

# Frank Wood

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Alexandra House  
17 Queen Square  
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## RESEARCH OVERVIEW

My primary research interests involve the development of new Bayesian models and inference algorithms. My research contributions include new non-parametric Bayesian models and inference algorithms as well as novel applications of such models to problems from neuroscience and computational neuroscience.

## EDUCATION

Ph.D., Computer Science, 2007  
“Nonparametric Bayesian Models for Neural Data”  
Advisor: Prof. Michael J. Black  
Brown University, Providence, RI

M.S., Computer Science, Spring 2004  
Advisor: Prof. Michael J. Black  
Brown University, Providence, RI

B.S., Computer Science, Summer 1996  
Cornell University, Ithaca, NY

## EXPERIENCE

*Postdoctoral Researcher*  
London, UK  
See publications section and research statement for details.

**Gatsby Unit, UCL**  
**Aug. 2007 –present**

*Research Assistant*  
Providence, RI  
See publications section for details.

**Brown University**  
**2002 –2007**

*Chief Executive Officer*  
Washington, DC

**Interfolio, Inc.**  
**2002**

Interfolio is an online academic credential file management provider. Tripled revenue, doubled partner schools and user base, acquired ReferenceNow, LLC (a competitor), and negotiated contracts for debt reduction and strategic partnerships.

*Travel*

**2001**

Visited South Africa, Namibia, Botswana, Zimbabwe, Zambia, Malawi, Tanzania, Kenya, Egypt, Israel, Russia, China, Nepal, and India.

*Principle Engineer*  
Dulles, VA

**AOL Time Warner**  
**2000 – 2001**

Designed (then) the world’s largest production image and mp3 search engines. Filed 5 patents for image, mp3, and text search innovations. Managed multimedia search engineering team.

*Chief Executive Officer / Founder*  
Washington, DC

**ToFish!, Inc.**  
**1998 – 2000**

ToFish! was a content-based image search technology company. Negotiated sale of company to AOL for a 400%+ return on investment. Managed marketing, sales, legal, finance, and technical teams. Arranged “friends and family” and early state venture financing. Negotiated contracts for sales, intellectual property, and employment.

*Research Engineer*

**Lawrence Berkeley  
National Laboratory**  
**1997 – 1998**

Berkeley, CA and Washington, DC

Contributed to successful grant proposals for over \$500,000. Communicated laboratory research to congressional staff persons. Designed and implemented virtual reality simulations.

*Research Engineer*

**Cornell Theory Center**  
**1996 – 1997**

Ithaca, NY

Designed and implemented the first virtual reality “window manager”. Implemented a military in-flight re-fueling simulator. Investigated novel super-computing computational steering algorithms.

TEACHING  
EXPERIENCE

*Teaching Assistant*

**Brown University**  
**January 2005 – June 2005**

Providence, RI

Course title: “CS 295-7 Topics in brain computer interfaces – computation and mathematical foundations”. Lectured on particle filtering, Kalman Filtering, the history and general techniques of neural decoding, EM, Gaussian mixture models, and spike sorting.

### JOURNAL PUBLICATIONS

- F. Wood and M. J. Black. A non-parametric Bayesian alternative to spike sorting. *Journal of Neuroscience Methods*, 173:1–12, 2008.
- D. H. Grollman, O. C. Jenkins, and F. Wood. Discovering natural kinds of robot sensory experiences in unstructured environments. *Journal of Field Robotics*, 23:1077–1089, 2006.
- F. Wood, M. Fellows, C. Vargas-Irwin, M. J. Black, and J. P. Donoghue. On the variability of manual spike sorting. *IEEE Transactions in Biomedical Engineering*, 51:912–918, 2004.
- F. Wood, D. Brown, B. Amidon, J. Alferness, B. Joseph, R. E. Gillilan, and C. Faerman. Windowing and telecollaboration for virtual reality with applications to the study of a tropical disease. *IEEE Computer Graphics and Applications*, 16:72–78, 1996.
- R. E. Gillilan and F. Wood. Visualization, virtual reality, and animation within the data flow model of computing. *Computer Graphics*, 29:55–58, 1995.

### REFEREED CONFERENCE PROCEEDINGS

- F. Wood and Y.W. Teh. A hierarchical nonparametric Bayesian approach to statistical language model domain adaptation. In *Advances in Neural Information Processing Systems*, submitted, 2008.
- J. Gasthaus, F. Wood, D. Görür, and Y.W. Teh. Dependent Dirichlet process spike sorting. In *Advances in Neural Information Processing Systems*, submitted, 2008.
- P. Berkes, J.W. Pillow, and F. Wood. Characterizing neural dependencies with Poisson copula models. In *Advances in Neural Information Processing Systems*, submitted, 2008.
- F. Wood and T. L. Griffiths. Particle filtering for non-parametric Bayesian matrix factorization. In *Advances in Neural Information Processing Systems*, pages 1513–1520, 2006.
- F. Wood, S. Goldwater, and M. J. Black. A non-parametric Bayesian approach to spike sorting. In *Proceedings of the 28th IEEE Conference on Engineering in Medicine and Biological Systems*, pages 1165–1169, 2006.
- F. Wood, T. L. Griffiths, and Z. Ghahramani. A non-parametric Bayesian method for inferring hidden causes. In *Proceedings of the 22nd Conference on Uncertainty in Artificial Intelligence*, pages 536–543, 2006.
- S. P. Kim, F. Wood, and M. J. Black. Statistical analysis of the non-stationarity of neural population codes. In *The First IEEE / RAS-EMBS International Conference on Biomedical Robotics and Biomechatronics*, pages 259–299, 2006.
- F. Wood, S. Roth, and M. J. Black. Modeling neural population spiking activity with Gibbs distributions. In *Advances in Neural Information Processing Systems*, pages 1537–1544, 2005.
- F. Wood, Prabhat, J. P. Donoghue, and M. J. Black. Inferring attentional state and kinematics from motor cortical firing rates. In *Proceedings of the 27th IEEE Conference on Engineering in Medicine and Biological Systems*, pages 149–152, 2005.
- F. Wood, M. Fellows, J. P. Donoghue, and M. J. Black. Automatic spike sorting for neural decoding. In *Proceedings of the 27th IEEE Conference on Engineering in Medicine and Biological Systems*, pages 4126–4129, 2004.

TECHNICAL REPORTS	F.Wood, D.H.Grollman, K.A.Heller, O.C.Jenkins, and M.J.Black. Incremental nonparametric Bayesian regression. Technical Report CS-08-07, Brown University, Department of Computer Science, 2008.
WORKSHOP PUBLICATIONS	F. Wood and Y.W. Teh. A hierarchical, hierarchical Pitman Yor process language model. In <i>ICML/UAI Nonparametric Bayes Workshop</i> , 2008. D. H. Grollman, O. C. Jenkins, and F. Wood. Discovering natural kinds of robot sensory experiences in unstructured environments. In <i>Advances in Neural Information Processing Systems Workshop on Machine Learning Based Robotics in Unstructured Environments</i> , 2005.
ABSTRACTS	F. Wood and M. J. Black, Energy Based Models of Motor Cortical Population Activity, <i>Neuroscience</i> , Washington, DC 2005 F. Wood, M. Fellows, J. P. Donoghue, and M. J. Black, Automatic Spike Sorting for Neural Decoding, <i>Statistical Analysis of Neural Data</i> , Pittsburg, PA 2004 F. Wood, M. Fellows, M. J. Black, and J. P. Donoghue, Accuracy of manual spike sorting: results for the Utah intracortical array, <i>Neuroscience</i> , New Orleans, LA 2003
PATENTS	M. J. Black, W. Wu, and F. Wood, application, <i>Method and system for automatic decoding of motor cortical activity</i> , 2005 G. Pass and F .Wood, 6,671,402, <i>Representing an image with weighted joint histogram</i> , 2003 G. Pass and F .Wood, 6,522,782, <i>Image and text searching techniques</i> , 2003 G. Pass and F .Wood, 6,556,710, <i>Image searching techniques</i> , 2003 G. Pass and F .Wood, 6,622,780, <i>Indexing of images and/or text</i> , 2003 G. Pass and F .Wood, 6,522,779, <i>Representing an image with a posterized joint histogram</i> , 2003
AWARDS AND HONORS	National Science Foundation Research Experience for Undergraduates, Cornell Theory Center, 1994
SERVICE	Brown computer science faculty search graduate representative, 2005 Graduate student council representative, 2003
REVIEWING	Neural Information Processing Systems Uncertainty in Artificial Intelligence International Conference on Machine Learning Journal of Machine Learning Research Association for the Advancement of Artificial Intelligence Journal of Neuroscience Methods IEEE Transactions on Biomedical Engineering
INVITED CONFERENCE PRESENTATIONS	“ <i>Applied Virtual Reality</i> ”, SigGraph, Course 14, Los Angeles, CA, 1997

INVITED TALKS

*“Gentle Introduction to Infinite Gaussian Mixture Modeling”*

Brown University 1<sup>st</sup> Annual CS Dept. Retreat, Bristol, RI 2006

*“Bayesian Decoding for Neural Prostheses”*

Northwestern University, IL, 2005

*“Variability of Manual Spike Sorting for Multi-Electrode Arrays”*

University of Chicago, IL, 2003