predictors: A Class of Perception-Based Metrics

SID Display Week 2024, invited paper
Chapiro, Hanji, Ashraf, Asano, Mantiuk

HDR VR

E-tech demo, SIGGRAPH 2022 [**Best-in-show award**]
Matsuda, Zhao, Chapiro, Smith, Lanman

Image Domain Warping for Advanced 3D Video Applications

IEEE COMSOC MMTC E - Letter, 2014, invited letter
Smolic, Wang, Lang, Stefanoski, Farre, Greisen, Heinze, Schaffner, Chapiro, Sorkine-Hornung, Gross

Computational Photography

IMPA, Rio de Janeiro-Brazil, 2011, technical report
Castro, Chapiro, Velho

Posters

Influence of Visual Salience on Video Consumption Behavior A Survival Analysis Approach

ACM Web Science, Oxford-United Kingdom, 2015
Huber, Scheibehenne, Chapiro, Frey, Sumner

Filter Based Deghosting for Exposure Fusion Video

SIGGRAPH, Vancouver-Canada, 2011. *Student Research Competition Semi-Finalist*
Chapiro, Cicconet, Velho

Towards Mobile HDR Video

International Conference on Computational Photography, Pittsburg-USA, 2011
Castro, Chapiro, Cicconet, Velho

Mountain's Pass Theorem

Minas-Gerais Meeting of Partial Diferential Equations, Itajuba-Brazil, 2009
Chapiro, Pereira

Patents

Perceptual algorithms and design interface to save display power

US Patent US20250199750 A1, 2025

Chapiro, Chen, Ninan, Bachy, Hillis, Wan, Matsuda

Controllable aperture projection for waveguide display

US Patent US20250067982 A1, 2025

Jang, Hu, Yao, Yang, Ninan, Chapiro

Eye tracking based on vergence

US Patent US12056276 B1, 2024

Chapiro, Ninan

Authentic Eye Region Capture through Artificial Reality Headset

US Patent 20240073376 A1, 2024

Bazin, Chapiro

Eyewear with display-optimized lenses

US Patent US11803060 B1, 2023

Wilburn, Moisant-Thompson, Chapiro, Hunter, Lyngnes, Bonnier

Electronic devices with color sampling sensors

US Patent US11735126 B1, 2023

Roland, Bonnier, Chapiro, Doyle, Lestoquoy, Moisant-Thompson

Peripheral luminance or color remapping for power saving

US Patent US0011858 A1, 2022

Yang, Chapiro, Agaoglu, Bonnier, Huang, Wang, Watson, Mascarenhas

Frame rate conversion metadata

US Patent US11019302 B2, 2020

Pytlarz, Atkins, Pieri, Chapiro, Daly

Luminance adaption to minimize discomfort and improve visibility

US Patent US 20200202814 A1, 2020

Chapiro, Atkins, Daly

Virtual reality cinema-immersive movie watching for headmounted displays

US Patent US10769754 B2, 2020

Chapiro, Atluru, Chun, Haricharan, Rozzi, Ruggieri, Ninan

Systems and methods for automatic key frame extraction and storyboard interface generation for video

US Patent US9552520 B1, 2017

Smolic, Martin, Pont-Tuset, Chapiro, Guiu

Methods for creating and distributing art-directable continuous dynamic range video

US Patent US20160353164 A1, 2016

Smolic, Chapiro, Croci, Aydin, Stefanoski, Gross

Visual salience of online video as a predictor of success

US Patent US20170061235 A1, 2015

Frey, Accardo, Sumner, Huber, Chapiro

Depth modification for display applications

US Patent US20150348273 A1, 2015

Chapiro, Aydin, Poulakos, Heinze, Smolic

Six additional patent applications currently in review

Languages

Portuguese	Fluent	Native speaker
Russian	Fluent	Native speaker
English	Fluent	TOEFL iBT 117/120, Cambridge FCE and CAE exams with A grades
Spanish	Fluent	3 years of school in Spain
French	Advanced	Alliance Française DELF diplome - 2005

Teaching

- Nov.2024 **Invited Lecture**, *Computer Graphics - Color and Perception*, NYU.
Hosted by Prof. Qi Sun
- Nov.2019 **Invited Lecture**, *Computer Graphics - Color and Perception*, TU Delft.
Hosted by Prof. Elmar Eisemann
- 2014 & 2015 **Teaching assistant**, *Math. Foundations of Computer Graphics and Vision*, ETHZ.
Graduate class teaching mathematical techniques in visual computing
- 2012 & 2013 **Teaching assistant**, *Informatik 1*, ETHZ.
Undergraduate class teaching fundaments of informatics to engineering students

Academic Honors As a Student

- 2015 Second youngest PhD to ever graduate from the CS department at ETH Zurich
- 2011 Finished 2-year Master's program at IMPA in 18 months
- 2009 Finished 4-year undergraduate program in Mathematics at the Federal University of Juiz de Fora in 3 years with the highest GPA in the graduating class
- 2007 Ranked 1st in admission exam, Mathematics, Federal University of Juiz de Fora
- 2006 Gold Medalist, Brazilian Astronomy Olympiad
- 2006 Gold Medalist, Brazilian Mathematics Olympiad for Public School Students. 95th place among approximately 5.3 million students

2005 Gold Medalist, Brazilian Mathematics Olympiad for Public School Students. 9th place among approximately 3.8 million students

Scholarships and Grants

2011-2013 **Participant**, European Commission Program FP7.

2010-2011 **Awarded**, Master program fellowship, CNPq.

2009 **Awarded**, Undergraduate research scholarship, FAPEMIG.

2008 **Awarded**, Undergraduate research scholarship, CNPq.

2006-2008 **Awarded**, Scholarship: winners OBMEP 2005, 2006 mathematics olympics, CNPq.

2005 **Awarded**, High-school research scholarship, CNPq.

o Obs.: CNPq is the Brazilian national funding agency. FAPEMIG is the funding agency for the state of Minas Gerais, Brazil