

Curriculum Vitae of Sunil Thulasidasan

Technical Staff Member

Information Sciences Group
Computational & Statistical Sciences Division
Los Alamos National Laboratory

Contact Information

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Employment History

Current Position

- **August 2011 - Present:** Technical Staff Member (Scientist 3), Information Sciences Group, Computational & Statistical Sciences Division (CCS), Los Alamos National Laboratory

Previous Positions

- **February 2007 - August 2011:** Technical Staff Member (Scientist 2), Information Sciences Group, Los Alamos National Laboratory,
- **February 2004 – February 2007:** Technical Staff Member, Basic and Applied Simulation Science, Los Alamos National Laboratory
- **March 2003 – February 2004:** Research Assistant, Basic and Applied Simulation Science, Los Alamos National Laboratory
- **August 2001– March 2003:** Research Assistant, Advanced Computing Group, Los Alamos National Laboratory
- **May 2000 – May 2001:** Research Assistant at the University of Southern California Information Sciences Institute

Areas of Research Experience

- Graph algorithms
- Parallel and distributed simulations
- Algorithms and applications for high-performance computing
- Large scale network modeling, simulation and analysis, including
 - Complex networks
 - Graph theoretic analysis of network structure
 - Infrastructure and sociotechnical networks
 - Internet and other communication networks
 - Transportation networks
- Computational Geometry
- Internet congestion control
- Internet routing
- Grid computing
- Network protocol performance analysis and modeling

Publications

(includes some selected technical reports)

- Sunil Thulasidasan, Lukas Kroc, Stephan Eidenbenz, **SimCore: A Library for Rapid Development of Large Scale Parallel Simulations**, To appear in the Second International Conference on Simulation and Modeling Methodologies, Technologies and Applications (SIMULTECH), July 2012, Rome, Italy. [\[PDF\]](#)
- Sunil Thulasidasan, **The Graph Laplacian and the Dynamics of Complex Networks**, (talk), given at the Department of Applied Mathematics, University of Washington. LANL Technical Report LA-UR-12-22066. [\[PDF\]](#)
- Stephan Eidenbenz, Kei Davis, Art Voter, Hristo Djidjev, Leonid Gurvits, Christoph Junghans, Susan Mniszewski, Danny Perez, Nandakishore Santhi, Sunil Thulasidasan **Optimization Principles for Codesign Applied to Molecular Dynamics: Design Space Exploration, Performance Prediction, and Optimization Strategies**, In Proceedings of the DOE ASCR Exascale Research Conference, Portland, OR, April 2012. LA-UR 12-20070 [\[PDF\]](#)
- Sunil Thulasidasan, **Heuristic Acceleration of Routing in Transportation Simulations Using GPUs**, (poster), In Proceedings of the Fourth International Conference on Simulation Tools and Technologies (SimuTools), Barcelona, Spain, March 2011. [\[PDF\]](#)

- Sunil Thulasidasan, Shiva Kasivishwanathan, Stephan Eidenbenz, Philip Romero, **Explicit Spatial Scattering for Load Balancing in Conservatively Synchronized Distributed Discrete Event Simulations**, In Proceedings of the 24th ACM /IEEE /SCS Workshop on the Principles of Advanced and Distributed Simulations (PADS), Atlanta, May 2010. [\[PDF\]](#)
- Sunil Thulasidasan, Shiva Kasivishwanathan, Stephan Eidenbenz, Emmanuelle Galli, Susan Mniszewski, Philip Romero, **Designing Systems for Large-Scale, Discrete-Event Simulations: Experiences with the FastTrans Parallel Microsimulator**, In Proceedings of the IEEE International Conference on High Performance Computing (HiPC), Kochi, India, December 2009. [\[PDF\]](#)
- Sunil Thulasidasan, Stephan Eidenbenz, **Accelerating Traffic Microsimulations: A Parallel Discrete-Event Queue-based Approach for Speed and Scale**, In Proceedings of the ACM/SIGSIM Winter Simulation Conference, Austin, December 2009. [\[PDF\]](#),
- Guanhua Yan, Stephan Eidenbenz, Sunil Thulasidasan, Venkatesh Ramaswamy, Pallab Datta, **Criticality Analysis of Internet Infrastructure**, Computer Networks Journal, Special Issue, 2009. [\[PDF\]](#)
- Russell Bent, Stephan Eidenbenz, Sunil Thulasidasan, **Large-scale Telephone Network Simulation: Discrete Event vs. Steady State**, In Proceedings of the 2009 Spring Simulation Multiconference, March 2009.
- Venkatesh Ramaswamy, Sunil Thulasidasan, Stephan Eidenbenz, Philip Romero, Leticia Cuellar, **Simulating the National Telephone Network: A Sociotechnical Approach to Assessing Infrastructure Criticality**, In Proceedings of the Military Communications Conference (MILCOM), 2007.
- Gabriel Istrate, Anders Hansson, Sunil Thulasidasan, Madhav Marathe, Christopher Barrett, **Semantic Compression of TCP Traces**, IFIP Networking Conference* Coimbra, Portugal, 2006. [\[PDF\]](#)
- V.S. Anil Kumar, Madhav Marathe, Ravi Sundaram, Mayur Thakur, Sunil Thulasidasan, **Scaling laws for the Internet over Urban Regions**, CAIDA ISMA Workshop on Internet Topology, San Diego, 2006. [\[PDF\]](#)
- Christopher Barrett, Gabriel Istrate, V.S Anil Kumar, Madhav Marathe, Shripad Thite, Sunil Thulasidasan, **Strong Edge Coloring for Channel Assignment in Wireless RadioNetworks**, IEEE International Workshop on Foundations and Algorithms for Wireless Networks (FAWN), Pisa, Italy, 2006. [\[PDF\]](#)
- Mark Gardner, Sunil Thulasidasan, Wu-chun Feng, **User-Space Auto-Tuning for TCP Flow Control inComputational Grids**, Journal of Computer Communications, 2004, Special Issue. [\[PDF\]](#),
- Sunil Thulasidasan, **AdhopNet: An Integrated Simulation Suite for Next Generation Communication Networks**, (talk), given at QualNet World 2003, Boston, MA, October 2003.
- Sunil Thulasidasan, Mark Gardner, Wu-chun Feng, **Optimizing GridFTP Through Dynamic Right-Sizing**, IEEE Conference on High Performance and Distributed Computing (HPDC), Seattle, June 2003. [\[PDF\]](#)

- Wu-chun Feng, Apu Kapadia, Sunil Thulasidasan, **GREEN: Proactive Queue Management over a Best Effort Network**, IEEE Globecom, Taipei, Taiwan, November 2002.
- Sunil Thulasidasan, Wu-chun Feng, **Using Steady-State TCP Behavior for Proactive Queue Management**, In Proceedings of the International Conference on Internet Computing, 2002, Las Vegas, NV, June 2002. [\[PDF\]](#)

Software

- **PolyClip**: Polyclip is a library for fast clipping (intersection) of 2-D polygons, written in C++. It supports arbitrarily shaped polygons, including multi-part, self-intersecting and holed polygons. Degenerate cases such as touching and overlapping polygons are also handled. Polyclip is free software, available under the GNU LGPL license. Visit the Polyclip [SourceForge web page here](#).
- **SimX**: SimX is a library for developing parallel, distributed-memory simulations in Python. SimX is written primarily in C++ and provides the simulation modeler with the core functionality needed in a parallel simulation library such as event queueing, time advancement, domain partitioning, synchronization and message passing. SimX APIs are exposed to Python, enabling rapid development and prototyping of a parallel simulation entirely in Python. SimX is free software, available under the GNU LGPL license, and [hosted on github](#).
- **SimCore** SimCore is a generic C++ library for designing simulation applications for large-scale, parallel discrete event simulations, and has been used to develop a host of infrastructure modeling and simulation applications by LANL's [National Infrastructure Simulation and Analysis Center \(NISAC\)](#) program. More information is [here](#).
- **FastTrans** is a parallel simulator for modeling large scale transportation networks, based on the SimCore framework, capable of simulating and routing millions of vehicles on real-world road networks in a fraction of real time. NISAC uses FastTrans to study the implications of loss of infrastructure components in crisis management and for dynamic prioritization studies. Visit the [NISAC FastTrans page](#) for more information.
- **MIITS: The Multi-Scale Integrated Information and Telecommunications System** The MIITS module is a scalable, end-to-end simulation environment for representing and analyzing extremely large, complex communication networks including cellular networks, public switched telephone networks (PSTN), the Internet, and ad hoc mesh networks. MIITS offers network representation in several resolutions, ranging from packet-level simulation to flow-based approaches. Visit the [NISAC MIITS page](#) for more information.
- Older Code
 - [Active Queue Management module for the NS-2 Network Simulator](#). (*Note*: This code hasn't been updated for a while.) [Download](#).

Software Skills

- Expertise in algorithm and software design for:
 - High performance, parallel and distributed computing
 - Mathematical modeling
 - Computational geometry
- Languages and Libraries: C++, Python, C, Matlab, Perl, Shell, MPI, OpenMP, Boost
- Documentation: LaTeX, Sphinx, reStructuredText, docutils

Education

- MS, Applied Mathematics (2012), University of Washington
- MS, Computer Science (2001), University of Southern California
- Bachelor of Technology, Computer Science & Engineering (1998), University of Kerala (College of Engineering, Trivandrum), India

Grants

- Principal Investigator on Laboratory Directed Research and Development (LDRD) project on algorithmic co-design for unstructured problems on parallel architectures, October 2010 to September 2013. Amount: \$1.1M

Mentoring Experience

- Mentored graduate student summer interns at Los Alamos National Lab in 2006, 2007, 2008 and 2009.
- Mentor for the NNSA minority student program in 2009

Awards

- Los Alamos Achievement Award 2005
- Los Alamos Achievement Award 2008

Professional Services

- Expert technical consultant for the New Mexico Small Business Assistance (NMSBA) program, August 2011 to December 2011
- Technical reviewer for various conferences and journals in computing.
- Member of LANL exploratory research committee for computational co-design
- Member of LANL directed research red-team (advisory) committee.

Available for technical consulting requests.

Miscellaneous Personal Information

- **Citizenship:** India
- **Visa Status:** US permanent resident