

SUMMARY

- Extensive knowledge of human factors related to stereoscopic 3D displays
- 5+ years experience prototyping novel displays and measuring image quality using psychophysics
- Expert in visual perception, understanding how information on a display is interpreted by the brain
- 4+ years industry experience with **Apple**, **Disney Research** and **Samsung Display**
- Proficiency in multiple programming languages including Python, C++, Objective C, and MATLAB

EDUCATION

- Ph.D., UC Berkeley - UC San Francisco Graduate Program in Bioengineering** 2010 – 2015
Dissertation: Perceptual artifacts associated with novel display technologies (Advisor: Martin Banks)
- B.A., Wesleyan University, Middletown, CT** 2004 – 2008
Mathematics, Biology, & Bioinformatics certificate (Phi Beta Kappa)

EXPERIENCE

- Apple Inc., Display Color & Vision Engineer, Cupertino, CA** 2015 - present
- Identifying new research and engineering areas to improve display performance
 - Evaluating emerging display technologies that can potentially enhance user experience
 - Developing new algorithms for display behavior correction to achieve device-independent front-of-screen performance
 - Writing iOS apps for internal testing and development (Objective C, Swift)
 - Prototyping novel hardware systems
- UC Berkeley, Graduate Student Researcher, Martin Banks lab, Berkeley, CA** 2011 - 2015
- Designed psychophysical experiments to quantify perceptual artifacts associated with novel stereoscopic 3D displays (e.g. flicker, motion artifacts, color breakup, depth distortion)
 - Collaborated on a method for reducing the visibility of color breakup in color-sequential displays, and confirmed with psychophysics and modeling of the human visual system
 - Demonstrated that a spatiotemporal hybrid stereoscopic display reduces artifacts associated with spatial and temporal multiplexing
 - Implemented, calibrated, and tested a novel stereoscopic display that reduces visual fatigue using dynamic lenses that can change focal state in synchrony with content
- Samsung Display America Lab, San Jose, CA** 2013 - 2014
- Collaborated with Samsung to characterize a 240Hz stereoscopic 3D OLED display that uses temporal multiplexing
 - Utilized psychophysical methods to determine the effect of duty cycle, frame rate, and display technology on visual artifacts and image quality
 - Analyzed psychophysical data to produce an “ideal” gamma curve optimized for high-dynamic-range displays, reducing quantization and loss of information
- Disney Research Zürich, Intern, Zürich, Switzerland** Summer 2012
- Interned in the Advanced Video Technology group for 12 weeks and collaborated for several months upon returning to Berkeley
 - Implemented a software tool (C++, OpenCV) to process stereoscopic 3D video content based on low-level features, disparity, and scene motion
 - Designed and carried out human eye-tracking experiments (Eyelink II with Python API) to validate perceptual models of how we perceive stereoscopic 3D content
- Mass. General Hospital, Laboratory Manager, Boston, MA** 2008-2010
- Study coordinator, lab manager, and research technician for a phase I clinical trial
 - In charge of coordinating with NIH and the FDA, keeping organized records of large amounts of sensitive clinical data, performing immunological assessments, analyzing data, and writing up results for publication

COMPUTER SKILLS

Software

- Image processing with C++ (OpenCV, Emacs), using gdb for debugging
- Video processing with ffmpeg and bash scripts (Linux)
- Generating complex Blender animations using integrated Python scripts
- Creating web applications using WebGL, Javascript, and HTML
- iOS app development using Objective C and Swift

Hardware

- Implementing and executing eye-tracking experiments with Eyelink II using Python API
- Interfacing with APIs to drive hardware for novel stereoscopic display techniques
- Using haploscopes, oscilloscopes, photometers, and other hardware for vision research

Psychophysics

- Implementing psychophysical experiments using adaptive staircases or method of constant stimuli (MATLAB PsychToolbox, Python PsychoPy, C#)
- Organizing and analyzing human psychophysical data (MATLAB, iPython) and using statistical packages (psignifit) to fit psychometric functions
- Using Pandas (Python) to analyze large data sets obtained from eye tracker

PUBLICATIONS

- **P.V. Johnson**, J. Kim, and M.S. Banks. (2017) Visible artifacts and limitations in stereoscopic 3D Displays. *Information Display*, 33: 12-17.
- **P.V. Johnson**, J.A.Q. Parnell, J. Kim, C.D. Saunter, G.D. Love, and M.S. Banks. (2016) Dynamic lens and monovision 3D displays to improve viewer comfort. *Optics Express*, 24(11): 11808-11827.
- **P.V. Johnson**, J. Kim, and M.S. Banks. (2015) Stereoscopic 3D display technique using spatiotemporal interlacing has improved spatial and temporal properties. *Optics Express*, 23(7): 9252-9275.
- **P.V. Johnson**, J. Kim, D.M. Hoffman, A. Vargas and M.S. Banks. (2015) Motion artifacts on 240Hz OLED stereoscopic 3D displays. *J. Soc. Inf. Display*, 22(8): 393-403. **Special Section: Best of Display Week 2014.**
- D.M. Hoffman, **P.V. Johnson**, J. Kim, A. Vargas and M.S. Banks. (2015) 240Hz OLED technology properties that can enable improved image quality. *J. Soc. Inf. Display*, 22(7): 346-356.
- J. Kim, **P.V. Johnson**, and M.S. Banks. (2014) Stereoscopic 3D display with color interlacing improves perceived depth. *Optics Express*, 22(26): 31924-31934.
- **P.V. Johnson**, J. Kim, and M.S. Banks. (2014) The visibility of color breakup and a means to reduce it. *Journal of Vision*, 14(14): 10.
- E.H. Eypper, **P.V. Johnson**, E.I. Purro, E.L. Hohmann. (2013) Transcutaneous immunization of healthy volunteers with an attenuated *Listeria monocytogenes* vaccine strain and cholera toxin adjuvant. *Vaccine*, 31(32): 3257-61.
- **P.V. Johnson**, B.M. Blair, S. Zeller, C. Kotton, T. Dubensky, and E.L. Hohmann. (2011) Attenuated *Listeria monocytogenes* vaccine vectors expressing Influenza A nucleoprotein: preclinical evaluation and oral inoculation of volunteers. *Microbiol Immunol*, 55: 304-317.
- M. Malo, S. Alam, G. Mostafa, S. Zeller, **P.V. Johnson**, N. Mohammad, K.T. Chen, A. Moss, A. Faruquil, S. Hodin, S. Premoda, R. Ramasamy, F. Ebrahimi, S. Narisawa, J. Millan, H.S. Warren, J. Kaplan, C. Kitts, E.L. Hohmann and R.A. Hodin. (2010) Intestinal Alkaline Phosphatase Preserves the Normal Homeostasis of Gut Microbiota. *Gut*, 59: 1476-1484.
- K.T. Chen, S. Zeller, **P.V. Johnson**, F. Ebrahimi, G. Mostafa, S.N. Alam, S. Ramasamy, H.S. Warren, E.L. Hohmann, M.S. Malo, and R.A. Hodin. (2010) Identification of specific targets for the gut mucosal defense factor intestinal alkaline phosphatase. *Am J Physiol Gastrointest Liver Physiol*, 299(2): G467-75.
- N. Pathak, **P.V. Johnson**, M. Getman, and R.P. Lane. (2009) Odorant Receptor (OR) gene choice is biased and non-clonal in two olfactory placode cell lines, and OR RNA is nuclear prior to differentiation of these lines. *J. Neurochem.* 108(2): 486-97.

PROCEEDINGS

- **P.V. Johnson**, J. Kim, D.M. Hoffman, A. Vargas, and M.S. Banks. (2014) 55.1: *Distinguished Paper*: Motion artifacts on 240Hz OLED stereoscopic 3D displays. In *SID Symposium Digest of Technical Papers* (Vol. 55, No. 1). Blackwell Publishing Ltd.
- A. Vargas, **P.V. Johnson**, J. Kim, D.M. Hoffman, and M.S. Banks. (2014) A perceptually uniform tone curve for OLED and other high dynamic range displays. *Journal of Vision*, 14(10), 83.
- **P.V. Johnson**, J. Kim, and M.S. Banks. (2014) A novel stereoscopic display technique with improved spatial and temporal properties. *Proc. SPIE-Int'l Soc. Optical Eng., Stereoscopic Displays and Applications XXV*, 9011-13.
- **P.V. Johnson**, J. Kim, and M.S. Banks. (2013) A novel stereoscopic display technique that minimizes perceptual artifacts. *Journal of Vision*, 13(9): 1173.
- J. Kim, **P.V. Johnson**, and M.S. Banks. (2013) Depth perception in color-interlaced stereoscopic 3D displays. *Journal of Vision*, 13(9), 968.
- J. Kim, **P.V. Johnson**, and M.S. Banks. (2013) Depth distortion in color-interlaced stereoscopic 3D displays. *Proc. SPIE-Int'l Soc. Optical Eng., Stereoscopic Displays and Applications XXIV*, 8648-23.
- J. Kim, **P.V. Johnson**, and M.S. Banks. (2012) The visibility of temporal artifacts in stereo 3D displays. *i-Perception*, 3(9), 699.
- **P.V. Johnson**, B.M. Blair, S. Zeller, C. Kotton, T. Dubensky, and E.L. Hohmann. (2009) Safety and immunogenicity of attenuated *actA/plcB*-deleted and *actA/inlB*-deleted *Listeria monocytogenes* vaccine vectors expressing Influenza A Nucleoprotein in adult volunteers. Global Infectious Diseases (GID) Program at Harvard Initiative for Global Health.

ACTIVITIES

- **UC Berkeley**, Admissions Committee for graduate program 2012 - 2014
- **UC Berkeley**, Webmaster for graduate student wiki 2013

TEACHING

- **UC Berkeley**, Graduate Student Instructor, *Medical Imaging Signals & Systems* Fall 2013
- **Wesleyan University**, Course Assistant, *Introductory Calculus* 2007 - 2008
- **Wesleyan University**, Course Assistant, *Calculus & Life Science Applications* Fall 2006

HONORS

- **Journal of the Society for Information Display**, Featured in: Best of Display Week 2014 Dec 2014
- **Pixar Animation Studios**, Invited talk, Research symposium Sep 2014
- **Society for Information Display**, Display Week 2014 Distinguished Paper Award June 2014
- **Society for Information Display**, Display Week 2014 Student Travel Award June 2014