

Nadya T. Bliss
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Director, Strategic Projects Development
Office of Knowledge Enterprise Development
Professor of Practice, Engineering
College of Technology & Innovation
Arizona State University

Technical Interests

Forensic & Tactical Data Analysis	Information & Sensor Fusion & Processing
Graph Algorithms	Data Representation
Parallel Algorithms & Architectures	Optimization & Co-design Approaches
High Performance & Cloud Computing	Big Data Analytics
Visualization & Analyst Experience	Defense and Intelligence Applications

Experience

Arizona State University	December 2012 - Present
Professor of Practice	July 2013 - Present
College of Technology & Innovation	

Director, Strategic Projects Development

May 2013 - Present

- Reports directly to the Senior Vice President, Knowledge Enterprise Development
- Responsibilities include:
 - Developing and maintaining strategic relationships with funding agencies
 - Working with the University leaders on developing large-scale, interdisciplinary proposals
 - Tracking / monitoring University's strategic investments
- Sampling of current activities:
 - Developing an ASU analytics initiative with a potential Government customer
 - Strategic planning with University leaders
 - Developing a (targeted) capacity reporting framework
 - Performing targeted gap analysis of sponsor needs
 - Active funding agency relationships: NGA (National Geospatial-Intelligence Agency), IARPA (Intelligence Advanced Research Projects Activity), DARPA (Defense Advanced Research Projects Agency), EPA (Environmental Protection Agency)
- Leads and participates in sponsored research where appropriate
- Grant activity:
 - Scalable Optical Networks for Novel Embedded Technology (SONNET). DOD-DARPA. Principal Investigator.

Technical Director, SDSI / ASURE

December 2012 – May 2013

- Responsibilities included: definition and execution of ASURE's technical and programmatic strategy and vision; providing technical and execution oversight to ASURE programs; identifying ASU and other academic capabilities that have the potential to address Department of Defense (DoD) and Intelligence Community (IC) technology needs; overseeing ASURE and ASU technical interactions and collaborations.
- Sampling of specific activities:
 - Identified wide range of ASU activities relevant to IC and DoD, engaged with faculty, and briefed various Government agencies on relevant technologies
 - Principal Investigator on 2 DARPA submissions

- Established an industry relationship with Reservoir Labs (small, innovative compiler technology company that is very successful in pursuing Government funding)
- Developed ASURE costing model that has been used in every ASURE proposal
- Performed wide range of start-up tasks relevant to ASURE operations and infrastructure, such as recruiting, hiring, procurement (including procurement of a high performance computing system), and identification of infrastructure to support security procedures

Group Leader and Technical Staff, MIT Lincoln Laboratory

2002 – 2012

- Joined MIT Lincoln Laboratory's Embedded and High Performance Computing Group in 2002 as an Assistant Technical Staff, promoted to Associate Technical Staff, then Technical Staff, then Assistant Group Leader, and then Group Leader;
- As an Assistant Group Leader, developed a research area, funding, and staff, leading to creation of new group (business unit): Computing and Analytics (FY13: 32 staff, approximately \$15M/year);
- Group Leader responsibilities included: strategic vision, technical and financial planning, program development and execution, staff recruiting, mentoring, and reviews.
- Under Bliss' leadership, the Computing and Analytics Group developed advanced hardware (novel architectures, HPC, and cloud), software (high level languages and interfaces, runtime code analysis), and algorithm (anomaly detection in massive relational data, image processing, multi-int fusion) technologies for processing large, high-dimensional datasets from a wide range of data sources (structured and unstructured). Technologies developed in the group focused on addressing "Big Data" challenges facing the Department of Defense and Intelligence Community. The group maintained multiple academic collaborations and engaged in community development activities through publications, symposia, and special sessions at top tier conferences. Technical staff in the group had advanced degrees (mostly PhDs) in Computer Science, Mathematics, and Electrical and Computer Engineering.
- Sampling of specific activities
 - Development of sponsored programs with DARPA, IARPA, ONR, ASD(RE), NGA, and other agencies and services (2006-2012)
 - Established collaborations with faculty at MIT, Harvard, Columbia, and Cornell
 - Principal Investigator: Global Pattern Search at Scale (Advanced Scalable Analytics) (2012, National Geospatial-Intelligence Agency)
 - Principal Investigator: Image Processing / 3D Reconstruction (2009-2012, ASD(RE) Line)
 - Principal Investigator: Signal Processing for Graphs (2009-2012, ASD(RE) Line)
 - Principal Investigator: Very Large Graphs for Information Extraction Study (2010-2012, iARPA)
 - Principal Investigator: Graph Exploitation Program (2009-2012, ONR)
 - Principal Investigator: Algorithms Codesigned with Electronics (2008-2012, DARPA)
 - Developed novel architecture (hardware and software) concepts for large scale sparse computations
 - Principal Investigator on Photonic Many-core Architecture and Photonically-Optimized Embedded Microprocessors (2007-2012, DARPA)
 - Developed novel computer architecture concepts and application performance projections in context of photonic device technology
 - Technical lead: Automated Parallelization Framework (US Patent 7983890) (2003-06)

- Designed and implemented automatic program optimization system for sparse and dense algebraic algorithms
- Leadership of a team, briefed sponsors and colleagues, software development
- Facilitated technology transition to other efforts (for example, PVTOL)
- Algorithm analysis and development for wide range of applications (2003-06)
- Lead software engineer of pMatlab: Parallel Matlab Library (2002-03)
- Widely used parallel software at MIT Lincoln Laboratory
 - www.ll.mit.edu/mission/isr/pmatlab/pmatlab.html

Education

Graduate Course in Parallel Computing, MIT, Spring 2003

Master of Engineering, Computer Science, Cornell University, May 2002

Project: Bayesian classifiers for noun phrase co-reference.

Advisor: Professor Claire Cardie

Bachelor of Science, Computer Science, Cornell University, January 2002

Teaching

- Computer Science 482: Introduction to Analysis of Algorithms
 - Teaching Assistant
 - Professor Jon Kleinberg, Cornell University
- Computer Science 472: Foundations of Artificial Intelligence
 - Teaching Assistant
 - Professor Bart Selman, Cornell University

Professional Activities

- Senior Member IEEE
- Member ACM
- DARPA ISAT Study Group (2010-2013)
 - DARPA ISAT Study Co-Chair: Macro-Economics and Cyber-Security
 - DARPA ISAT Study Co-Chair: Science and Engineering of Functional Networks
- National Geospatial-Intelligence Agency (NGA) Academic Research Symposium and Workshops 2012 mini-workshop organizer and moderator
 - Massive Data
- MIT LL Internal Education Course
 - Modern Graph Theory
- IEEE ICASSP 2012 Special Session Organizer
 - Signal and Information Processing for 'Big Data'
- IEEE SSP 2011 Special Session Organizer
 - Signal Processing for Static and Dynamic Networks
- IEEE ICASSP 2010 Special Session Organizer
 - Signal Processing for Graphs and Other Non-Euclidean Data
- ASD(RE) Complex Systems Study (2010-2011)
 - Briefed to Mr. Al Shafer, Principal Deputy, Assistant Secretary of Defense for Research and Engineering
- PhD Thesis Committee
 - Rebecca Collins, "Data-Driven Programming Abstractions and Optimization for Multi-Core Platforms", Columbia University, Fall 2010
- MIT LL Advanced Concepts Committee (2007-2010)
 - Committee reviews and makes funding decisions on seedling research proposals submitted by MIT Lincoln Laboratory Technical Staff and MIT faculty
- ACM/IEEE Supercomputing 2010 Technical Committee
- IEEE ICIP 2010 Reviewer

- MIT LL Graph Exploitation Symposium Chair (Technical - 2010, General 2011-12)
- MIT LL Graph Exploitation Symposium Technical Committee (2013)
- IEEE High Performance Extreme Computing (HPEC) Technical Committee (2009-present)
- MIT LL Technical Women's Network (LLTWN)
- LLTWN Mentoring Subcommittee – defined and piloted mentoring program
- MIT LL PACE (Professional and Community Enhancement) Committee
- MIT LL History Book Editorial Board
- MIT LL Cornell Recruiting Team (member and lead)
- Multiple students supervised (summer undergraduate, summer graduate, capstone projects, MEng projects)

Awards

- 2011 (inaugural) MIT Lincoln Laboratory Early Career Technical Achievement Award (presented to 2 employees under 35): for work in parallel computing, computer architectures, and graph processing algorithms and her leadership in anomaly detection in graph-based data.
- 2011 R&D100 Award for PVTOL: Parallel Vector Tile Optimizing Library
- 2011 US Patent No. 7,983,890 Method and apparatus performing automatic mapping for a multi-processor system
- 2010 MIT Excellence Award: Fostering Diversity and Inclusion, LLTWN
- 2006-2007 MIT Lincoln Laboratory Team Awards for LLGrid (Lincoln Laboratory Grid)
- HPEC 2005 Best Paper Award

Security Clearance

- Active DoD clearances

Publications and Presentations

- N. Bliss, A. Hero, B. Miller, "Statistical Signal Processing for Graphs", Tutorial (Subject Area: Fundamentals), IEEE ICASSP 2014, May 4, 2014 (To be presented.)
- B. Miller, N. Arcolano, N. Bliss, "Efficient Anomaly Detection in Dynamic Attributed Graphs", IEEE Intelligence and Security Informatics, June 2013.
- B. Miller, N. Bliss, "A Stochastic System For Large Network Growth", IEEE ICASSP, May 2013.
- B. Miller, N. Bliss, P. Wolfe, M. Beard, "Detection Theory for Graphs", to appear in Lincoln Laboratory Journal, Volume 20, Number 1, May 2013.
- N. Bliss, M. Schmidt, Introduction to Special Issue – Confronting the Challenges of Graphs and Networks, Lincoln Laboratory Journal Special Issues on Graphs and Networks, Volume 20, Number 1, May 2013.
- D. Whelihan, J. Hughes, S. Sawyer, E. Robinson, M. Wolf, S. Mohindra, J. Mullen, A. Klein, M. Beard, N. Bliss, J. Chan, R. Hendry, K. Bergman, L. Carloni, "P-sync: A Photonically Enabled Architecture for Efficient Non-Local Data Access", IEEE IPDPS, May 2013.
- M. Schmidt, S. Kelley, J. Crouser, D. Hook, E. Ferme, R. Carrington, B. Miller, A. Reuther, N. Bliss, "Uncued Analytics for Large-Scale Datasets with Geospatial Metadata", ASPRS (American Society for Photogrammetry and Remote Sensing), March 2013.
- B. Miller, N. Arcolano, E. Rutledge, M. Schmidt, N. Bliss, "Anomaly Detection In Very Large Graphs: Modeling and Computational Considerations", SIAM CSE, February 2013.
- V. Mehta, F. Patel, Y. Glina, M. Schmidt, B. Miller, N. Bliss, "Characterization of Traffic and Structure in the US Airport Network", IEEE Conference on Intelligent Data

Understanding (CIDU), October 2012.

- B. Miller, N. Bliss, “A stochastic system for large network growth”, *IEEE Signal Processing Letters*, vol. 19, no. 6, pp. 356–359, 2012.
- B. A. Miller and N. T. Bliss, “Toward matched filter optimization for subgraph detection in dynamic networks”, *IEEE SSP 2012*.
- K. Ni, Z. Sun, N. T. Bliss, “Real-time Global Motion Blur Detection”, *IEEE ICIP 2012*.
- S. Sawyer, K. Ni, N. Bliss, “Cluster-based 3D Reconstruction of Aerial Video”, *IEEE HPEC 2012*.
- N. Arcolano, K. Ni, B. A. Miller, N. T. Bliss, and P. J. Wolfe, “Moments of parameter estimates for Chung-Lu random graph models”, in *Proc. IEEE Int. Conf. Acoust., Speech and Signal Process.*, pp. 3961–3964, 2012.
- B. A. Miller, L. H. Stephens, and N. T. Bliss, “Goodness-of-fit statistics for anomaly detection in Chung-Lu random graphs”, in *Proc. IEEE Int. Conf. Acoust., Speech and Signal Process.*, pp. 3265–3268, 2012.
- B. A. Miller, N. Arcolano, M. S. Beard, J. Kepner, M. C. Schmidt, N. T. Bliss, and P. J. Wolfe, “A scalable signal processing architecture for massive graph analysis”, in *Proc. IEEE Int. Conf. Acoust., Speech and Signal Process.*, pp. 5329–5332, 2012.
- N. T. Bliss and B. A. Miller, “Emergent behavior detection in massive graphs”, *SIAM Conf. Parallel Process. for Scientific Computing*, 2012.
- E. Robinson, N. Bliss, S. Mohindra, “Parallel Mapping of Sparse Computations”, Book Chapter in *Graph Algorithms in the Language of Linear Algebra*, J. Kepner, J. Gilbert (Editors), SIAM 2011.
- J. Kepner, D. Bader, R. Bond, N. Bliss, C. Faloutsos, B. Hendrickson, J. Gilbert, E. Robinson, “Fundamental Questions in Analysis of Large Graphs”, Book Chapter in *Graph Algorithms in the Language of Linear Algebra*, J. Kepner, J. Gilbert (Editors), SIAM 2011.
- B. A. Miller, M. S. Beard, and N. T. Bliss, “Eigenspace analysis for threat detection in social networks”, in *Int. Conf. Inform. Fusion*, pp. 1–7, 2011.
- B. Miller, M. Beard, N. Bliss, “Matched Filtering for Subgraph Detection in Dynamic Networks”, *IEEE Statistical Signal Processing (SSP) 2011*.
- N. Singh, B. Miller, N. Bliss, P. Wolfe, “Anomalous Subgraph Detection Via Sparse Principal Component Analysis”, *IEEE Statistical Signal Processing (SSP) 2011*.
- K. Ni, Z. Sun, N. Bliss, “3D Image Geo-registration Using Vision-based Modeling”, *IEEE ICASSP 2011*.
- U.M. O’Reilly, E. Robinson, S. Mohindra, J. Mullen, N. T. Bliss, “A Knowledge-Based Operator for a Genetic Algorithm which Optimizes the Distribution of Sparse Matrix Data”, Book Chapter in *Parallel and Distributed Computational Intelligence*, J. Hidalgo, F. Fernandez, J. Lanchares (Editors), Springer Studies in Computational Intelligence Series, 2011.
- G. Hendry, E. Robinson, V. Gleyzer, J. Chen, L. Carloni, N. T. Bliss, K. Bergman, “TDM Arbitration in a Silicon Nanophotonic Network-On-Chip for High Performance CMPs”, to appear in *Journal of Parallel and Distributed Computing*, 2011.
- U.M. O’Reilly, E. Robinson, S. Mohindra, J. Mullen, N. T. Bliss, “Hogs and Slackers: Using Operations Balance in a Genetic Algorithm to Optimize Sparse Algebra Computation on Distributed Architectures”, *Parallel Computing (Journal)*, 2010.
- B. Miller, N. T. Bliss, P. J. Wolfe, “Subgraph Detection Using Eigenvector L1 Norms”, *Neural Information Processing Systems (NIPS) Conference Proceedings*, Dec 2010.
- G. Hendry, E. Robinson, V. Gleyzer, J. Chen, L. Carloni, N. T. Bliss, K. Bergman, “Circuit-Switched Memory Access in Photonic Networks-on-Chip for High Performance Embedded Computing”, *Proceedings of ACM/IEEE Supercomputing*, Nov 2010.
- N. T. Bliss, B. Miller, P. J. Wolfe, “Spectral Methods for Subgraph Detection”, *SIAM Annual Meeting*, July 2010.

- B. Miller, N. T. Bliss, P. J. Wolfe, "Toward Detection Theory for Graphs and Other Non-Euclidean Data", IEEE ICASSP 2010.
- Z. Sun, K. Ni, N. T. Bliss, "A 3D Feature Model for Image Matching", IEEE ICASSP 2010.
- K. Ni, Z. Sun, N. Bliss, N. Snavely, "Construction and exploitation of a 3D model from 2D image features", Proceedings of SPIE International Conference on Electronic Imaging, Inverse Problems Session, SPIE-2010, Vol. 7533, San Jose, CA, U.S.A., January 2010.
- U.M. O'Reilly, N. T. Bliss, S. Mohindra, J. Mullen, E. Robinson, "Multi- objective Optimization of Sparse Array Computations", High Performance Embedded Computing Workshop (HPEC 2009), Sep 2009.
- J. Mullen, N. T. Bliss, R. Bond, J. Kepner, H. Kim, A. Reuther, "High- Productivity Software Development with pMatlab", Computing in Science and Engineering, Vol 11, No. 1, Jan/Feb 2009.
- N. T. Bliss, K. Asanovic, K. Bergman, L. Carloni, J. Kepner, V. Stojanovic, "Photonic Many-Core Architecture Study", High Performance Embedded Computing Workshop (HPEC 2008), Sep 2008.
- N. T. Bliss, S. Mohindra, and U.M. O'Reilly, "Performance Modeling and Mapping of Sparse Computations," IEEE DoD HPCMP Users Group Conference, July 2008.
- N. T. Bliss, "Automatic Code Parallelization and Optimization", Book chapter in High Performance Embedded Computing Handbook: A Systems Perspective, D. Martinez, R. Bond, M. Vai (Editors), CRC Press 2008.
- N. T. Bliss, J. Kepner, "Addressing the Multicore Programming Challenge with Automatic Parallelization", Lincoln Laboratory Journal, Vol 17, No 1, 2007.
- N. T. Bliss, J. Kepner, "pMatlab Parallel Matlab Library", Special Issue on High-Productivity Programming Languages and Models, International Journal of High Performance Computing Applications, Volume 21 Number 3, Fall 2007.
- H. Kim, N. T. Bliss, R. Haney, J. Kepner, S. Mohindra, S. Sacco, G. Schrader, E. Rutledge, "PVTOL: A High-Level Signal Processing Library for Multicore Processors", HPEC, Sep 2007.
- N. T. Bliss, S. Mohindra, V. Aggarwal, U.M. O'Reilly, "Analysis and Mapping of Sparse Computations", HPEC, Sep 2007.
- N. T. Bliss, J. Kepner, H. Kim, A. Reuther, "pMatlab: Parallel Matlab Library for Signal Processing Application", IEEE ICASSP, 2007.
- N. T. Bliss, S. Mohindra, "pMapper: Automatically Partitioning the Global Address Space", Partitioned Global Address Space Programming Models Conference (PGAS), 2006.
- N. T. Bliss, R. Bond, J. Kepner, H. Kim, A. Reuther, "Interactive Grid Computing at Lincoln Laboratory", Lincoln Laboratory Journal, Vol 16, No 1, 2006.
- N. T. Bliss, J. Dahlstrom, S. Mohindra, D. Jennings, "Automatic Mapping of HPEC Challenge Benchmarks", HPEC, Sep 2006.
- N. Travinin, H. Hoffmann, R. Bond, H. Chan, J. Kepner, E. Wong, "Automatic Parallelization with pMapper", IEEE International Conference on Cluster Computing, Sep 2005.
- N. Travinin, H. Hoffmann, R. Bond, H. Chan, J. Kepner, E. Wong, "pMapper: Automatic Parallelization of Parallel Matlab Programs", Best Presentation Award, HPEC, Sep 2005.
- N. Travinin, "pMatlab: High Productivity, High Performance Scientific Computing", SIAM CSE, Feb 2005.
- Reuther, J. Kepner, H. Kim, A. McCabe, P. Michaleas, N. Travinin, "Technology Requirements for Supporting On-Demand Interactive Grid Computing," IEEE Users Group Conference (DOD-UGC), 2005.

- R. Haney, A. Funk, J. Kepner, H. Kim, C. Rader, A. Reuther, N. Travinin, "pMatlab Takes the HPC Challenge," High Performance Embedded Computing Workshop (HPEC 2004), Lexington, MA.
- J. Kepner and N. Travinin, "Parallel Matlab: The Next Generation," High Performance Embedded Computing Workshop (HPEC 2003), Lexington, MA.
- N. Travinin, Cornell University Master's Project: Bayesian techniques for noun phrase coreference, Ithaca, NY 2002.