

# James A. Ferwerda

Chester F. Carlson Center for Imaging Science  
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## RESEARCH INTERESTS:

Computer graphics; digital imaging; display systems; visual perception; material appearance; low vision; assistive technologies, psychophysics.

## EDUCATION:

Ph.D. in Experimental Psychology, Cornell University, 1998.  
Dissertation: "*Visual Models for Realistic Image Synthesis.*"

M.S. in Computer Graphics, Cornell University, 1987.  
Thesis: "*A Psychophysical Approach to the Aliasing Problem.*"

B.A. in Psychology with Honors, Cornell University, 1980.

## PROFESSIONAL EXPERIENCE:

Associate Professor, Chester F. Carlson Center for Imaging Science, Rochester Institute of Technology, 2007-present.

Research Associate, Program of Computer Graphics, Cornell University, 1998-2007.

Senior Project Leader, Program of Computer Graphics, Cornell University, 1987-1998.

Systems Programmer/Analyst, Department of Computer Science, Cornell University, 1983-1984.

Computer Systems Specialist, Department of Psychology, Cornell University, 1980-1983.

Research Assistant, Gibson Laboratory, Department of Psychology, Cornell University, 1978-1980.

## HONORS AND AWARDS:

Seminal Graphics Paper, ACM SIGGRAPH 50th Anniversary, 2023

Stanford University, Top 2% most-cited scientist ranking, global, career-long impact, 2022

Best Paper Award, IS&T/SID Color Imaging Conference, 2013.

Distinguished Paper Award, SID International Symposium, 2013.

Xerox Chair in Imaging Science, RIT, 2011.

Best Paper Award, IS&T/SID Color Imaging Conference, 2011.

National Academies Keck Futures Initiative, Future of Imaging Science Program, 2010.

Best Paper Award, IS&T/SID Color Imaging Conference, 2009.

National Academy of Engineering, Frontiers of Engineering Program, 2003, 2005.

Paper of the Year Award, IEEE Computer Society, 1992.

## PROFESSIONAL ACTIVITIES:

Guest Editor, Journal of Perceptual Imaging – Special Issue on Color and Imaging, V(5), 2022.

Associate Editor: ACM Transactions on Applied Perception 2004-present.

Associate Editor: IS&T Journal of Perceptual Imaging, 2017-present.

Guest Editor: IEEE Computer Graphics and Applications - Special Issue on Applied Perception, 2001.

Technical Program Chair, IS&T/SID Color Imaging Conference, 2010.

Conference Chair: IS&T/SID Color Imaging Conference, 2011.  
Conference Committee: IS&T Color Imaging Conference, 2012-present.  
Program Committees: ACM Symposium on Applied Perception in Graphics and Visualization, 2004-2011. IS&T Human Vision and Electronic Imaging 2010-present, IS&T Measurement Modeling and Rendering of Material Appearance 2013-2014.  
Technical Committee: CIE TC8-08 High Dynamic Range Imaging, 2003-2008.  
Review Panelist: NSF CISE 2002, 2005, 2010.  
Peer Reviewer: ACM SIGGRAPH; ACM TOG; ACM TAP; IEEE CG&A; IEEE TVCG; Computer Graphics Forum; Eurographics; Pacific Graphics; JOSA A; JIST; Color Res. & Appl.; Optical Engineering; Optics Express; Psychological Science; Journal of Vision; Journal of Perceptual Imaging.  
Consultant: Hewlett-Packard Laboratories 1999-2000; General Motors Research 2002-2005; Proctor and Gamble 2007; McCarter & English 2014; Kilpatrick, Townsend & Stockton 2015, Sistine Solar 2015; Corning 2018-present; Sherwin-Williams 2018-present.

**GRANTS RECEIVED:**

Principal Investigator, RIT D-RIG (2019) "Digital Modeling of Cultural Heritage Objects", \$13,000.  
Principal Investigator, Dole Inc. (2015) "Appearance of Vegetable Products and Packaging", \$50,000.  
Co-Investigator, RIT D-RIG (2015) "Virtual Medical Imaging Augmentation and Simulation for Surgery and Therapy: Evaluating New Paradigms for Anatomy Teaching and Training", (G. Diaz, PI, C. Linte, Co-I), \$15,000.  
Principal Investigator, Corning Inc. (2012) "Visibility of Artifacts in Tiled Displays", \$44,816.  
Principal Investigator, Hewlett Packard Laboratories (2012) "High Fidelity Softproofing of Surface Appearance", \$75,852.  
Co-Investigator, NSF IIP-1237761 (2012) Partnerships for Innovation in Printed Devices and Materials, \$40,467, (D. Cormier, RIT, PI, \$599,389 total award)  
Principal Investigator, Center for Emerging and Innovative Sciences (CEIS) (2012) "Visibility of Artifacts in Flat Panel Displays", \$17,863 (supplement to Corning award).  
Principal Investigator, Hewlett Packard Laboratories (2011) Gift for research support. \$30,000.  
Principal Investigator, Corning Corp. (2011) "Impact of Glass Surface Texturing on Display Performance.", \$77,247  
Principal Investigator, Xerox Corp. (2011) Xerox Professorship, \$90,000.  
Principal Investigator, NSF IIS-1064410 (2011) "A Unified Approach to Material Appearance Modeling", \$398,810.  
Principal Investigator, XRite Corp. (2010) Gift for research support., \$50,000.  
Senior Investigator, A.W. Mellon Foundation (2009) "Improving Artwork Reproduction Through 3D Spectral Capture and Computer Graphics Rendering (Phase 2)", \$750,000, (R. Berns, RIT, PI)  
Principal Investigator, Sherwin-Williams Co. (2008) "Measurement, Modeling and Perception of Painted Surfaces", \$71,698.  
Principal Investigator, Eastman-Kodak Co. (2008) "Digital Imaging Media: Measurement, Modeling and Perception", \$55,037.  
Principal Investigator, Center for Emerging and Innovative Sciences (CEIS) (2008) "Digital Imaging Media: Measurement, Modeling and Perception", \$10,077 (supplement to Kodak award).  
Principal Investigator, NSF CCF-0811032 (2008) "Visual Equivalence: A New Foundation for Perceptually-Based Rendering of Complex Scenes", \$125,000.  
Co-Investigator, U.S. Army Night Vision and Electronic Sensors Directorate (2008) "Common Sensor Payload Performance Modeling", \$68,000, (S. Brown, PI)  
Principal Investigator, RIT Office of the Vice President for Research (2007) "A Second Generation High Dynamic Range Display", \$25,432.

- Principal Investigator, Eastman-Kodak Co. (2006) "Measurement, Modeling and Perception of Digital Imaging Media", \$125,665.
- Co-Investigator, NIH/NEI SBIR (2006) "Accessible Graphical Display for Numerical Data", \$100,000, (J. Gardner, PI)
- Principal Investigator, General Motors Corp. (2003) "Evaluating the Effectiveness of Advanced Rendering for Automobile Design", \$155,799.
- Co- Investigator, NSF CCF-0205438 (2002) "ITR/AP: Beyond Polygons and Pixels: New Paradigms for Real-Time, Physically-Based Rendering", \$2,743,914, (D. Greenberg, PI)
- Principal Investigator, NSF IIS-0113310 (2001) "ITR/PE: Digital Imaging Techniques for the Simulation and Enhancement of Low Vision", \$450,799, (\$6,000 REU supplement 2004).
- Senior Investigator, NSF CNS-8920219 (supplement) (1998) "Physically-Based Rendering: Why Bother?", \$60,000.
- Senior Investigator, NSF CNS-8920219 (supplement) (1997) "Realistic Display of High Dynamic Range Images", \$99,294.
- Senior Investigator, NSF OCI-9523483 (1995) "MRA: Physically and Perceptually-Based Parallel Global Illumination Solutions", \$990,000.
- Senior Investigator: NSF CNS-8920219 (supplement) (1994) "Networking and Computer Graphics for Education", \$200,000.
- Senior Investigator, NSF EIA-8717024 (1987) "CISE Research Instrumentation: Computer Graphics Dynamic Simulation for Scientific Inquiry". \$90,600.

#### **TEACHING EXPERIENCE:**

##### **University Courses:**

- Imaging Science Senior Project I & II (ugrad), RIT, 2019 - present
- Vision and Psychophysics (ugrad), RIT, 2017 - present.
- Color Science, (ugrad), RIT, 2013 - present.
- Imaging Systems Analysis (ugrad), RIT, 2007 - 2016.
- Advanced Imaging Laboratory (ugrad), RIT, 2014.
- Appearance of Materials, (grad), RIT, 2009 - 2011.
- Computing for Color Science, (grad), RIT, 2008 - 2013.
- Color Measurement Laboratory II, (grad), RIT, 2008 - 2013.
- Engineers without Frontiers, (ugrad), Cornell University 2002 - 2003.
- Special Topics in Computer Graphics, (ugrad), Cornell University, 1999 - 2000.
- Realistic Image Synthesis, (grad), Cornell University, 1998 - 2002.
- Practicum in Computer Graphics, (ugrad), Cornell University, 1987.

##### **Professional Courses:**

- Fundamentals of Color Science: ACM SIGGRAPH 2018, 2020
- Fundamentals of Psychophysics: Munsell Color Science Laboratory, RIT, 2008 - 2013; IS&T Color Imaging Conference 2009, 2010, 2015 - present.
- Characterizing Surface Appearance: International Seminar on Surface Metrology 2012; IS&T Color Imaging Conference 2015 - present.
- Psychophysics 101: How to Run Perceptual Experiments in Computer Graphics: ACM SIGGRAPH 2002, 2008; IEEE Visualization 2002; IS&T Color Imaging Conference 2009 - 2010.
- Frontiers of Perceptually-Based Computer Graphics: ACM SIGGRAPH 2003.
- Principles of Visual Perception and its Applications in Computer Graphics: ACM SIGGRAPH 1997, 1998.

**Colloquia and Invited Presentations:**

Society for Imaging Science and Technology, webinar, 10/20  
Technical University of Delft, The Netherlands, Department of Computer Science, 7/19  
University of Giessen, Germany, Department of Psychology, 7/19  
Sherwin-Williams Co., Cleveland OH, 9/18  
IS&T Color and Imaging Conference, San Diego, CA (Panelist), 11/16  
International Conference on Advanced Imaging, Tokyo, Japan, (Keynote), 6/15  
Skidmore College, Saratoga Springs, NY, Department of Psychology, 10/14  
Corning Inc., 5/14  
Technical University of Delft, The Netherlands, 4/14  
International Workshop on Video Processing and Quality Metrics (VPQM), Chandler, AZ, (Keynote), 1/14  
Digital Image Computing Techniques and Applications (DICTA) 2013, Hobart, Tasmania, (Keynote), 11/13  
ACM Symposium on Applied Perception, Trinity College, Dublin, (Keynote), 8/13  
University of Bangor, Wales, 8/13  
International Association on Pattern Recognition, CCIW '13 Conference, Chiba, Japan, (Keynote), 3/13  
SPIE Electronic Imaging Conference, San Francisco, CA (Keynote), 2/13  
A.W. Mellon Foundation, Workshop on Total Appearance Imaging, Rochester, NY, 7/12  
Corning Research Laboratories, Corning, NY, 4/12  
Yale University, Department of Computer Science, New Haven, CT, 2/12  
Harvard University Libraries Department of Preservation and Digital Imaging, Cambridge, MA, 2/12  
Qualcomm Research Laboratories, San Jose, CA, 1/12  
Hewlett-Packard Laboratories, Palo Alto, CA, 11/11.  
IEEE IVMS 2011, Workshop on Perception and Visual Signal Analysis (Keynote), Ithaca, NY, 6/11.  
International Symposium on Material Appearance, Giessen, Germany, 5/11.  
Eastman Kodak Research, Rochester, NY, 5/11.  
Inter-society Color Council (ISCC) Annual Meeting (Keynote), Charlotte, NC 04/11.  
Delft University of Technology, Department of Industrial Design, Delft, The Netherlands, 9/10.  
Northwestern University, Department of Electrical and Computer Engineering, Evanston, IL, 3/10.  
Picture Coding Society of Japan Annual Meeting (Keynote), Chiba, Japan, 10/09.  
Proctor and Gamble Imaging Community of Practice Symposium (Keynote), 10/09.  
Stanford University, Center for Imaging Science and Engineering, 9/09.  
Vision Society of Japan Annual Meeting (Keynote) 7/09.  
NTT Research, Japan, 7/09.  
National Institute of Physiological Sciences, Japan, 7/09.  
Chiba University, Japan, Department of Information Science, 7/09.  
Sherwin-Williams Co., 5/09.  
Xerox Research, 3/09.  
Yale University, Department of Computer Science, 2/09.  
Proctor and Gamble, 1/07.  
Eastman-Kodak Research, 6/06.  
Johns Hopkins School of Medicine, 9/05.  
National Academy of Engineering, 5/05.  
Asilomar Conference on Signals, Systems and Computers, 11/03.  
ACREO Symposium on Paper Optics and Perception, Sweden, 11/02.  
Swedish Royal Institute of Technology, 11/02.  
ACM SIGGRAPH Workshop on Perceptually Adaptive Graphics, 5/01.

IBM T.J. Watson Research Center, 5/01.  
MIT, Department of Brain and Cognitive Sciences, 9/00.  
ACM SIGGRAPH '99, Panel on Perceptual Issues in Computer Graphics, 8/99.  
University of Minnesota, Department of Psychology, 6/99.  
Stanford University, Department of Computer Science, 5/99.  
Hewlett-Packard Laboratories, 5/99.  
Cornell University, Workshop on Rendering, Perception and Measurement, 4/99.  
ASTM, E12 Committee Annual Meeting, 1/99.  
University of Minnesota, Department of Computer Science, 11/98.  
ACM SIGCHI '94, Workshop on the Challenges of 3D Interaction, 4/94.

## **STUDENT MENTORING:**

### **Graduate Thesis Advising:**

Bitu Panahi, Ph.D. candidate, Color Science, National Technical University of Norway.  
Jacob Cheeseman, Ph.D. candidate, Psychological Science, University of Giessen.  
Snehal Padhye, Ph.D. 2023, Imaging Science, Center for Imaging Science, RIT.  
Nicholas Maggio, M.S. candidate, Imaging Science, Center for Imaging Science, RIT.  
Zhaoyu Cui, Ph.D. candidate, Imaging Science, Center for Imaging Science, RIT.  
Brittany Cox, Ph.D. 2017, Color Science, Center for Imaging Science, RIT.  
Alicia Stillwell, M.S. candidate, Color Science, Center for Imaging Science, RIT.  
Stefan Luka, M.S. candidate, Color Science, Center for Imaging Science, RIT.  
Adria Fores-Herranz, Ph.D. 2015, Color Science, Center for Imaging Science, RIT.  
Dengyu Liu, M.S. 2015, Imaging Science, Center for Imaging Science, RIT.  
Stephen Dolph, M.S. 2014, Imaging Science, Center for Imaging Science, RIT.  
Benjamin Darling, Ph.D. 2013, Color Science, Center for Imaging Science, RIT.  
Anthony Blatner, M.S. 2011, Computer Engineering, RIT.  
Suparna Kalghatgi, M.S. 2011, Industrial Engineering, RIT.  
Dan Zhang, M.S. 2011, Color Science, Center for Imaging Science, RIT.  
Jonathan Phillips, M.S. 2010, Color Science, Center for Imaging Science, RIT.  
William Stokes, M.S. 2004, Program of Computer Graphics, Cornell University.  
John Mollis, M.S. 2004, Program of Computer Graphics, Cornell University.  
Fabio Pellacini, Ph.D. 2002, Department of Computer Science, Cornell University.  
Patrick Heynen, M.S. 1996, Program of Computer Graphics, Cornell University.  
Leonard Wanger, M.S. 1992, Program of Computer Graphics, Cornell University.

### **Thesis Committees:**

Avadhi Katariya, M.S. candidate, Photographic Sciences, RIT.  
Abhijan Wasti, M.S. 2023, Imaging Science, Center for Imaging Science, RIT.  
Davit Gigilashvili, Ph.D. 2023, Color Science, National Technical University of Norway (NTNU).  
Rakshit Kothari, Ph.D. 2019, Imaging Science, Center for Imaging Science, RIT.  
Nargess Hassani, Ph.D. 2019, Program of Color Science, RIT.  
Jiashu Zhang, Ph.D. 2014, Imaging Science, Center for Imaging Science, RIT.  
Susan Farnand, Ph.D. 2012, Color Science, Center for Imaging Science, RIT.  
Steven Glaser, M.S. 2012, Computer Science, RIT.  
Chih-Chun Lin, M.S. 2012, Computer Science, RIT.  
Hrushikesh Godbole, M.S. 2011, Industrial Engineering, RIT.

Bingxin Hou, M.S. 2010, Color Science, Center for Imaging Science, RIT.  
Susan Munn, Ph.D. 2009, Imaging Science, Center for Imaging Science, RIT.  
Stacey Casela, M.S. 2009, Color Science, Center for Imaging Science, RIT.  
Erin Fredricks, M.S. 2009, Color Science, Center for Imaging Science, RIT.  
Ying Chen, Ph.D. 2008, Imaging Science, Center for Imaging Science, RIT.  
Ganesh Ramanarayanan, Ph.D. 2008, Department of Computer Science, Cornell University.  
William Feth, M.Eng. 2000, Department of Computer Science, Cornell University.

**Undergraduate Thesis/Research Advising:**

Emily Rivera Ojeda, B.S. candidate (dual degree), Motion Picture Science, Imaging Science, RIT.  
Melanie Smedira, B.S. candidate, Motion Picture Science, RIT.  
Lisa Enochs, B.S. 2023, Motion Picture Science, RIT.  
Valerie Yost, B.S. 2020, Imaging Science, RIT.  
Jared Luce, B.S. candidate, Imaging Science, RIT.  
Grace Annese, B.S. 2019, Motion Picture Science, RIT.  
Thomas LaMagna, B.S. candidate, Motion Picture Science, RIT.  
Sara Leary, B.S. 2018, Imaging Science, RIT.  
Timothy Bausch, B.S. 2016, Imaging Science RIT.  
Nicholas Maggio, B.S. 2014, Motion Picture Science RIT.  
Suzanne Farrell, B.S. Digital Cinema, RIT, 2011-2012.  
Chris Corvan, B.S. Computer Science, RIT, 2011-2012.  
Ann Nunziata, Center for Imaging Science, RIT. Summer 2009.  
Juliet Bernstein, Center for Imaging Science, RIT, Spring, Summer 2009.  
Brendan Rehon, Department of Computer Science, Cornell University, Summer 2006.  
Victor Kwok, Department of Computer Science, Cornell University, Summer 2006.  
Ang Pet Chean, Department of Computer Science, Cornell University, Summer 2005.  
Ankur Moitra, Department of Computer Science, Cornell University, Summer 2005.  
Simon Leet, B.S. 2003, College Scholar, Cornell University.

**PUBLICATIONS:** (\* indicates student co-author)

**Refereed journal articles:**

- [J24] \*Cheeseman, J.R., Ferwerda, J.A., Morimoto, T., and Fleming, R.W. (2023). Gloss discrimination: towards an image-based perceptual model. *Journal of Vision*, Submitted for review.
- [J23] \*Padhye, S, Messinger, D.W., Ferwerda, J.A. (2022). SVBRDF estimation using a normal sorting technique. *Journal of Imaging Science and Technology*, 050405-1-11
- [J22] \*Cheeseman, J.R., Ferwerda, J.A., \*Maile, F.J. and Fleming, R.W. (2021). Scaling and discriminability of perceived gloss. *Journal of the Optical Society of America A*, 38(2),149-210.
- [J21] Ferwerda, J.A. (2019). The FechDeck: a hand-tool for exploring psychophysics. *ACM Transactions on Applied Perception*, 16(2), 9:1-14.
- [J20] Ferwerda, J.A. (2018). Lightweight estimation of surface BRDFs. *Journal of Imaging Science and Technology*, 62(5), doi:10.2352/J.ImagingSci.Technol.2018.62.5.050407
- [J19] Ferwerda, J.A. (2014) ImpastoR: a realistic surface display system. *Vision Research*, doi: 10.1016/j.visres.2014.10.016.
- [J18] Ferwerda, J.A., Stillwell, A., Hovagimian, H., and Kosik Williams, E. (2014) Perception of sparkle in anti-glare display screens. *Journal of the Society for Information Display*, 22(2), 139-146.

- [J17] Ferwerda, J.A., (2013) *Tangible Images: bridging the real and virtual worlds*. Springer Lecture Notes in Computer Science, Vol. 7786, 13-24.
- [J16] Krivanek, J. Ferwerda, J.A. and Bala, K. (2010) Effects of global illumination approximations on material appearance. *ACM Transactions on Graphics*, 29(4), (SIGGRAPH '10), 1-10.
- [J15] Ferwerda, J.A. (2009) Envisioning the material world (invited review article). *Vision: Journal of the Vision Society of Japan*, 1-11.
- [J14] \*Ramanarayanan, G., Bala, K. and Ferwerda, J.A. (2008) Perception of complex aggregates. *ACM Transactions on Graphics*, 27(3), (SIGGRAPH '08), 1-10.
- [J13] \*Ramanarayanan, G., Ferwerda, J.A., Walter, B.J. and Bala, K. (2007) Visual Equivalence: towards a new standard for image fidelity. *ACM Transactions on Graphics*, 26(3), (SIGGRAPH '07), 1-11.
- [J12] \*Stokes, W., Ferwerda, J.A., Walter, B.J. and Greenberg, D.P. (2004) Perceptual Illumination Components: A new approach to efficient, high quality global illumination rendering. *ACM Transactions on Graphics*, 23(3). (SIGGRAPH '04), 742-749.
- [J11] Dumont, R., \*Pellacini, F. and Ferwerda, J.A. (2003) Perceptually-driven decision theory for interactive realistic rendering. *ACM Transactions on Graphics* 22(2), 152-181.
- [J10] \*Reinhard, E., Stark, M., Shirley, P. and Ferwerda, J.A. (2002) Photographic tone reproduction for digital images. *ACM Transactions on Graphics*, 21(3), (SIGGRAPH '02), 267-276.
- [J9] Thompson, W., Shirley, P. and Ferwerda, J.A. (2002) A spatial post-processing algorithm for images of night scenes. *Journal of Graphics Tools* 7(1), 1-12.
- [J8] Ferwerda, J.A. (2001) Elements of early vision for computer graphics. *IEEE Computer Graphics and Applications*, 21(5), 22-33.
- [J7] \*Pellacini, F., Ferwerda, J.A. and Greenberg, D.P. (2000) Toward a psychophysically-based light reflection model for image synthesis. *Proceedings SIGGRAPH '00*, 55-64.
- [J6] Pattanaik, S., Ferwerda, J.A., Fairchild, M.D. and Greenberg, D.P. (1998) A multiscale model of adaptation and spatial vision for realistic image display. *Proceedings SIGGRAPH '98*, 287-298.
- [J5] Ferwerda, J.A., Pattanaik, S., Shirley, P. and Greenberg, D.P. (1997) A model of visual masking for computer graphics. *Proceedings SIGGRAPH '97*, 143-152.
- [J4] Greenberg, D.P., Torrance, K.T., Shirley, P., Arvo, J., Ferwerda, J.A., Pattanaik, S., Lafortune, E., Walter, B., Foo, S. and Trumbore, B. (1997) A framework for realistic image synthesis. *Proceedings SIGGRAPH '97*, 477-494.
- [J3] Ferwerda, J.A., Pattanaik, S., Shirley, P. and Greenberg, D.P. (1996) A model of visual adaptation for realistic image synthesis. *Proceedings SIGGRAPH '96*, 249-258.
- [J2] \*Wanger, L.R., Ferwerda, J.A. and Greenberg, D.P., (1992) Perceiving spatial relationships in computer-generated images. *IEEE Computer Graphics and Applications*, 12(3), 44-58.
- [J1] Ferwerda, J.A. and Greenberg, D.P. (1988) A psychophysical approach to assessing the quality of antialiased images. *IEEE Computer Graphics and Applications*, 8(5), 85-95.

#### **Refereed conference proceedings:**

- [R34] Ferwerda, J.A. and Padhye, S.A. (2021) Visual perception of surface properties through manipulation. *Proceedings 29th IS&T Color and Imaging Conference*, 66-70, <https://doi.org/10.2352/issn.2169-2629.2021.29.66>
- [R33] \*Padhye, S., Messinger, D., and Ferwerda, J. A. (2021) A practitioner's guide to fringe projection profilometry. *Proceedings IS&T Archiving Conference 2021* (18), 56-60.
- [R32] \*Padhye, S., Messinger, D., and Ferwerda, J. A. (2021) A simple web-based tool for multi-spectral surface visualization. In *SPIE Algorithms, Technologies, and Applications for Multispectral and Hyperspectral Imaging XXVII* (Vol. 11727), 265-272.
- [R31] \*Padhye, S.A., Messinger, D., and Ferwerda, J.A. (2021) A web-based visualization tool for multispectral images. *Proceedings IS&T Electronic Imaging '21*, 33, 1-6.

- [R30] Ferwerda, J.A., Gardner, J. and Bulatov, V. (2016) Comparing the effectiveness of auditory and tactile graphs for the visually impaired. Proceedings IS&T Electronic Imaging '16, 1-6.
- [R29] Ferwerda, J.A. (2015) Image quality and material appearance. Proceedings 1st International Conference on Advanced Imaging, Tokyo, Japan, 1-4.
- [R28] Ferwerda, J.A. (2014) On pictures and stuff: image quality and material appearance. Proceedings SPIE Electronic Imaging '14, 90180I, doi:10.1117/12.2036501
- [R27] Priess, J., Fairchild, M.D., Ferwerda, J.A., and Urban, P. (2014) Gamut mapping in a high-dynamic range color space. Proceedings SPIE Electronic Imaging '14, 90150A, doi:10.1117/12.2039747
- [R26] Liu, X., Chen, L., Ortiz-Segovia, M., Ferwerda, J.A., and Allebach, J. (2014) Characterization of relief printing. Proceedings SPIE Electronic Imaging '14, 90180P, doi:10.1117/12.2040977
- [R25] \*Fores, A., Ferwerda, J.A., Tastl, I., and Recker, J. (2013) Perceiving gloss in surfaces and images. Proceedings IS&T/SID 21<sup>st</sup> Color Imaging Conference, 44-51. (Best paper award)
- [R24] \*Hensley, B. and Ferwerda, J.A. (2013) Colorimetric characterization of a 3D printer with a spectral model. Proceedings IS&T/SID 21<sup>st</sup> Color Imaging Conference, 160-166.
- [R23] Gollier, J., Piech, G., Hart, S., West, J., Hovagimian, H., Kosik Williams, E., \*Stillwell, E., and Ferwerda, J.A. (2013) Display sparkle measurement and human response. Proceedings of the Society for Information Display, 1-3.
- [R22] \*Stillwell, A., Ferwerda, J.A., Hovagimian, H., and Kosik Williams, E. (2013) Perception of sparkle in anti-glare display screens. Proceedings of the Society for Information Display, 1-3. (Distinguished paper award)
- [R21] Ferwerda, J.A. (2013) Tangible imaging systems. Proceedings SPIE Electronic Imaging '13 (Invited keynote paper), 86640M, doi:10.1117/12.2010968
- [R20] Ferwerda, J.A. (2012) Through a glass brightly: material appearance and image quality. In: Predicting Perceptions: 3<sup>rd</sup> International Conference on Material Appearance, 32-33.
- [R19] \*Darling, B.A. and Ferwerda, J.A. (2012) Seeing virtual objects: simulating reflective surfaces on emissive displays. Proceedings IS&T/SID 20<sup>th</sup> Color Imaging Conference, 135-141.
- [R18] \*Fores-Herranz, A., Ferwerda, J.A., and Gu, J. (2012) Toward a perceptually-based metric for BRDF modeling. Proceedings IS&T/SID 20<sup>th</sup> Color Imaging Conference, 142-148.
- [R17] Ferwerda, J.A. (2011) High dynamic range displays and low vision. Proceedings IS&T/SID 19<sup>th</sup> Color Imaging Conference, 181-185.
- [R16] \*Blatner, A.M., Ferwerda, J.A., Darling, B.A. and Bailey, R.J. (2011) TangiPaint: a tangible digital painting system. Proceedings IS&T/SID 19<sup>th</sup> Color Imaging Conference, 102-107.
- [R15] \*Darling, B.A., Ferwerda, J.A., Chen, T. and Berns, R. (2011) Real-time multi-spectral rendering with complex illumination. Proceedings IS&T/SID 19<sup>th</sup> Color Imaging Conference, 345-351.
- [R14] Ferwerda, J.A. (2010) Effects of mesoscale texture on apparent surface gloss. Proceedings 2<sup>nd</sup> CIE Expert Symposium on Appearance, 1-4.
- [R13] Ferwerda, J.A., \*Selan, J. and Pellacini, F. (2010) Perception of lighting errors in image compositing. Proceedings IS&T/SID 18<sup>th</sup> Color Imaging Conference, 375-380.
- [R12] Ferwerda, J.A., \*Kalghatgi, S. and Darling, B. (2010) A multiscale analysis of the touch-up problem. Proceedings IS&T/SID 18<sup>th</sup> Color Imaging Conference, 266-271.
- [R11] \*Zhang, D. and Ferwerda, J.A. (2010) Appearance-based image splitting for HDR displays. Proceedings IS&T/SID 18<sup>th</sup> Color Imaging Conference, 340-346.
- [R10] \*Darling, B.A. and Ferwerda, J.A. (2009) The tangiBook: a tangible display system for direct interaction with virtual surfaces. Proceedings IS&T 17<sup>th</sup> Color Imaging Conference, 260-266. (Best paper award)
- [R09] \*Phillips, J.B. and Ferwerda, J.A. (2009) Effects of dynamic range on apparent surface gloss. Proceedings IS&T 17<sup>th</sup> Color Imaging Conference, 193-197.



- [R08] Ferwerda, J.A., \*Ramanarayanan, G., Bala, K. and Walter, B.J (2008) Visual Equivalence: an object-based approach to image quality. Proceedings IS&T 16<sup>th</sup> Color Imaging Conference, 347-354.
- [R07] Bala, K., Ferwerda, J.A. and Walter, B.J. (2006) Information-preserving imaging for heterogeneous networked displays. Workshop on Information Visualization and Interaction Techniques across Multiple Displays, ACM CHI '06, 1-4.
- [R06] \*Irawan, P., Ferwerda, J.A and Marschner, S.R. (2005) Perceptually-based tone mapping of high dynamic range image streams. Eurographics Symposium on Rendering, 231-242.
- [R05] Ferwerda, J.A, Westin, S.H., Smith, R.C. and Pawlicki, R. (2004) Effects of rendering on shape perception in automobile design. First ACM Symposium on Applied Perception in Graphics and Visualization, 107-114.
- [R04] Ferwerda, J.A and \*Pellacini, F. (2003) Functional difference predictors (FDPs): measuring meaningful image differences. Asilomar Conference on Signals, Systems, and Computers, 1388-1392.
- [R03] Dumont, R., \*Pellacini, F. and Ferwerda, J.A. (2001) Perceptually-based texture caching for hardware rendering. Proceedings 12<sup>th</sup> Eurographics Workshop on Rendering, 246-256.
- [R20] Pattanaik, S.N., Fairchild, M.D., Ferwerda, J.A. and Greenberg, D.P. (1998) Multiscale model of adaptation, spatial vision and color appearance. Proceedings IS&T 6<sup>th</sup> Color Imaging Conference, 2-7.
- [R01] Pattanaik, S.N., Ferwerda, J.A., Torrance, K.E. and Greenberg, D.P. (1997) Validation of global illumination simulations through CCD camera measurements. Proceedings IS&T 5<sup>th</sup> Color Imaging Conference, 250-253.

**Conference papers, posters, abstracts, presentations:**

- [C32] \*Cheeseman, J.R., Ferwerda, J.A., Morimoto, T., and Fleming, R.W. (2023) Predicting gloss sensitivity across variations in surface shape, illumination and viewpoint. Journal of Vision, 23(9), 5362. <https://doi.org/10.1167/jov.23.9.5362>.(abstract/poster)
- [C31] \*Cheeseman, J.R., Ferwerda, J.A., Morimoto, T., and Fleming, R.W. (2022). Consistent and predictable variations in gloss discrimination across viewing conditions. Proceedings European Conference on Visual Perception (ECVP2022), PERCEPTION (51), 45. (abstract/poster)
- [C30] \*Padhye, S, Messinger, D.W., Ferwerda, J.A. (2022) SVBRDF estimation using a normal sorting technique. Proceedings SIGGRAPH 2022, (abstract/poster).
- [C29] \*Padhye, S., Doerschner, K., Phillips, F., and Ferwerda, J. (2021) Visual perception of surface properties through direct manipulation. Journal of Vision, 21(9), 2424. <https://doi.org/10.1167/jov.21.9.2424> (abstract/poster)
- [C28] \*Padhye, S.A., and Ferwerda, J.A. (2021) Real-time illumination capture and rendering on mobile devices. Frameless Journal, 4(1), 33.
- [C27] \*Padhye, S.A., A Ferwerda, J., and Messinger, D. (2020) Digital modeling of cultural heritage objects. Frameless Journal, 3(1), 3.
- [C26] \*Amiri, M.M., \*Binaee, K., and Ferwerda, J. (2019) A comparison of colorimetric performance of Oculus and HTC virtual reality headsets. Frameless Journal, 1(1), 18.
- [C25] Ferwerda, J.A., (2018) PsychoPysics: a suite of tools for teaching Psychophysics using PsychoPy. Vision Sciences Society Annual Meeting, 18(10):589-589. doi: 10.1167/18.10.589 (abstract/poster)
- [C24] Ferwerda, J. (2017). Visual estimation of surface BRDF. Vision Sciences Society Annual Meeting, 17(10):767-767. doi: 10.1167/17.10.767 (abstract/poster)
- [C23] Ferwerda, J.A., (2015) The FechDeck: a hand-tool for exploring psychophysics. Vision Sciences Society Annual Meeting, Journal of Vision, 15(12), doi: 10.1167/14.10.453 (abstract/poster)
- [C22] Ferwerda, J.A., (2014) Perceiving gloss in surfaces and images. Vision Sciences Society, 13<sup>th</sup> Annual Meeting, Journal of Vision, 14(10), doi: 10.1167/14.10.453 (abstract/poster)

- [C21] Ferwerda, J.A., Stillwell, A., Hovagimian, H., and Kosik Williams, E. (2013) Visibility of artifacts in flat panel displays. Center for Electronic Imaging Systems (CEIS) Annual Meeting. (abstract/poster)
- [C20] Ferwerda, J.A. (2012) Through a glass brightly: seeing through the surface in image quality. Vision Sciences Society, Annual Meeting, *Journal of Vision*, 12(9), 872a. (abstract/poster)
- [C19] Ferwerda, J.A. (2012) Tangible display systems: bringing virtual surfaces into the real world. Proceedings SPIE Electronic Imaging '12 (Human Vision and Electronic Imaging XVII), 8291 1-10. (paper/presentation)
- [C18] Ferwerda, J.A. and \*Phillips, J.B. (2010) Effects of image dynamic range on perceived surface gloss. Vision Sciences Society, 9<sup>th</sup> Annual Meeting, *Journal of Vision*, 10(7), 387. (abstract/poster)
- [C17] \*Kalghatgi, S. and Ferwerda, J.A. (2010) Effects of microscale and mesoscale structure on surface appearance (abstract), Vision Sciences Society, 9<sup>th</sup> Annual Meeting, *Journal of Vision*, 10(7), 449. (abstract/poster)
- [C16] \*Zhang, D. and Ferwerda, J.A. (2010) A low-cost, color-calibrated, reflective high dynamic range display (abstract), Vision Sciences Society, 9<sup>th</sup> Annual Meeting, *Journal of Vision*, 10(7), 397. (abstract/poster)
- [C15] Ferwerda, J.A. (2010) The medium and the message: a revisionist view of image quality. Proceedings SPIE Electronic Imaging '10 (Human Vision and Electronic Imaging XV), 7257 0J 1-11. (paper/presentation)
- [C14] \*Darling, B.A. and Ferwerda, J.A. (2010) Tangible Display Systems: direct interfaces for computer-based studies of surface appearance Proceedings SPIE Electronic Imaging '10 (Human Vision and Electronic Imaging XV), 7257 0Q 1-12. (paper/presentation)
- [C13] \*Phillips, J., Ferwerda, J.A., and \*Nunziata, A. (2010) Gloss discrimination and eye movements. Proceedings SPIE Electronic Imaging '10 (Human Vision and Electronic Imaging XV), 7257 0Z 1-12. (paper/presentation)
- [C12] \*Luka, S and Ferwerda, J.A. (2009) Colorimetric image splitting for high dynamic range displays. Proceedings SID 2009 Annual Conference, 1298-1301. (paper/poster)
- [C11] Ferwerda, J.A. and \*Luka, S. (2009) A high resolution high dynamic range display for vision research. Vision Sciences Society, 8<sup>th</sup> Annual Meeting, *Journal of Vision*, 9(8), 346a. (abstract/poster)
- [C10] \*Darling, B.A. and Ferwerda, J.A. (2009) The situated laptop: a tangible interface for computer-based studies of surface appearance. Vision Sciences Society, 8<sup>th</sup> Annual Meeting, *Journal of Vision*, 9(8), 324a. (abstract/poster)
- [C09] \*Ramanarayanan, G., Ferwerda, J.A., Bala, K. and Walter, B.J (2008) Dimensionality of visual complexity in computer graphics scenes. Proceedings SPIE Electronic Imaging '08 (Human Vision and Electronic Imaging XIII), 1-10. (paper/presentation)
- [C08] Ferwerda, J.A. and Arditi, A. (2008) Are high dynamic range displays bad for the eyes? Council on Optical Radiation Measurement, Proceedings of the Annual Meeting (CORM 2008), 1.1 (abstract/presentation)
- [C07] Ferwerda, J.A, \*Irawan, P. and Marschner S.R. (2008) Simulating low vision in high dynamic range scenes. Council on Optical Radiation Measurement, Proceedings of the Annual Meeting (CORM 2008), 1.4 (abstract/presentation)
- [C06] Ferwerda, J.A. and \*Rehon, B. (2007) MagnoFly: game-based screening for dyslexia. 7<sup>th</sup> Annual Meeting, Vision Sciences Society, *Journal of Vision*, 7(9), 520a. (abstract/poster)
- [C05] Ferwerda, J.A. and Arditi A. (2006) High dynamic range displays and the blue light hazard. 6<sup>th</sup> Annual Meeting, Vision Sciences Society, *Journal of Vision*, 6(6), 70a. (abstract/poster)
- [C04] Ferwerda, J.A. and \*Ang, P.C. (2004) Dalton's Jungle: a video game for assessing color anomalies in children's vision. 4<sup>th</sup> Annual Meeting, Vision Sciences Society, *Journal of Vision*, 4(8), 310a. (abstract/poster)

- [C03] Ferwerda, J.A., \*Irawan, P., and Marschner, S.R. (2004) Simulating low vision in high dynamic range scenes. 4<sup>th</sup> Annual Meeting, Vision Sciences Society, Journal of Vision, 4(8), 879a. (abstract/poster)
- [C02] Ferwerda, J.A (2003) Three varieties of realism in computer graphics. Proceedings SPIE Human Vision and Electronic Imaging '03, 290-297. (paper/presentation)
- [C01] Ferwerda, J.A., \*Pellacini, F. and Greenberg, D.P. (2001) A psychophysically-based model of surface gloss perception. Proceedings SPIE Human Vision and Electronic Imaging '01, 291-301. (paper/presentation)

#### **Chapters, monographs and tutorials:**

- [M4] Ferwerda, J.A. and Long D.L. (2018, 2020) Fundamentals of Color Science, Course notes, Course a7, ACM SIGGRAPH '18,'20 1-88.
- [M3] Ferwerda, J.A. (2008) Psychophysics 101: how to run perception experiments in computer graphics, Course notes, Course 87, ACM SIGGRAPH '08, 1-27.
- [M2] Ferwerda, J.A. (1997) Fundamentals of spatial vision. In V. Interrante (Ed.) Principles of Visual Perception and its Applications in Computer Graphics. Course 33, ACM SIGGRAPH '97, 1-27.
- [M1] Ferwerda, J.A. (1991) Psychophysical methods. In B. Guenter (Ed.) Understanding Visual Perception and its Impact on Computer Graphics. Course 9, ACM SIGGRAPH '91, 3:1-38.

#### **Technical reports:**

- [T5] \*VanGorp, P., \*Condon, T., Ferwerda, J.A., Bala, K., Schoukens, R., and Dutre, P. (2009) Visual equivalence in dynamic scenes. Department of Computer Science, Katholieke Universiteit Leuven, Tech. Rep. CW 557.
- [T4] \*Jensen, H.W., \*Premoze, S., Shirley, P., Thompson, W.B., Ferwerda, J.A., and \*Stark, M.M. (2000) Night rendering. Department of Computer Science, University of Utah, Tech. Rep. UUCS-00-016.
- [T3] Ferwerda, J.A. (1993) GV-STC digital media network. Program of Computer Graphics, Cornell University, PCG-93-4.
- [T2] Ferwerda, J.A. (1993) GV-STC video widgets. Program of Computer Graphics, Cornell University, PCG-93-2.
- [T1] Ferwerda, J.A., Rose, J.A., and Yoo, T.S. (1993) A widely distributed video teleconferencing environment. Program of Computer Graphics, Cornell University, PCG-93-1.

#### **Popular press:**

- [P18] ACM SIGGRAPH (August 2023) "Seminal Graphics Papers: Pushing the Boundaries, Vol. 2"
- [P17] RIT News (Nov, 21,2022) "RIT researchers included on Stanford University's list of the world's top 2% of scientists."
- [P16] SPIE Newsroom, (Jan. 28, 2013) "Tangible Imaging Systems Merge Real and Virtual Worlds."
- [P15] Research at RIT, (Spring/Summer 2012) "The Science of Color."
- [P14] National Association of Broadcasters, NABShow Blog (3/29/10) "The tangiBook."
- [P13] IS&T Reporter (Jan./Feb. 2010) "The tangiBook: A tangible display system for direct interaction with virtual surfaces."
- [P12] RIT Athenaeum (5/1/10) "The tangiBook."
- [P11] Research at RIT (5/1/10) "Bringing virtual surfaces into the real world."
- [P10] Cornell Daily Sun (3/8/06) "Duffield showcases BOOM technology."
- [P9] Nature (6/2/05) "Scientists with disabilities: access all areas."
- [P8] Cornell Engineering Magazine (Spring '05) "Coloring sound."
- [P7] Cornell Daily Sun (2/17/05) "CU student's software uses sound to aid blind."
- [P6] BBC News (2/14/05) "Blind student 'hears' in colour."

- [P5] Cornell Chronicle (1/27/05) "Blind graduate student 'reads' maps using CU software that converts color into sound."
- [P4] Cornell Chronicle (2/5/04) "Thanks to CU project L-VIS is in the library."
- [P3] Cornell Chronicle (12/13/01) "Low-vision sufferers could be aided by CU computer graphics technology."
- [P2] Cornell Daily Sun (11/15/01) "Computer graphics research may lead to electronic eyes."
- [P1] Computer Graphics World (10/1/01) "Seeing with the minds eye."