

Suresh K. Bhavnani

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Education

Carnegie Mellon University

Ph.D. in Computational Design and Human-Computer Interaction, 1998.

University of California at Los Angeles

Master of Architecture (Specialization in 2D and 3D Computer-Aided Design and Visualization).

University of Bombay

Bachelor of Architecture (Specialization in Design).

Professional Experience

Research Assistant Professor: Center for Computational Medicine and Bioinformatics, Medical School, University of Michigan (2008-present).

Assistant Professor of HCI: School of Information, University of Michigan (2000-2007).

Post-Doctoral Fellow: Human-Computer Interaction Institute, School of Computer Science, Carnegie Mellon University (1998-2000).

Product Manager and Developer of 2D and 3D Computer Graphics and Visualization Applications: Intergraph Corporation (1984-1991).

Research Interests

My research interests include (1) using visualizations such as graphical networks, and quantitative methods to analyze biomedical data including electronic health records (EHRs), (2) using techniques from HCI to analyze the difficulties users have in performing information-intensive biomedical tasks, and (3) translating my analysis of information and users to build generalizable systems that help users perform complex biomedical tasks. The following are examples of my research projects.

1. Visualization and Quantitative Analysis of Biomedical Data

Network Analysis and Visualization of EHR-based data. Used networks and statistical methods to visualize and analyze patterns of comorbidity between mental, cardio-vascular and endocrine disorders in a large EHR-based dataset consisting of 32 million patients. The network analysis helped to identify complex patterns of unexpectedly frequent comorbidities that are under-reported in the literature, with implications for the design of systems to support the exploration of large electronic health records.

Network Analysis and Visualization of Cancer Patients and Symptoms. Used 2D and 3D networks to visualize and analyze the co-occurrence of symptoms across cancer patients undergoing chemotherapy. The results led to the design of algorithms and interfaces for decision-support systems.

Network Analysis and Visualization of Toxic Chemicals and Symptoms. (Data provided by the National Library of Medicine). Used networks to visualize and analyze toxic chemicals and acute symptoms. The results led to recommendations for interfaces and algorithms to help emergency responders in the rapid identification of toxic chemicals.

Network Analysis and Visualization of Renal Diseases and Genes. Used networks to analyze how genes overlap across renal diseases. The results led to implications for a molecular basis of classifying renal diseases.

2. Analysis of Users Performing Complex Biomedical and Healthcare Tasks

Semi-structured Interviews of Translational and Clinical Science Researchers. Analyzed the computational and social networking needs of 30 junior and senior researchers to conduct effective translational and clinical science. The results led to the design of a prototype for a research portal, which should enable translational researchers discover, find, and make more effective use of human and computational resources.

Cognitive Analysis of Expert and Novice Search Strategies. Used verbal protocols and problem behavior graphs to analyze the domain-specific search strategies used by experts and novices to find online healthcare information. The results led to strategies for finding accurate and complete healthcare information.

Contextual Analysis of Patent Searchers and Biomedical/Engineering Inventors (in Collaboration with IBM). Used semi-structured interviews, in-context observations, and surveys to analyze the collaborative search and sensemaking activities between patent searchers (in a technology transfer office), and biomedical/engineering inventors. The results led to recommendations on how to support collaborative search and sensemaking activities related to finding comprehensive prior art about an invention.

3. Design and Evaluation of Systems to Support Complex Healthcare Tasks

Design and Evaluation of MAIDN (Mining and Interpretation of Diagnostic Networks). Developed and evaluated a system to help first responders rapidly identify toxic chemicals based on symptoms and properties. In comparison to systems currently used, MAIDN significantly reduces the symptoms required to uniquely identify a chemical.

Design and Evaluation of StrategyHub for Cancer Patients (in Collaboration with Physicians at the University of Michigan). Developed and evaluated the StrategyHub which provides expert search strategies to help patients and caregivers find comprehensive healthcare information. The results led to design guidelines for providing online search procedures.

Technical Skills

Visualization and Quantitative Analysis of Biomedical Data. Analysis of genome, phenome, and web scale biomedical data to visually identify patterns, and verify those patterns using quantitative methods. Experience in manipulating biomedical datasets using Python, and visualizing and quantitatively analyzing 2D and 3D networks using Pajek, GUESS, and CAVE. The research has led to an outstanding paper and a distinguished paper award at American Medical Informatics Association conferences.

Analysis of User Needs and Evaluation of Systems. 15 years of experience in identifying user needs and evaluating system interactions through the use of methods from HCI, Educational Psychology, and Information Science. These methods include computational cognitive modeling, contextual studies, controlled laboratory and classroom experiments, and graphical network analysis.

Interdisciplinary Collaboration. Initiated and led research collaborations and publications with experts in medicine, public health, psychology, physics, computer science, education and engineering. Mentored and co-authored publications with more than ten students with a wide range of educational backgrounds.

Management and Development of Systems. Experience in managing and developing commercial and prototype computer applications.

Written and Spoken Communication. Over 50 journal and conference publications including 6 long paper publications and presentations at the high impact ACM SIGCHI conference. Research funded by NSF, Microsoft, and the University of Michigan. High teaching scores in courses including *HCI Evaluation Methods*, and *Search and Retrieval* at the University of Michigan.

Honors and Awards

Outstanding Paper, American Medical Informatics Association Summit on Translational Bioinformatics (Role: First Author), 2009.

Top Poster Award, Michigan World Usability Day Conference (Role: First Author), 2008.

Outstanding Research Mentorship Award, Honorable Mention, Undergraduate Research Opportunity Program (UROP), University of Michigan, 2008.

Poster Award of Excellence (Role: Faculty Mentor and Co-Author), Undergraduate Research Opportunity Program (UROP), 2008.

Distinguished Paper Award. American Medical Informatics Association (Role: First Author), 2007.

Special Mention. Student Team Award (Role: Team Leader), Apple Design Competition, 1993.

First Prize. Student Team Award (Role: Team Leader), National Association of Students of Architecture.

Publications

Vis / Analysis Visualization / Analysis
HCI Human-Computer Interaction

Journal Articles (Refereed)

1. **Bhavnani, S.K.**, Eichinger, F., Martini, S., Saxman, P., Kretzler, M. Network Analysis of Genes Regulated in Renal Diseases: Implications for a Molecular-Based Classification. *BMC Bioinformatics* 10 (Suppl 9):S3 (2009). [Journal version of **Outstanding Paper** at the AMIA 2009 Summit on Translational Bioinformatics].
Vis / Analysis
2. **Bhavnani, S.K.**, Peck, F.A. Scatter Matters: Regularities and Implications for the Scatter of Healthcare Information on the Web. *Journal of the American Society for Information Science and Technology* (in press).
Vis / Analysis
3. **Bhavnani, S.K.**, Peck, F.A., Reif, F. Strategy-Based Instruction: Lessons Learned in Teaching the Effective and Efficient Use of Computer Applications. *ACM Transactions on Computer Human-Interaction* 15,1 (2008) 2:1-2:43.
HCI
4. Adamic, L.A., **Bhavnani, S.K.**, and Xiaolin, S. Scatter Networks: A New Approach for Analyzing Information Scatter on the Web. *New Journal of Physics* 9 (2007) 231.
Vis / Analysis
5. **Bhavnani, S.K.**, Bichakjian, C.K., Johnson, T.M., Little, R.J., Peck, F.A., Schwartz, J.L., & Strecher, V.J. Strategy Hubs: Domain Portals to Help Find Comprehensive Information. *Journal of the American Society for Information Science and Technology* 57,1 (2006), 4-24.
HCI
6. **Bhavnani, S.K.** Why is it Difficult to Find Comprehensive Information? Implications of Information Scatter for Search and Design. *Journal of the American Society for Information Science and Technology* 56, 9 (2005), 989-1003.
Vis / Analysis
7. Schlosser, R.W., Wendt, O., **Bhavnani, S.K.**, Nail-Chiwetalu, B. Use of Information Seeking Strategies in Evidence-Based Practice: The Case of Pearl Growing. *International Journal of Communication and Language Disorders* 41, 5 (2006), 567-582. PMID: 17050471.
HCI
8. **Bhavnani, S.K.** The retrieval of highly scattered facts and architectural images: Strategies for search and design. *Automation in Construction* 14 (2005), 724-735.
HCI
9. **Bhavnani, S.K.**, and John, B.E. The Strategic Use of Complex Computer Systems. *Human-Computer Interaction* 15 (2000), 107-137.
HCI
10. Flemming, U., **Bhavnani, S.K.**, and John, B.E. Mismatched Metaphor: User vs. System Model in Computer-Aided Drafting. *Design Studies* 18 (1997), 349-368.
HCI
11. **Bhavnani, S.K.**, Flemming, U., Forsythe, D.E., Garrett, J.H., Shaw, D.S., and Tsai, A. CAD Usage in an Architectural Office: From Observations to Active Assistance. *Automation in Construction* 5 (1996), 243-255.
HCI

Journal Articles in Review (Refereed)

12. **Bhavnani, S.K.**, Bellalla, G., Ganesan, A., Krishna, R., Saxman, P., Scott, C., Silveira, M., and Given, C. The Nested Structure of Cancer Symptoms: Implications for Analyzing Co-occurrence and Managing Symptoms. (selected as “journal potential” by AMIA).
Vis / Analysis

Publications at ACM SIGCHI Conferences (These are refereed papers published in a high-impact conference with a low acceptance rate under 20%. In computer science, this conference is considered to be more competitive than many journals).

ACM SIGCHI Long Papers

13. **Bhavnani, S.K.**, Peck, F.A., Reif, F. Strategy-Based Instruction: Lessons Learned in Teaching the Effective and Efficient Use of Computer Applications. (Invited presentation of TOCHI journal article).
HCI
14. **Bhavnani, S.K.**, Bichakjian, C.K., Johnson, T.M., Little, R.J., Peck, F.A., Schwartz, J.L., and Strecher, V.J. Strategy Hubs: Next-Generation Domain Portals with Search Procedures. *Proceedings of CHI'03* (2003), 393-400. New York: ACM.
HCI

15. **Bhavnani, S.K.**, Reif, F. and John, B.E. Beyond Command Knowledge: Identifying and Teaching Strategic Knowledge for Using Complex Computer Applications. *Proceedings of CHI'01* (2001), 229-236. New York: ACM. HCI
16. **Bhavnani, S.K.**, John, B.E., and Flemming, U. The Strategic Use of CAD: An Empirically Inspired, Theory-Based Course. *Proceedings of CHI'99* (1999), 42-49. New York: ACM. HCI
17. **Bhavnani, S.K.**, and John, B.E. Delegation and Circumvention: Two Faces of Efficiency. *Proceedings of CHI'98* (1998), 273-280. New York: ACM. HCI
18. **Bhavnani, S.K.**, and John, B.E. From Sufficient to Efficient Usage: An Analysis of Strategic Knowledge. *Proceedings of CHI'97* (1997), 91-98. New York: ACM. HCI
19. **Bhavnani, S.K.**, and John, B.E. Exploring the Unrealized Potential of Computer-Aided Drafting. *Proceedings of CHI'96* (1996), 332-339. New York: ACM. HCI

ACM SIGCHI Short Papers

20. **Bhavnani, S.K.**, Jacob, R. T., Nardine, J., and Peck, F.A. Exploring the Distribution of Online Healthcare Information. *Proceedings of CHI'03* (2003), 816-817. Vis / Analysis

ACM SIGCHI Posters and Work in Progress

21. **Bhavnani, S.K.**, Clarkson, G., Scholl, M. Search and Sensemaking of Patents. *Extended Abstracts Proceedings of ACM CHI'08*, 2799-2804. HCI
22. **Bhavnani, S.K.** Domain-Specific Search Strategies for the Effective Retrieval of Healthcare and Shopping Information. *Proceedings of CHI'02* (2002), 610-611. New York: ACM. HCI
23. **Bhavnani, S.K.** Strategic Approach to Computer Literacy. *Proceedings of CHI'00* (2000), 161-162. New York: ACM. HCI

Publications at the American Medical Informatics Association (AMIA) Conferences

AMIA Papers

24. **Bhavnani, S.K.**, Bellalla, G., Ganesan, A., Krishna, R., Saxman, P., Scott, C., Silveira, M., and Given, C. The Nested Structure of Cancer Symptoms: Implications for Analyzing Co-occurrence and Managing Symptoms. *Proceedings of AMIA'09* (in press). [This will be published as an abstract, and the full version published in a journal]. Vis / Analysis
25. **Bhavnani, S.K.**, Eichinger, F., Martini, S., Saxman, P., Kretzler, M. Network Analysis of Genes Regulated in Renal Diseases: Implications for a Molecular-Based Classification. *Proceedings of AMIA Summit on Translational Bioinformatics. Proceedings of AMIA'09* (2009) *Summit on Translational Bioinformatics. (Outstanding Paper)*. Vis / Analysis
26. **Bhavnani, S.K.**, Abraham, A., Demeniuk, C., Gebrekristos, M., Gong, A., Nainwal, S., Vallabha, G.K., Richardson, R.J. Network Analysis of Toxic Chemicals and Symptoms: Implications for Designing First-Responder Systems. *Proceedings of AMIA'07* (2007) **(Distinguished Paper Award)** PMID: PMC2244515. Vis / Analysis
27. **Bhavnani, S.K.** The Distribution of Online Healthcare Information: A Case Study on Melanoma. *Proceedings of AMIA'03* (2003), 81-85. PMID: PMC1479972. Vis / Analysis
28. **Bhavnani, S.K.**, Bichakjian, C.K., Schwartz, J.L., Strecher, V.J., Dunn, R.L., Johnson, T.M., and Lu, X. Getting patients to the right healthcare sources: From Real-World Questions to Strategy Hubs. *Proceedings of AMIA'02* (2002), 51-55. PMID: PMC2244515. HCI

AMIA Posters

29. **Bhavnani, S.K.**, Saxman, P.R., Hunscher, D.A., Zheng, K., Smith, K.A., Athey, B.D. CaTER: University of Michigan's Web Portal for Clinical and Translational Empowered Research. *Proceedings of 2008 AMIA Summit on Translational Bioinformatics*. HCI
30. **Bhavnani, S.K.**, Ganesan, A., Scott, C., Weber, C., Saxman, P. A Novel System for Rapidly Identifying Toxic Chemicals. *Proceedings of AMIA'08*. PMID: 18999084. HCI

Book Chapters

31. **Bhavnani, S.K.**, Wilson, C. Information Scattering. *Encyclopedia of Library and Information Science* (in press). Vis / Analysis
32. **Bhavnani, S.K.** Application Use Strategies. In: Bainbridge, W.S. (ed), *Berkshire Encyclopedia of Human-Computer Interaction*, 2004, 32-37. HCI
33. **Bhavnani, S.K.** A Personal Story – Internet Singing Lessons. (Side bar). In: Bainbridge, W.S. (ed), *Berkshire Encyclopedia of Human-Computer Interaction*, 2004, 119. HCI
34. **Bhavnani, S.K.**, and John, B.E. The Strategic Use of Complex Computer Systems. In: Carroll, J. (ed), *Human-Computer Interaction in the New Millennium*, 2001, 97-124. HCI

Papers, Posters, Abstracts, and Panels in Other Refereed Conferences and Workshops

35. Martini, S., **Bhavnani, S.K.**, Eichinger, F., Saxman, P., Cohen, C., Kretzler, M., and the European Renal cDNA Bank Consortium. Defining the molecular network of renal diseases: Genome-wide mRNA profiles identify molecular relationships in eight renal diseases. *Renal Week 2008: American Society of Nephrology (ASN) Annual Meeting*. Vis / Analysis
36. **Bhavnani, S.K.**, Consolvo, S., Newman, M., Norman, D., Veinot, T., Zheng, K. The Role of HCI in Biomedical Informatics: Untapped Opportunities for Broad Social Impact. Panel Discussion. *Human Computer Interaction Consortium Workshop* (2009). HCI
37. **Bhavnani, S.K.**, Ganesan, A., Weber, C., Banas, S., Saxman, P. A System for the Rapid Identification of Toxic Chemicals in HazMat Vehicles. Michigan World Usability Day Conference, 2008. [**Top Poster Award**]. HCI
38. **Bhavnani, S.K.** and Adamic, L. A. Making Sense of Information Scatter on the Web. *Human Computer Interaction Consortium* (2007). Vis / Analysis
39. **Bhavnani, S.K.** and Peck, F.A. Towards a Model of Information Scatter: Implications for Search and Design. *Proceedings of ASIST'06* (2006). Vis / Analysis
40. **Bhavnani, S.K.** How to Facilitate Effective Computer Use? The Interaction of Task Complexity and Tool Sophistication. *Proceedings of Designing Information and Organizations with a Positive Lens* (online position paper, 2005). HCI
41. **Bhavnani, S.K.** Crossing the line: Opportunities and Challenges of Interdisciplinary Research by Untenured Researchers. *Proceedings of i-Conference 2005* (online position paper, 2005). HCI
42. **Bhavnani, S.K.** Emergent Web Regularities: Implications for Research and Education in i-Schools. *Proceedings of i-Conference 2005* (online position paper, 2005). Vis / Analysis
43. Peck, F.A., **Bhavnani, S.K.**, Blackmon, M.H., Radev, D.R. Exploring the use of natural language systems for fact identification: Towards the automatic construction of healthcare portals. *Proceedings of ASIST'04* (2004). HCI
44. **Bhavnani, S.K.** The retrieval of highly scattered facts and architectural images: Strategies for search and design. *G-CADS'04* (2004). Vis / Analysis
45. **Bhavnani, S.K.**, and Bates, M.J. Separating the knowledge layers: cognitive analysis of search knowledge through hierarchical goal decompositions. *Proceedings of ASIST'02* (2002), 204-213. HCI
46. **Bhavnani, S.K.** Important Cognitive Components of Domain-Specific Search Knowledge. *Proceedings of TREC'01* (2001), 571-578. Washington, DC: NIST. HCI
47. **Bhavnani, S.K.**, Drabenstott, K., and Radev, D. Towards a Unified Framework of IR Tasks and Strategies. *Proceedings of ASIST'01* (2001), 340-354. HCI
48. **Bhavnani, S.K.**, Drabenstott, K., and Athota, S. General and Efficient Strategies for Information Retrieval. *Proceedings of ASIST'01* (2001), 680-681. HCI
49. **Bhavnani, S.K.** Designs Conducive to the Use of Efficient Strategies. *Proceedings of DIS'00*, (2000), 338-345. HCI

50. **Bhavnani, S. K.**, Garrett, J.H., Flemming, U., and Shaw, D. S. Towards Active Assistance. In: Garrett, J.H., and Rehak, D.R. (eds.), *Bridging the Generations. The Future of Computer-Aided Engineering*, 1999, 199-203. Pittsburgh, PA: Carnegie Mellon University. HCI
51. **Bhavnani, S.K.**, Flemming, U., Forsythe, D.E., Garrett, J.H., and Shaw, D.S. Understanding and Assisting CAD Users in the Real World. *Proceedings of ACADIA '95* (1995), 209-227. HCI
52. **Bhavnani, S.K.**, Garrett, J. H., and Shaw, D. S. Leading Indicators of CAD Experience. *Proceedings of CAAD Futures '93* (1993) 313-334. HCI
53. Shaw, D.S., Yang, D., Garrett, J.H., and **Bhavnani, S.K.** Human-Computer Communication and Response. *Proceedings of the 21st Annual Conference on Computer Science, CSC '93* (1993) 278-283. HCI
54. **Bhavnani, S.K.** Expert CAD Systems: What's the Problem? Proceedings of the Annual Conference of the International Association of Knowledge Engineers, IAKE'89 (1989), 436-441. HCI

News Reports and Magazine Articles

1. Moore, N.C. How best to exploit the power of popular computer programs. (Published on the home page of the University of Michigan, and featured a description of strategies to use complex computer applications). *University of Michigan News Service* (April 1, 2009).
2. Arun Ganesan's interdisciplinary undergraduate research project leads to two awards. (Published on the home page of the Electrical Engineering and Computer Science department at the University of Michigan, and features a description of the UROP awards by Bhavnani's student Arun Ganesan, and Bhavnani). *Electrical Engineering and Computer Science News and Announcements* (May 27, 2008).
3. Applause! Bhavnani and team win distinguished paper award. (Features a description of the AMIA paper that won the distinguished paper award) *Applause!* (January 2008).
4. Ganguly, D. Bhavnani Hits the Bullseye. (Features Bhavnani's career trajectory and research findings). *Economic Times* (July 9, 2004). This newspaper has a 1 million readership, and is the third largest business daily in the world.
5. Jackson, J. Search Party: Professors' Strategies Make Finding Information Easier. (Features an interview with Marcia Bates and Suresh Bhavnani). *SI@umich* (Fall 2002), 7.
6. **Bhavnani, S.K.** Learning FEA by Computer. *Computer-Aided Engineering*, (May 1991) 72-73.
7. **Bhavnani, S.K.** I/ExperTutor: Bridging the Experience Gap. *Intervue*, Intergraph Year Book, (Winter 1990) 26-30, v. 10, no. 1.

Invited and Elected Positions

Co-chair with Ed Chi (PARC) and Wendy Kellog (IBM), *Human-Computer Interaction Consortium (HCIC) Workshop* (2007).

Editorial advisory board: *Encyclopedia of Library and Information Sciences* (2006-present).

Program committee: *The American Society for Information Science (ASIST)* (2003, 2006).

Member: *Comprehensive Cancer Center*, University of Michigan (2002-present).

Member: Project advisory group, *Studio for Creative Inquiry*, Carnegie Mellon University (1998).

Invited Presentations

Guest Lecturer (2009). BI/MHP 668 Introduction to Health Informatics. *Network Analysis*.

ACM CHI (2009). *Strategy-Based Instruction: Lessons Learned in Teaching the Effective and Efficient Use of Computer Applications*.

University of California, San Francisco (2009) Introduction to Network Analysis (invited online presentation to Ida Sims' lab).

Michigan State University (2009). Network Analysis of Cancer Symptom Co-occurrence.

- CTSA Collaboration Facilitation** (2008), From User Needs to System Design: Developing Michigan's Research Portal for Translational Scientists.
- University of Michigan** (2007), Center for Computational Medicine and Bioinformatics. *Hidden Regularities in Online Public Health Information: Implications for Search and Design*.
- University of Texas** (2006), School of Health Information Sciences (SHIS). *Why is it Difficult to Find Comprehensive Healthcare Information? Implications of Information Scatter for Search and Design*.
- University of Michigan** (2006), Socio Technical Infrastructure for Electronic Transactions (STIET) seminar. *GoogleBuddy: Towards a Collaborative Environment for Learning and Sharing Search Knowledge*.
- University of Michigan** (2005). *The Scatter of Healthcare Information: Causes and Design Implications*.
- Carnegie Mellon University** (2004). G-CADS symposium. *The retrieval of highly scattered facts and architectural images: Strategies for search and design*.
- ALISE Annual Conference** (2002). *Experiences of information technology faculty in Library Schools*.
- University of Michigan** (2001), Health Media Research Laboratory. *Important Cognitive Components of Domain-Specific Search Knowledge*.
- Text Retrieval Conference** (2001). *Important Cognitive Components of Domain-Specific Search Knowledge*.
- Bentley Inc.**, Philadelphia (1998), Research and Software Development. *The Strategic Use of CAD: An Empirically Inspired, Theory-Based Course* (with Flemming U.).
- Intergraph Corporation**, (1994). Intergraph Graphics Users Group Fall Conference, *Active Assistance - Path Through the Jungle*.

Grants and Research Contracts

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| Pending | Centers for Disease Control. <i>Novel Systems for Rapidly Identifying Toxic Chemicals During Emergencies</i> (PI). |
| Pending | National Library of Medicine, NIH. <i>Trial Bank Project</i> (Co-PI). |
| Sept 2007-present | CTSA, NIH. <i>CTSA Portal Project</i> (Investigator). |
| Sept 2008-Jun 2009 | NICRR, NIH. <i>Administrative Supplement for CTSA Consortium Project</i> . (Investigator). Subaward amount to University of Michigan: \$75,000. |
| Jun 2006–May 2007 | Microsoft. <i>VISP: Visualizing Information Search Processes</i> . (Co-PI). Award amount \$49,500. |
| Jan 2006–April 2006 | Grants Opportunities Collaborative Spaces (GROCS) Award. <i>GoogleBuddy: Collaborative Environment for Learning and Sharing Search Knowledge</i> . (Mentor). Award amount \$11,500. |
| Sept 2005–Aug 2007 | National Science Foundation (NSF) Award# IIS-0534903, <i>Patent Cartography: Improving the Process of Searching Through the Patent Thicket</i> (Co-PI). Award amount: \$397,964. |
| Jun 2005–Aug 2005 | University of Michigan Center of Excellence in Cancer Communications Research (CECCR, funded by NIH). <i>Developmental Grant Proposal: Link Topologies in Healthcare Sites</i> (PI). Award amount: \$20,000. |
| Nov 2001–Sept 2004 | Institute of Museum and Library Services (IMLS). <i>Evaluating the Effectiveness of Interactive Multimedia for Library-User Education</i> (Co-PI). Award amount: \$249,949. |
| Aug 1998–July 2001 | National Science Foundation (NSF), CISE Educational Innovations Award# EIA-9812607, <i>The Strategic Use of Complex Computer Systems</i> . (Project Director: Bhavnani, PI: Bonnie John. Award amount: \$397,915. |
| Oct 1995–Dec 1996 | US Army Corp of Army Engineers, Construction Engineering Research Laboratory (CERL) contract# DACA88-93-D-0004, <i>Application of Adapter User Interface Concept to the Non-CAD Application</i> . (PI: Jim Garrett. I participated in writing the proposal and implementing the project). |

- May 1995–Dec 1995 **US Army Corp of Army Engineers, Construction Engineering Research Laboratory** (CERL) contract# DACA88-94-K-0006/0013, *Investigating User Issues for an Adaptive Workstation* (PI: Jim Garrett. I participated in writing the proposal and implementing the project).
- Jan 1993–Dec 1993 **US Army Corp of Army Engineers, Construction Engineering Research Laboratory** (CERL) contract# DACA88-93-D-0004, *Automated Characterization of CAD User Activity* (PI: Jim Garrett. I participated in writing the proposal and implementing the project).

Teaching Experience

- Winter 2005–2006 *Evaluation of Systems and Services* (SI 622).
- Winter 2002–2006 *Learning to Teach Strategic Uses of Computers* (SI 601).
- Winter 2002–2006 Co-taught *Search and Retrieval* (SI 503).
- Fall 2001–2003 *Computing Skills and Concepts* (SI 101).
- Fall 2000 Co-taught *Use of Information* (SI 501).

Service

- 2008-2009 Representative for University of Michigan on CTSA meetings related to user needs and research networking.
- 2004-2005 Undergraduate Committee, School of Information.
- 2003 Master's Committee, School of Information.
- 2000 Curriculum Committee, School of Information.
- 2000, 2003, 2005 Senate Assembly, University of Michigan.

Other Academic and Service Experience

Journal and Conference Reviewing. Arthritis Research & Therapy (2009), Cognitive Science (2007), TOIS (2007) ACM SIGCHI (2001-2008), TOCHI (1999, 2007), HCI (2003, 2006), JASIST (2003, 2006), IP&M (2005), JMIR (2003), AMIA (2003).

Grant Reviewing. NSF (2002, 2006).