

Christopher Kanan

- CONTACT** Dept. of Computer Science & Engineering
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- RESEARCH AGENDA** I study brain-inspired algorithms, with an emphasis in object categorization. I've developed computationally efficient and state-of-the-art techniques for classification of sounds, images, and electronic nose data. My current projects investigate the neuroscience of the primate active vision system, brain-inspired computer vision, and neural networks. I'm also developing a new method for eye movement analysis.
- EDUCATION** **Ph.D.**, Computer Science, 2013 (expected), **University of California, San Diego**, La Jolla, CA
Thesis: Neuromorphic Models of Active Perception
Advisor: Garrison Cottrell
Thesis Committee: Garrison Cottrell (Chair), Terrence Sejnowski (Co-Chair), Keith Rayner, Serge Belongie, Nuno Vasconcelos
C.Phil., Computer Science, 2011, **University of California, San Diego**, La Jolla, CA
M.S., Computer Science, 2006, **University of Southern California**, Los Angeles, CA
Advisor: Michael Arbib
B.S., Philosophy and Computer Science, 2004, **Oklahoma State University**, Stillwater, OK
- GRANTS** *Inter-Science of Learning Centers Conference*. Garrison Cottrell (PI), **Christopher Kanan** (Co-PI). NSF SMA 1212288, 03/01/2012 – 02/28/2013, \$115,797.
- AWARDS & HONORS**
University of California President's Dissertation Year Fellowship 2012 – 2013
TDLC San Diego Fellowship 2010 – 2012
Eugene Cota-Robles Fellowship 2007 – 2009
NSF Integrative Graduate Education and Research Traineeship 2007 – 2009
Oklahoma State University Continuing Student Scholarship 2002 – 2004
Oklahoma State University Regents' Scholarship 2002 – 2004
- POSITIONS HELD**
Graduate Student Researcher **University of California, San Diego**
Supervisor: Garrison Cottrell, Ph.D. 2007 – Present
Projects: Modeling eye movements; active vision; brain-inspired computer vision.
Research Assistant **University of Southern California**
Supervisors: Michael Arbib, Ph.D. 2005 – 2007
Projects: Modeling tool use and context dependent visual-motor receptive field formation; neuroinformatics.
Junior Researcher, Brain Inspired Cognitive Architecture (BICA) Team **HRL Laboratories, LLC.**
Supervisor: Deepak Khosla, Ph.D. 2005 – 2007
Projects: Neuromorphic algorithms for attention and object recognition in scenes; multi-modal sensor fusion.
- PEER REVIEWED PUBLICATIONS** **Kanan, C.** (2013) Recognizing Sights, Smells, and Sounds Using Gnostic Fields. *PLOS ONE*, 8(1): e54088. doi:10.1371/journal.pone.0054088
Birmingham, E., Meixner, T., Iarocci, G., **Kanan, C.**, Smilek, D., & Tanaka, J. (2012) The Moving Window Technique: A Window into Age-Related Changes in Attention to Facial Expressions of Emotion. *Child Development*. doi:10.1111/cdev.12039
Kanan, C. & Cottrell, G. W. (2012) Color-to-Grayscale: Does the Method Matter in Image Recognition? *PLOS ONE*, 7(1): e29740. doi:10.1371/journal.pone.0029740

- Kanan, C.** & Cottrell, G. W. (2010) Robust Classification of Objects, Faces, and Flowers Using Natural Image Statistics. In: *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR) 2010*, pp. 2472-2479. [26.4% Accept Rate]
- Kanan, C.**, Flores, A., & Cottrell, G. (2010) Color Constancy Algorithms for Object and Face Recognition. *Lecture Notes in Computer Science*, 6453 (ISVC 2010): 199-210.
- Kanan, C.**, Tong, M. H., Zhang, L., & Cottrell, G. W. (2009) SUN: Top-down Saliency Using Natural Statistics. *Visual Cognition*, 17:979-1003.

PATENTS

- Khosla, D., **Kanan, C.**, Huber, D., Chelian, S., & Srinivasa, N. (2012) Visual Attention and Object Recognition System. *U.S. Patent No. 8,165,407*. Washington, DC: U.S.

PAPERS IN REVIEW

- Kanan, C.** & Cottrell, G. W. (In Revision) When Should Image Recognition be Colorful?

PAPERS IN PREPARATION

- Kanan, C.** (In Preparation) Incorporating Cortical Magnification in a Model of Early Visual Cortex.
- Chukoskie, L., Miller, M., **Kanan, C.**, Dorai, M., Townsend, J., & Trauner, D. (In Preparation) Did you see that change? A study of dyspraxia, eye movement, and visual perception in autism.
- Kanan, C.**, Bseiso, D., Ray, N., Hsiao, J., & Cottrell, G. (In Preparation) Multi-Fixation Pattern Analysis: What can we infer from scanpaths when viewing faces?

CONTRIBUTED TALKS

- Kanan, C.** (2012) Recognizing Sights, Smells, and Sounds with Gnostic Fields. *25th Meeting of the Perceptual Expertise Network*, Austin, TX.
- Kanan, C.** (2011) Recognizing Objects, Faces, and Flowers using Fixations. *Vision Sciences Society Annual Meeting (VSS 2011)*, Naples, FL.
- Kanan, C.** (2011) Active Neuromorphic Image Recognition. *TDL All Hands Meeting*, San Diego, CA.
- Kanan, C.** (2010) Image Recognition Using Fixations. *The 2010 Inter-Science of Learning Conference*, Boston, MA.
- Kanan, C.** (2010) Recognizing Objects Using Fixations. *Kavli Institute for Brain and Mind Symposium*, San Diego, CA.
- Kanan, C.** (2009) SUN: Top-down saliency using natural statistics. *The 2009 Inter-Science of Learning Conference*, Seattle, WA.

ABSTRACTS & POSTERS

- Kanan, C.** & Cottrell, G. W. (2012) A Neural Network Model of the Primate Visuo-Motor System. *Computational and Systems Neuroscience (COSYNE 2012)*.
- Chukoskie, L., Miller, M., **Kanan, C.**, Dorai, M., Townsend, J., & Trauner, D. (2012) Did you see that change? A study of dyspraxia, eye movement, and visual perception in autism. *International Meeting for Autism Research (IMFAR-2012)*.
- Kanan, C.** (2011). A Training Program in Grantsmanship. *NSF Science of Learning Center 2011 PI Meeting*.
- Kanan, C.**, Chukoskie, L., & Sejnowski, T. (2011) Shifting from a Stimulus-driven to a Task-driven Saccadic Policy. *18th Joint Symposium on Neural Computation*.
- Kanan, C.** & Cottrell, G. W. (2011) Robust Classification of Objects, Faces, and Flowers Using Natural Image Statistics. *Jacobs Research Expo 2011*. [Semi-Finalist in Best Poster Competition]
- Kanan, C.** & Cottrell, G. W. (2010) Robust Classification of Objects, Faces, and Flowers Using Natural Image Statistics. *Society for Neuroscience (SFN 2010)*.
- Cottrell, G. & **Kanan, C.** (2010) Robust Object and Face Recognition Using a Biologically Plausible Model. *Vision Sciences Society Annual Meeting (VSS 2010)*.
- Kanan, C.** & Cottrell, G. W. (2009) Robust Classification of Objects, Faces, and Flowers Using Natural Image Statistics. *NSF Science of Learning Center 2009 PI Meeting*.

Tong, M.H., **Kanan, C.**, Zhang, L., & Cottrell, G. (2009) Task-driven Saliency Using Natural Statistics. *Vision Sciences Society Annual Meeting (VSS 2009)*.

Tong, M.H., **Kanan, C.**, Zhang, L., & Cottrell, G.W. (2009) Task-driven Saliency Using Natural Statistics (SUN). *MIT Scene Understanding Symposium*.

Tong, M. H., **Kanan, C.**, Zhang, L., & Cottrell, G. W. (2009) Task-driven saliency using natural statistics (SUN). *Computational and Systems Neuroscience (COSYNE 2009)*.

Kanan, C., Tong, M. H., Zhang, L., Cottrell, G. W. (2008) SUN: Top-down saliency using natural statistics. *NSF Science of Learning Center 2008 PI Meeting*.

OTHER PUBLICATIONS

Kanan, C. (2012) Turing: Beyond the original concept. *Nature*, 483: 275.

UNDERGRADS MENTORED

Dina Bseiso, Cognitive Science, UCSD	2012 – Present
Nick Ray, Kinesiology, SDSU	2012 – Present
Felix Schüler, Cognitive Science, UCSD	2012 – Present

TEACHING

Guest Lecturer for UCSD's CSE 87: Freshman Seminar in Neural Networks 2012
Lectured on using neural networks for object recognition.

Preuss School Internship Supervisor 2008 – 2009
Supervised and mentored research projects conducted by three students from the Preuss School, a charter school devoted to preparing low-income students for college.

Guest Lecturer for UCSD's Cognitive Science 200: Visual Saliency 2009
Discussed models of task-driven (endogenous) visual attention.

Cognitive Science Summer Boot Camp Teaching Assistant 2008
Supervised a lab on auditory processing and perception.

Going for the Goal 2005 – 2006
Mentor for English as a second language (ESL) students at Camino Nuevo, a middle school in downtown Los Angeles, CA. Helped alleviate their anxieties about college and encouraged them to pursue higher education.

SERVICE

Organizer & General Chair, Fifth NSF Inter-Science of Learning Center (iSLC) Conference 2012
Awarded \$115,797 NSF grant to organize a three day conference for more than 100 graduate students and post-docs from the six NSF-sponsored Science of Learning centers. Conference was hosted at UC San Diego on April 21-23, 2012. See: nsf-islc.org

Fellow & Trainee Chair, NSF Temporal Dynamics of Learning Center (TDLC) 2009 – 2012
Served as Chair on the student training committee, which organizes TDLC student activities and serves as the interface between graduate students, postdocs, and the TDLC Executive committee. Ran and improved TDLC's \$20,000 Small Grant program. Regularly gave talks to NSF program directors.

California Forum for Diversity in Graduate Education 2009, 2010, 2011, 2012, 2013
Invited to speak with underrepresented minorities attending California colleges about how to get accepted into and succeed in graduate school.

Workshop Chair, NSF Inter-Science of Learning Center (iSLC) Conferences 2009, 2010, 2011
Acted as workshop chair for three NSF sponsored conferences for graduate students and post-docs at the University of Washington, Boston University, and Gallaudet University. Responsibilities included grant writing, planning, soliciting and reviewing workshop proposals, and handling logistical issues.

Graduate Diversity Outreach

2008

Spoke at California State University Dominguez Hills on how to gain admittance to Ph.D. programs.

University of Southern California Parkside Area Government

2004 – 2006

Created a student program called “Small World” aimed at breaking cultural stereotypes. “Small World: Afghanistan” was awarded Best Diversity Program of October 2005 in the Pacific region of the National Association of College and University Residence Halls (NACURH).

OK State University Association for Computing Machinery (ACM) Vice President

2003 – 2004

Developed software and problems for programming contests, arranged student outings, promoted ACM, and served as webmaster.

REVIEWER

Journal of Vision (JoV)

Neural Information Processing Systems (NIPS)

PLOS ONE

Visual Cognition

Optics and Lasers in Engineering

Journal of Machine Learning Research (JMLR)

IEEE Trans Pat. Analysis Machine Intelligence (TPAMI)

IET Image Processing

Cognitive Science Society (CogSci)

PROGRAMMING

MATLAB, C, C++, C#, JavaScript

TECHNIQUES

Eye Tracking

OTHER**PROJECTS**

Developed the web and mobile iOS game Mind Builder.

See: www.chriskanan.com/FluidIntelligence.html**CITIZENSHIP**

United States of America

MEMBERSHIP

Wiley Science Advisor

Institute of Electrical and Electronics Engineers (IEEE)

Society for Neuroscience (SFN)

Vision Sciences Society (VSS)

NSF Temporal Dynamics of Learning Center (TDLC)

Perceptual Expertise Network (PEN)

2012 – Present

2010 – Present

2010 – Present

2010 – Present

2007 – Present

2007 – Present