

PRADEEP SHENOY

CONTACT INFORMATION

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RESEARCH INTERESTS

I am interested in using machine learning to study and model human behavior in brain-computer interfaces (BCI), HCI and neuroscience. I have extensive experience with the analysis and use of biosignals such as EEG, ECoG and EMG. My previous research work includes algorithms for indexing and navigation of semistructured data, and query result caching in traditional databases.

EDUCATION

University of Washington, Seattle, WA USA

Ph.D. (Computer Science), Spring 2008

- Dissertation Topic: "Brain-Computer Interfaces for Control and Computation"
- Advisor: Rajesh P.N. Rao

M.S. (Computer Science), 2004

Indian Institute of Technology, Bombay, India

B.Tech (Computer Science), 1999

RESEARCH EXPERIENCE

University of Washington, Seattle, WA USA

Research Assistant

2002 - present

- Designed classifier-based techniques and an online system for using electrocorticographic signals in multi-class BCIs.
- Designed an image-based noninvasive brain interface for control of a humanoid robot.
- Developed a system for controlling a robotic arm using Electromyographic signals.
- Applied dynamic Bayesian networks for building models of user behavior in BCIs.

Microsoft Research, Redmond, WA USA

Consulting work

Aug 2007 - present

Working on image categorization using electroencephalographic brain responses.

Microsoft Research, Redmond, WA USA

Research Intern

Jan - Mar, 2007

Designed a system for classifying images based on EEG brain responses.

Fraunhofer Institute, Berlin, Germany

Visiting Researcher

Jul - Oct, 2005

Developed and evaluated adaptive algorithms for the Berlin Brain-Computer Interface.

Bell Laboratories, Murray Hill, NJ USA

Research Intern

Jun - Sep, 2001

Worked on novel query processing and optimization techniques for the ROLEX project. The goal of ROLEX is to provide fast on-demand navigational access to relational data via an XML wrapper.

Member of Technical Staff

Nov 1999 - Aug 2000

Developed novel techniques for indexing semistructured data. I also worked on the AQUA approximate query answering project.

TEACHING AND
MENTORING

University of Washington, Seattle, WA USA

Research Supervision

2006 - 2007

Mentored two research assistants in the design of experiments, algorithms, analysis methods and online systems for a variety of brain-computer interface paradigms. Part of this work has already been published, and more manuscripts are being prepared.

TA and Co-Designer, Brain-Computer Interfaces Course

Spring 2006

Developed the course structure, reading list and course projects. Helped coordinate class discussions, gave introductory lectures and supervised student projects.

Mentor for Undergraduate Research

2004 - 2005

Supervised 3 undergraduate honors theses on topics in Brain-Computer Interfaces. Guided undergraduates through research projects involving development of a novel EMG-based prosthetic interface, and large-margin methods for robust classification of ECoG signals in Brain-Computer Interfaces. Part of this work was extended into a paper at AAAI 2005.

Tutoring for Undergraduates

2003

Volunteered as tutor for CS undergraduates taking courses in discrete mathematics and theoretical computer science.

Teaching Assistant, CSE 322

Autumn 2002

Graded homeworks and exams, conducted office hours and taught guest lectures for an undergraduate course in theoretical computer science.

Teaching Assistant, CSE 142

Spring 2002

Taught two weekly sections for a campus-wide introductory computer programming course.

PUBLICATIONS

Journal Publications:

Control of a Humanoid Robot by a Noninvasive Brain-Computer Interface in Humans. C.J. Bell, P. Shenoy, R. Chalodhorn, R. Rao. *J Neural Eng* 5 (2008), 214-220.

Generalized Features for Electrographic BCIs. P. Shenoy, K.J. Miller, J. Ojemann, R. Rao. *IEEE Trans Biomed Engg* 55(1) 273-280, 2008.

Online Electromyographic Control of a Robotic Prosthesis. P. Shenoy, K.J. Miller, B. Crawford, R. Rao. *IEEE Trans Biomed Engg* 55(3) 1128-1135, 2008.

Beyond the Gamma Band: The Role of High Frequency Features in Movement Classification. K.J. Miller, P. Shenoy, M. den Nijs, L.B. Sorensen, R. Rao, J. Ojemann. *IEEE Trans Biomed Engg* 55(5) 1634-1637, 2008.

Real-time Functional Brain Mapping using Electrographic. K.J. Miller, M. denNijs, P. Shenoy, R. Rao, J. Ojemann. *NeuroImage* 37(2) 504-507, 2007.

Towards Adaptive Classification for BCI. P. Shenoy, M. Krauledat, B. Blankertz, R. Rao, K.-R. Mueller. *J Neural Eng* 3, 2006.

Adaptation in CSP-based BCI systems (book chapter). M. Krauledat, P. Shenoy, B. Blankertz, R. Rao, K.-R. Mueller. *Toward Brain-Computer Interfacing*, MIT Press, 2007.

Conference Publications:

Combining Brain Computer Interfaces With Vision for Object Categorization. Ashish Kapoor, Pradeep Shenoy, Desney Tan. *Computer Vision and Pattern Recognition (CVPR)* 2008.

Human-aided Computing: Utilizing Implicit Human Processing to Classify Images. Pradeep Shenoy, Desney Tan. ACM Conference on Human Factors in Computing (CHI) 2008.

Feasibility and Pragmatics of Classifying Working Memory Load with an Electroencephalograph. D. Grimes, D. Tan, S. Hudson, P. Shenoy, R. Rao. ACM Conference on Human Factors in Computing (CHI) 2008.

Finger Movement Classification for an Electroencephalographic BCI. P. Shenoy, K.J. Miller, J. Ojemann, R. Rao. IEEE EMBS Conf. Neur Engg 2007.

An Image-based Brain-Computer Interface Using the P3 Response. C.J. Bell, P. Shenoy, R. Chalodhorn, R. Rao. IEEE EMBS Conf. Neur Engg 2007.

Realtime Classification of Electromyographic Signals for Prosthetics. Beau Crawford, Kai Miller, Pradeep Shenoy, Rajesh Rao. Association for Advancement of Artificial Intelligence (AAAI) 2005.

Dynamic Bayes Networks for Brain-Computer Interfacing. Pradeep Shenoy, Rajesh Rao. Neural Information Processing Systems (NIPS) 2004.

Abstracts and Workshop Papers:

Risk Taking as Exploration in a Fast-Changing World. E.J. Chastain, P. Shenoy, R.P.N. Rao. Computational and Systems Neuroscience (COSYNE) 2008.

Correlation in Paired One-Dimensional, Closed Loop, Overt, Motor Controlled BCI. K.J. Miller, G. Schalk, E.C. Leuthardt, P. Shenoy, R.P.N. Rao, J.G. Ojemann. 3rd Int'l BCI Workshop, Graz, Austria, 2006.

Publications Prior to 2004:

Corpus-based Schema Matching. Jayant Madhavan, Philip Bernstein, Kuang Chen, Alon Halevy, Pradeep Shenoy. Workshop on Information Integration and the Web, IJCAI 2003.

Optimizing View Queries in ROLEX to Support Navigable Result Trees. P. Bohannon, S. Ganguly, H.F. Korth, P.P.S. Narayan, P. Shenoy. VLDB 2002.

Updates for Structure Indexes. Raghav Kaushik, Philip Bohannon, Jeff Naughton, Pradeep Shenoy. VLDB 2002.

Exploiting Local Similarity for Efficient Indexing of Paths in Graph Structured Data. Raghav Kaushik, Pradeep Shenoy, Philip Bohannon, Ehud Gudes. ICDE 2002.

Turbo-Charging Vertical Mining of Large Databases. P. Shenoy, J. Haritsa, S. Sudarshan, G. Bhalotia, M. Bawa, D. Shah. SIGMOD 2000.

PROFESSIONAL
SERVICE

Reviewer for SIGMOD, VLDB, NIPS 2003, NIPS 2004, CHI 2006, NIPS 2006, NIPS 2007, CHI 2008, UIST 2008, NIPS 2008, and for the IEEE journals on Biomedical Engineering (TBME) and Neural Systems & Rehab Engg (TNSRE).