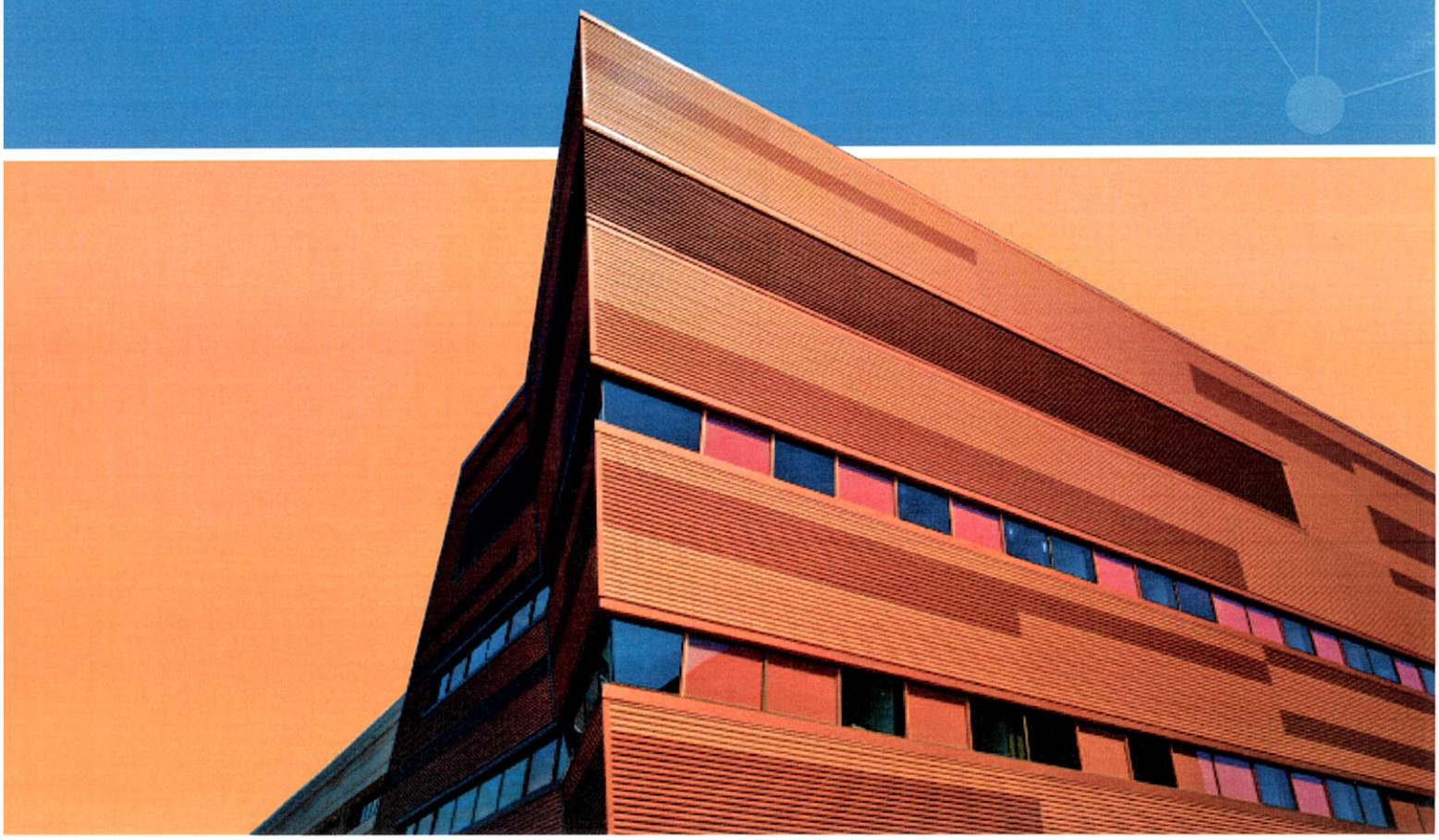
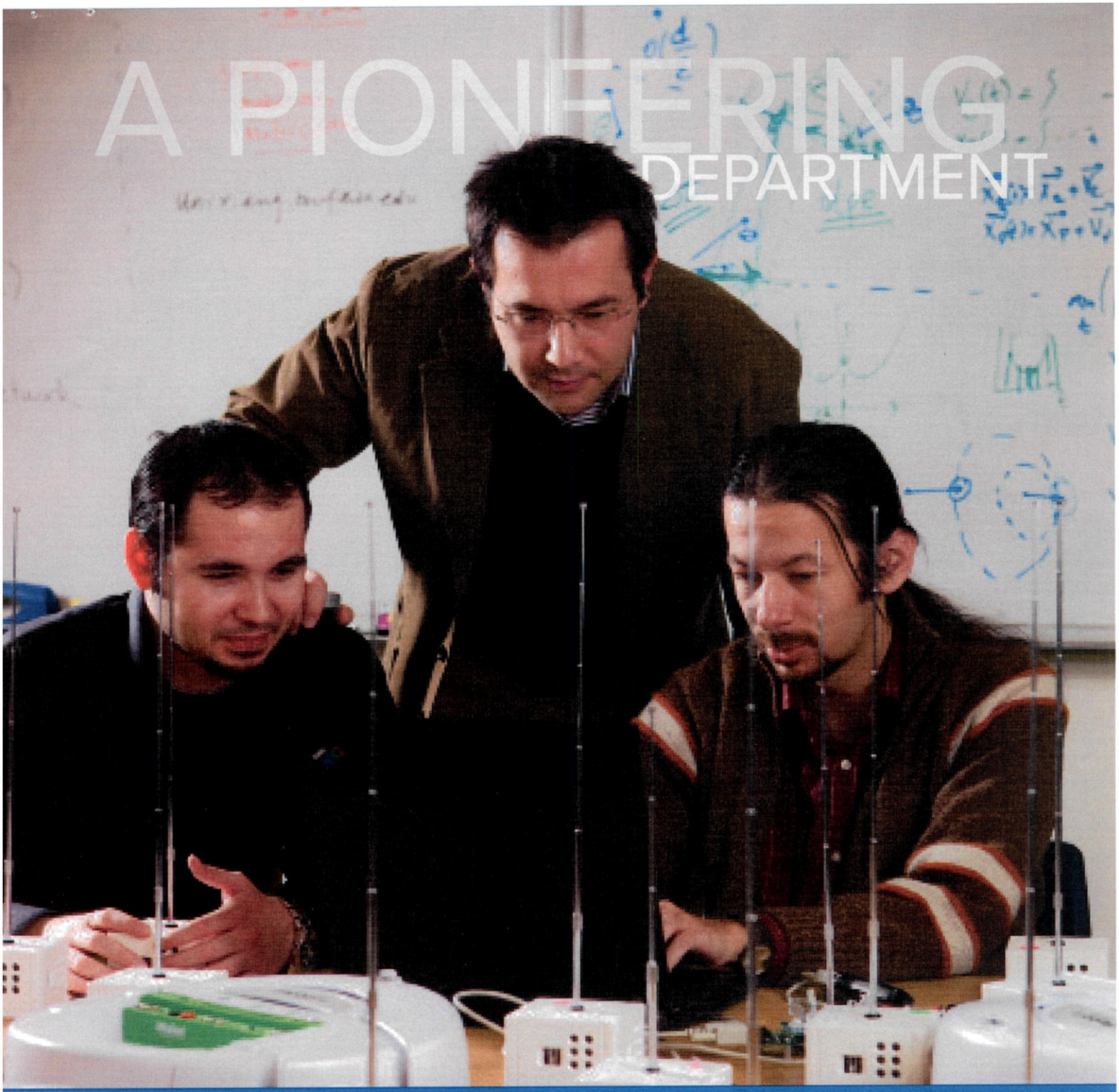
University at Buffalo *The State University of New York* | REACHING OTHERS

Computer Science and Engineering





A PIONEERING DEPARTMENT

EXCELLENCE IN EDUCATION, RESEARCH, AND INNOVATION

ADD: From the Chair

State University of New York (SUNY) at Buffalo

PUT A Title here perhaps — "Computer Science AND Engineering Excellence"

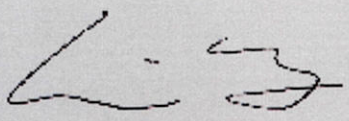
Ever since the ~~University at Buffalo~~ became one of the first higher learning institutions to offer degree programs in the computing field more than 45 years ago, our Department of Computer Science and Engineering has succeeded in establishing itself as a leading education and research department, well known both nationally and internationally for its groundbreaking foresight and pioneering innovations.

For decades, our highly motivated and dedicated faculty members have engaged in high quality education and world-class research in every aspect of computer science and technology, and are recipients of numerous national and international awards. They have founded, and currently direct, major research centers devoted to biomedical computing, biometric systems, cognitive science, document analysis and recognition, information assurance, and high-performance computing. In addition, they have played key roles in many other major areas of research, including algorithms, bioinformatics, computer security, computer vision, complexity theory, databases, optical and wireless networks, robotics, and software and hardware systems.

Among many of their cutting-edge achievements, our faculty has pioneered in the science and technology of automated handwriting recognition and developed software systems for machine reading of handwritten addresses, which has saved the U.S. Postal Service more than a billion dollars in just a few years. They have also been credited with an algorithm developed for crystal structure determination, which has been ranked as one of the top algorithms of the 20th century. Moreover, our faculty has helped establish SUNY at Buffalo as one of the leading academic supercomputing centers in the world.

Equally distinguished are the accomplishments of our alumni, many of whom are prize-winning researchers and CEOs of some of the fastest-growing companies of information technology worldwide.

Our department has led the way in advancing the science and technologies of information, computing, and communication technologies that are indispensable to our world today, and we will continue to lead the way into the future.



Aidong Zhang
SUNY DISTINGUISHED PROFESSOR AND DEPARTMENT CHAIR

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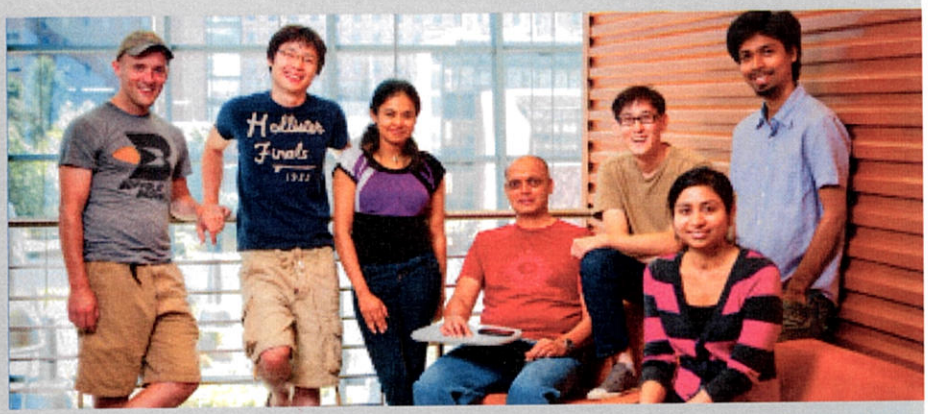


FACULTY Leading the Way

Alphonce, Carl // TEACHING ASSOCIATE PROFESSOR

Ph.D., University of British Columbia, 2000

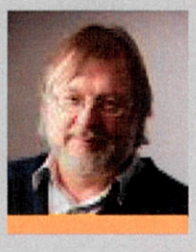
RESEARCH HIGHLIGHTS

Carl Alphonce is interested in formalisms and the practice of programing languages and natural languages, as well as how students learn to read, write, test and design software.

SELECTED PUBLICATIONS

- Carl Alphonce and Joseph LeGasse. 2012. "Using reflection to enhance feedback for automated grading" (abstract only). *In Proceedings of the 43rd ACM technical symposium on Computer Science Education* (SIGCSE '12). ACM, New York, NY, USA, 664-664.
- Carl Alphonce. (2010). "Computational Linguistics". An unpublished presentation at the Western New York CSTA Fall Conference, Buffalo, NY.
- Dale Skrien, Michael E. Caspersen, Jürgen Börstler, Adrienne Decker, and Carl Alphonce. 2009. Good examples for exposing bad practice: a "killer examples" workshop. In Proceedings of the 24th ACM SIGPLAN conference companion on Object oriented programming systems languages and applications (OOPSLA '09). ACM, New York, NY, USA, 711-712.

Buckley, Michael // TEACHING ASSOCIATE PROFESSOR



MSEE, Rochester Institute of Technology, 1983

RESEARCH HIGHLIGHTS

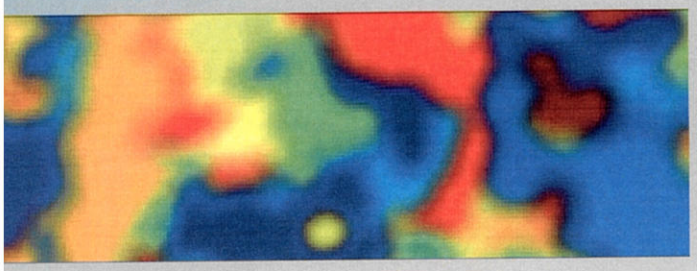
Mike Buckley has been an industry consultant for 25 years, and shares ownership of a 50-person company in Buffalo, NY, that develops embedded systems and industrial control software. His work has appeared in magazines, on radio and TV, but the greatest opportunities that he has found are in promoting the use of socially relevant projects in schools, where he believes that "creative energy will carry it forward."

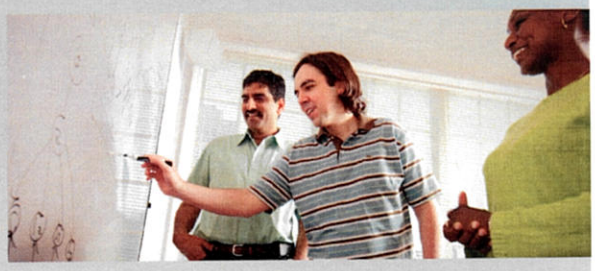
AWARDS

- Richard T. Sarkin Award 2008 – The award acknowledges outstanding and significant achievements of UB alumni who have earned distinction as educators at accredited institutions of higher education.
- Milton Plesur Award 2008 – This Student Association award recognizes undergraduate teachers who have inspired, excited, or had a positive and memorable effect on students, who bring an added spark of enthusiasm into the classroom, who fuel an atmosphere of creativity and participation.
- University Innovator Awards 2002, 2003, 2004, 2006.

SELECTED PUBLICATIONS

- Michael Buckley, "Promoting Social Relevance of Computer Science Education", CSTA Voice, Nov. 2009.
- Michael Buckley, "Computing as Social Science", *Communications of the ACM*, April 2009.
- Michael Buckley, John Nordlinger, Devika Subramanian, "Socially Relevant Computing", *SIGCSE*, Portland, OR, March 15, 2008.





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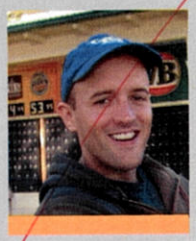
Challen, Geoffrey // ASSISTANT PROFESSOR



Ph.D., Harvard University, 2010

RESEARCH HIGHLIGHTS

Geoffrey Challen's research group, blue, designs, builds, and evaluates novel computer systems. We are currently focused on smartphones, a powerful and transformative pervasive computing technology already seeing rapid adoption in developed countries and spreading quickly to the billions of mobile phone users worldwide. Our approach is to simultaneously explore novel smartphone uses and applications that leverage their unique visibility and capabilities while also addressing the fundamental problems currently limiting their potential. To further demonstrate smartphone capabilities, we are using smartphones to estimate parking lot capacity, make use of unused storage on personal devices, monitor and reconfigure infrastructure wireless networks, and help users prepare for and survive natural disasters. At the same time, to address smartphone limitations we are improving energy management, helping users conceal their behavior from applications, and determining new uses for the millions of mobile devices discarded each year.

SELECTED PUBLICATIONS

- Geoffrey Challen, Scott Haseley, Anudipa Maiti, Anandatirtha Nandugudi, Guru Prasad, Mukta Puri and Junfei Wang, "The Mote is Dead. Long Live the Discarded Smartphone," Fifteenth Workshop on Mobile Computing Systems and Applications (HotMobile '14), Santa Barbara, CA, February, 2014.
- Nick DiRienzo, Gino Buzzelli and Geoffrey Challen, "Smartphone UsersWant to Be Mocked", (Poster Abstract): Fifteenth Workshop on Mobile Computing Systems and Applications (HotMobile '14), Santa Barbara, CA, February, 2014.
- Anandatirtha Nandugudi, Anudipa Maiti, Taeyeon Ki, Fatih Bulut, Murat Demirbas, Tevfik Kosar, Chunming Qiao, Steven Y. Ko and Geoffrey Challen, *"PhoneLab: A Large Programmable Smartphone Testbed"*, (Invited Paper): First International Workshop on Sensing and Big Data Mining (SenseMine '13), Rome, Italy, November, 2013.

Chandola, Varun // ASSISTANT PROFESSOR

Ph.D., University of Minnesota, 2009

RESEARCH HIGHLIGHTS

Varun Chandola's research interest is in mining massive and complex data sets for extracting critical knowledge such as anomalies and events. He focuses on anomaly detection, knowledge discovery, machine learning, spatio-temporal data analysis, geospatial data visualization and analysis and their applications in Healthcare Fraud Detection, Climate Sciences, Sustainability, National Electric Grid, Cyber Intrusion Detection, and National Security.

SELECTED PUBLICATIONS

- Varun Chandola and Sukumar Srinivas and Jack Schryver, "Knowledge Discovery from Massive Healthcare Claims Data", KDD, Chicago, IL, August/2013.
- Varun Chandola and Shyam Boriah and Vipin Kumar, "A Framework for Exploring Categorical Data", *Statistical Analysis and Data Mining*, 2011.
- Varun Chandola and Vipin Kumar, "Summarization – Compressing Data into an Informative Representation", International Conference on Data Mining, Houston, December, 2005.

Chaudhary, Vipin // PROFESSOR

Ph.D., University of Texas at Austin, 1992

RESEARCH HIGHLIGHTS

Vipin Chaudhary is a veteran of High Performance Computing (HPC), and has been actively participating in the business and technology innovation frontiers of HPC for over two decades. His contributions range from heading research laboratories and holding executive management positions to starting technology ventures. He is the co-founder of the Data Intensive Discovery Initiative and Center for Computational and Data Driven Science and Engineering at SUNY Buffalo. He is also the President of Scalable Informatics, Inc., a leading provider of high performance software-defined storage and compute solutions. His current research interests are in the area of High Performance and Big Data Computing and its applications to scientific, engineering, financial, social, and medical applications; and Computer Assisted Diagnosis and Interventions.

AWARDS

- Visionary Innovator, STOR, University at Buffalo, SUNY, 2007
- National Science Foundation Research Initiation Award, 1993
- President of India Gold Medal for first rank among all graduating students, 1986

SELECTED PUBLICATIONS

- V. Chaudhary and J. K. Aggarwal, "A Generalized Scheme for Mapping Parallel Algorithms", *IEEE Transactions on Parallel and Distributed Systems*, Mar. '93, pp. 328 – 346.
- X. Meng and V. Chaudhary, "A High-Performance Heterogeneous Computing Platform for Biological Sequence Analysis", IEEE Transactions on Parallel and Distributed Systems, vol. 21, no. 9, pp. 1267-1280, 2010.
- R. Alomari, J. Corso, and V. Chaudhary, "Labeling of Lumbar Discs using both Pixel- and Object-Level Features with a Two-Level Probabilistic Model", *IEEE Transactions on Medical Imaging*, 30(1):1-10.

Chen, Chang Wen // PROFESSOR

Ph.D., University of Illinois at Urbana-Champaign, 1992

RESEARCH HIGHLIGHTS

Chang Wen Chen's lab, Ubiquitous Multimedia Lab (UBMM), is dedicated to research of new theories, algorithms, and systems for multimedia analysis, encoding, transmission, search, adaptation and security. UBMM hosts a research team consisting of faculty, students, and visiting scholars who are engaged in emerging research funded by both federal agencies, NSF and NIH, as well as industrial corporations, including Huawei, Intel, Kodak, Microsoft and Thomson.

AWARDS

- ICME2013 Best Student Paper award for "Mining Visualness", Zheng Xu, Xin-Jing Wang, and Chang Wen Chen (July 2013).
- VCIP2012 Best Student Paper award for ""Assessing Photo Quality with Geo-context and Crowdsourced Photos" Wenyuan Yin, Tao Mei, Chang Wen Chen (Dec. 2012).
- IEEE ICME2014 Best Paper award for "High Resolution Free-View Interpolation of Planar Structure" by Jie Hu, Dongqing Zhang, Heather Yu and Chang Wen Chen (July 2014)".
- Fellow, IEEE (2004) and SPIE (2007).

SELECTED PUBLICATIONS

- W. Yin, T. Mei, C. W. Chen and S. Li, "Socialized Mobile Photography: Learning to Photograph with Social Context via Mobile Devices", *IEEE Trans. Multimedia*, January 2014.
- B. Liu, Z. Yan and C. W. Chen, "MAC Protocol in Wireless Body Area Networks for E-Health: Challenges and a Context-aware Design", IEEE Trans. on Wireless Communications, October 2013.
- S. Liu and C. W. Chen, "A novel 3D Video Transcoding Scheme for Adaptive 3D Video Transmission to Heterogeneous Terminals", *ACM Trans. Multimedia Computing, Communication and Applications*, September 2012.

Chomicki, Jan // ASSOCIATE PROFESSOR

Ph.D., Rutgers University, 1990

RESEARCH HIGHLIGHTS

Jan Chomicki's research has been mostly in the area of logical foundations of databases. He has pioneered the use of temporal logic in temporal databases, and formal approaches to inconsistent databases and preference queries, focusing on classical problems like query evaluation and optimization. His recent interests include temporal data exchange, conflict resolution using priorities, preference management, data cleaning, and language documentation. He is the author of over 85 research publications, and has served on the editorial boards of ACM Transactions on Database Systems, Information Processing Letters, Journal of Applied Logic, and Knowledge and Information Systems. He has given many invited talks in academia and industry, and keynote addresses and tutorials at international database conferences. He has co-edited two books: "Logics for Databases and Information Systems" (Kluwer, 1998) and "Logics for Emerging Applications of Databases" (Springer, 2003).

AWARDS

- Erasmus Mundus Faculty Fellow, 2008.
- Fulbright Lecturing Award, 2007.

SELECTED PUBLICATIONS

- S. Staworko, J. Chomicki and J. Marcinkowski. "Prioritized Repairing and Consistent Query Answering in Relational Databases." *Annals of Mathematics and Artificial Intelligence*, 64(2-3), pages 209-246, 2012.
- D. Mindolin and J. Chomicki. "Preference Elicitation in Prioritized Skyline Queries" *VLDB Journal*, 20(2), pages 157-182, 2011. Special issue: selected papers from VLDB'09.
- D. Mindolin and J. Chomicki. "Contracting Preference Relations for Database Applications. Artificial Intelligence," 175(7-8), pages 1092-1121, May 2011. *Special issue on Representing, Processing, and Learning Preferences: Theoretical and Practical Challenges.*

Dantu, Karthik // PROFESSOR

KARTHIK DANTU'S

Ph.D., University of Southern California, 2010

RESEARCH HIGHLIGHTS

Karthik's research interests span Robotics, Mobile Systems, and Networked Sensing Systems. He is interested in designing systems that cope with uncertainty (usually through sensing and actuation) and coordinate across multiple agents to help build future applications. Examples of such systems include swarms of Micro-Aerial Vehicles to assist first responders, smart camera networks for privacy-preserving surveillance, smart phones for disaster assistance, and robots to assist masons in construction sites.

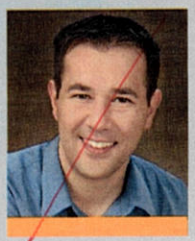
AWARDS

- Runner-up for Best Paper Award (SPOTS Track)
- Best Demo Award (IPSN-SPOTS 2012)

SELECTED PUBLICATIONS

- Autonomous MAV guidance with a lightweight omnidirectional vision sensor, Richard Moore, Karthik Dantu, Geoffery Barrows and Radhika Nagpal, In *ICRA '14: IEEE International Conference on Robotics and Automation*, Hong Kong, China, June 2014.
- A Comparison of Deterministic and Stochastic Approaches to Allocating Spatially Dependent Tasks in *Micro-Aerial Vehicle Swarms*, Karthik Dantu, Spring Berman, Bryan Kate, Radhika Nagpal, In *IROS '12: Proceedings of IEEE/RSJ International Conference on Intelligent Robots and Systems*, Villamoura, Portugal, October 2012.
- Simbeeotic: A Simulator and Testbed for Micro-Aerial Vehicle Swarm Experiments, Bryan Kate, Jason Waterman, Karthik Dantu, Matt Welsh, In *IPSN '12: Proceedings of the 11th International Conference on Information Processing in Sensor Networks (SPOTS Track)*, Beijing, China, Apr. 16-19, 2012.

Demirbas, Murat // ASSOCIATE PROFESSOR



Ph.D., The Ohio State University, 2004

RESEARCH HIGHLIGHTS

Murat Demirbas's research interests are in distributed and networked systems, cloud computing, smartphone-based sensing and collaboration, wireless sensor/actor networks, and self-stabilizing fault-tolerance. In his work on wireless sensor networks (WSNs), Murat helped in the development and deployment of a 1000 node wireless sensor network "Line In The Sand", showed for the first time that it is possible to solve consensus efficiently in WSNs, and developed a framework that provides an efficient and lightweight implementation of transaction primitive in a distributed manner in WSNs. Murat was among the pioneers of the use of social networks for crowdsourcing, and worked on crowdsourced collaboration and coordination, tasking via social networks, sensing via social networks, and smartphone/cloud services for ubiquitous monitoring.

AWARDS

- The International Conference on Collaboration Technologies and Systems (CTS) Outstanding Paper Award, 2014.
- UB Exceptional Scholars Young Investigator Award, 2010.
- NSF CAREER Award, 2008.
- The International Conference on Distributed Computing Systems (ICDCS), Best Paper Award, 2002.
- The Ohio State University, Outstanding Researcher Award, 2002.

SELECTED PUBLICATIONS

- Y. S. Yilmaz, B. Aydin, M. Demirbas. Targeted Question Answering on Smartphones Utilizing App Based User Classification, Received the Outstanding Paper Award in the *International Conference on Collaboration Technologies and Systems (CTS)*, 2014.
- S. Tasci, M. Demirbas. Giraphx: Parallel Yet Serializable Large-Scale Graph Processing, *EuroPar*, 2013.
- F. Bulut, Y. Yilmaz, M. Demirbas, H. Ferhatosmanoglu, N. Ferhatosmanoglu. LineKing: Crowdsourced Line Wait-Time Estimation using Smartphones, *MobiCASE*, 2012.

Dong, Wen // ASSISTANT PROFESSOR

Ph.D., Massachusetts Institute of Technology, 2010

RESEARCH HIGHLIGHTS

Wen Dong focuses on modeling human interaction dynamics with stochastic process theory through combining the power of "big data" and the logic/reasoning power of state-of-the-art agent-based models, to solve our society's most challenging problems such as transportation sustainability and efficiency. His approach is to drive "simulation games" (like SimCity) with petabyte-sized "data exhaust trails" of networked people to study our social systems and make decisions through playing the data-driven simulation games on super-computers. He has applied this approach to social systems of different sizes, ranging from the
movement of millions of vehicle locations sampled every minute for years, the co-evolution of social network and individual behavior of different communities tracked by personal mobile phones and surveys, and Bales' interaction process analysis of several individuals solving problems tracked by socio-metric badges.

AWARDS

- Cisco Innovation Award, 2012
- Nissan Presidential Award of Technology Innovation, 2011
- Best paper award of Social Computing, Behavior modeling and Prediction, 2010

SELECTED PUBLICATIONS

- Wen Dong, Bruno Lepri, Fabio Pianesi, and Alex Pentland. Modeling Functional Roles: Dynamics in Small Group Interactions. *IEEE Transactions on Multimedia*, 2013.
- Wei Pan, Wen Dong, Manuel Cebrian, Taemie Kim, James Fowler, and Alex Pentland. *Modeling Dynamical Influence in Human Interaction: Using Data to Make Better Inferences. IEEE Signal Processing Magazine,* 2012, 29(2): 77-86.
- Wen Dong, Katherine Heller, and Alex Pentland. Modeling Infection with Multi-agent Dynamics. In *Proceedings of the 2012 International Conference on Social Computing, Behavioral-Cultural Modeling, & Prediction*. D.C., USA, 2012: 172-179 (best paper award).

Fischer, Daniel // ASSOCIATE PROFESSOR

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Ph.D., Tel Aviv University, Israel, 1994

RESEARCH HIGHLIGHTS

Daniel Fischer's research is aimed at exploiting the flood of information accumulating in biological databases to address central questions of protein function, structure and evolution. This includes the development of bioinformatics tools to aid in the experimental studies and to produce new, previously unavailable biological information in-silico. His view of bioinformatics research is to closely interact with experimentalists. In particular, he currently focuses on two main research directions. The first is genomic-scale prediction of protein function and structure, and the second direction is aimed towards evolutionary studies of complete genomes, including genomic ORFans. A more ambitious goal is to study the interactions of the modeled structures with other molecules, as they occur in nature. The ultimate goal is to provide a better understanding of the biology of organisms, including metabolism, development, differentiation, morphogenesis and evolution.

SELECTED PUBLICATIONS

- Fischer D., Baker D., Moult J. We need both computer models and experiments. *Nature*; 409:558, 2001.
- Fischer D., Eisenberg D. Assigning folds to the proteins encoded by the genome of Mycoplasma genitalium. *Proc Nat Academy of Sciences*; 94:11929-11934, 1997.
- Fischer D., Eisenberg D. Finding families for genomic ORFans. *Bioinformatics*; 15: 759-762, 1999.

Gao, Jing // ASSISTANT PROFESSOR

Ph.D., University of Illinois at Urbana Champaign, 2011

RESEARCH HIGHLIGHTS

Jing Gao is broadly interested in data and information analysis with a focus on information integration, ensemble methods, mining data streams, transfer learning and anomaly detection. Her current research focus is on integrating data of multiple sources to detect trustworthy information. She has published more than 60 papers in referred journals and conferences and her work has received over 1300 citations. She has served as program committee member of many conferences including KDD, ICDM, SDM, ECML/PKDD, CIKM, ASONAM and BigData.

AWARDS

- IBM Faculty Award, 2013

SELECTED PUBLICATIONS

- Q. Li, Y. Li, J. Gao, B. Zhao, W.Fan, J. Han. Resolving Conflicts in Heterogeneous Data by Truth Discovery and Source Reliability Estimation. ACM SIGMOD International Conference on Management of Data (SIGMOD '14), Snowbird, UT, June 2014, 1187-1198.
- L. Ge, J. Gao, H.Q. Ngo, K. Li, A. Zhang. On Handling Negative Transfer and Imbalanced Distributions in Multiple Source Transfer Learning. SIAM International Conference on Data Mining (SDM '13), Austin, TX, May 2013, 261-269.
- J. Gao, W. Fan, J. Jiang, J. Han. Knowledge Transfer via Multiple Model Local Structure Mapping. ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (KDD '08), Las Vegas, NV, August 2008, 283-291.

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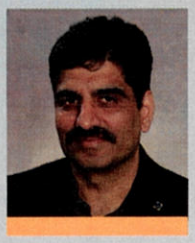
Govindaraju, Venu // FURNAS MEMORIAL CHAIR & SUNY DISTINGUISHED PROFESSOR



Ph.D., SUNY at Buffalo, 1992

RESEARCH HIGHLIGHTS

Venu Govindaraju's research interests are in the areas of Pattern Recognition and Machine Learning with a focus on language technologies, biometrics, smart environments and big data analytics. He is credited with major conceptual and practical advances in pattern recognition that have resulted in the development of robust and scalable systems in a variety of application domains, from document processing to fingerprint and face biometrics. He has designed several seminal algorithms for cursive handwriting recognition that were at the core of the first handwritten mail-processing system developed for Postal Services around the world – a machine learning success story with a level of practical impact that has few parallels in academia. He has about 400 peer-reviewed publications and is the recipient of many peer honors and awards and has an excellent sustained funding record for over 20 years from a broad range of sponsors, government as well as industry.

AWARDS

- IIT Kharagpur Distinguished Alumnus Award (2014)
- IEEE Technical Achievement Award (2010)
- MIT Global Indus Technovator Award (2004)
- IAPR Outstanding Young Investigator Award (2001)
- Fellow of SPIE (2013), AAAS (2010), ACM (2009), IEEE (2006), IAPR (2004)

SELECTED PUBLICATIONS

- S. Wshah, G. Kumar, and V. Govindaraju, "Statistical script independent word spotting in offline handwritten documents", Journal of Pattern Recognition, 2014.
- V. Govindaraju and C. R. Rao, Machine Learning Theory and Applications: Handbook of Statistics, Elsevier, 2013.
- M. Malgireddy, I. Nwogu, and V. Govindaraju, "Language motivated approach to action recognition", Journal of Machine Learning Research, 2013.

He, Xin // PROFESSOR

PhD, Ohio State University, 1987

RESEARCH HIGHLIGHTS

Xin He's main research interest is graph algorithms. Many computational problems can be modeled as graph problems. They have many practical applications and also pose challenging theoretical questions. Xin He is particularly interested in the applications of graph algorithms in computational geometry, graph drawing, VLSI layout, and graph theory.

SELECTED PUBLICATIONS

- Jiun-Jie Wang and Xin He, "Visibility Representation of Plane Graphs with Simultaneous Bound for Both Width and Height", Journal of Graph Algorithms and Applications (JGAA), Vol. 16 (2), March 2012, pp. 317-334.
- Xin He, Jiun-Jie Wang and Huaming Zhang, "Compact Visibility Representation of 4-Connected Plane Graphs", special issue of Theoretical Computer Science, Vol. 447, Aug. 2012, pp. 62-73.
- Xin He and Huaming Zhang, "A simple routing algorithm based on Schnyder coordinates", special issue of Theoretical Computer Science, Vol. 494, no. 8, July 2013, pp. 112-121.

Jayaraman, Bharat // PROFESSOR

Ph.D., University of Utah, 1981

RESEARCH HIGHLIGHTS

Dr. Jayaraman's research centers around software and intelligent systems, with a focus on programming languages and runtime environments. Three recent projects: (1) a state-of-the-art execution environment for Java, called JIVE, with support for query-based debugging, run-time visualizations, and execution summarization; (2) identification, tracking, and retrieval in 'smart spaces' based upon a network of cameras and other biometric sensors; and, (3) a language paradigm called constrained objects for engineering modeling and simulation, as well as constraint-based design.

SELECTED PUBLICATIONS

- E. Blanton, D. Lessa, P. Arora, L. Ziarek, B. Jayaraman, Ji.FI: Visual Test and Debug Queries for Hard Real Time, *Concurrency and Computation: Practice and Experience*, 2014.
- J. Poroor and B. Jayaraman, Modeling Mobile Stateful Channels in Pi-Z, *Science of Computer Programming*, (78)9: 1470-1489, 2013.
- V. Menon, B. Jayaraman, and V. Govindaraju, Three R's of Cyber Physical Spaces, *IEEE Computer*, 44(9): 73-79, 2011.

Kennedy, Oliver // ASSISTANT PROFESSOR

Ph.D., Cornell University, 2011

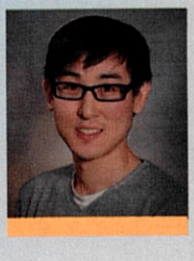
RESEARCH HIGHLIGHTS

Oliver Kennedy's research explores two areas of data management: Incrementality and Uncertainty. Incrementality: How can continuous data management tasks can be automatically broken down into smaller sub-tasks. The output of smaller sub-tasks can be more easily saved and re-used, allowing for memory/compute tradeoffs. Second, smaller sub-tasks admit much more fine-grained control over how compute resources are allocated, allowing these resources to be used much more efficiently. This in turn, admits online approximation methods, tying in with my work on uncertainty. Uncertainty: How can we represent and compute with incomplete, imprecise, or otherwise uncertain data. Oliver Kennedy's research focuses on using existing techniques (e.g., the field of probabilistic databases) to support online approximation techniques, as well as understanding how qualitative expressions of uncertainty can be used to help human beings understand and use uncertain data.

SELECTED PUBLICATIONS

- Agarwal, Bellinger, Kennedy, Upadhyaya, Ziarek, "Monadic Logs for Collaborative Web Applications", in WebDB 2013.
- Koch, Ahmad, Kennedy, Nikolic, Nötzli, Lupei, Shaikha, "DBToaster: Higher-Order Delta Processing for Dynamic, Frequently Refreshed Views", in The VLDB Journal (2014 - 23 (2), "Best of VLDB 2012", pp 253-278).
- Ahmad, Kennedy, Koch, Nikolic "DBToaster: Higher-Order Delta Processing for Dynamic, Frequently Refreshed Views", in VLDB 2012 (pp 968-979).

Ko, Steven // ASSISTANT PROFESSOR



Ph.D., University of Illinois at Urbana-Champaign, 2009

RESEARCH HIGHLIGHTS

Steve Ko's current research focuses on mobile systems and wide-area data analytics including: BlueSeal, a static analysis and instrumentation tool for Android; PhoneLab, a large-scale smartphone testbed with 300 smartphones used by students/faculty/staff at SUNY Buffalo; PigOut, a wide-area analytics system; and RTDroid, a real-time adaptation of Android. His general research interest lies in systems.

AWARDS

- NSF (National Science Foundation) CAREER Award, 2014.
- USENIX NSDI (Symposium on Networked Systems Design and Implementation) Community Award, Honorable Mention, for "Serval: An End-Host Stack for Service-Centric Networking," 2012.

SELECTED PUBLICATIONS

- Y. Yan, S. Cosgrove, V. Anand, A. Kulkarni, S. H. Konduri, S. Y. Ko, L. Ziarek, Real-Time Android with RTDroid, in *Proceedings of the 12th International Conference on Mobile Systems, Applications, and Services (MobiSys)*, Jun. '14.
- E. Nordstrom, D. Shue, P. Gopalan, R. Kiefer, M. Arye, S. Y. Ko, J. Rexford, M. J. Freedman, Serval: An End-Host Stack for Service-Centric Networking, in *Proceedings of the 9th USENIX Symposium on Networked Systems Design and Implementation (NSDI)*, Apr. '12.
- S. Y. Ko, I. Hoque, B. Cho, I. Gupta, Making Cloud Intermediate Data Fault-Tolerant, in *Proceedings of the ACM Symposium on Cloud Computing (SOCC)*, Jun. '10.

Kosar, Tevfik // ASSOCIATE PROFESSOR

Ph.D., University of Wisconsin, 2005

RESEARCH HIGHLIGHTS

Tevfik Kosar's research focus is data-intensive distributed computing, with applications in eScience, Grids, Clouds, and collaborative computing systems. His work includes cyberinfrastructure design and development; end-to-end data and workflow management; I/O optimization, modeling, and scheduling; distributed storage management; energy-efficient transfer I/O scheduling; and coordination of computation and I/O in distributed environments. Tevfik designed and developed the Stork distributed data scheduling system currently used by institutions worldwide; and the PetaShare distributed storage network that managed more than 700 Terabytes of storage located across nine university campuses in Louisiana.

AWARDS

- NSF CAREER Award, 2009
- Business Report's Top 40 Under 40, 2009
- LSU Flagship Faculty, 2009
- 1012 Corridor Young Scientist, 2009
- LSU College of Basic Sciences Research Award, 2009
- LSU CCT Faculty of the Year, 2008

SELECTED PUBLICATIONS

- E. Yildirim and T. Kosar. End-to-end Data-flow Parallelism for Throughput, Optimization in High-speed Networks. In *Journal of Grid Computing (JGC)*, Vol.10, No.3 (2012), pp.395-418.
- D. Yin, E. Yildirim, S. Kulasekaran, B. Ross, and T. Kosar. A Data Throughput Prediction and Optimization Service for Widely
  Distributed Many-Task Computing. In *IEEE Transactions on Parallel and Distributed Systems (TPDS)*, Vol.22 No.6 (2011) pp.899-909.
- E. Yildirim, D. Yin, and T. Kosar. Prediction of Optimal Parallelism Level in Wide Area Data Transfers. In *IEEE Transactions on Parallel and Distributed Systems (TPDS)*, Vol.22 No.12 (2011) pp.2033-2045.

Koutsonikolas, Dimitrios // ASSISTANT PROFESSOR

Ph.D., Purdue University, 2010

RESEARCH HIGHLIGHTS

Dimitrios Koutsonikolas's research interests are broadly in experimental wireless networking and mobile computing, with a focus on high performance protocol design and implementation, energy-aware protocol design and implementation, testbed prototyping, network measurements, and performance evaluation. His research spans multiple layers of the network stack (MAC, routing, transport layer, and applications), and multiple types and applications of wireless networks (community wireless mesh networks, 802.11 WLANs, cellular networks, smartphone networking, sensor networks, cognitive radio networks, underwater acoustic networks). Dimitrios leads the UB Wireless Networking and Systems Lab (UB WiNS Lab). He is a member of IEEE, ACM, and USENIX.

AWARDS

- 1st place in ACM Student Research Competition (SRC), ACM MobiCom 2009.
- Best Paper Award, SENSORCOMM 2007.

SELECTED PUBLICATIONS

- Modeling WiFi Active Power/Energy Consumption in Smartphones. Li Sun, Ramanujan K. Sheshadri, Wei Zheng, and Dimitrios Koutsonikolas In *Proceedings of the 34th IEEE International Conference on Distributed Computing Systems (ICDCS 2014)*, Madrid, Spain, 30 June – 3 July, 2014.
- Securing Underwater Acoustic Communications through Analog Network Coding. Hovannes K. Kulhandjian, Tommaso Melodia, and Dimitrios Koutsonikolas. In *Proceedings of the IEEE International Conference on Sensing, Communications and Networking (SECON 2014)*, Singapore, 30 June – 3 July, 2014.
- Comparison of Routing Metrics in 802.11n Wireless Mesh Networks. Ramanujan K. Sheshadri, Dimitrios Koutsonikolas, In *Proceedings of IEEE INFOCOM 2013*, Turin, Italy, April 14-19, 2013.

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~~Bridg~~ Bringing Mobility-Awareness to WLANs using PHY Layer Information, Li Sun, Dimitrios Koutsonikolas, In Proceedings of the 10th ACM International Conference on emerging Networking Experiments and Technologies (CoNEXT, 2014), Sydney, Australia, December 2-5, 2014.

Miller, Russ // PROFESSOR

PhD, State University of New York at Binghamton, 1985

RESEARCH HIGHLIGHTS

Russ Miller is world-renowned for his seminal work in areas of parallel algorithms for the mesh, pyramid, hypercube, and reconfigurable architectures, covering domains that include computational geometry, image analysis, and fundamental data movement operations. His current focus is on cyberinfrastructure: cloud, grid, cluster, and networked computing. Russ's breakthroughs in parallel algorithms led to a collaboration with world-class scientists at the Hauptman-Woodward Medical Research Institute, who were working on solutions to problems in molecular structure determination. This collaborative effort in rational drug design led to revolutionary algorithms and community codes that have been used to solve molecular structures several orders of magnitude larger than had previously been possible, as well as solving numerous structures with a wide variety of properties that were previously thought to be unsolvable. This work was recognized by the IEEE with its inclusion in the IEEE poster "Top 10 Algorithms of the 20th Century."

AWARDS

- Fellow of the IEEE, with the citation "contributions to theory and practice of parallel algorithms and architectures," 2012.
- Member of the European Academy of Science (Computer Science) with the citation "for an outstanding and lasting contribution to parallel algorithms and computer science education," August, 2002.
- Listed in HPCwire 2003 Top People & Organizations to Watch, http://www.tgc.com/hpcwire/features/topwatch03.html, March, 2003.

SELECTED PUBLICATIONS

- R. Miller and Q.F. Stout, Mesh computer algorithms for computational geometry: IEEE Transactions on Computers, vol. 38, no. 3, March 1989, pp. 321-340.
- R. Miller, G.T. DeTitta, R. Jones, D.A. Langs, C.M. Weeks, and H.A. Hauptman, On the application of the minimal principle to solve unknown structures: IEEE Transactions on Computers, vol. 42, no. 6, June 1993, pp. 678-692.
- R. Miller, V.K. Prasanna Kumar, D. Reisis, and Q.F. Stout, Parallel computations on reconfigurable meshes: Science, vol. 259, March, 1993, pp. 1430-1433.

Napp, Nils // ASSISTANT PROFESSOR

Ph.D., University of Washington, 2011

RESEARCH HIGHLIGHTS

Nils Napp's research focuses on creating robust global behavior from local interactions. In this type of problem, the behavior of individual system components is typically the design input. During runtime each component has only limited state information, yet needs to take actions that ensure overall correctness and progress. Many natural and biological systems – ranging from molecular self-assembly to cooperative behaviors in groups of animals – are extremely good at creating robust global outcomes from relatively simple local rules. The core research question is how to extract some of the fundamental algorithmic properties of these systems and then to apply them to engineered systems like robots.

SELECTED PUBLICATIONS

- N. Napp and R. Nagpal, Distributed Amorphous Ramp Construction in Unstructured Environments: *Robotica*, 2014.
- N. Napp and R. P. Adams, Message Passing Inference with Chemical Reaction Networks: Advances in Neural Information Processing Systems, Lake Tahoe, USA, 2013.
- N. Napp, S. Burden, and E. Klavins, Setpoint Regulation for Stochastically Interacting Robots: *International Conference on Robotics and Automation*, Hong Kong, 2014.

Ngo, Hung // ASSOCIATE PROFESSOR

Ph.D., University of Minnesota, 2001

RESEARCH HIGHLIGHTS

Hung Ngo's main research interests include database join algorithms, algorithmic group testing, and switching networks. In database join, he helped designed the first known worst-case optimal join algorithm, which received the best paper award from PODS 2012. Since then he has worked on designing a framework to design and analyze beyond worst-case join algorithms. In group testing, Hung and co-authors have devised combinatorial non-adaptive group testing schemes which achieve almost optimally all four key objectives of explicit construction, error-tolerant, minimal number of tests, and sub-linear time decoding. In switching networks, Hung has developed a theory for analyzing and designing multi-channel switching networks. His analytical technique using linear programming duality won the best paper award at COCOON 2008.

AWARDS

- Best paper award, PODS 2012.
- Best paper award, COCOON 2008.

SELECTED PUBLICATIONS

- Hung Q. Ngo, Dung Nguyen, Christopher Ré, Atri Rudra, Beyond Worst-Case Analysis for Joins with Minesweeper, PODS 2014.
- Hung Q. Ngo, Ely Porat, Christopher Ré, and Atri Rudra, Worst Case Optimal Join Algorithms, PODS 2012.
- Hung Q. Ngo, Atri Rudra, Anh N. Le, Thanh-Nhan T. Nguyen, Analyzing Nonblocking Switching Networks using Linear Programming (Duality), INFOCOM 2010.

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Qiao, Chunming // PROFESSOR

Ph.D., University of Pittsburgh, 1993

RESEARCH HIGHLIGHTS

Chunming Qiao pioneered research on optical burst switching (OBS) in 1997, and in addition, his work on integrated cellular and ad hoc relaying systems (iCAR) in 1999 is also recognized as the harbinger for today's push towards the convergence between heterogeneous wireless technologies, and has been featured in BusinessWeek and Wireless Europe, etc. His current research focuses on SLA (availability)-aware cloud resource allocation and optically switching with a datacenter, survivable and resilient network designs, network virtualization and virtual network mapping across wide-area networks, transportation cyber physical systems, and smartphone systems.

AWARDS

- SUNY Chancellor's Award for Excellence in Scholarship and Creative Activities in 2013.
- SUNY Buffalo Visionary Inventor 2007.
- SUNY Buffalo Exceptional Scholar awards 2005.
- Best Tutorial Paper Award in 2004, IEEE Communication Society, 2005

SELECTED PUBLICATIONS

- C. Qiao and M. Yoo, Optical Burst Switching – A New Paradigm for an Optical Internet, *Journal of High Speed Networks (JHSN)*, Special Issue on Optical Networks, Vol. 8, No. 1, pp. 69-84, 1999.
- H. Wu, C. Qiao, S. De and O. Tonguz, Integrated Cellular and Ad hoc Relaying Systems: iCAR, *IEEE J. Selected Areas in Communications (JSAC)*, Special issue on Mobility and Resource Management in *Next Generation Wireless Systems*, Vol. 19, No. 10, pp. 2105-2115, Oct. 2001.
- C. Qiao and D. Xu, Distributed Partial Information Management Schemes for Survivable Networks – Part I, *Proc. of IEEE Infocom '02*, pp. 302-311, June 2002.

Ramamurthy, Bina // TEACHING ASSOCIATE PROFESSOR

Ph.D., SUNY at Buffalo, 1997

RESEARCH HIGHLIGHTS

Bina Ramamurthy's research focus is data-driven applications with emphasis on predictive analytics. Her work includes data-intensive computing education, learning environments with focus on gamification, next-generation data-driven automotive engineering, and a big-data-platform for business intelligence. The product developed by her team a population genetics tool Pop!World is widely used and is available on the cloud as well as an app.

AWARDS

- CSTEP Research Mentor Award, presented at annual dinner for graduating CSTEP mentees, 2008.
- Award of Appreciation presented by SUNY AMP, at Seventh Bi-Annual Statewide Graduate School Awareness Conference (for minorities), October 9, 2004.
- Certificate of Recognition presented by Career Services Division of Student Affairs at University at Buffalo for being a positive influence on the students who graduated in 2003, as evidenced in a survey filled by students.

SELECTED PUBLICATIONS

- B. Ramamurthy. "Securing Business IT in the Cloud." Book Chapter in *Security, Trust, Regulatory Aspects of Cloud Computing in Business Environments*, Edited by S. Srinivasan, IGI Global, Hershey, PA, 2013.
- B. Ramamurthy, J. Poulin, K. Dittmar. Cloud-enabling Biological Simulations for Scalable and Sustainable Access: An Experience Report. Presented at XSEDE (Extreme Science and Engineering Discovery Environment) inaugural conference, Chicago, IL, July 2012.
- B. Ramamurthy, J. Poulin, and K. Dittmar. Cloud-enabling Scientific Tools and Computational Methods for Invigorating STEM Learning and Research, *The Journal of Computational Science Education (JOCSE)*, A Shodor publication, Volume 3, Issue 1, pp.28-33, 2012.

Regan, Kenneth W. // ASSOCIATE PROFESSOR

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Ph.D., Oxford University, 1986

RESEARCH HIGHLIGHTS

Kenneth W. Regan has worked in Computational Complexity Theory since obtaining his BA in 1981 from Princeton University and his doctorate in 1986 from Oxford University, where he was a Marshall Scholar. He made early contributions to the logical status of the P vs. NP question, to fixed-parameter complexity, and to resource-bounded measure theory. His later work has focused on algebraic complexity and quantum computation. He co-manages and writes for the popular we-blog "Gödel's Lost Letter and P=NP" (over 600,000 reads/year) begun in 2009 by Professor Richard Lipton of Georgia Tech, with whom he also collaborates. He is an International Master at chess and conducts a second major research program on Human Decision Making (At Chess).

AWARDS

- Golden Key Award for Excellence in Teaching, 1997
- Popular coverage of chess research:

  -The New York Times Science Tuesday, Page D4, March 19, 2012

  -Chess Life Magazine (cover story), June 2014

  -NPR Weekend Edition Saturday, June 21, 2014 (interviewed by Scott Simon)

SELECTED PUBLICATIONS

- Subruk Kalyanasundararam, Richard Lipton, Kenneth Regan, and Farbod Shokrieh, Improved Simulation of Nondeterministic Turing Machines. *Theoretical Computer Science*, vol. 417, Feb. 2012, 66-73.
- Richard Lipton and Kenneth Regan and Atri Rudra, Symmetric Functions Capture General Functions. Proceedings of the 36th International Symposium on Mathematical Foundations of Computer Science (MFCS 2011), Warsaw, Poland, August 2011.
- Kenneth Regan and Tamal Biswas and Jason Zhou, Human and Computer Preferences at Chess. Proccedings of the 8th Multidisciplinary Workshop on Preferences, associated to AAAI 2014, Quebec City, July 2014.

Ren, Kui // ASSOCIATE PROFESSOR

Ph.D., Worcester Polytechnic Institute, 2007

RESEARCH HIGHLIGHTS

Kui Ren is the Director of Ubiquitous Security and Privacy Research Laboratory (UbiSeC Lab). Kui's research interests include Cloud Security, Wireless Security, and Smartphone-enabled Crowdsourcing Systems. His research has been supported by NSF, DoE, AFRL, MSR, and Amazon. He is a recipient of NSF CAREER Award in 2011 and Sigma Xi Research Excellence Award in 2012. Kui has published more than 125 peer-review journal and conference papers. His total publication citation counts have exceeded 6,200, and his H-Index is 37 as of Jul. 2014.

AWARDS

- Distinguished Lecturer, IEEE Vehicular Technology Society, 2014
- NSF CAREER Award, 2011
- Best Paper Award, IEEE ICNP, 2011
- Sigma Xi Faculty Research Excellence Award, 2012.

SELECTED PUBLICATIONS

- C Wang, S Chow, Q Wang, K Ren, and W Lou, Privacy-preserving public auditing for secure cloud storage: IEEE Transactions on Computers 62 (2), 362-375, 2013.
- C Wang, N Cao, K Ren, and W Lou, Enabling secure and efficient ranked keyword search over outsourced cloud data: IEEE Transactions on Parallel and Distributed Systems, 23 (8), 1467-1479, 2012.
- M. Li, H. Zhu, Z. Gao, S. Chen, L. Yu, S. Hu, and K. Ren, All Your Location Are Belong to Us: Breaking Mobile Social Networks for Automated User Location Tracking, ~~IEEE INFOCOM, Shanghai, China, 2011.~~ ACM MobiHoc, Philadelphia, USA, 2014

Rudra, Atri // ASSOCIATE PROFESSOR

Ph.D., University of Washington, 2007

RESEARCH HIGHLIGHTS

Atri Rudra's research deals with the following aspects of handling data: recovering from corrupted data (via error-correcting codes), synthesizing data from various sources (by computing joins of database tables) and compressing data (via group testing and compressed sensing). Atri's research in error-correcting codes include designing code with optimal tradeoff between redundancy and adversarial errors (this result answered a 50 year old open question) as well as showing that the popular Reed-Solomon codes that are used in CDs and DVDs can correct more errors than known before. His results in computing joins resulted in the first algorithms that have provably optimal runtime.

AWARDS

- IBM Faculty Award, 2013.
- Best Paper award at the 31st ACMSIGMOD-SIGACT-SIGART Symposium on Principles of Database Systems (PODS), 2012.
- UB Exceptional Scholars - Young Investigator award, 2011.
- Best Paper award at the 18th Annual European Symposium on Algorithms (ESA), 2010.
- HP Labs Open Innovation Award, 2010.
- NSF CAREER Award, 2009.
- William Chan Memorial Dissertation Award, 2007. Awarded annually to the best doctoral thesis from the department of Computer Science and Engineering at the University of Washington.
- Best Student Paper award at the 1stWorkshop on Internet and Network Economics, 2005.

SELECTED PUBLICATIONS

- A. Rudra and M. Wootters. Every list-decodable code for high noise has abundant near-optimal rate puncturings. In *Proceedings of 46th ACM Symposium on Theory of Computing (STOC)*, 2014. To Appear.
- D. T. Nguyen, H. Q.Ngo, C. Ré, and A. Rudra. Beyond worst-case analysis for joins with minesweeper. In *Proceedings of the 33rd ACM SIGMOD-SIGACT-SIGART Symposium on Principles of Database Systems (PODS)*, 2014. To Appear.
- H. Q. Ngo, E. Porat, C. Ré, and A. Rudra. Worst-case optimal join algorithms. In *Proceedings of the 31st ACM SIGMOD-SIGACT-SIGART Symposium on Principles of Database Systems (PODS)*, pages 37–48, 2012. Best Paper Award.

Schindler, Kris // TEACHING ASSOCIATE PROFESSOR

Ph.D., SUNY at Buffalo, 2001

RESEARCH HIGHLIGHTS

Kris Schindler is co-director of the Center for Socially Relevant Computing, where he has incorporated experiential learning into a research group that gives students opportunities to apply what they have learned in their core classes toward the development and implementation of real world projects in the community. His research interests include the development of interactive learning systems for K-16 education as well as assistive and adaptive technology for people with disabilities.

AWARDS

- U.S. Patent: Augmentative Communications Device for the Speech Impaired Using Commercial-Grade Technology, Issue Date: November 22, 2011, Inventors: Kris Schindler and Michael Buckley,

SELECTED PUBLICATIONS

- Kris Schindler, *Introduction to Microprocessor Based Systems Using the ARM Microprocessor*, Second Edition, Pearson, 2013 - Textbook.
- Kris Schindler, Michael Buckley, Helene Kershner, Carl Alphonce, Jennifer Braswell, "Benefits of Using Socially-Relevant Projects in Computer Science and Engineering Education," SIGCSE 2004 Technical Symposium on Computer Science Education, ACM.
- K. Adams, K. Portis, A. Bisantz, M. Buckley, J. Higginbotham, K. Schindler, M. Sweeney, "Experiences Using a Hueristic Evaluation Tool on AAC Software Interfaces", RESNA Proceedings, Atlanta, GA, 2005.

Sridhar, Ramalingam // ASSOCIATE PROFESSOR

MSEE, Rochester Institute of Technology, 1983

RESEARCH HIGHLIGHTS

Ram Sridhar has conducted research in cross-cutting areas spanning circuits to architecture and systems, focusing on performance, power efficiency, security in developing affordable, reliable and green systems. He conducts research in Green Computing leading to energy efficient systems through hardware/software/system level approaches, both at the mobile portable devices and large systems. His work also spans embedded systems and technology for mobile devices, embedded cloud devices, power aware security solutions, secure architectures, multicore system on chips, secure wireless ad hoc and sensor networks, computer forensics and cyber security. He applies circuits to systems level design techniques towards body sensor networks, smart environment to assist older adults. His work in VLSI systems include power and reliability aware solutions, clocking and synchronizations, memory architectures, wave-pipelining, asynchronous systems, special purpose architectures for multimedia, imaging and wireless embedded systems, including foveal vision systems. He has actively involved in many technical conferences in VLSI Systems, Networks and Security.

AWARDS

- NSF Research Initiation Award
- Tau Beta Pi Teacher of the Year 1991-92; University at Buffalo
- Lilly Endowment Teaching Fellowship, 1988-89
- Distinguished Lecturer, IEEE Circuits and Systems Society, Jan. 2003-Dec. 2004

SELECTED PUBLICATIONS

- Na Gong, Jinhui Wang, Shixiong Jiang and Ramalingam Sridhar, TM-RF: Aging Aware Power Efficient Register file Design for Modern Microprocessors, *IEEE Transacations on VLSI Systems*, 2014.
- M. R. Tomita, L. S. Russ, R. Sridhar and B. J. Naughton, Smart home with healthcare technologies for community-dwelling older adults, in Smart Home Systems Edited by Mahmoud A. Al-Qutayri, INTECH, Feb. 2010, pp. 139-158.
- S. Sankaran and R. Sridhar, User-adaptive Energy-aware Security for Mobile Devices, In Proceedings of the IEEE International Symposium on Computer and Network Security (CNS) Poster Session, Washington, DC, Oct. 14-16, 2013, pp. 391-392.

Srihari, Rohini // PROFESSOR

Ph.D., SUNY at Buffalo, 1992

RESEARCH HIGHLIGHTS

Rohini Srihari's research spans information retrieval, natural language processing of electronic text documents, and text/data mining This work has followed a continuum beginning with (i) information retrieval (search for information), to (ii) information extraction (extraction of salient information from text and multimedia data) and culminating in (iii) text and data mining (detecting significant patterns or trends). She has served as founder and chief scientist at several start-up companies she founded: Cymfony, Janya and Content Savvy. A product developed is the InfoXtract engine which is now being used by the United States Air Force. At Janya, she began applying this technology to mining trends and automatic sentiment analysis from blogs and newsgroups. The ContentSeer™ platform developed at Content Savvy combines content ingestion and analytics along with core text mining resulting in a state-of-the-art, big data content analytics solution. It is now used commercially in the health informatics community.

AWARDS

- Pan-Am Centenary: Women of Accomplishment, 2001
- Beta Star (Buffalo Emerging Technology Award), 2007

SELECTED PUBLICATIONS

- R. K. Srihari, R. Smith and E. Peterson, "Context aware back-transliteration and translation of names and common phrases using web resources", *United States Patent 8,731,901*, May 20, 2014.
- S. Mukund and R. K. Srihari, "An Information Extraction System for Urdu – A Resource Poor Language,"*ACM Transactions on Asian Language Information Processing (TALIP)*, 9(4): 15, 2010.
- N. Londhe, V. Gopalakrishnan, A. Zhang, H. Q. Ngo, J. Gao, and R. K. Srihari, "Spam Detection in Dynamic Text Streams from Social Networks," Proc. VLDB 2014.

Srihari, Sargur // SUNY DISTINGUISHED PROFESSOR

Ph.D., Ohio State University, 1976

RESEARCH HIGHLIGHTS

Sargur Srihari's research is in statistical machine learning and pattern recognition. Both topics are concerned with designing systems that learn from examples; with machine learning having its roots in computer science and pattern recognition being the engineering facet. The first significant application of his research was in mail automation – the work on interpretation of handwritten postal addresses led to what is now almost complete automation of processing of handwritten addresses by the USPS. The second area of his research has been computational forensics. The focus has been on developing methods for quantifying uncertainty in the comparison of evidence, particularly impression evidence such as handwriting, latent prints and footwear prints. In particular, the work on handwriting comparison has led to a generally usable software system by the forensic community. More recently he is involved in developing machine learning algorithms, particularly methods for learning probabilistic graphical models with a focus on computational issues.

AWARDS

- Fellow, IEEE and IAPR

SELECTED PUBLICATIONS

- Y. Tang and S. N. Srihari, "Likelihood Ratio Estimation in Forensic Identification using Similarity and Rarity," *Pattern Recognition*, March 2014.
- S. N. Srihari and K. Singer. "Role of Automation in the Examination of Handwritten Items," *Pattern Recognition*, March 2014.
- D. Kovalenko and S. N. Srihari, "On Methods for Incorporating Evidences into Posterior Scoring of Hypotheses", *Proc. Int. Conf. Pattern Recognition*, Tsukuba, Japan, Nov. 2012.

Su, Lu // ASSISTANT PROFESSOR

Ph.D., University of Illinois at Urbana-Champaign, 2013

RESEARCH HIGHLIGHTS

Lu Su's research interests lie in the general areas of cyber-physical systems, mobile computing, wireless and sensor networks, security and privacy, renewable energy, and statistical data analysis. With the ultimate goal of building information-effective and resource-efficient cyber-physical systems that interconnect human beings and the surrounding physical world, he focuses his current research on developing theories, algorithms, and tools that can intelligently collect, transmit, integrate, and eventually transform the deluge of sensory data generated by the ubiquitous human and physical sensors into high quality information that can draw a better understanding of the social and physical world.

AWARDS

- Best Poster Award, the 13th ACM/IEEE International Conference on Information Processing in Sensor Networks (IPSN 2014), Berlin, Germany, April 15-17, 2014.
- Teachers Ranked as Excellent, University of Illinois at Urbana-Champaign, 2010.
- Distinguished Master Dissertation Award, Harbin Institute of Technology, 2004

SELECTED PUBLICATIONS

- Lu Su, Shaohan Hu, Shen Li, Feng Liang, Jing Gao, Tarek F. Abdelzaher, and Jiawei Han, "Quality of Information based Data Selection and Transmission in Wireless Sensor Networks," the *33rd IEEE Real-Time Systems Symposium (RTSS 2012)*, San Juan, Puerto Rico, December 2012.
- Lu Su, Yong Yang, Bolin Ding, Jing Gao, Tarek F. Abdelzaher, and Jiawei Han, "Hierarchical Aggregate Classification with Limited Supervision for Data Reduction in Wireless Sensor Networks," the *9th ACM Conference on Embedded Networked Sensor Systems (SenSys 2011)*, Seattle, WA, November 2011.
- Lu Su, Yan Gao, Yong Yang, and Guohong Cao, "Towards Optimal Rate Allocation for Data Aggregation in Wireless Sensor Networks," the *12th ACM International Symposium on Mobile Ad Hoc Networking and Computing (MobiHoc 2011)*, Paris, France, May 2011.

Tripathi, Satish K. // PROFESSOR AND UB PRESIDENT

Ph.D., University of Toronto, 1979

RESEARCH HIGHLIGHTS

Dr. Satish K. Tripathi was appointed the 15th president of the University at Buffalo on April 18, 2011. An active leader in the national higher education community, he is a member of the Mid-American Conference Council of Presidents Executive Committee and the boards of directors of the Council for Higher Education Accreditation and the Digital Preservation Network and has given numerous presentations on higher education at national and international conferences and meetings including BITS Pilani, India (Strategic Planning for Institutional Growth, January 2014), Georgia Regents University (Bringing our mission to life The Relevance of the Research University in the 21st Century, March 2014), and IIIT Allahabad – 6th Science Conclave, India (Efficient Learning and Accelerated Discovery in the Era of "Big Data," December, 2013). Dr. Tripathi's research interests focus on mobile computing, multimedia systems, and ad hoc networks. A founding member of the editorial board of IEEE Pervasive Computing, he has also served on the boards of several other prominent computer science journals, including IEEE Network Magazine, International Journal of Applied Software Technology, ACM Multimedia Systems, the International Journal of High Speed Networks, and Theoretical Computer Science.

AWARDS

- Distinguished Alumni Award, Banaras Hindu University (2009)
- Eminent Alumni, Banaras Hindu University (2007)
- Honorary Doctorate of Sciences, Indian Institute of Information Technology, Allahabad (2006)
- Fellow, Institute of Electrical and Electronics Engineers (IEEE) and IEEE Computer and Communication Societies (1997)
- Fellow, American Association for Advancement of Science (1997)
- Fellow, Humboldt Foundation (1985)

SELECTED PUBLICATIONS

- Zhenqiang Ye, Lap Kong Law, Srikanth V. Krishnamurthy, Zhong Xu, Suvidhean Dhirakaosal, Satish K. Tripathi, Mart Molle: Predictive channel reservation for handoff prioritization in wireless cellular networks. *Computer Networks* 51(3): 798-822, 2007.
- Asheq Khan, Chunming Quiao, Satish K. Tripathi: "Mobile Traversal Schemes Based on Triangulation Coverage," *Mobile Networks and Applications (MONET)* 14 (5): 422-437, 2007.
- Fabius Klemm, Zhenqiang Ye, Srikanth V. Krishnamurthy, Satish K. Tripathi: Improving TCP Performance in Ad Hoc Networks using Signal Strength based Link Management, *Ad Hoc Networks*, 3 (2): 175-191, 2005.

Upadhyaya, Shambhu // PROFESSOR

Ph.D., University of Newcastle, Australia, 1987

RESEARCH HIGHLIGHTS

Shambhu J. Upadhyaya's research interests are information assurance, computer security, fault diagnosis, fault tolerant computing and VLSI Testing. He led the efforts in information assurance and computer security and formed a center of excellence in information systems assurance research and education (CEISARE) which was accredited by the National Security Agency (NSA) and the Department of Homeland Security (DHS) in 2002. His research projects under the aegis of CEISARE include real-time intrusion detection with emphasis on insider attacks, event correlation for cyber-attack recognition, protecting documents from insider threats, modeling threats in emerging technologies such as wireless mesh networks, smartphone networks, social networks and cyber physical systems, behavior based methodologies to mitigate Internet attacks, secure proactive recovery, wireless networks security, and malware propagation studies and mitigation techniques in social networks. His projects have been supported by NSF, U.S. Air Force Research Lab (AFRL), DARPA, NSA, IBM, Intel Corporation and Harris Corporation. His paper "Spycon: Emulating User Activities to Detect Evasive Spyware" received the RSA Best Paper Award in IEEE Malware 2007 and the paper "Content-sensitive, Temporally Adaptive Metadata" received the Best Paper Award in 11th Annual New York State Cyber Security Conference, 2008.

AWARDS

- NSF Research Initiation Award, 1988.
- Best Paper Award at 2nd IEEE International Swarm Intelligence & Other Forms of Malware Workshop (Malware'07), New Orleans, LA, held in conjunction with IPCCC 2007, April 2007 (with M. Chandrasekaran and S. Vidyaraman), sponsored by RSA, the Security Division of EMC.

- Sustained Achievement Award – UB Exceptional Scholars, 2013.
- Tan Chin Tuan (TCT) Exchange Fellow, Singapore, 2013.

SELECTED PUBLICATIONS

- Jadliwala M., S. Zhong, S. Upadhyaya and C. Qiao and Jean-Pierre Hubaux, Secure Distance-based Localization in the Presence of Cheating Beacon Nodes, *IEEE Transactions on Mobile Computing*, Vol. 9, No. 6, June 2010, pp. 810-823.
- Mathew S., M. Petropoulos, H.Q. Ngo and S. Upadhyaya, A Data-Centric Approach to Insider Attack Detection in Database Systems, *13th International Symposium on Recent Advances in Intrusion Detection*, Ottawa, Canada, September 2010.
- Salerno S., A. Sanzgiri and S. Upadhyaya, Exploration of Attacks on Current Generation Smartphones, *8th International Conference on Mobile Web Information Systems (MobiWIS)*, Niagara Falls, ON, Canada, September 2011.

Xu, Jinhui // PROFESSOR

Ph.D., University of Notre Dame, 2000

RESEARCH HIGHLIGHTS

Jinhui Xu's research interest lies in the areas of algorithms, computational geometry, optimization, and their applications in medicine, biology, networking, machine learning and computer vision. He has published intensively in these areas, designed the state-of-the-arts algorithms for a number of fundamental problems (including several longstanding open problems), and generalized a class of geometric structures and classical problems. He is a pioneer of using geometric techniques to solve challenging biomedical problems, such as determining the spatial organization and dynamics of the cell nucleus and planning and optimizing treatments for interventional procedures and radiation cancer therapy. He is on the editorial boards of a couple of international journals and a recipient of the NSF CAREER Award and IBM faculty partnership award.

AWARDS

- NSF Faculty Early CAREER Development Award, National Science Foundation, 2005-2010
- UB Visionary Inventor Award, State University of New York at Buffalo, 2009
- IBM Faculty Partnership Award, IBM, 2001-2002

SELECTED PUBLICATIONS

- Q. Duan and J. Xu, "On the Connectivity Preserving Minimum Cut Problem," *Journal of Computer and System Sciences*, 80(4):837-848, 2014.
- H. Ding and J. Xu, "Sub-linear Time Hybrid Approximations for Least Trimmed Squares Estimator and Related Problems," *Proc. 30th ACM Annual Symposium on Computational Geometry (SoCG)*, pp. 110-119, June 8-11, 2014, Kyoto, Japan.
- D.Z. Chen, Z. Huang, Y. Liu, and J. Xu, "On Clustering Induced Voronoi Diagrams," *Proc. 54th Annual IEEE Symposium on Foundations of Computer Science (FOCS)*, pp. 390-399, October 27-29, 2013, Berkeley, California, USA.

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Xu, Wenyao // ASSISTANT PROFESSOR

Ph.D., University of California, Los Angeles, 2013

RESEARCH HIGHLIGHTS

Wenyao Xu's current research foci include Embedded System Design and Optimization, Body Sensor Networks, Human Computer Interaction, Integrated Circuit Design Technologies, and their applications in medical and health applications. He has published over 50 papers in the peer-reviewed Journals/Conferences. His research work on smart medical devices has been reported by many renowned public media, such as LA Times, Chicago Tribune and Discovery Channel. He is the inventor of five US/International patents, which all have been licensed. He is also an Adjunct Researcher in Veterans Affairs (VA) Western New York Healthcare System.

AWARDS

- Best Paper Award of the IEEE Conference on Implantable and Wearable Body Sensor Networks (BSN), 2013
- Best Demo Paper Award of the IEEE Conference on Implantable and Wearable Body Sensor Networks (BSN), 2012
- Best Demo Award of the ACM Conference on Wireless Health (WH), 2011

SELECTED PUBLICATIONS

- Nabil Alshurafa, Wenyao Xu, Jason J. Liu, Ming-Chun Huang, Bobak Jack Mortazavi, Majid Sarrafzadeh, "Designing a Robust Activity Recognition Framework for Health and Exergaming using Wearable Sensors", To appear *IEEE Journal of Biomedical and Health Informatics* (J-BHI '14).
- Wenyao Xu, Ming-Chun Huang, Navid Amini, Lei He, Majid Sarrafzadeh, "eCushion: A Textile Pressure Sensor Array Design and Calibration for Sitting Posture Analysis", IEEE Sensors Journal (SJ'13), Volume 13, Number 10, October 2013, pp. 3926-3934.
- Wenyao Xu, Mi Zhang, Alexander A. Sawchuk, Majid Sarrafzadeh, "Robust Human Activity and Sensor Location Co-Recognition via Sparse Signal Representation", IEEE Transactions on Biomedical Engineering (TBME '12), Volume 59, Issue 11, November 2012, pp. 3169-3176.

Zhang, Aidong // SUNY DISTINGUISHED PROFESSOR AND DEPARTMENT CHAIR

Ph.D., Purdue University, 1994

RESEARCH HIGHLIGHTS

Aidong Zhang's research interests include bioinformatics, data mining, multimedia, database systems, and content-based image retrieval. She has published over 250 research publications in these areas and has developed several significant approaches for analyzing multimedia, genomic and proteomic data. In particular, she has published two books (monograph) on Advanced Analysis of Gene Expression Microarray Data and Protein Interaction Networks: Computational Analysis. She has developed or implemented several well known data mining algorithms, including WaveCluster, a Wavelet-based clustering method for multi-dimensional data sets, which was patented in 2005. Her approaches on genomic data analysis have opened a new direction to interactive mining of gene expression data. She also works on network mining and its applications in biology and biomedicine and has developed an approach to identify bridges in large networks. This work was patented in 2010. She has graduated 25 doctoral students as primary advisor.

AWARDS

- IEEE Fellow, 2009
- NSF Career Award, 1998
- SUNY Chancellor's Research Recognition Award, 2002

SELECTED PUBLICATIONS

- Aidong Zhang, Protein Interaction Networks: Computational Analysis Cambridge University Press, 2009
- Aidong Zhang, Analysis of Gene Expression Microarray Data World Scientific Publishing Co., Inc., 2006
- G. Sheikholeslami, S. Chatterjee, and A. Zhang, WaveCluster: A Multi-Resolution Clustering Approach for Very Large Spatial Databases, the Proceedings of the 24th International Conference on Very Large Data Bases (VLDB), New York City, August 1998.
- W. Hwang, T. Kim, M. Ramanathan, and A. Zhang, Bridging Centrality: Graph Mining from Element Level to Group Level, the proceedings of the 14th ACM SIGKDD International Conference on Knowledge Discovery & Data Mining, Las Vegas, August 24–27, 2008.

Ziarek, Lukasz // ASSISTANT PROFESSOR

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Ph.D., Purdue University, 2012

RESEARCH HIGHLIGHTS

Luke Ziarek's research interests fall broadly into three categories: programming languages, software engineering, and systems. More specifically he is interested in language, compiler, and runtime design targeted at concurrent and parallel systems. He is also interested in real-time Java as well as embedded and real-time systems and their applications. Concretely he is working on high assurance software for embedded and mixed-criticality systems with the goal of incorporating real-time guarantees into Android. He works on a number of large software systems including: RTDroid, Blue Seal, Fiji VM, MLton, and STing and is a member of the Reliable Mobile Systems group.

SELECTED PUBLICATIONS

- Yin Yan, Shaun Gerard Cosgrove, Varun Anand, Amit Kulkarni, Sree Harsha Konduri, Steven Y. Ko, Lukasz Ziarek. Real-Time Android with RTDroid. *MobiSys 2014.*
- Feng Shen, Namita Vishnubhotla, Chirag Todarka, Mohit Arora, Babu Prasad, Eric Lehner, Steve Ko, and Lukasz Ziarek. Information Flows as a Permission Mechanism. *International Conference on Automated Software Engineering 2014.*
- Lukasz Ziarek, KC Sivaramakrishnan, and SureshJ agannathan. Composable Asynchronous Events. *Programming Language Design and Implementation 2011.*

Zola, Jaroslaw // ASSISTANT PROFESSOR

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Ph.D., Grenoble Institute of Technology, 2005

RESEARCH HIGHLIGHTS

Jaroslaw Zola's research focuses on the development of novel parallel, distributed and high performance algorithms and techniques to address challenges in data driven science and engineering, especially in computational biology and life sciences. He authored several broadly used tools for multiple sequence alignment, gene networks inference and metagenomic clustering. He is a founding co-chair of the ACM International Workshop on Big Data in Life Sciences, and he serves on the joint AAAS and FBI working group on Big Data in Life Sciences and National Security.

AWARDS

- 2012, IEEE Senior member.
- 2007, Best paper award nomination, ACM/IEEE Supercomputing Conference.

SELECTED PUBLICATIONS

- J. Zola, Constructing Similarity Graphs from Large-scale Biological Sequence Collections, In *Proc. of IEEE Int. Workshop on High Performance, Computational Biology (HiCOMB 2014)*, 2014.
- O. Nikolova, J. Zola, S. Aluru: Parallel Globally Optimal Structure Learning of Bayesian Networks, *Journal of Parallel and Distributed Computing*, 73(8), pp. 1039–1048, 2013.
- X. Yang, J. Zola, S. Aluru: Large-Scale Metagenomic Clustering on Map-Reduce Clusters, *Journal of Bioinformatics and Computational Biology*, 11(1):1340001, 2013.

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SYNERGETIC RESEARCH

ALGORITHMS AND THEORY

Roger He | Russ Miller | Hung Quang Ngo | Kenneth W. Regan| Jinhui Xu | Atri Rudra

The design and analysis of efficient algorithms is the cornerstone of Computer Science, in both its theoretical foundation and its applications. Research interests of faculty in this area include parallel algorithms, graph algorithms, geometric algorithms, approximation algorithms for intractable problems, database algorithms, and theory of error-correcting codes.

Computational complexity is the study of how long it takes computers to solve problems, and how much memory and other computational resources they need. Its signature achievement to date is the discovery of mathematical relationships among many thousands of natural problems, quantizing them into amazingly few complexity classes. The theory shows reductions and equivalences between problems, explains why some problems have no practical solutions, and helps researchers anticipate the difficulties involved in solving problems of certain types. Complexity theory deals generally with the quantitative laws of computation and reasoning, and impacts issues and problems in many other disciplines. Research in this area addresses properties of complexity classes, relationships between classes, structures of problems that affect their computational complexity, and obstacles to proving non-trivial lower bounds on complexity.

ARTIFICIAL INTELLIGENCE

Varun Chandola | Venu Govindaraju | Rohini Srihari | Sargur Srihari

One of the great aspirations of computer science from its earliest days has been to design algorithms to perform tasks considered to be expressive of intelligence in humans. The goals of artificial intelligence range from basic sensory interactions with the world (vision, speech, locomotion) to higher level cognitive analysis (game playing, language understanding, problem solving).

An active area of research in AI at CSE is concerned with computational linguistics (or natural-language processing). Some tasks explored in recent years are: multi-document summarization, mining social media for sentiment/behavioral analysis, and multilingual information extraction. Another area of AI research that has been very active at CSE is knowledge representation and reasoning (techniques used by AI programs). A third area of intense activity, one which pervades many research projects in CSE, is machine learning-- where new methods and applications of statistical modeling, classification and regression have been developed.

COMPUTER INTEGRATED SURGERY AND BIOMEDICAL IMAGING

Vipin Chaudhary | Jinhui Xu | Wenyao Xu

Our faculty are active in all aspects of biomedical imaging, including computer aided diagnosis, computer integrated and tele-surgery, medical image reconstruction, segmentation and registration, and architectures and parallelization of biomedical algorithms. Vipin Chaudhary's current foci are diagnosis of orthopedic problems, computer-assisted neurosurgeries, and high-performance bioinformatics. Jinhui Xu's current foci are the algorithmic underpinnings of computer aided tomography, reconstruction and segmentation, and analysis and understanding of the organization and dynamics of the cell nucleus. Wenyao Xu's current foci are low-power biomedical computing architecture, efficient biomedical data mining, and energy-aware algorithmic and architectural co-design.

COMPUTER SCIENCE EDUCATION

Carl Alphonce | Michael Buckley | Bina Ramamurthy | Kris Schindler

Computer science education is an area of research which focuses on curricular and pedagogic issues in the teaching of computer science, as well as related issues such as recruitment and retention of underrepresented groups in the discipline.

Research interests of faculty in this area include object-oriented pedagogy, the pedagogy of CS1-CS2 courses and rapidly emerging areas (such as grid computing and server-side programming), software tools which support course pedagogy, and student and community engagement through socially relevant projects.

CYBERSECURITY

Hung Ngo | Kui Ren | Shambhu Upadhyaya

In a densely connected world, malicious attacks have become extremely sophisticated with dire consequences. Computer security is one of the top priorities of business enterprises, government and academic institutions. The need to protect data and applications against attacks in a networked world necessitates continued research on attack prevention, attack detection and techniques for recovery from attacks. Research interests of faculty in this area include applied cryptography, anomaly detection, insider threat modeling and mitigation techniques, cloud security, wireless security, smartphone security, modeling malware propagation in social networks, human-centered security, and empirical cyber-security.

DISTRIBUTED/NETWORK SYSTEMS

Geoffrey Challen | Vipin Chaudhary | Chang Wen Chen | Murat Demirbas | Wen Dong | Steven Ko | Tevfik Kosar | Dimitrios Koutsonikolas | Chunming Qiao | Kui Ren | Ram Sridhar | Lu Su | Shambhu Upadhyaya | Wenyao Xu

CSE laboratories and research groups conduct research on both hardware and software sides of distributed/networked systems, either as a standalone system or as a part of Cyber Physical Systems (CPS) and Internet of Things (IoT). Current research topics include big data transfer and analytics, data center networking, warehouse-scale computing, virtualization and orchestration of cloud resources and network functions, connected vehicles technologies, and resiliency and survivability. Many of the faculty members listed here also work on other related topics such as Mobile Systems, Sensor Networks, Embedded Systems and Cyber Security.

EMBEDDED SYSTEMS AND ARCHITECTURE

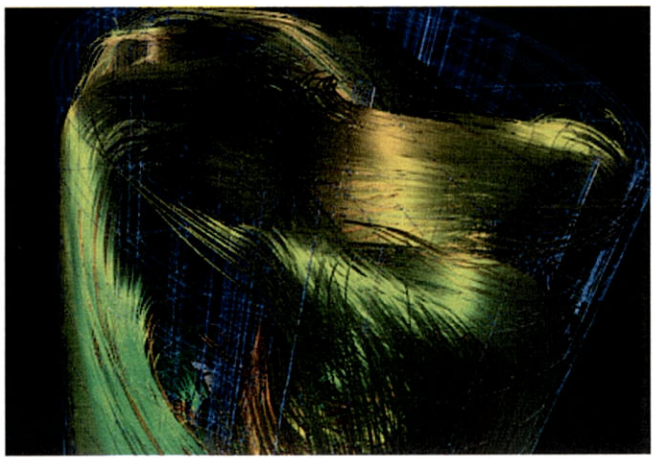
Vipin Chaudhary | Bina Ramamurthy | Ram Sridhar | Lu Su |Shambhu Upadhyaya| Wenyao Xu

In CSE, embedded systems span hardware, software and real-time operating systems, enabling technologies and their applications to diverse fields, with additional emphasis on power aware and secure systems. Enabling technologies include hardware architectures, special purpose processor design, memory technologies, multicore systems, cyber physical systems and VLSI design. Applications include, automobile systems, medical systems, socially relevant applications and process control, and education. In addition, both hardware and software approaches to power and energy efficiency, and secure privacy preserving approaches are considered.

HIGH PERFORMANCE COMPUTING/ COMPUTATIONAL SCIENCE

Varun Chandola | Vipin Chaudhary | Steven Ko | Tevfik Kosar | Russ Miller | Bina Ramamurthy

Computational Science is an emerging discipline that unites computer science and mathematics with disciplin-



ary research in biology, chemistry, physics, and other applied and engineering fields. It is already being called the third science, complementing theoretical as well as laboratory science. A major focus of computational science is the knowledge and techniques required to perform computer simulation. The importance of simulation can be found in "grand challenge" problems in areas such as structural biology, materials science, high-energy physics, economics, fluid dynamics, and global climate change, to name a few. These "grand challenge" problems require high performance computing to solve "real-world" problems.

MOBILE SYSTEMS

Geoffrey Challen | Chang Wen Chen | Karthik Dantu | Murat Demirbas | Steve Ko | Dimitrios Koutsonikolas | Chunming Qiao | Kui Ren | Ram Sridhar | Lu Su | Lukasz Ziarek

Mobile systems research at UB CSE focuses on the design and implementation of next-generation mobile systems utilizing mobile devices such as smartphones, tablets, and wearables. The research is experimental in nature and evaluates new ideas by building real systems. The topics of research broadly encompass diverse aspects of mobile systems, such as crowdsourcing, debugging, mobile app instrumentation, mobile app static analysis, mobile networking, energy efficiency, real-time guarantees, resource accounting, security and privacy, and testbed design. We study future use of such mobile systems in diverse application areas such as disaster response, assisting architects in construction sites, real time applications, and enhancing mobile device utility in day-to-day life.

PATTERN RECOGNITION MACHINE LEARNING COMPUTER VISION

Varun Chandola | Chang Wen Chen | Venu Govindaraju | Sargur Srihari

Pattern recognition, machine learning and computer vision can be regarded aspects of artificial intelligence. Pattern recognition is concerned with methods and algorithms for putting data objects into categories-- with its techniques rooted in decision theory. Machine learning concerns the programming of computers to learn from a set of examples—it is rooted in probability theory and computer science. Work on pattern recognition and machine learning at CSE has contributed to: development of statistical methods, e.g., classifier combination, handwriting recognition, e.g., postal address reading, biometrics, computational forensics and information retrieval.

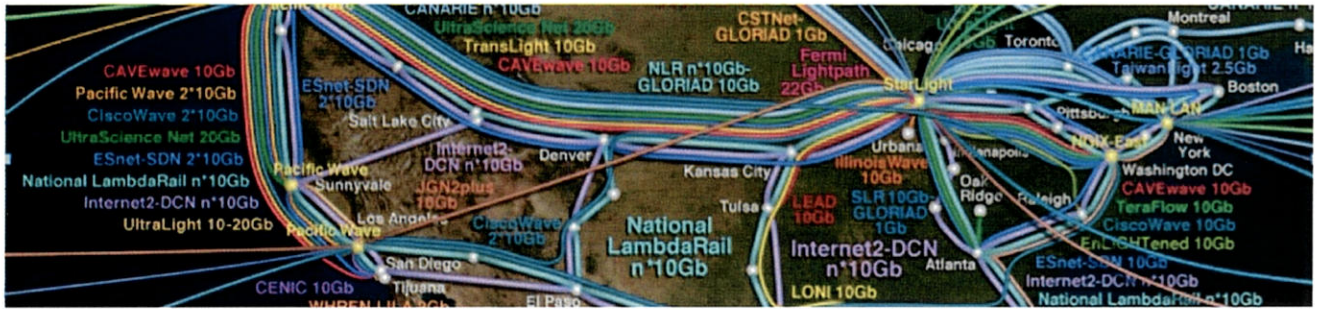
Computer vision draws on concepts from signal processing, neurophysiology, and perceptual psychology to endow artificial systems with the capacity to see and understand visual imagery at a level rivaling or exceeding human vision. CSE research includes developing techniques for two-and three-dimensional object recognition, and visualizing data-structures.

ROBOTICS

need a space

Karthik Dantu | Nils Napp

Robotics research is where the cyber and physical world collide. In CSE that means designing algorithms and systems that make robots autonomous and help make good decisions when interacting with the outside world. The particular focus areas in our department are methods for



coordinating large-scale robotic swarms, learning from nature and providing autonomy in severely resource-constrained robots such as micro-aerial vehicles. Our research emphasizes rigorous modeling and algorithm development as well as practically demonstrating and evaluating these abstract concepts on real robots. The applications we look at are diverse and change with new and emerging technologies. Currently they range from assisting first responders to allowing construction workers to build large structures reliably and safely. A complementary part of the research is how to take advantage of new technologies to make better robots.

SENSOR NETWORKS

Geoffrey Challen | Murat Demirbas | Chunming Qiao | Lu Su | Wenyao Xu

Sensor network research at UB CSE focuses on developing sensors and distributed robust and resilient wireless sensor network (WSN) services and applications. The research aims to enable wide adoption of WSNs in long-lived maintenance-free urban-spaces sensing, personal health/body sensing, and traffic monitoring, in providing physical-world spatial querying/search services, and in achieving decentralized coordination and actuation for fulfilling the ubiquitous/pervasive computing vision.

SOCIAL RELEVANCE

Michael Buckley | Kris Schindler

Michael Buckley and Kris Schindler are employing computing technology to improve the quality of life of people with disabilities. Among the more than 30 research projects and products under development are natural-voice talkers for the speech impaired, single-switch Internet surfing for quadriplegics, robotic wheelchairs, sensory systems to teach cause-and-effect to severely delayed children, Tablet PCs (in conjunction with Microsoft Corporation) that translate the uncharacteristic handwriting of people with spastic cerebral palsy, computers vision systems that interpret sign language, and a means to extend special-education classwork to home- and hospital-bound children.

SOFTWARE AND INFORMATION SYSTEMS

Varun Chandola | Jan Chomicki | Jing Gao | Bharat Jayaraman | Oliver Kennedy | Rohini Srihari | Aidong Zhang | Luke Ziarek | Jaroslaw Zola

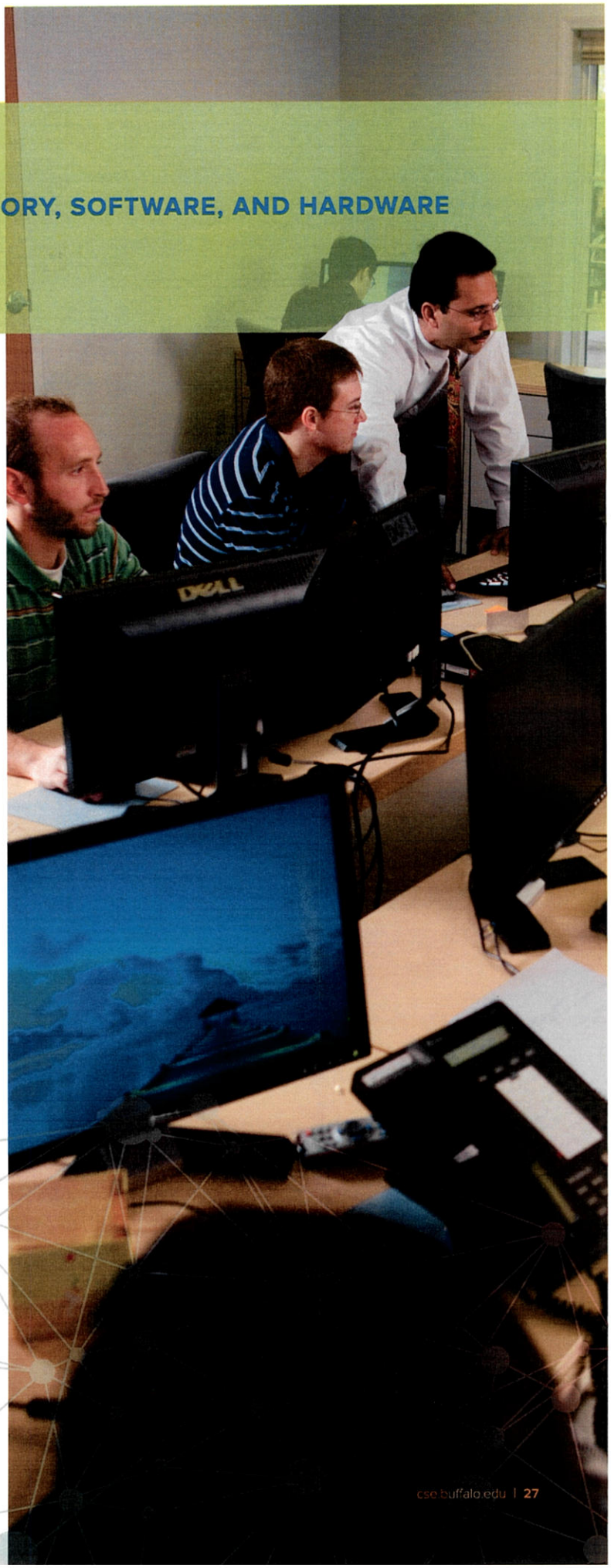
CSE database research involves designing, studying, implementing, and evaluating novel query interfaces and new query language constructs. Of special interest are the challenges of data integration and uncertainty, in which data coming from many autonomous, heterogeneous, and potentially inconsistent sources is combined and presented to the users in a unified way. Other topics include inconsistency resolution, queries with preferences, probabilistic databases, incremental computation, distributed systems, and query processing and optimization. The research projects combine engineering prototype systems with rigorous mathematical analyses.

The data mining research focuses on extracting valid, pre-

WORLD-CLASS RESEARCH IN THEORY, SOFTWARE, AND HARDWARE

viously unknown, and ultimately comprehensible information from disparate data sources. Facing the big data challenge, we devote our efforts to developing highly effective and scalable data analysis methods and systems, which transform noisy data into accurate, reliable and accessible knowledge. Of special interest are network and multi-source data analysis, evolutionary trend discovery, truth and trustworthiness inference, transfer learning, parallel computation, cluster analysis of high-dimensional data, feature extraction and analysis, and visualization tools for interactive pattern analysis.

The field of programming languages is concerned with concepts, notations, methodologies, tools, and environments for the construction of robust, efficient, maintainable, evolvable software. At CSE, research is focused on linguistic constructs and program analysis as well as compilers and run-time systems. Of special interest are languages that are geared toward high-level real-time systems and linguistic constructs for concurrency and parallelism. Also of interest are dynamic analysis and scalable run-time visualizations of program execution. Our research covers the spectrum of programming paradigms from imperative and object-oriented languages to functional and constraint programming languages.



Research CENTERS

BUFFALO CENTER FOR BIOMEDICAL COMPUTING

The Center's mission is to establish a multi-disciplinary program to address fundamental research issues in Biocomputing while contributing to mid-to-long-term research, development, and experimental deployment challenges of analyzing genomic data for diseases and treatment effects. The Center provides the expertise and infrastructure that merges the research activities of computational and biomedical scientists. The focus of the Center research is the study of common diseases, such as cancer, multiple sclerosis and coronary artery disease in which the underlying causes are multi-factorial. We use advanced computational techniques and approaches to convert raw genomic data into knowledge that will advance the understanding of these common diseases and potentially identify new modalities of treatment.

CENTER FOR UNIFIED BIOMETRICS AND SENSORS

The Center's mission is to establish a unified biometric framework, facilitating the development of next-generation biometric systems from proof-of-concept to product readiness. This includes radically different biometric technologies geared toward applications to improve comfort, convenience, and security for personal and commercial use.

CENTER FOR COGNITVIE SCIENCE

The Center's mission is to investigate the nature of cognition, i.e., of intellective processes as exhibited either by the human mind or by computer. Most centrally, cognitive science is the study of how the mind works, both in its conceptual organization and in its computational and neural infrastructure. Accordingly, cognitive science has brought together researchers from a number of traditionally separate disciplines – primarily, computer science, psychology, linguistics, philosophy, anthropology, and neuroscience – in order to build a new and unified understanding of cognition that is compounded from the different disciplinary perspectives and that moves beyond them. The Center organizes colloquia and conducts both an undergraduate major leading to a B.A. on Cognitive Science and a program of graduate tracks in cognitive science.

CENTER OF EXCELLENCE FOR DOCUMENT ANALYSIS AND RECOGNITION

The Center's mission is to focus on the development of computational methods for the analysis of patterns in documents, text and two-dimensional images. While the application of such methods to the analysis of paper documents and handwriting recognition has been the Center's core strength since 1978, these applications have since been diversified to include computational forensics, e.g., fingerprints and shoe-prints. The methods of research are in the areas of pattern recognition, machine learning, information retrieval, data mining and text mining.

CENTER OF EXCELLENCE IN INFORMATION SYSTEMS ASSURANCE RESEARCH AND EDUCATION

The Center's mission is to promote Information Assurance (IA) in graduate education and coordinated research in computer security and information insurance by faculty members from several schools and departments at the University at Buffalo and promote collaborative relationships with companies engaged in security research and multidisciplinary research focus in IA.

NFS CAREER AWARD

Eight members of the CSE faculty have received the prestigious Faculty Early Career Development (CAREER) Award from the National Science Foundation. The award is one of the NSF's highest recognitions of junior faculty who "exemplify the role of teacher-scholars through outstanding research, excellent education and the integration of education and research within the context of the mission of their organizations." Funding is typically in the range of $400,000 to $500,000 for a period of five years. The following CSE faculty were awarded the NSF Career Award:

Murat Demirbas
An In-Network Collaboration and Coordination Framework for Wireless Sensor Actor Networks (2008)

Steve Ko
Systems for Transparency in Personal Devices and Services (2014)

Tevfik Kosar
Data-aware Distributed Computing for Large-scale Collaborative Science (2009)

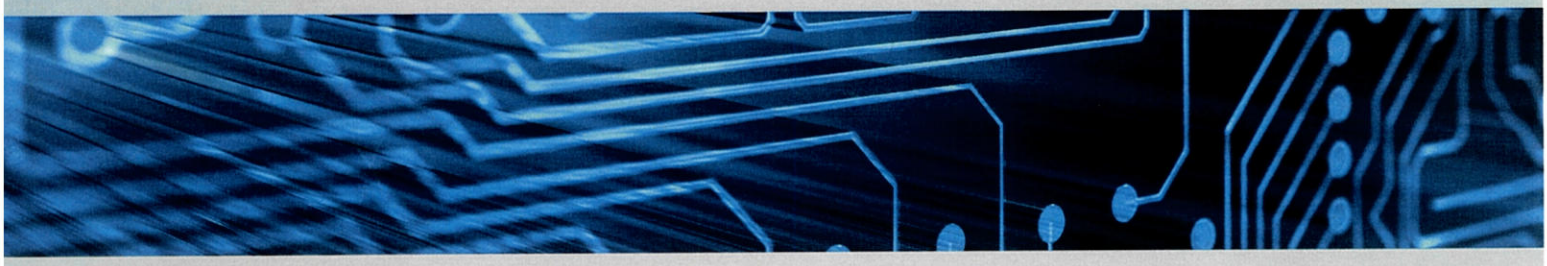
Hung Ngo
Designs and Analyses of WDM Switching Architectures (2004)

Kui Ren
Secure and Privacy-assured Data Service Outsourcing in Cloud Computing (2011)

Atri Rudra
(TF/TOC) Efficient Computation of Approximate Solutions (2009)

Jinhui Xu
Efficient Geometric Techniques for Problems Arising in Cardiovascular Intervenational Procedures (2005)

Aidong Zhang
Consistent and Robust Retrieval, Transmission and Presentation of Multimedia Data (1998)



CURRENT EXTERNAL RESEARCH FUNDING (OVER $31M):

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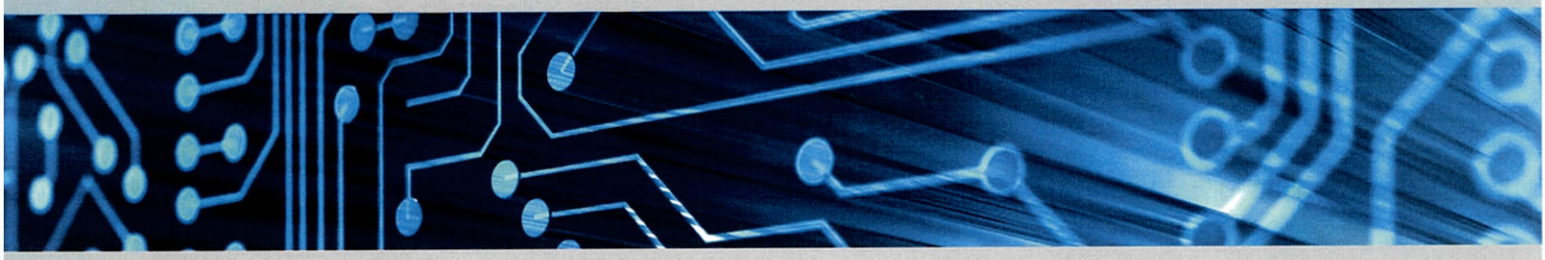
1. "CSR: Small: Jouler: A Cross-Device Application Energy Management Framework for Smartphones"; NSF; Geoffrey Challen (PI); 9/2014–9/2017; $499,185.
2. "CSR: Medium: Collaborative Research: Architecture and System Support for Power-Agile Computing"; NSF; Geoffrey Challen (PI), Mark Hempstead (Drexel, PI); 8/2014–8/2016; $282,930 (UB).
3. "PhoneLab: A Programmable Participatory Smartphone Testbed"; NSF; Geoffrey Challen (PI), Murat Demirbas (co-PI), Steven Y. Ko (co-PI), Tevfik Kosar (co-PI), Chunming Qiao (co-PI); 6/2012–6/2015; $1,322,510.
4. "TWC: Medium: Collaborative: Data is Social: Exploiting Data Relationships to Detect Insider Attacks," NSF, Hung Ngo (PI), Oliver Kennedy (Co-PI), Varun Chandola (Co-PI), Shambhu Upadhyaya (Co-PI), 10/2014 – 9/2018, $959,999.
5. "CDI Type II: New cyber-enabled strategies to realize the promise of quantum chemistry as a far-reaching tool for engineering applications," NSF, PI: D. Kofke, co-PI: T. Furlani, Vipin Chaudhary, 9/1/2010 – 8/31/2015, $1,426,482.
6. "Technology Audit and Insertion Service for TeraGrid," NSF, PI: T. Furlani, co-PI: M. Green, M. Jones, Vipin Chaudhary, and G. Laszweski, 6/2010 – 5/2015, $7,763,246.
7. "Integrating Display Energy Awareness into Video Streaming Infrastructure
to Reduce Mobile Device Energy Consumption in the Video-rich Era," Chang Wen
Chen (PI), NSF, 2014-2017, $450,000.
8. "Detect and Interrupt Alcohol Impaired Driving with a New 3D Camera System,"
Chang Wen Chen (Co-PI), NIH, 2013-2015, $401,105.
9. "Research in Multimedia Processing and Communications," Chang Wen Chen (PI),
Huawei Technologies, $600,000, 2009-2016.
10. "EAGER: Collaborative Research: Conflict Resolution and Exchange of Temporal Data," PI: Jan Chomicki, NSF, $100,000, 2014-2015.
11. "Language Documentation, Field-work Training Models, and Computational Tools for Understanding Linguistic Stability and Change," NSF, PI: Jeff Good, Linguistics, Co-PI: Jan Chomicki, 2014-2017, $406,186.
12. "Conflicts to Harmony: Integrating Massive Data by Trustworthiness Estimation and Truth Discovery," NSF, PI: Jing gao, 8/2013-7/2016, $288,814.
13. "Sparse Heterogeneous Representations and Domain Adaptive Matching for Unconstrained Face Recognition," IARPA, V.Govindaraju (Co-PI), R. Chellappa (PI, UMD) 2014-18, $1,300,000 (UB funding share).
14. "Long Term Active User Authentication Using Multimodal Profiles," NSF, V. Govindaraju (PI), S. Upadhyaya, I. Inwogu, 2013-16, $849,718.
15. "Identification Technology Research (I/UCRC)," NSF, PI: Venu Govindaraju, I. Inwogu, 2013-16, $300,000.
16. "Integrating Privacy Preserving Biometric Templates and Efficient Indexing Methods," NSF, PI: V. Govindaraju, Co-PI: A. Rudra, 2011-15, $499,788.
17. "Efficient Algorithms for Rectangular Layouts and Cartograms," NSF, PI: Xin He, 2013-2016, $349,986.
18. "Intuitive Data Interpretation; Oracle University Relations," PI: Oliver Kennedy, Co-PI: Jan Chomicki, 03/14 – 03/15, $88,000
19. "CAREER: Systems for Transparency in Personal Devices and Services," NSF, PI: Steve Ko, 1/14 – 12/18, $498,419.
20. "SI2-SSI: Collaborative Research: Building Sustainable Tools and Collaboration for Volcanic and Related Hazards," NSF, PI: A. Patra, Co-PIs: C. Conner, M. Jones, Tevfik Kosar, 08/2013 – 08/2017, $1,000,000.
21. "CAREER: Data-aware Distributed Computing for Large-scale Collaborative Science," NSF, PI: Tevfik Kosar, 02/2009 - 01/2015, $400,001.

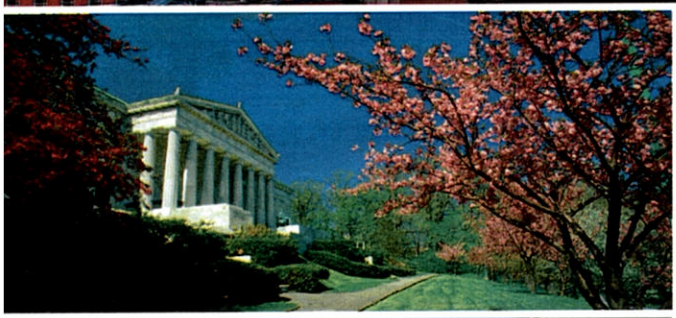


22. "Power-Performance Tradeoffs for Mobile Devices in Next Generation WiFi Networks," National Science Foundation, PI: Dimitrios Koutsonikolas, Co-PI: Ramalingam Sridhar, 7/2014 – 6/2017, $499,924.
23. "CSR: Medium: Collaborative Research: A Holistic Approach to Achieving Quantitative Availability (Aqua) in Cloud Computing," NSF, PI: Chunming Qiao, 9/2014-10/2016, $400,000.
24. "CHS: Small: Modeling Cyber Transportation and Human Interaction in Connected and Autonomous Vehicles," NSF, PI: Changxu Wu, Co-PI: Chunming Qiao, Adel Sadek, Kevin Hulme, 12/2014-11/2017, $499,952.00.
25. "Collaborative Research: RIPS Type 2: Strategic Analysis and Design of Robust and Resilient Interdependent Power and Communications Networks," NSF, PI: Chunming Qiao, 11/2014-10/2017, $314,982.00.
26. "US-German Collaboration: Somatic Na Channels and Spike Precision," NSF-IOS, PI: Dr. Friedman-BIO, Co-PI: Bina Ramamurthy, 8/2012-11/2017, $438,151.00.
27. "CI-TEAM Demonstration Project: A Cloud-enabled Evolutionary Genetics Learning Tool for Engaging the Net-Savvy Generation (POP!World)," NSF-ACI, PI: Bina Ramamurthy, Co-PI: Dr. Ditmarr, Dr. Poulin-BIO, 8/2010-8/2014, $249,909.00,
28. "A Comprehensive Framework for Timely Introduction of Emerging Data-Intensive Computing to STEM Audiences," NSF-DUE, PI: Bina Ramamurthy, 08/2009-09/2014, $249,000.00.
29. "Windows Azure Research Pass Grant, Indoor 3D Maps from the Power of the Crowd," Microsoft Research, PI: Kui Ren, 2014-2015, $40,000.
30. "Enabling Robust Communication in Cognitive Radio Networks with Multiple Lines of Defense," NSF, PI: Kui Ren, 10/2013 - 09/2016, $250,000.
31. "CAREER: Secure and Privacy-assured Data Service Outsourcing in Cloud Computing," NSF, PI: Kui Ren, 08/2011 - 07/2016, $498,679.
32. "NeTS: Small: Collaborative Research: Realizing Visual and Acoustic Near Field Communication Systems for Smartphones: Performance Optimization and Security Assurance," NSF, PI: Kui Ren, 8/14-7/17, $200K.
33. "AF:III:Small: Collaborative Research: New Frontiers in Join Algorithms: Optimality, Noise, and Richer Languages," NSF, PI: Hung Ngo, Co-PI: Atri Rudra, 8/2013-6/2016, $326,101.00.
34. "AF: Medium: Collaborative Research: Sparse Approximation: Theory and Extensions," NSF, lead PI: Anna Gilbert, Michigan; UB's PI: Atri Rudra, UB's co-PI: Hung Ngo, 7/2012- 6/2015, $1,199,230 total, total UB's share is $305,467.
35. "CAREER: Efficient Computation of Approximate Solutions," NSF, PI: Atri Rudra, 2/2009- 1/2015, $449,807.
36. "SFS: An Interdisciplinary Information Assurance Curriculum," NSF, PI: Shambhu Upadhyaya, H.R. Rao (co-PI), T. Cusick (co-PI) and M. Bartholomew (co-PI), 9/2012-8/2017, $1,645,559.
37. "AF:Small:Algorithmic Techniques for Several Geometric Problems Arising in Biomedical Imaging Applications," NSF, PI: Jinhui Xu, 9/2014-8/2017, $470, 349.
38. "III:Small:Algorithmic Techniques for Determining Alterations in the Patterns of Chromosome Spatial Organization inside the Cell Nucleus," NSF, PI: Jinhui Xu, co-PI: Ronald Berezney, 8/2014-7/2017, $499,968.
39. "III:Small:Algorithmic Tools for Spatial Positioning Studies in the Cell Nucleus," NSF, PI: Jinhui Xu, co-PI: Ronald Berezney, 8/1/2011-7/31/2015, $499,968.
40. "Brain Password: Exploring A Psychophysiological Approach for Secure User Authentication", NSF, PI: Wenyao Xu, 10/2014 -9/2017, $~~154,817~~ 200,000
41. "Smartphone Based Preventive Healthcare and its Social, Behavioral and Economic (SBE) Impact", Streber Tech Gift, PI: Wenyao Xu, 8/2014/ – 7/2015, $40,000.
42. "Dynamic Social Network Mining: Feature Extraction, Modeling and Anomaly Detection," NSF, PI: Aidong Zhang, 9/12-8/15, $500,000.
43. "Bio-nanocombinatorics to Achieve Precisely-Assembled Multicomponent, Functional Hybrid Nanomaterials," Air Force Office of Scientific Research, PI: Paras N. Prasad, co-PIs: Tiffany R. Walsh, Marc R. Knecht, Mark T. Swihart and Aidong Zhang, 5/12-4/17, $2,875,000.
44. "II-EN: Collaborative Research: Positioning MLton for Next-Generation Programming Languages Research," NSF, PI: Lukasz Ziarek, 9/14 – 8/17, $381,640.
45. "STTR Phase I: Using Big Data to Support Supply Chain Analytics and Optimization." NSF (sub-award from Optimal Solutions, Inc.), PI: Jaroslaw Zola, Co-PIs Javier Diaz-Montes, Manish Parashar, 01/2014-12/2014, $112,500.
46. "Collaborative Research: CDS&E: Sculpting Fluid Flow Using a Programmed Sequence of Micro-pillars.", NSF, PI Jaroslaw Zola, 09/2013-08/2016, $59,842.
47. "BIGDATA: Mid-Scale: DA: Collaborative Research: Genomes Galore – Core Techniques, Libraries, and Domain Specific Languages for High-throughput DNA Sequencing.", NSF, PI: Srinivas Aluru, Co-PIs: Charles F. Sing, Patric S. Schnable, Jaroslaw Zola, 01/13-31/2015, $1,300,000.

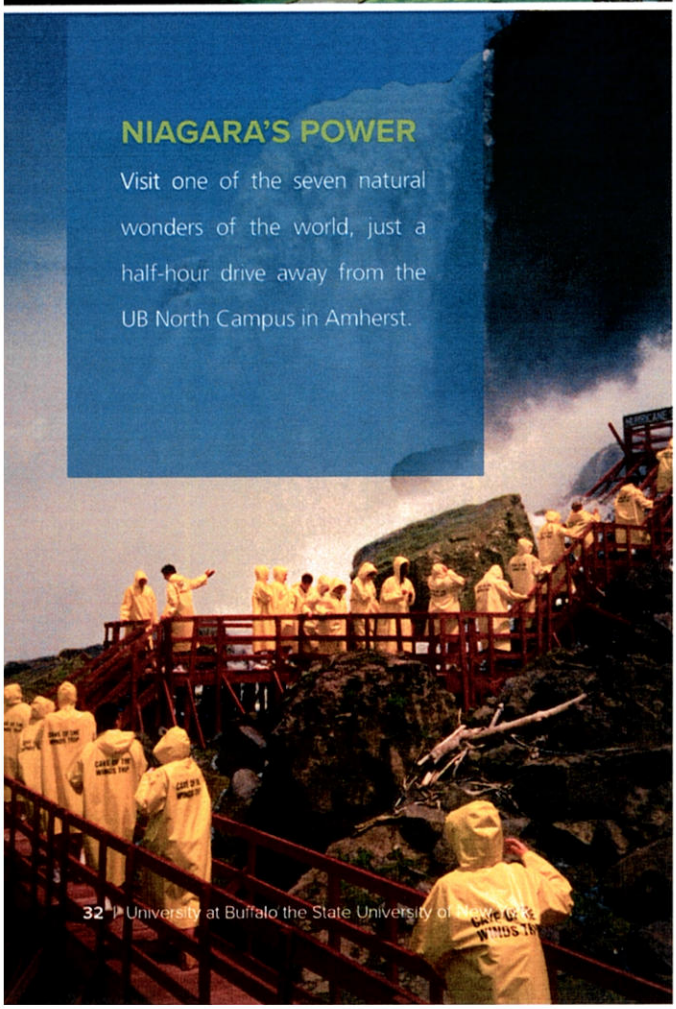
48. "Mobile Content Distribution in Vehicular Ad Hoc Networks," NSF, PI: Kui Ren, 08/2012-07/2015, $181,691.

POINTS OF PRIDE WITHIN UB'S

Western New York



The University at Buffalo's three campuses are located within three diverse and robust communities of the Buffalo area. Located in Western New York, Buffalo is a thriving city situated in a region of more than two million people that offers a world of opportunity with a small-town feel.



NIAGARA'S POWER

Visit one of the seven natural wonders of the world, just a half-hour drive away from the UB North Campus in Amherst.

RESURGING HISTORY

Buffalo's rich history is fueling its promising future. The city has seen a resurgence of historic sites, from the development of Canalside in the former Erie Canal district, to new life breathed into the elegant Statler City and the Hotel @ the Lafayette, to the creation of the truly unique Larkin Square.

ACCESSIBLE AND AFFORDABLE

Buffalo offers all the amenities of a major urban area—without the headaches. The average workday commute is less than 20 minutes, which is the lowest out of 50 major U.S. cities. Affordable housing is widely accessible throughout the region, and reasonable costs of living make the good life possible on any budget. Most neighborhoods offer easy access to shopping, recreation, dining and excellent schools.

CULTURE

Artistic indulgence is plentiful with a vast array of professional theaters, performance venues and galleries within the region. Buffalo is a top arts destination in the U.S., and UB's Center for the Arts plays a significant role in enhancing and promoting the artistic landscape in Buffalo.

TOPS IN EDUCATION

Western New York features outstanding high schools, including Buffalo's City Honors School, which Newsweek has ranked among the best in the nation. Many more rank within the top 100 in New York State.

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Computer Science
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