

# Curriculum Vitae — Robert J. Peters



## Robert J. Peters, Ph.D.

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Citizenship: U.S.

## Education and Research Experience

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- 2004–present **Postdoctoral Fellow, University of Southern California**, Department of Computer Science. *Biological Principles Applied to Geospatial Intelligence Data Fusion*. Prof. Laurent Itti, supervisor.
- 1997–2004 **Doctor of Philosophy in Computation and Neural Systems, California Institute of Technology**. *Visual attention and object categorization: from psychophysics to computational models*. Prof. Christof Koch, thesis advisor. Degree awarded June 2004.
- 1995–1997 **Research Specialist, University of Wisconsin-Madison**, Department of Anatomy. *Development of the enteric nervous system*. Prof. Miles Epstein, supervisor.
- 1990–1995 **Bachelor of Science, University of Wisconsin-Madison**, College of Letters and Science. Majors in *Math, Music and Zoology*. Graduated with distinction, May 1995; GPA 3.9/4.0; class rank 68/2777.

## Publications

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PDF files available from <http://ilab.usc.edu/rjpeters/>; hard copies available on request.

1. RJ Peters, L Itti (2008). **Congruence between model and human attention reveals unique signatures of critical visual events**. *Advances in Neural Information Processing Systems*, Vol. 21 (NIPS\*2007).
2. RJ Peters, L Itti (2008). **Applying computational tools to predict gaze direction in interactive visual environments**. *ACM Transactions on Applied Perception*, 5(2), Article 8.
3. M Cerf, DR Cleary, RJ Peters, W Einhauser, C Koch (2007). **Observers are consistent when rating image conspicuity**. *Vision Research*, (in press).
4. RJ Peters, L Itti (2007). **Beyond bottom-up: Incorporating task-dependent influences into a computational model of spatial attention**. *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR 2007)*, 1-8.
5. RJ Peters, L Itti (2006). **Computational mechanisms for gaze direction in interactive visual environments**. *Proceedings of the ACM Eye Tracking Research and Applications (ETRA) Symposium, 2006:20-27*.

6. RJ Peters, A Iyer, L Itti, C Koch (2005). **Components of bottom-up gaze allocation in natural images.** *Vision Research*, 45(18):2397-2416.
7. RJ Peters (2004). **Visual attention and object categorization: from psychophysics to computational models.** *Ph.D. thesis, California Institute of Technology*, Christof Koch, advisor.
8. RJ Peters, F Gabbiani, C Koch (2003). **Human visual object categorization can be described by models with low memory capacity.** *Vision Research*, 43(21):2265-2280.
9. D Chung, R Hirata, TN Mundhenk, J Ng, RJ Peters, E Pichon, A Tsui, T Ventrice, D Walther, P Williams, L Itti (2002). **A New Robotics Platform for Neuromorphic Vision: Beobots.** *In: Lecture Notes in Computer Science*, 2525(November):558-566.
10. J Jovicich, RJ Peters, C Koch, J Braun, L Chang, T Ernst (2001). **Brain areas specific for attentional load in a motion-tracking task.** *Journal of Cognitive Neuroscience*, 13(8):1048-1058.
11. RJ Peters, MA Osinski, JA Hongo, GL Bennett, AJ Okragly, M Haak-Frendscho, ML Epstein (1998). **Glial-derived neurotrophic factor (GDNF) is abundant in the adult rat gut.** *Journal of the Autonomic Nervous System*, 70: (1-2) 115-122.

## Conference abstracts

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1. RJ Peters, L Itti (2007). **Integrating low-level and high-level visual influences on eye movement behavior.** *Vision Sciences Society (VSS) Annual Meeting*, Sarasota, FL.
2. RJ Peters, L Itti (2006). **Computational models for predicting gaze direction in interactive visual environments.** *13th Joint Symposium on Neural Computation (JSNC)*, La Jolla, CA.
3. RJ Peters, L Itti (2006). **A computational model of task-dependent influences on eye position.** *Vision Sciences Society (VSS) Annual Meeting*, Sarasota, FL.
4. RJ Peters, A Iyer, C Koch, L Itti (2005). **Components of bottom-up gaze allocation in natural scenes.** *Vision Sciences Society (VSS) Annual Meeting*, Sarasota, FL.
5. RJ Peters, TN Mundhenk, L Itti, C Koch (2003). **Contour-facilitation in a model of bottom-up attention.** *Society for Neuroscience Annual Meeting*, New Orleans, LA.
6. RJ Peters, L Itti, C Koch (2002). **Eye movements are influenced by short-range interactions among orientation channels.** *Society for Neuroscience Annual Meeting*, Orlando, FL.
7. RJ Peters, A Backer, F Gabbiani, C Koch (2001). **Human visual object categorization is best described by a model with few stored exemplars.** *Society for Neuroscience Annual Meeting*, San Diego, CA.
8. RJ Peters, F Gabbiani, C Koch (2001). **Models of object categorization reflect multiple categorization strategies.** *Vision Sciences Society (VSS) Annual Meeting*, Sarasota, FL.
9. RJ Peters, F Gabbiani, J Jovicich, T Ernst, L Chang, C Koch (2000). **Psychophysics and physiology of figural perception in humans.** *ARVO Annual Meeting*, Ft. Lauderdale FL.
10. RJ Peters, F Gabbiani, J Jovicich, L Chang, T Ernst, C Koch (2000). **Models of visual object recognition in humans.** *Cognitive Neuroscience Society Annual Meeting*, San Francisco CA.

## Research and academic funding

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1. 2004–2006 **Intelligence Community (IC) Postdoctoral Fellowship** for post-doctoral work at University of Southern California. Fellowship proposal co-written with Prof. Laurent Itti. Intelligence Community Advisor: Jeffrey Kretsch, NGA (National Geospatial-Intelligence Agency).

2. 1998–2003 **Howard Hughes Medical Institute Predoctoral Fellowship in Biological Sciences** for doctoral thesis research at Caltech.
3. 1992–1994 **Barry M. Goldwater Scholarship** for undergraduate research at University of Wisconsin-Madison.
4. 1991 **Hilldale Undergraduate/Faculty Research Fellowship** to study the partition congruences of Srinivasa Ramanujan with Prof. Richard Askey at University of Wisconsin-Madison.
5. 1990–1994 **Schoenleber Foundation Scholarship**, full scholarship for undergraduate study at University of Wisconsin-Madison.

## Invited talks

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1. 2006-May-22 **Computational methods for predicting gaze direction**. Invited talk for the AI seminar series (Prof. Gary Cottrell, organizer) in the Department of Computer Science and Engineering at University of California-San Diego.

## Teaching experience

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1. 2004–present Informal mentor for graduate students in Professor Itti’s laboratory, including supervision of development in the iLab Neuromorphic Vision Toolkit.
2. 2000–2004 T.A. at Caltech for CNS 100/200, “Introduction to Computation and Neural Systems.” Responsibilities included organizing the class, including arranging for the lecture series from CNS faculty and setting grading policy.
3. 2001 Mentor for Caltech’s Summer Undergraduate Research Fellowship (SURF) program with undergraduate student Haitham Abd El-Moaty.
4. 1999 T.A. at Caltech for CNS/Biology 120, “Neuronal Basis of Visual Awareness.” Responsibilities included delivering lectures on the functional neuroanatomy of the human visual system, as well as developing homework assignments and grading homework and papers.

## Peer-review activities

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1. Journal reviewer for *ACM Transactions on Applied Perception*
2. Journal reviewer for *EURASIP Journal on Applied Signal Processing*
3. Journal reviewer for *IEEE Proceedings—Vision, Image, and Signal Processing*
4. Journal reviewer for *IEEE Transactions on Circuits and Systems for Video Technology*
5. Journal reviewer for *IEEE Transactions on Systems, Man and Cybernetics*
6. Journal reviewer for *ISPRS Journal of Photogrammetry and Remote Sensing*
7. Journal reviewer for *Journal of Experimental Psychology: Human Perception and Performance*
8. Journal reviewer for *Journal of Optics and Laser Technology*
9. Journal reviewer for *Perception & Psychophysics*
10. Conference reviewer for *Neural Information Processing Systems (NIPS)*
11. Conference reviewer for *ACM Eye Tracking Research and Applications (ETRA)*

## Software

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1. 2001–present **iLab Neuromorphic Vision Toolkit (iNVT)** (<http://ilab.usc.edu/toolkit/>), contributor. Around 380 programs in 440,000 lines of C++ code. Significant personal contributions include: authored 3420 of 7855 total commits to the toolkit’s version control repository; wrote and integrated a core array class to support transparent reference-counting and copy-on-write semantics; wrote an extensible system for parallel and nestable image-processing “channels” which constitute the core of the bottom-up saliency algorithm; wrote generic transport layers for image input and output, with multiple sources (raster files, movie files, framegrabbers and cameras), destinations (raster files, movie files, onscreen windows, stats analyzers), and filters (transparent compression/decompression, deinterlacing, rescaling); wrote a fast integer-math version of the core bottom-up saliency algorithms for embedded devices; wrote a test-suite for the toolkit including “white-box” unit tests and “black-box” regression tests; wrote a fast compile-dependency and link-dependency analyzer to manage make-file dependencies; converted the toolkit to use GNU autoconf for portable configuration; initiation and continued maintenance of Windows/Cygwin and Mac OS X ports of the toolkit.
2. 1998–present **GroovX** (<http://ilab.usc.edu/rjpeters/groovx/>), author. C++/Tcl framework for driving visual psychophysics experiments. Around 80,000 lines of code; includes a C++-friendly wrapping of the Tcl C API to allow domain-level objects to be scriptable, a lightweight persistence framework with multiple backends, and a class hierarchy for object-oriented 3-D scene graphs with multiple renderers (OpenGL, PostScript).