Curriculum Vitae – Kalyan S. Perumalla

I. CAREER PROFILE

Kalyan Perumalla is a Distinguished Research Staff Member (Band 5) at the Oak Ridge National Laboratory (ORNL, a US Department of Energy laboratory) in the Computer Science and Mathematics Division.

Dr. Perumalla holds additional appointments as Joint Full Professor in the School of Industrial and Systems Engineering at the University of Tennessee, Knoxville, and as Adjunct Professor in the School of Computational Sciences and Engineering at the Georgia Institute of Technology.

He also serves on the Special Interest Group Governing Board of the Association for Computing Machinery (ACM) as the elected chair for ACM Special Interest Group in Simulation (SIGSIM).

Prior to his ongoing research career at ORNL since 2005, he held full-time research appointments since 1997 at the Georgia Institute of Technology. He also visited Durham University, UK as Fellow of the Institute of Advanced Study, and served as member of the National Academies' Technical Advisory Boards for the U.S. Army Research Laboratory.

Dr. Perumalla is among the first recipients of the U.S. Department of Energy Early Career Award in Advanced Scientific Computing Research ($2.5 million for research over 5 years). Over the past 23 years, he has served as a principal investigator (PI) or co-PI on several research projects sponsored by agencies including the Department of Energy, Department of Homeland Security, Air Force, DARPA, Army Research Laboratory, National Science Foundation, and industry.

He is the author of "Introduction to Reversible Computing," a seminal book in the fundamental theory and analysis of energy in computation. He co-authored another book, three book chapters, and over 125 articles in conferences and journals. He has delivered several advanced tutorials and lectures in defense simulation technologies, parallel systems, and reversible computing. Five (5) of his co-authored papers received the best paper awards, in 1999, 2002, 2005, 2008, and 2014.

Dr. Perumalla serves on international conference program committees and editorial boards of journals. He also held leadership roles as program chair or co-chair of multiple international conferences spanning areas from parallel simulation to cybersecurity.

Some of his research tools in parallel and distributed computing have been disseminated to research institutions worldwide. His algorithms and software prototypes have been scaled to over 200,000 processor cores and 1000's of GPUs on large supercomputing systems, including the Oak Ridge Leadership Computing Facility's Jaguar, Titan, and Summit series of supercomputers.

Dr. Perumalla earned his Ph.D. in computer science from the Georgia Institute of Technology in 1999. He is certified in Agile Development technologies as a Certified ScrumMaster, a Certified Scrum Product Owner, and a Certified Scrum-at-Scale Practitioner. He holds an active Q clearance.

II. RESEARCH INTERESTS

Fundamentals of Computation and Energy; Mathematical Modeling and Simulation Methods; Parallel Algorithms; Parallel Integer Programming and Combinatorial Optimization; Discrete Event Methods; Exascale Computing; Scalability of Machine Learning Systems and Artificial Intelligence (AI); Reversible Computing; Computer Modeling and Simulation of Man-made Systems including Electric Grids and Intelligent Transportation; Virtual Machine Technology and Cloud Computing; Cyberphysical Systems and Digital Twins; Cyber Security/Network Simulation; Parallel and Distributed Systems; Image Processing; Domain Specific Languages and Compilers

III. EMPLOYMENT HISTORY

A. Summary

ORNL	Distinguished R&D Staff Member	Band 5	2014-Present
UTK	Joint Faculty	Professor	2020-Present
Georgia Tech	Adjunct Professor	Professor	2006-Present
ORNL	Group Leader		2014-2020
Durham Univ.	IAS Fellow		2014-2015
ORNL	Senior Research Staff Member	Band 4	2010-2014
ORNL	Research Staff Member	Band 3	2005-2010
Georgia Tech	Academic Professional	Faculty	2000-2005
Georgia Tech	Research Scientist	Faculty	1997-2000
Bellcore	Intern, Consultant		1995, 1996
Schlumberger	Intern		1994
IST, UCF	Developer, Research Assistant		1991-1993

B. Current

- **Oak Ridge National Laboratory**, Oak Ridge, Tennessee, USA *2014-Present*
  Distinguished R&D Staff Member, Computing & Computational Sciences Directorate.
    - Responsibilities include initiation, planning and managing major research programs or projects; broad responsibility guided by unit goals, policies, procedures and strategy; exercise of considerable latitude in determining objectives and approach to work assignments; influences top management in determining unit goals and objectives; performance of work managed by results; development of new client relationships; management of full range of research services in most complex problems; competence with all standard and advanced equipment, systems, policies and work methods; maintenance of international reputation for knowledge in speciality; establishment of track record in pushing the edge of knowledge; advanced knowledge of wide range of principles, theories, professional competencies and research methods; advanced knowledge of other disciplines and functions; handling most complex, diverse and impactful problems with original solutions and integration/coordination of disciplines, functions and staff; application of considerable judgement and professional competency;

and achievement and maintenance of reputation as key contributor to major programs; externally recognized expertise in one or more fields.

- **University of Tennessee**, Knoxville, Tennessee, USA *2020-Present*
  Joint Full Professor, School of Industrial Systems and Engineering.

- **Georgia Institute of Technology**, Atlanta, Georgia, USA *2006-Present*
  Adjunct Full Professor, School of Computational Sciences and Engineering.

C. Previous

- **Oak Ridge National Laboratory**, Oak Ridge, Tennessee, USA *2014-2020*
  Group Leader, Discrete Computing Systems Group, Computer Science and Mathematics Division, Computing and Computational Sciences Directorate.
    - Founded the group; formulated its vision and mission; desgined its strategic plan, analysis of technical strengths, weaknesses, opportunites and threats; maintain human capital management plans
    - Regular responsibilities include personnel performance evaluations/appraisals and development plans; promotion processes, salary recommendations; time entry and accounting; budget preparation and tracking; absence policies; oversight of administrative assistants; interaction with human resources personnel; incentivizing with avenues such as significant awards; sensitivity to legal, programmatic, personal, and technical considerations; procrurement and purchasing; travel and project approvals; ergonomics and safety compliance; hosting visitors; recruitment, interviewing, and external representation; and several others.

- **Durham University**, Durham, UK *2015*
  IAS Fellow, Fellow at the Institute of Advanced Study (IAS): Performing interdisciplinary research in the Epiphany term under the theme Emergence.

- **Oak Ridge National Laboratory**, Oak Ridge, Tennessee, USA *2009-2014*
  Senior R&D Staff Member, Computational Sciences and Engineering Division, Computing & Computational Sciences Directorate.

- **Oak Ridge National Laboratory**, Oak Ridge, Tennessee, USA *2010-2014*
  R&D Manager and Team Lead, Computational Sciences and Engineering Division, Computing & Computational Sciences Directorate.

- **Oak Ridge National Laboratory**, Oak Ridge, Tennessee, USA *2005-2008*
  Research Staff Member, Computational Sciences and Engineering Division, Computing & Computational Sciences Directorate.

- **Georgia Institute of Technology**, Atlanta, Georgia, USA *2000-2005*
  Research Faculty Member, College of Computing: Advised graduate students, supervised research assistants, taught senior undergraduate course, obtained

externally sponsored research funding, served as co-PI on multiple projects, performed collaborative research within as well as outside Georgia Tech.

- **Georgia Institute of Technology**, Atlanta, Georgia, USA *1997-2000*
  Research Scientist. Performed research in large-scale network modeling, high-performance simulation, compilers and Department of Defense (DoD) High Level Architecture (HLA) federations.

- **Georgia Institute of Technology**, Atlanta, Georgia, USA *1993-1997*
  Graduate Research Assistant. Researched Asynchronous Transfer Mode (ATM) network simulation and parallel simulation.

- **Bellcore**, Morristown, New Jersey, USA *Summer 1996*
  Consultant. Researched formal specification, modeling & simulation systems for wired & wireless networks; modeled large ATM Private Network-Network Interface (PNNI) networks.

- **Bellcore**, Red Bank, New Jersey, USA *Summer 1995*
  Intern. Researched performance evaluation techniques for ATM networks.

- **Schlumberger**, Tulsa, Oklahoma, USA *Summer 1994*
  Intern. Designed and developed network communication and visualization software for real-time data from oil exploration devices.

- **Institute for Simulation and Training**, Orlando, Florida, USA *1992-1993*
  Developer. Team member for DoD Computer Generated Forces in distributed interactive (JSAF) battlefield simulation. Developed intelligent behavior for simulated tanks & soldiers. Investigated aggregation & disaggregation of entities.

- **University of Central Florida**, Orlando, Florida, USA *1991-1992*
  Graduate Teaching Assistant. Taught sophomore-level computer programming class: teaching, preparing exams, grading exams and lab work.

IV. EDUCATION

A. Academic

- **Ph.D., Computer Science** *December 1999*
  Georgia Institute of Technology, Atlanta, Georgia, USA
  Thesis Title: "Techniques for Efficient Parallel Simulation and their Application to Large-Scale Telecommunication Network Models"
  Advisor: Dr. Richard Fujimoto

- **M.S., Computer Science** *June 1993*
  University of Central Florida, Orlando, Florida, USA
  Thesis Title: "A Debugging Environment for the Parallel Virtual Machine (PVM)"
  Advisor: Dr. Udaya Vemulapati

- **B.E., Mechanical Engineering** *May 1991*
  Osmania University, India
  Thesis Title: "Interactive Computation of the Critical Path Method"

B. Management Training

- "Courageous Leaders" July 2020
  Oak Ridge National Laboratory, Oak Ridge, Tennessee, USA
  Program Overview: Summit program designed as comprehensive and insightful training for inclusive leadership, awareness of insider culture, and specific actions. and skills to identify next steps in leadership. Training offered by WMFDP Global.

- **"Developing Leadership Potential (DLP)" Program** *March-July 2016*
  Oak Ridge National Laboratory, Oak Ridge, Tennessee, USA
  Program Overview: Curriculum designed to address advanced leadership needs in career development, personal strengths & challenges, leadership communication strategies, networking, senior leader expectations. Uses a variety of methods and venues to enhance ongoing learning and application. Provides support through networking, interaction with senior leaders, individual coaching and personal assessments.
  Designed for: Individuals who are currently in a leadership role, have completed Management Boot Camp, seek to grow his/her leadership abilities, and are identified as a high potential individual and as a potential successor for a higher level role.

- **"Management Boot Camp: Skills for Managers"** *February 2011*
  American Management Association, Oak Ridge, Tennessee, USA
  Coverage: Effective Communication, The Art of Influencing Others, Coaching for Performance, Motivation, Delegating for Growth and Development, Institutional Planning and Integrated Performance Management, Facilities and Space, Employee Recruitment, Strategic Planning and Execution, Time Keeping, Finance Fundamentals, Employee Discipline, Employee Performance Management

- **"Project Management Training," "Unconscious Bias," "Sexual Harrasment in Workplace"** and other training at Oak Ridge National Laboratory.

C. Teamwork Training

- **Certified Scrum Master** Since *March 2018*
  The Scrum Alliance for Scrum and Agile (www.scrumalliance.org)

- **Certified Scrum Product Owner** Since *May 2018*
  The Scrum Alliance for Scrum and Agile (www.scrumalliance.org)

- **Certified Scrum-at-Scale Practitioner** Since *Nov 2018*
  The Scrum Alliance for Scrum and Agile (www.scrumalliance.org)

V. RECOGNITION

A. Fellowships

- **Durham IAS Fellow**, awarded a research fellowship from a worldwide selection process, at the Institute of Advanced Study (IAS), Durham University, United Kingdom; fellowship period December 2014-March 2015 (with full financial support by the fellowship).

  Completed a collaborative engagement on Durham campus with 7 fellows, under the "Epiphany term" theme *Emergence*. Interdisciplinary cohort of fellows spanned philosophy, art, anthropology, history, and economics.

B. Appointments

- **ACM SIG Governing Board Member** (SIG Governance) as elected chair of the Association for Computing Machinery Special Interest Group in Simulation (SIGSIM) (https://www.acm.org/special-interest-groups/sig-governance) for term starting July 1, 2020.
- **Member of National Academy of Sciences' Panel** for Assessment of Computational Science at the US Army Research Laboratory, 2017.

  Served on the panel on Aberdeen Proving Grounds campus to review the computational science research programs and projects at the ARL. Contributed as co-author to a detailed assessment of research documented in a panel report published by the National Academies.
- **Member of National Academy of Sciences' Panel,** appointed for a two-year term as panel member on Information Science at the US Army Research Laboratory, 2015–2017.

  Served on the panel on Aberdeen Proving Grounds and Adelphi campuses to advise on information science research directions of the ARL. Contributed as co-author to a detailed assessment of research documented in a panel report published by the National Academies.

C. Awards

- **Division's Significant Technical Contribution Award**, "*in recognition of the most Significant Technical Contribution by Advancing the Field of Reversible Computing*," Computer Science and Mathematics Division, Oak Ridge National Laboratory, December 2017.
- **Division's Best Publication Award**, Computational Sciences and Engineering Division, Oak Ridge National Laboratory, July 2014.
- **Best Paper Award Winner**, lead author, paper on *Simulating Billion-Task Parallel Programs* in the SCS Summer Simulation Conference, International Symposium on Performance Evaluation of Computer and Telecommunication Systems, July 2014.
- **Best Paper Award Finalist**, co-author, paper on *Efficiently Scheduling Multi-core Guest Virtual Machines on Multi-core Hosts in Network Simulation* in the ACM/IEEE/SCS Workshop on Principles of Advanced and Distributed Simulation, July 2011.
- **Best Paper Award Finalist**, lead author, paper on *Reversible Parallel Discrete Event Execution of Large-scale Epidemic Outbreak Models* in the ACM/IEEE/SCS Workshop on Principles of Advanced and Distributed Simulation, June 2010.

- **Best Paper Award Finalist**, lead author, paper on *Agent Simulations on Multi-GPU and Multi-Core Clusters* in the ICST International Conference on Simulation Techniques and Tools, March 2010.
- **DOE Career Award Winner, FY 2010-2015**, *ReveR-SES: Reversible Software Systems,* announced January 2010
  - One of the 69 selected from a national pool of over 2200 pre-proposals and over 1500 proposals
  - One of only two awarded in the inaugural year of the program (2010) to national laboratories for research in advanced scientific computing research.
- **Best Paper Award Winner**, co-author, paper on *Agent Simulations on GPUs* in the SCS Spring Simulation Multi-Conference, April 2008.
- **Significant Event Award**, "Largest and Fastest PDES Executions on the Blue Gene Supercomputer," Oak Ridge National Laboratory, September 2007, recognized by the Associate Laboratory Director (Thomas Zacharia).
- **Best Project Poster Winner**, member of team led by John Stovall in the "Electric Grid Real-time Monitoring & Visualization" project, among Oak Ridge National Laboratory-Directed R&D projects of 2003-2006, November 2006, recognized by the Laboratory Director (Jeffreey Wadsworth).
- **Best Paper Award Winner**, co-author, paper on *Plasma Simulations* in the ACM/IEEE/SCS Workshop on Parallel & Distributed Simulation, June 2005.
- **Best Paper Award Winner**, co-author, paper on *Updateable Simulation* in the ACM/IEEE/SCS Workshop on Parallel & Distributed Simulation, May 2002.
- **Best Paper Award Winner**, co-author, paper on *Reverse Computation* in the ACM/IEEE/SCS Workshop on Parallel & Distributed Simulation, May 1999.
- **Contest Winning Teams and Honorable Mentions,** Programming team coach, Georgia Tech: Coached ACM programming teams 1993-2000. Teams placed 1st among 60-70 teams in ACM Southeast Regional Programming Contests in 1994, 1998 and 1999. Team placed 10th in 1995 World Finals. Teams placed 1st in IBM Java Challenge 1999 and 2000.
- **Programming team member**, University of Central Florida: Team placed 2nd in the ACM Southeast Regional Programming Contest, 1992.

D. Award Nominations

- **R&D100 Award Finalist**, "*HELICS: Hierarchical Engine for Large-scale Infrastructure Co-Simulation*," with other DOE labs led by PNNL, April 2019.
- **UT-Battelle Awards Night**, nominated four consecutive years (2010-2013) as the best division-level candidate from the Computational Sciences and Engineering Division (out of ~150 research staff members), Oak Ridge National Laboratory, in the category of scientific research.

E. Research in the News

- "Kalyan Perumalla: Then and Now / 2010 Early Career Award Winner," US Department of Energy, Office Science, September 2020
  https://www.energy.gov/science/articles/kalyan-r-perumalla-then-and-now-2010-early-career-award-winner
  https://twitter.com/doescience/status/1304464864182755328

- "ORNL's Perumalla elected chair of ACM Simulation Group" – HPCWire & ORNL, August 2020
  www.hpcwire.com/off-the-wire/ornls-perumalla-elected-chair-of-acm-simulation-group/
  www.ornl.gov/news/ornls-perumalla-elected-chair-acm-simulation-group

- U.S. Department of Energy Advanced Scientific Computing Research Advisory Committee Meeting (chair Daniel Reed) *Minutes of Record* (public), December 2015, "Reversible Software Execution Systems" Pages 23-25

- Knox News, and others, "Computer science that's spooky cool,"
  blogs.knoxnews.com/munger/2010/01/computer_science_thats_spooky.html

- Maryville College News, ORISE News, and others, "Oak Ridge Internship Helps MC Senior Focus on Computer Science Goals,"
  maryvillecollege.edu/news/news.asp?id=1192&pgID=1216

- Texas A&M News, ORISE News, and others, "Fostering Safe Sharing of Confidential Information Proves Challenging,"
  engineeringnews.tamu.edu/news/1369 and *orise.orau.gov/sep/profiles/06beier.htm*

- Wired.com, "Net Analysis Gets Turbo Boost,"
  www.wired.com/news/infostructure/0,1377,60077,00.html

- PSC News Center (Pittsburgh Supercomputing Center), "Better Networks,"
  www.psc.edu/publicinfo/2003/inprogress/

- Georgia Tech News, "Georgia Tech Researchers Create the World's Fastest Detailed Computer Simulations of the Internet,"
  www.gatech.edu/news-room/release.php?id=173.

VI. SPONSORED RESEARCH AND DEVELOPMENT

A. Proposals in Review

- **Co-PI (ORNL), National Virtual Bio-Technologies Laboratory, Department of Energy** "Epidemiology Modeling in Support of Response Planning", ($400K of $1.9million led by LBNL) 2020-2021.

- **PI (ORNL), Office of Electricity, Department of Energy** "Simulation-based Optimization of Relay Settings in Large-scale Electric Grids", ($400K) 2020-2021.

- **Co-PI (ORNL), Office of Electricity, Department of Energy** "Edge Computing Infrastructure using Application-Specific Programmable System-on-Chip to Process Large Datasets", ($530K) 2020-2021.

B. Funded Research Projects

- **Co-PI (ORNL), Air Force** "Cyber Operations Capabilities Development, Design and Analysis", ($5.2million) 2020-2023.
- **PI (ORNL), Exascale Computing Program (ECP), Department of Energy** "ExaSGD: Exascale Smart Grid Dynamics", ($875K of $6million led by PNNL) 2019-2023.
- **Co-I (ORNL), Hydro Power Technologies Office, Department of Energy** "Needs Assessment and Initiation of a Digital Twin for Hydropower Systems Open Platform Framework", ($550K) 2020-2021.
- **Co-PI (ORNL), Office of Cybersecurity, Energy Security, and Emergency Response, Department of Energy** "CYVET: A Cyber-physical Assurance Framework based on a Semi-Supervised Vetting Approach", ($3million) 2019-2022.
- **PI (ORNL), Missile Defense Agency – STTR Scalable Network Technologies Inc.,** "Secure Environment for Cyber Resiliency Evaluation of Missile Defense Systems", ($37K) 2020-2021.
- **Co-PI (ORNL), Office of Electricity, Department of Energy** "A New Approach to Transient Analysis for Smart Power Systems," ($400K) 2019-2021.
- **Co-PI (ORNL), Oak Ridge National Laboratory Directed Research and Development** "Deep CYBERIA: Application of Digital Twin Techniques to Operational Assets", ($800K) 2018-2020.
- **Co-PI (ORNL), National Science Foundation - Expeditions** (no-cost collaboration with U. Virginia-led multi-institutional team) "Global Pervasive Computational Epidemiology," 2020-2025.
- **Area-Lead (ORNL), Office of Electricity, Department of Energy** "North American Energy Resilience Model", Software Architecture Team Lead, ($750K of $6million) 2019-2021.
- **Co-PI (ORNL), Oak Ridge National Laboratory Seed Money** "Automated Intelligent Generative Design for Scientific and Engineering Applications – Heat Exchanger", ($190K) 2018-2020.
- **PI (ORNL), US Department of Energy** "Development of Integrated Transmission, Distribution, and Communication (TDC) Models [Grid Modernization Laboratory Consortium (GMLC)]", with Z. Huang (Lead PI, PNNL) and LLBL, NREL, ANL, SNL and INL, ($600K for ORNL) 2016–2019.
- **Co-PI (ORNL), Oak Ridge National Laboratory Directed Research and Development** "Rapid Digital-Twin Development Framework for Quantitative Assessment of Grid Cyber Resilience", ($1.4million) 2018.
- **Co-PI (ORNL), A sponsor from the Intelligence Community** "Fast Detection Algorithms for Parallel Execution using DLIB on GPUs", ($60K) 2017-2018.

- **Co-PI (ORNL), A sponsor from the Intelligence Community** "High Performance Algorithms and Optimization of Image Registration Workloads on Multi-GPU, Multi-Core, and Mobile Platforms", ($400K) 2016-2018.
- **PI (ORNL), US Department of Energy** "ReveR-SES: Reversible Software Execution Systems", ($2.5million) 2010–2015, DOE/ASCR Early Career Award.
- **PI (ORNL), Oak Ridge National Laboratory Directed Research and Development** "CloneX: Discrete Event Cloning at Exascale", ($730K) 2014–2016.
- **PI (ORNL), Department of Defense (US Army Research Laboratory)** "NetWarp-Frontline: VM/Cloud-based Discrete Event Simulations for military MANETs", ($300K) 2012–2013.
- **PI (ORNL), Caterpillar Inc.** "Rocks3D-HPC", ($300K) 2011–2012.
- **PI (ORNL), Department of Defense (US Army Research Laboratory)** "Design of Discrete-Event Testbed for Systems Effects in Defense Communications", ($300K) 2011–2012.
- **PI (ORNL), Oak Ridge National Laboratory Directed Research and Development** "Runtime Infrastructures for Discrete Event Execution at Peta-scale and Beyond", ($700K) 2009–2011.
- **PI (ORNL), Oak Ridge National Laboratory Program Development** "High-Performance Discrete Computing Systems", ($28K) 2008–2009.
- **PI (ORNL), US Department of Homeland Security/Southeastern Regional Research Initiative** "RealSim: HPC and Data-Enabled Solutions to Critical Applications," ($960K) 2007-2008, with B. Worley (Project Director, ORNL).
- **Co-PI (ORNL), Oak Ridge National Laboratory Program Development** "Large-scale Simulation and Bio-Medical Technologies", ($20K) 2007–2008, with D. Hetrick (PI, ORNL), Barbara Beckerman (Co-PI, ORNL).
- **PI (ORNL), Oak Ridge National Laboratory Program Development** "High-Performance Parallel Discrete Event Technologies", ($30K) 2006–2007.
- **Co-PI (ORNL), National Geo-Spatial Intelligence Agency** "An Agile and Error-Resilient GIS Database Architecture for Uncertainty Management," ($850K) 2006-2008, with B. Bhaduri (PI), A. Ganguly (Co-PI), M. Shankar (Co-PI).
- **PI (ORNL), Oak Ridge National Laboratory Directed Research and Development** "An Evolutionary Approach to Porting Applications to Peta-Scale Platforms", ($650K) 2006–2009, LDRD 07-024 with J. Vetter (Co-PI, ORNL).
- **PI (ORNL), Oak Ridge National Laboratory Program Development** "Infrastructure Testbeds for High Performance Platforms", ($8K) 2006–2007.
- **Co-PI (ORNL)** (*joined subsequent to funding*)**, Oak Ridge National Laboratory Directed Research and Development** "Real-Time, Interconnection-Wide Power System Analysis & Visualization", ($450K) 2005–2006, LDRD 05-015.

- **Co-PI (Georgia Tech), US National Science Foundation Information Technology Research** "Collaborative Research: ITR: Global Multi-scale Kinetic Simulations of Earth's Magnetosphere using Parallel Discrete Event Simulation", ($1.3million) 2003–2006, ATM-0326431 (Georgia Tech).
- **Co-PI (Georgia Tech), US Defense Advanced Research Projects Agency** "Backplane-based Network Simulation & Emulation", ($780K) 2004-2005.
- **Co-PI (Georgia Tech), US Defense Advanced Research Projects Agency** Network Modeling & Simulation (NMS) Program "A Backplane Approach to Flexible, Efficient Network Emulation", ($1.6million) 2000–2003, N66001-00-1-8934.
- **Co-PI (Georgia Tech)** (*joined subsequent to funding*)**, US Defense Advanced Research Projects Agency** Next Generation Internet (NGI) Program "Scalable Self-Organizing Simulations", ($400K) 1996–1999, N66001-96-C-8530.
- **Co-PI (Georgia Tech)** (*joined subsequent to funding*)**, US National Science Foundation** "Simulation of Integrated Communication Systems," ($200K) 1995–1998, NCR-9527163.

C. Other Unfunded Large Proposals

- **PI (ORNL), Israel-US Energy Foundation** "Distributed Energy Asset Early Warning System," ($23.5million) 2020-2025, with Elta, SIGA and Siemens.
- **Co-PI (ORNL), Advanced Scientific Computing Research, Department of Energy** "MAIDS: Meta-level AI Decision System to Steer ML-Accelerated Large-scale Scientific Simulations", ($2.5million) 2020-2023.
- **PI (ORNL), Hydro Power Technologies Office, Department of Energy** "Towards Holistic Evaluation of Hydropower Cybersecurity", ($700K) 2020-2022.
- **Co-PI (ORNL), Intelligence Community** "[A Proposal on Image Processing]," ($1.2million) 2016.
- **PI (ORNL), US Department of Energy** Advanced Scientific Computing Research, FOA-1059, "Resiliency in Extreme Scale Computing Platforms: Anomaly Detection and Fault Avoidance Via Real-time Learning," ($3million) 2015–2018.
- **PI (ORNL), US Department of Energy** Advanced Scientific Computing Research, LAB14-1088, "RX – Tools for Reconciling Reality-vs-Expectation in Extreme-scale Computing", ($1million) 2014–2016.
- **PI (ORNL), US Department of Energy** Advanced Scientific Computing Research, "NetWarp: High-fidelity Experimentation Environments for Analysis of Rapidly Evolving Software," ($1.5million) 2009–2012, with Lawrence Livermore National Laboratory.
- **PI (ORNL), US Defense Advanced Research Projects Agency** National Cyber Range (NCR) Program, "ORANGE-Net: A Real-Time Resilient and Scalable System for National Cyber Range," ($2million) 2008–2009, with Microsoft Inc., and NASA Jet Propulsion Laboratory.

- **PI (ORNL), US National Science Foundation** PetaScale Applications (PetaApps) Program, "Petascale Simulation of Large-Scale Transportation Cyberinfrastructure," ($600K) 2008–2012, with Georgia Tech and SNT Inc.
- **PI (Georgia Tech), US National Science Foundation** Networking Technologies and Systems (NeTS) Program, "Design of Sensor Networks using Constraints-based Specification and Simulation," ($900K) 2005–2008, with RPI and SUNY Stony Brook.
- **PI (Georgia Tech), US National Science Foundation** Formal and Mathematical Foundations (FMF) Program, "Real-time and Best-effort Solutions of Mixed Integer Programs," ($900K) 2004–2007, with Georgia Tech, Lehigh University, and University of Wisconsin.

D. Supercomputing Allocations

- **Titan**, 2012 (PI): "ReveR-SES: Reversible Software Execution System for Ultra-scale Computing," 2,000,000 hours (CSC088) on the Titan supercomputer at the Oak Ridge Leadership Computing Facility, National Center for Computational Sciences, Oak Ridge National Laboratory
- **Jaguar**, 2010 (PI): "Data and Runtime Infrastructure for Parallel Discrete Event at Petascale," 500,000 hours (CSC034 #2) on the Jaguar supercomputer at the Oak Ridge Leadership Computing Facility, National Center for Computational Sciences, Oak Ridge National Laboratory
- **Jaguar**, 2007 (PI): "An Evolutionary Framework for Porting Applications to Petascale Platforms," 150,000 hours (CSC034 #1) on the Jaguar supercomputer at the Oak Ridge Leadership Computing Facility, National Center for Computational Sciences, Oak Ridge National Laboratory
- **Participant**: Allocations in other projects spanning multiple areas including deep learning and non-linear optimization.

VII. MAJOR RESEARCH SOFTWARE ARTIFACTS

Package	*Description*	*Impact*
ExaCorona	Scalable generator of simulated datasets for COVID and similar pandemics, aimed at three dimensions of scalability *https://github.com/perumallaks/exacorona*	▪ Runs on Linux, MacOS, and Summit Supercomputer.
MutEnt	Novel mutual entropy computation code for highly scalable and efficient computation of image registration operations for large sized, high volume images.	▪ Runs on CPU and GPU platform (C++, CUDA) ▪ Beats the best-known open source implementations available in OpenCV.
DeepEx	Manager for novel ORNL code for Deep Learning designed for very light software footprint, scaling to large heterogeneous platforms (GPU and multicore CPU),	▪ Runs on supercomputing platforms with GPUs and CPUs (C++, MPI, CUDA – CUDNN, NCCL)

	highly portable compiled implementation for high performance.	▪ Tested on several networks (VGGNet, etc.), and image data sets.
RBLAS	Reversible version of basic linear algebra subprograms (BLAS) interface and implementation that works over traditional (irreversible) BLAS.	▪ The only available reversible linear algebra library. Portable across GPUs and CPUs (C, C++, FORTRAN, CUDA)
μπ (MUPI)	The world's most scalable simulator of Message Passing Interface (MPI) programs.	▪ Tested on up to 216,000 processor cores of Cray XT5; supports over 227 million virtual tasks
libSynk	Library for high performance time-synchronized communication on distributed memory platforms; written in C, over sockets, MPI & shared memory.	▪ Employed by most leading distributed network simulators including *pdns*, *DaSSF* & *GTNetS*
μsik	Novel PDES "micro-kernel", unifying most existing virtual time-synchronization techniques; written in C++.	▪ Designed for scalable Time Warp as well as conservative synchronization on 216,000 processor core execution ▪ Being applied to large-scale space physics DES models, neurological simulations and others
TeD	Domain Specific Language and compiler for automated Time Warp-based execution of network models. *www.cc.gatech.edu/computing/pads/teddoc.html*	▪ Precursor to currently leading parallel/distributed network simulators ▪ Widely disseminated world-wide and well cited in the literature
FDK *Co-author*	High-performance realization of the Department of Defense High Level Architecture (HLA) Runtime Infrastructure (RTI) *www.cc.gatech.edu/computing/pads/fdk.html*	▪ Among the very few source-available HLA RTI implementations ▪ Well recognized in HLA community
PARINO	Parallel/distributed branch-and-cut solver for mixed integer programming (MIP)	▪ Incorporated novel cut sharing and distributed management mechanisms

VIII. TEACHING

- **Faculty**, Georgia Institute of Technology, Summer 2003: Taught *Advanced Operating Systems* (CS4210) to senior-undergraduate and graduate computer science students.
  - Georgia Tech end-of-course student evaluations for this course:

Question	Rating (0-5)
1. COURSE SEEMED WELL PLANNED AND ORGANIZED	4.0
2. GOOD JOB COVERING COURSE OBJECTIVES/CONTENT	4.0
3. EXPLAINED COMPLEX MATERIAL CLEARLY	4.7
4. WAS APPROACHABLE AND WILLING TO ASSIST	4.9
5. ENCOURAGED STUDENTS TO CONSULT WITH HIM/HER	4.8
6. CLASS ATTENDANCE IMPORTANT IN PROMOTING LEARNING	4.7
7. NUMBER OF ASSIGNMENTS WAS REASONABLE	4.1
8. EXAMS COVERED COURSE CONTENT/OBJECTIVES	4.2
9. EXAMS WERE OF APPROPRIATE DIFFICULTY	4.0

- **Graduate Teaching Assistant**, Georgia Institute of Technology, Fall 1993–Fall 1994: Taught special section of an introductory course on computing; handled laboratory classes.
- **Instructor**, University of Central Florida, Spring 1992: Taught data structures and algorithms to junior computer science students.
- **Graduate Teaching Assistant**, University of Central Florida, Fall 1991: Handled laboratory classes for business majors on software tools such as databases, spreadsheets and word processors.

IX. MENTORING

A. Mentee Staff Members

- Pablo Moriano (Ph.D., Computer Science), 2020-Present
- Olivera Kotevska (Ph.D., Computer Science), 2018-2020
- Philipp Andelfinger (Ph.D., Computer Science), 2019-2020
- Maksud Alam (Ph.D., Computer Science), 2016-Present
- Srikanth Yoginath (Ph.D., Computer Science), 2007-Present
- Sudip Seal (Ph.Dul., Computer Science; Ph.D., Physics), 2007-Present

B. Post-doc and Post-Masters

- Olivera Kotevska, (Ph.D, Computer Science), Oak Ridge National Laboratory, Feb ’19-Mar ’20:
  - Supervisor to Dr. Kotevska on cyberphysical systems-related research projects
- Varisara Tansakul, (M.S., Industrial and Systems Engineering), Oak Ridge National Laboratory, May ’18-Apr’19:
  - Supervisor to Ms. Tansakul on multiple projects
- Maksudul Alam, (Ph.D., Computer Science), Oak Ridge National Laboratory, Dec ’16-present:
  - Supervisor to Dr. Alam on multiple projects
- Alfred Park, (Ph.D., Computer Science), Oak Ridge National Laboratory, Nov ’10-Oct ’12:
  - Supervisor to Dr. Park on multiple projects
- Sudip Seal, (Ph.D., Computer Science and Ph.D., Physics), Oak Ridge National Laboratory, Nov ’07-Nov ’09:
  - Supervisor to Dr. Seal on multiple projects

- Srikanth Yoginath (M.S., Computer Science), Georgia Institute of Technology and Oak Ridge National Laboratory, Jan '07-Jul '14
    - Supervisor to Dr. Yoginath as Group Leader, Project Manager, and Ph.D. Advisor

C. Students

1. Doctoral Thesis Advisor

- Georgia Institute of Technology, Atlanta, GA – On-record thesis advisor for Dr. Yoginath:
    - Srikanth Yoginath, 2007-2014 (currently at Discrete Computing Systems, ORNL)
      Thesis Title: "Virtual Time-Aware Virtual Machine Systems"
      Thesis Committee: K. Perumalla (advisor), R. Fujimoto (co-advisor), U. Ramachandran, D. Bader, G. Riley

2. Doctoral Thesis Committee Member

- University of Rome La-Sapienza, Rome, Italy:
    - Davide Cingolani, 2018
      Thesis title "Speculative Parallel Discrete Event Simulation" (Advisor: Prof. Francesco Quaglia)
- Virginia Polytechnic and State University (Virginia Tech):
    - Maksudul Alam, 2016
      Thesis title "Parallel Generation Techniques for Large Random Graphs" (Advisors: Profs. Maleq Khan and Madhav Marathe)
- Karlsruhe Institute of Technology, Karlsruhe, Germany:
    - Philipp Andelfinger, 2016
      Thesis title "Identifying and Harnessing Concurrency for Parallel and Distributed Network Simulation" (Advisor: Prof. Hannes Hartenstein)
- Georgia Institute of Technology, Atlanta, GA:
    - Dushmanta Mohapatra, 2015
      Thesis title "Coordinated Memory Management in Virtualized Environments" (Advisor: Prof. Kishore Ramachandran)
- EURECOM, Nice, France:
    - Bilel Rodhamme, 2013
      Thesis title "Simulation des Réseaux à grande Échelle sur les architectures de calcules hètèrogénes"
- Georgia Institute of Technology, Atlanta, GA:
    - Alfred J. Park, 2009
      Thesis title "Master-Worker Parallel Discrete Event Simulation" (Advisor: Prof. Richard Fujimoto)

3. Interns

- Oak Ridge National Laboratory – direct supervisor/mentor for student interns:
    - Cora Chanel Richardson (Duke University, Tufts University), Summer 2020 (moved to 2021 due to COVID19), "Quantum Optimization and Reversible Computing applied to Electric Grid Resilience" (**GEM Fellow**)
    - Alejandro Vega Nogales (Indiana University, University of Peurto Rico), Summer 2019, "Machine Learning Techniques applied to Cyber-Physical Systems" (**GEM Fellow**)
    - Aakriti Upadhyay (State University of New York, Albany), Summer 2019, "Efficient Sparse Matrix Computations on Graphical Processing Units"
    - James Fox (Georgia Institute of Technology), Summer 2018, "Community Detection-based Generation of Electric Distribution Network Graphs"
    - Amin Nikakhtar (Texas Tech University), Summer 2018-Fall 2018, on doctoral thesis research proposal titled "Polynomial Optimization for Optimal Power Flow and Assured Generation", competitively selected under the U.S. DOE Office of Science Graduate Student Research Program
    - Till Koester (University of Rostock, Germany), Fall 2016-Spring 2017, "High-Performance Simulations of Cell Biology Models on Modern GPUs"
    - Maksudul Alam (Virginia Tech), Spring 2016, "Computational Support for Cloning Simulations"
    - Zhengchun Liu (U. Barcelona, Spain), Spring 2016, "High Performance Agent-based and Discrete Event Simulations"
    - Maksudul Alam (Virginia Tech), Summer 2015, "Efficient Index Searching on Modern GPUs"
    - Charles Elliott (CJ) Johnson (L&N STEM Academy), Summer 2015, "Message Passing Interface in JavaScript"
    - Masatoshi Hanai (Tokyo Institute of Technology), 2015, "Exact-Differential Simulations" (mentored while at Durham University, UK)
    - Melissa Yu (Farragut High School), Summer 2013, "Memory-Efficient Reversible Algorithms for Integer Square Root Computation"
    - Matthew Street (Middle Tennessee State University), Summer 2010, "Visualizing Rollbacks in Parallel Discrete Event Simulations"
    - Brandon Aaby (Maryville College), Summer 2008, "High Performance Hybrid Computing using Networks of Processors and GPGPUs"
    - Clayton Thurmer (Oberlin University), Spring 2008, "Discrete Event Simulator Benchmarking"
    - Brandon Aaby (Maryville College), Summer 2007, Fall 2007, "Social Science Simulations on GPGPUs"

- Patrick Wilkerson (Austin Peay State University), Summer 2007, "Parallel FDTD as Asynchronous Speculative Execution"
- John Wright (Mercer University), Summer 2007, "Reversibility of Computational Methods"
- Kathleen Abercrombie (Georgia Tech), Summer 2006, "Cut Selection in Sensor Network Optimization"
- Eric Beier (Texas A&M), Summer 2006, "Federated Optimization of Sensor Networks"
- Alfred Park (Georgia Tech), Summer 2006, "Integrated Analysis of Sensor Networks"
- Jason Roop (N. Carolina Central), Summer 2006, "Social Network Simulation using GPGPUs"

4. Other

- Georgia Institute of Technology – Special Topics (CS 8903) students:
  - Sivagowri Swaminathan, Summer 2005, "Incremental Mixed Integer Programming"
  - Ashok Babu Amara, Fall 2004, "Scalable Sensor Network Simulation"
  - Srikanth Sundargopalan, Fall 2003, "High-Fidelity Modeling of Computer Worms"
- Georgia Institute of Technology – Master's thesis committee member:
  - Jagrut Dave, Fall 2004 – Spring 2005
- Georgia Institute of Technology – Supervised or advised six students and graduate research assistants, jointly with Dr. Richard Fujimoto

D. Contest Coaching

- **Programming Team Coach**, Georgia Institute of Technology *1994–2000*
  Coached the programming teams to top places in regional and international **ACM Intercollegiate Programming Contests**. Under my coaching:
  - Coached Georgia Tech to place in **top 5** in southeast region **4 times**.
  - Coached Georgia Tech to participate in **World Finals 3 times**.
- **Programming Team Member**, University of Central Florida 1991-1992
  - Placed **8th** in 1991 in ACM Southeast Regional Contest.
  - Placed **2nd** in 1992 in ACM Southeast Regional Contest.

X. RESEARCH COMMUNITY SERVICE

A. Professional Leadership

- **Program Chair**, International Conference on Cyber Warfare and Security (**ICCWS**), Cookeville, TN, 2020.
- **Judge**, multiple venues over the years; recently on judging panel of doctoral consortium and poster judging teams at the **Tapia Conference** on Diversity in Computing 2018, 2019, 2020.

- **Track Chair**, Scientific Computing track, Winter Simulation Conference (**WSC**), Savannah, GA, 2014.
- **Program Chair**, International Conference on Simulation Tools and Techniques (**SimuTools**), Lison, Portugal, 2014.
- **Program Chair**, International Symposium on Modeling, Analysis and Simulation of Computer and Telecommunication Systems (**MASCOTS**), Washington, DC, 2012.
- **Guest Editor**, Special Issue on Best of PADS'07, SCS Transactions of the Society for Modeling and Simulation International (**SIMULATION journal**), 85(4), 2009.
- **Program Chair**, Symposium on Asynchronous Methods in Scientific and Mathematical Computing (**ASYM**), San Diego, CA, 2007.
- **Program Chair**, International Workshop on Principles of Advanced and Distributed Simulation (**PADS**), San Diego, CA 2007.

B. Organizational Leadership and Service

- **ACM SIGSIM Chair**, elected chair of the Association for Computing Machinery Special Interest Group in Simulation (*www.acm.org/special-interest-groups/sig-governance*) for term starting July 1, 2020.
- **Team Lead, Creativity and Innovation Team**, Oak Ridge National Laboratory, Division-level team to investigate development of creativity and innovation in research and development, August-September 2015.

  Led a team of 9 selected research staff assigned to analyze and make recommendations to top management on increasing scientific creativity and innovation in the Computational Sciences and Engineering division consisting of 150 research staff.
- **Seed Money Review Committee Voting Member**, Oak Ridge National Laboratory Director's Research and Development Funds for Strategic Development, 2006-2007.

  Served on the institutional committee consisting of top scientists appointed by top management to evaluate and make recommendations on proposals from scientists across the entire laboratory for "seed projects" with futuristic scientific potential.

C. Professional Board Membership, Chairing, and Committees

- **Editorial Board Member** (Associate Editor), ACM Transactions on Modeling and Computer Simulation (**TOMACS journal**) 2008-present.
- **Editorial Board Member** (Associate Editor), SCS Transactions of the Society for Modeling and Simulation International (**SIMULATION journal**) 2008-present.
- **Program Committee Member** (partial list – **not up to date**)
  - International Conference on Systems Simulation (**AsiaSim**) 2013, 2014.
  - ACM SIGSIM Conference on Principles of Advanced and Discrete Simulation (**PADS**) 2013.

- IEEE/SCS/ACM International Workshop on Principles of Advanced and Distributed Simulation (**PADS**) continuously from 2003 to 2012.
- International Symposium on Modeling, Analysis and Simulation of Computer and Telecommunication Systems (**MASCOTS**) 2001, 2005, 2010-13.
- International Conference on Algorithms and Architectures for Parallel Processing (**ICA3PP**) 2012.
- International Conference on Distributed Simulation and Real-time Applications (**DS-RT**) 2010-12.
- International Conference on High Performance Computing and Communication (**HPCC**) 2012.
- International Conference on Simulation Tools and Techniques (**SimuTools**) 2010-14.
- International Conference on High Performance Computing, Storage and Networking (**Supercomputing**) 2008.

- **Steering Committee Member**, International Workshop on Principles of Advanced and Distributed Simulation (**PADS**) 2007-2011.

D. Reviewing (Partial List)

Served as reviewer for the several journals and conferences over many years.

List is **not up to date**. The following is a **partial list** to illustrate the technical areas.

- Transactions of the Society for Modeling & Simulation Intl. (**SIMULATION**).
- Journal of Parallel and Distributed Computing (**JPDC**)
- Information Processing Letters (**IPL**)
- Interscience Wiley Journal on Software Practice & Experience (**SP&E**)
- IEEE Journal on Computer Communications (**CC**)
- IEEE Conference on Distributed Simulation & Real-time Applications (**DS-RT**)
- ACM Transactions on Modeling and Computer Simulation (**TOMACS**)
- ACM/IEEE Workshop on Parallel and Distributed Simulation (**PADS**)
- INFORMS Winter Simulation Conference (**WSC**)
- IEEE Transactions on Parallel and Distributed Systems (**TPDS**)
- IEEE Conference on Computer Communications (**INFOCOM**).

XI. PUBLICATIONS

A. H-Index and G-Index

- **H-index**: 31 (Google Scholar, as of September 3, 2020)
- **I10-index**: 64 (Google Scholar, as of September 3, 2020)
- **Citations**: 3311 (Google Scholar, as of September 3, 2020)

B. Books

1. Kalyan Perumalla, "Introduction to Reversible Computing," Computational Science Series, Chapman & Hall/CRC Press, ISBN 978-143-9873-40-3, 325 pages, 2013. *www.crcpress.com/product/isbn/9781439873403*

2. (*Monograph*) Richard Fujimoto, Kalyan Perumalla and George Riley, "Network Simulation," Synthesis Lectures on Communication Networks (Jean Walrand, Editor), Morgan & Claypool Publishers, ISBN 1598291106, 2006. *www.morganclaypool.com/page/lectures/lectureList.jsp*

C. Book Chapters

1. Kalyan Perumalla, "Computational Spectrum of Agent Model Simulation," in *Modelling, Simulation and Optimization*, IN TECH Publishers, ISBN 978-953-7619-36-7, published April 2010.
2. Kalyan Perumalla, "Model Execution," in *CRC Handbook of Dynamic System Modeling* (Paul Fishwick, Editor), ISBN 1584885653, 2007.
3. Homa Karimabadi, Yuri Omelchenko, Jonathan Driscoll, Richard Fujimoto and Kalyan Perumalla, "A New Methodology for Multi-Scale Simulation of Plasmas," in *Lecture Book on Advanced Methods for Space Engineering*, January 2007.

D. Agency Reports

1. National Academies of Science, Engineering and Medicine Panel Report, "The 2017-2018 Assessment of the Army Research Laboratory," May 2018, ISBN 978-0-309-47161-9, *www.nap.edu/25011* (contributor to Computational Sciences).
2. National Academies of Science, Engineering and Medicine Panel Report, "The 2015-2016 Assessment of the Army Research Laboratory," April 2017, ISBN 978-0-309-45436-0, *www.nap.edu/24653* (contributor to Information Sciences).
3. I. Foster, T. Lehman, N. Rao, B. Lyles, I. Monga, P. Balaprakash, K. Perumalla, S. Prowell, R. Vatsavai, "Smart High-Performance Networks: Towards New Generation Intelligent Networking Infrastructure for Distributed Science Environments," U.S. Department of Energy Workshop Report, December 2016 *www.orau.gov/smarthp2016/Final-report.pdf*.
4. "Computational Modeling of Big Networks (COMBINE)," US DOE ASCR Workshop Report (contributor), December 2012 *www.nist.gov/sites/default/files/documents/itl/antd/DoE-Combine-Report.pdf* .

E. Journal Articles

1. Maksudul Alam, Maleq Khan, Kalyan Perumalla and Madhav Marathe, "Generating Massive Scale-Free Networks: Novel Parallel Algorithms using the Preferential Attachment," in ACM Transactions on Parallel Computing, Vol. 7, No. 2, pages 1-35, May 2020.
2. Kalyan Perumalla, "Normality, Magic, Miracle and Error: Emergence Along a Reversibility Spectrum," Insights Journal of the Durham University, Vol. 10, No. 17, December 2019.
3. Masatoshi Hanai, Toyotaro Suzumura, Elvis Liu, Georgios Theodoropoulos and Kalyan Perumalla, "Exact Differential Simulation: Differential Processing of Large-Scale Discrete Event Simulations", ACM Transactions on Modeling and Computer Simulation, Vol. 29, No. 3, pages 1-25, June 2019.

4. Maksudul Alam and Kalyan Perumalla, "Novel Parallel Algorithms for Fast Multi-GPU-based Generation of Massive Scale-free Networks," in Journal of Data Science and Engineering, Vol. 4, pages 61-75, April 2019.
5. Srikanth Yoginath and Kalyan Perumalla, "Scalable Cloning on GPUs with Application to Time Stepped Simulation on Grids", ACM Transactions on Modeling and Computer Simulation, Vol. 28, No. 1, pages 1-25, January 2018.
6. Hunter Vallejos, James Nutaro and Kalyan Perumalla, "An Agent-Based Model of the Exponential-Pareto Distribution," Journal of Economic Interaction and Coordination, Vol. 13, No. 3, pages 641-656, August 2018.
7. S. Dinesh Kumar, Himanshu Thapliyal, Azar Mohammad and Kalyan Perumalla, "Design Exploration of a Symmetric Pass Gate Adiabatic Logic for Energy-Efficient and Secure Hardware", Integration, the VLSI Journal, Vol. 58, pages 369-377, June 2017.
8. Kalyan Perumalla, Olama Mohammed and Srikanth Yoginath, "Model-Based Dynamic Control of Reversible Speculative Forays", Elsevier Electronic Notes in Theoretical Computer Science, Vol. 327, pages 93-107, October 2016.
9. Srikanth Yoginath and Kalyan Perumalla, "Efficient Parallel Discrete Event Simulation on Cloud/Virtual Machine Platforms", ACM Transactions on Modeling and Computer Simulation, Vol. 26, No. 1, pages 5:1-5:26, 2015.
10. Srikanth Yoginath and Kalyan Perumalla, "Virtual Machine-Based Simulation Platform For MANET-Based Cyber Infrastructure", SCS Journal of Defense Modeling and Simulation, Vol. 12, No. 4, pages 439-456, 2015 [**A featured article of the journal**].
11. Kalyan Perumalla and Srikanth Yoginath, "Towards Reversible Linear Algebra Subprograms: A Performance Study", Springer Transactions on Computational Science Special Issue on Reversible Computing, Vol. 24, pages 56-73, 2014.
12. Kalyan Perumalla, Alfred Park and Vinod Tipparaju, "Discrete Event Execution with One-Sided and Two-Sided GVT Algorithms on 216,000 Processor Cores", ACM Transactions on Modeling and Computer Simulation, Vol. 24, No. 3, pages 16:1-16:25, 2014.
13. Kalyan Perumalla and Alfred Park, "Reverse Computation for Rollback-based Fault Tolerance in Large Parallel Systems", Cluster Computing Journal, Vol. 17, No. 2, pages 303-313, 2014.
14. Alfred Park and Kalyan Perumalla, "Efficient Heterogeneous Execution on Large Multicore and Accelerator Platforms: Case Study Using a Block Tridiagonal Solver", Journal of Parallel and Distributed Computing, Vol. 73, No. 12, pages 1578-1591, 2013.
15. Kalyan Perumalla and Vladimir Protopopescu, "Reversible Simulations of Elastic Collisions", ACM Transactions on Modeling and Computer Simulation, Vol. 23, No. 2, pages 12:1-12:25, 2013.
16. Sudip Seal, Kalyan Perumalla and Steven Hirshman, "Revisiting Cyclic Reduction and Parallel Prefix-Based Algorithms for Tri-diagonal Systems of Equations", Journal of Parallel and Distributed Computing, Vol. 73, No. 2, pages 273-280, 2013.
17. Sudip Seal, Kalyan Perumalla and Stephen P. Hirshman, "Scaling the SIESTA Magnetohydrodynamics Equilibrium Code," Concurrency and Computation: Practice and Experience, Vol. 25, No. 15, pages 2207-2223, 2013.

18. Kalyan Perumalla and Sudip Seal, "Discrete Event Modeling and Massively Parallel Execution of Epidemic Outbreak Phenomena," SIMULATION: Special Issue on Parallel and Distributed Simulation, Vol. 88, Issue 7, pages 768-783, 2012.

19. Kalyan Perumalla, Brandon Aaby, Srikanth Yoginath and Sudip Seal, "Interactive, Graphical Processing Unit-based Evaluation of Evacuation Scenarios at State-Scale," SIMULATION: Transactions of the Society for Modeling and Simulation International, Vol. 88, Issue 6, pages 746-761, 2012.

20. Sudip Seal and Kalyan Perumalla, "Reversible Parallel Discrete Event Formulation of a TLM-based Radio Signal Propagation Model", ACM Transactions on Modeling and Computer Simulation (TOMACS), Vol. 22, No. 1, pages 4:1-4:25, 2011.

21. Steven Hirshman, Kalyan Perumalla, Vickie Lynch and Raul Sanchez, "Bcyclic: A Parallel Block Tri-diagonal Matrix Cyclic Solver," Journal of Computational Physics, Volume 229, Issue 18, pages 6392-6404, 2010.

22. Kalyan Perumalla and Srikanth Yoginath, "Reversible Discrete Event Formulation and Optimistic Parallel Execution of Vehicular Traffic Models," International Journal of Simulation and Process Modeling, 2009.

23. Kalyan Perumalla, Richard Fujimoto, Homa Karimabadi, "Efficient Parallel Execution of Event-Driven Electromagnetic Hybrid Models," International Journal for Multi-scale Computational Engineering, Vol. 5(1), 2007.

24. Homa Karimabadi, Yuri Omelchenko, Jonathan Driscoll, Richard Fujimoto and Kalyan Perumalla, "A New Methodology for Multi-scale Simulation of Plasmas," in ISS-7 Lecture Notes on Advanced Methods for Space Simulations, Kyoto, Japan, 2007.

25. Yarong Tang, Kalyan Perumalla, Richard Fujimoto, Homa Karimabadi, Jonathan Driscoll and Yuri Omelchenko, "Optimistic Simulation of Physical Systems using Reverse Computation," SIMULATION: Transactions of the Society for Modeling and Simulation International, Vol. 82, No. 1, pages 61-73, 2006.

26. Homa Karimabadi, Jonathan Driscoll, Jagrut Dave, Yuri Omelchenko, Kalyan Perumalla, Richard Fujimoto and N. Omidi, "Parallel Discrete Event Simulations of Grid-based Models – Asynchronous Electromagnetic Hybrid Code," in Springer Lecture Notes in Computer Science, 2005.

27. George Riley, Mostafa Ammar, Richard Fujimoto, Alfred Park, Kalyan Perumalla and Donghua Xu, "A Federated Approach to Distributed Network Simulation", ACM Transactions on Modeling and Computer Simulation (TOMACS), Vol. 14, No. 2, 2004.

28. Kalyan Perumalla and Richard Fujimoto, "Interactive Parallel Simulations with the JANE Framework", Future Generation Computer Systems, Vol. 17, No. 5, Elsevier Science, 2001.

29. Christopher Carothers, Kalyan Perumalla and Richard Fujimoto, "Efficient Optimistic Parallel Simulations using Reverse Computation," ACM Transactions on Modeling and Computer Simulation (TOMACS), Vol. 9, No. 3, 1999.

30. Sandeep Bhatt, Richard Fujimoto, Andrew Ogielski and Kalyan Perumalla, "Parallel Simulation Techniques for Large-scale Networks," IEEE Communications, Vol. 36, No. 8, 1998.

31. Kalyan Perumalla and Narsingh Deo, "Parallel Algorithms for Maximum Sub-sequence and Sub-array," Parallel Processing Letters, Vol. 5, No. 3, 1995.

F. Invited Articles

1. Kalyan Perumalla, "Concurrent Conversation Modeling and Parallel Simulation of the Naming Game in Social Networks," in Proceedings of Winter Simulation Conference (WSC), Las Vegas, NV, December 2017.
2. Kalyan Perumalla, "Relating the Limits of Computational Reversibility to Emergence," in Proceedings of the 9th International Conference on Reversible Computation (RC), July 2017.
3. Masatoshi Hanai, Toyotaro Suzumura, Georgios Theodoropoulos, and Kalyan Perumalla, "Towards Large-Scale What-If Traffic Simulation with Exact-Differential Simulation," in Proceedings of Winter Simulation Conference (WSC), Huntington Beach, CA, December 2015.
4. Srikanth Yoginath and Kalyan Perumalla, "Design of a High-Fidelity Testing Framework for Electric Grid Control Software," in Proceedings of Winter Simulation Conference (WSC), Savannah, GA, December 2014.
5. Kalyan Perumalla, "Tutorial: Parallel Simulation on Supercomputers," in Proceedings of Winter Simulation Conference (WSC), Berlin, Germany, December 2012.
6. Srikanth Yoginath, Kalyan Perumalla and Brian Henz, "Runtime Performance And Virtual Network Control Alternatives In Vm-Based High-Fidelity Network Simulations," in Proceedings of Winter Simulation Conference (WSC), Berlin, Germany, December 2012.
7. Christopher Carothers and Kalyan Perumalla, "On Deciding between Conservative and Optimistic Approaches on Massively Parallel Platforms," in Proceedings of Winter Simulation Conference (WSC), Washington, D.C., December 2010.
8. Kalyan Perumalla, "Switching to High Gear: Opportunities for Grand-scale Real-Time Simulations," in Proceedings of Distributed Simulations and Real-Time Applications(DS-RT), Singapore, October 2009.
9. Kalyan Perumalla, "Parallel and Distributed Simulation: Traditional Techniques and Recent Advances," in Proceedings of Winter Simulation Conference (WSC), Monterey, California, December 2006.
10. Alfred Park, Kalyan S. Perumalla, Vladimir Protopopescu, Mallikarjun Shankar, Frank DeNap and Bryan Gorman, "On Evaluation Needs of Real-life Sensor Network Deployments," in Proceedings of European Modeling and Simulation Symposium (EMSS), Barcelona, Spain, October 2006.
11. Kalyan Perumalla, "Parallel and Distributed Systems and the High-Level Architecture," Interservice/Industry Training, Simulation and Education Conference (IITSEC), Orlando, Florida, December 2005.
12. Kalyan Perumalla, Matthew Andrews and Sandeep Bhatt, "TeD Models for ATM Internetworks," ACM Performance Evaluation Review, Vol. 25, No. 4, March 1998.
13. Kalyan Perumalla, Andrew Ogielski, Richard Fujimoto, "TeD - A Language for Modeling Telecommunication Networks," ACM Performance Evaluation Review, Vol. 25, No. 4, March 1998.

G. Abstracts with Presentations

1. Kalyan Perumalla and Alan Burwell, "GPU-Accelerated Optimization of Flight Path Planning for Unmanned Aerial Systems," in INFORMS Computing Society Conference, Knoxville, Tennessee, January 2019.
2. Maksudul Alam and Kalyan Perumalla, "Scale-Free Networks: GPU-based Generation and Applications," in INFORMS Computing Society Conference, Knoxville, TN, January 2019.
3. Kalyan Perumalla, Maksudul Alam and Srikanth Yoginath, "EpiClone: Efficient GPU-based Cloning System for Massive What-If Decision Analyses of Epidemic Models," in INFORMS Computing Society Conference, Knoxville, TN, January 2019.
4. Kalyan Perumalla and Jack Wells, "Computational Directions in Energy System Modeling, Simulation and Optimization," in Workshop on Macroeconomic Energy Systems Modeling and Optimization, Prague, Czechoslovakia, September 2016.
5. Srikanth Yoginath and Kalyan Perumalla, "Unique Simulation Test-bed Requirements to Realize Internet of Things (IoT)," in Future of Instrumentation and Internet Workshop, Washington, DC, May 2015.
6. Kalyan Perumalla, "Discrete Event Execution and Reversibility: Challenges in the Path to Asynchrony for Massively Parallel Computing," in SIAM Joint Mathematics Meeting, Boston, Massachusetts, January 2012.
7. Kalyan Perumalla and Christopher Carothers, "Compiler-based Automation Approaches to Reverse Computation," in Workshop on Reverse Computation, Atlanta, Georgia, June 2010.
8. Kalyan Perumalla, "High-Performance Simulations for Capturing Feedback and Fidelity in Complex Networked Systems," in SIAM Conference on Parallel Processing for Scientific Computing (PP10), Seattle, Washington, February 2010.
9. Kalyan Perumalla, Brandon Aaby, Srikanth Yoginath and Sudip Seal, "Towards Highly Interactive, GPU-based Evaluation of Evacuation Transport Scenarios at State-Scale," National Evacuation Conference, February 2010.
10. Kalyan Perumalla, "Cyber Security Experimentation: Gory Detail or None at All?" in SIAM Annual Meeting (AN), Denver, Colorado, July 2009.
11. Kalyan Perumalla, Richard Fujimoto, Santosh Pande, Homa Karimabadi, Jonathan Driscoll and Yuri Omelchenko, "Virtual Simulator: An Infrastructure for Design and Performance-Prediction of Massively Parallel Codes," in American Geophysical Union Fall Meeting (GU), San Francisco, California, December 2005.

H. Abstracts with Posters

1. Slaven Peles, Cosmin Petra, Asher Mancinelli, Maksudul Alam and Kalyan Perumalla, "Porting Optimization Algorithms in HiOp Library for Execution on Hardware Accelerators Using Raja and Umpire Abstractions," SIAM Conference on Computational Science and Engineering, submitted September 2020.
2. Sudip Seal, Steven Hirshman and Kalyan Perumalla, "Scaling Optimization of the SIESTA MHD Code," abstract and poster at the 55th Annual Meeting of the American Physical Society, Division of Plasma Physics, Denver, CO, November 2013.

3. Kalyan Perumalla, "ReveR-SES: Reversible Software for Exascale," abstract and poster at Department of Energy Exascale PI Meeting, Arlington, VA, October 2012.
4. Sudip Seal, Kalyan Perumalla and Steven Hirshman, "Improved Parallelization of the SIESTA Magneto-hydrodynamic Equilibrium Code Using Cyclic Reduction," abstract and poster at the 53rd Annual Meeting of the American Physical Society, Division of Plasma Physics, Salt Lake City, Utah, November 2011.
5. Brandon Aaby and Kalyan Perumalla, "A Case Study of Efficient Social Network Simulation through General Processing on Graphics Processing Units (GPGPUs)," Journal of Undergraduate Research of the Department of Energy, October 2008.
6. Patrick Wilkerson and Kalyan Perumalla, "A Case Study of the Performance of Speculative Asynchronous Simulation on Parallel Computers," Journal of Undergraduate Research of the Department of Energy, October 2008.
7. John Wright and Kalyan Perumalla, "Two Case Studies in Reversibility of Computational Methods," Journal of Undergraduate Research of the Department of Energy, October 2008.

I. Peer-reviewed Conference Papers

1. Kalyan Perumalla, Juan Lopez, Maksudul Alam, Olivera Kotevska, Michael Hempel, and Hamid Sharif, "CYVET: "A Novel Vetting Approach to Cybersecurity Verification in Energy Grid Systems," in Proceedings of the IEEE Kansas Power and Energy Conference (KPEC), Manhattan, KS, July 2020.
2. Kalyan Perumalla, Srikanth Yoginath and Juan Lopez, "Deep CYBERIA: Detecting Sensors and Inferring their Relations at Level-0 in Industrial Cyber-Physical Systems," in Proceedings of the IEEE International Symposium on Technologies for Homeland Security (IEEE HST), Boston, MA, November 2019.
3. Srikanth Yoginath, Maksudul Alam, Kalyan Perumalla, "Energy Conservation Through Cloned Execution of Simulations," in Proceedings of the Winter Simulation Conference (WSC), December 2019.
4. Olivera Kotevska, Kuldeep Kurte, Jefferey Munk, Travis Johnston, Evan McKee, Kalyan Perumalla, and Helia Zandi, "RL-HEMS: Reinforcement Learning-based Home Energy Management System for HVAC Energy Optimization," in Proceedings of the ASHRAE Winter Conference, Orlando, FL, February 2020.
5. Olivera Kotevska, Kalyan Perumalla, and Juan Lopez, "Kensor: Coordinated Intelligence with Co-located Sensors," in Proceedings of the IEEE International Conference on Big Data (BigData), Los Angeles, CA, December 2019.
6. Srikanth Yoginath, Varisara Tansakul, Supriya Chinthavali, Curtis Taylor, Joshua Hambrick, Philip Irminger, Kalyan S. Perumalla, "On the Effectiveness of Recurrent Neural Networks for Live Modeling of Cyber-Physical Systems," in Proceedings of the IEEE International Conference on Industrial Internet (ICII), Orlando, FL, November 2019.
7. Srikanth Yoginath, Maksudul Alam, Aravind Ramanathan, Debsindhu Bhowmik, Nouamane Laanait and Kalyan Perumalla, "Towards Native Execution of Deep Learning on a Leadership-Class HPC System," in Proceedings of the Workshop on Scalable Deep Learning over Parallel and Distributed Infrastructures, International Parallel and Distributed Processing Symposium (IPDPS), May 2019.

8. Juan Lopez, Ryan Kerekes, Kalyan Perumalla, Mark Buckner, "Digital-Twin Development Framework for Quantitative Assessment of Power Grid Cyber-Resilience," in Proceedings of the IEEE SoutheastCon, Orlando, FL, April 2018.
9. Srikanth Yoginath and Kalyan Perumalla, "Efficient Reversible Uniform and Non-Uniform Random Number Generation in UNU.RAN," in Proceedings of the Spring Simulation Multi-Conference (SpringSim), April 2018.
10. Maksudul Alam and Kalyan Perumalla, "GPU-based Parallel Algorithm for Generating Massive Scale-free Networks using the Preferential Attachment Model," in Proceedings of the BigGraphs Workshop at the IEEE BigData Conference (IEEE BigGraphs), December 2017.
11. Till Köster, Kalyan Perumalla, Adelinde M. Uhrmacher, "Efficient Simulation of Nested Hollow Sphere Intersections: for Dynamically Nested Compartmental Models in Cell Biology," in Proceedings of the ACM International Conference on Principles of Advanced Discrete Simulation (SIGSIM-PADS), May 2017.
12. Maksudul Alam, Srikanth Yoginath and Kalyan Perumalla, "Performance of Point and Range Queries for In-Memory Databases using Radix Trees on GPUs," in Proceedings of the International Conference on High Performance Computing and Communication, December 2016.
13. Kalyan Perumalla, Mohammed Olama and Srikanth Yoginath, "Model-based Dynamic Control of Speculative Forays in Parallel Computation," in Proceedings of the International Workshop on Practical Applications of Stochastic Modeling, April 2016.
14. S. Dinesh Kumar, Himanshu Thapliyal, Azhar Mohammad, Vijay Singh, Kalyan Perumalla, "Energy-Efficient and Secure S-Box Circuit Using Symmetric Pass Gate Adiabatic Logic," in Proceedings of the International Symposium on Very Large Scale Integrated Circuits (ISVLSI), 2016.
15. Masatoshi Hanai, Toyotaro Suzumura, Georgios Theodoropoulos, Kalyan Perumalla, "Exact-Differential Large-Scale Traffic Simulation," in Proceedings of the ACM Conference on Principles of Advanced Discrete Simulation (SIGSIM-PADS), June 2015.
16. Kalyan Perumalla and Alfred Park, "Simulating Billion-Task Parallel Programs," in Proceedings of International Symposium on Performance Evaluation of Computer and Telecommunication Systems (SPECTS), Monterey, CA, July 2014 [**Best Paper Award**].
17. Srikanth Yoginath and Kalyan Perumalla, "Empirical Evaluation of PDES Execution on Cloud and Virtual Machine Platforms," in Proceedings of ACM SIGSIM Conference on Principles of Advanced Discrete Simulation (PADS), Montreal, Canada, May 2013.
18. Srikanth Yoginath and Kalyan Perumalla, "Optimized Hypervisor Scheduler for Parallel Discrete Event Simulations on Virtual Machine Platforms," in Proceedings of ICST International Conference on Simulation Tools and Techniques (SimuTools), Cannes, France, March 2013.
19. Srikanth Yoginath, Kalyan Perumalla and Brian Henz, "Taming Wild Horses: The Need for Virtual Time-based Scheduling of VMs in Network Simulations," in Proceedings of International Symposium on Modeling, Analysis and Simulation of Computer and Telecommunication Systems (MASCOTS), Washington, DC, August 2012.

20. Kalyan Perumalla, Alfred Park and Vinod Tipparaju, "GVT Algorithms and Discrete Event Dynamics on 129K+ Processor Cores," in Proceedings of International Conference on High Performance Computing (HiPC), Bangalore, India, December 2011.

21. Kalyan Perumalla and Alfred Park, "Improving Multi-Million Virtual Rank MPI Execution in μπ," in Proceedings of International Symposium on Modeling and Simulation of Computing and Telecommunication Systems (MASCOTS), Singapore, July 2011.

22. Kalyan Perumalla, James Nutaro and Srikanth Yoginath, "Towards High Performance Discrete Event Simulations of Smart Electric Grids," in Proceedings of International Workshop on High Performance Computing, Networking and Analytics for the Power Grid (HiPCNAG), Seattle, Washington, November 2011.

23. Srikanth Yoginath and Kalyan Perumalla, "Efficiently Scheduling Multi-core Guest Virtual Machines on Multi-core Hosts in Network Simulation," in Proceedings of International Workshop on Principles of Advanced and Distributed Simulation (PADS), Nice, France, July 2011. [**Best Paper Finalist**]

24. Christopher Carothers and Kalyan Perumalla, "On Deciding between Conservative and Optimistic Approaches on Massively Parallel Platforms," in Proceedings of Winter Simulation Conference (WSC), Washington, DC, December 2010.

25. Kalyan Perumalla and Sudip Seal, "Reversible Parallel Discrete-Event Execution of Large-scale Epidemic Outbreak Models," in Proceedings of International Workshop on Principles of Advanced and Distributed Simulation (PADS), Atlanta, Georgia, May 2010. [**Best Paper Finalist**]

26. Kalyan Perumalla, "μπ: A Scalable and Transparent System for Simulating MPI Programs," in Proceedings of ICST International Conference on Simulation Tools and Techniques (SimuTools), Malaga, Spain, March 2010.

27. Brandon Aaby, Kalyan Perumalla and Sudip Seal, "Efficient Simulations of Agent-Based Models on Multi-GPU and Multi-Core Clusters," in Proceedings of ICST International Conference on Simulation Tools and Techniques (SimuTools), Malaga, Spain, March 2010. [**Best Paper Finalist**]

28. Sudip Seal and Kalyan Perumalla, "Scalable Parallel Execution of an Event-based Radio Signal Propagation Model for Cluttered 3D Terrains," in Proceedings of International Conference on Parallel Processing, Vienna, Austria, September 2009.

29. Kalyan Perumalla and Jack Schryver, "A Connectionist Modeling Approach to Rapid Analysis of Emergent Social Cognition Properties in Large-Populations," in Proceedings of Human Behavior-Computational Modeling and Interoperability Conference, Oak Ridge, Tennessee, June 2009.

30. Kalyan Perumalla, "Efficient Execution on GPUs of Field-based Vehicular Mobility Models," in Proceedings of International Workshop on Principles of Advanced and Distributed Simulation, Lake Placid, New York, June 2009.

31. Richard Mills, Forrest Hoffman, Patrick Worley, Kalyan Perumalla, Art Mirin, Glenn Hammond and Barry Smith, "Coping at the User-Level with Resource Limitations in the Cray Message Passing Toolkit MPI at Scale: How Not to Spend Your Summer Vacation," in Proceedings of Cray User Group Meeting, Atlanta, Georgia, May 2009.

32. Srikanth Yoginath and Kalyan Perumalla, "Parallel Vehicular Traffic Simulations using Reverse Computation-based Optimistic Execution," in Proceedings of International Workshop on Principles of Advanced and Distributed Simulation, Rome, Italy, June 2008.

33. Kalyan Perumalla and Brandon Aaby, "Data Parallel Execution Challenges and Runtime Performance of Agent Simulations on GPUs," in Proceedings of Spring Computer Simulation Conference, Ottawa, Canada, April 2008. [**Best Paper Award**]

34. Kalyan Perumalla and Martin Beckerman, "An Analysis Approach to Large-Scale Vehicular Network Simulations," in Proceedings of Summer Computer Simulation Conference, San Diego, California, June 2007.

35. Kalyan Perumalla, "Scaling Time Warp-based Discrete Event Execution to 10^4 Processors on a Blue Gene Supercomputer," in Proceedings of ACM Computing Frontiers, Ischia, Italy, May 2007.

36. Kalyan Perumalla, "A Systems Approach to Scalable Transportation Network Modeling," in Proceedings of Winter Simulation Conference (WSC), Monterey, California, December 2006.

37. Kalyan S. Perumalla, "On Accounting for the Interplay of Kinetic and Non-Kinetic Aspects of Population Mobility Models," in Proceedings of European Modeling and Simulation Symposium (EMSS), Barcelona, Spain, October 2006.

38. Kalyan S. Perumalla, "Parallel Execution of Region-Scale Evacuation Traffic Models," in Proceedings of International Workshop on Principles of Advanced and Distributed Simulation, Singapore, May 2006.

39. Kalyan S. Perumalla, "Discrete-Event Execution Alternatives on GPGPUs," in Proceedings of International Workshop on Principles of Advanced and Distributed Simulation, Singapore, May 2006.

40. Kalyan S. Perumalla, Richard M. Fujimoto, Homa Karimabadi, "Scalable Simulation of Electromagnetic Hybrid Codes," in Proceedings of International Conference on Computational Science, Reading, United Kingdom, May 2006.

41. Kalyan S. Perumalla, Richard M. Fujimoto, Prashant Thakare, Santosh Pande, Homa Karimabadi, Yuri Omelchenko, Jonathan Driscoll, "Performance Prediction of Large-scale Parallel Discrete Event Models of Physical Systems," in Proceedings of Winter Simulation Conference, Orlando, Florida, December 2005.

42. Kalyan S. Perumalla, Richard M. Fujimoto, Santosh Pande, Homa Karimabadi, Jonathan Driscoll, Yuri Omelchenko, "Virtual Simulator: An Infrastructure for Design and Performance-Prediction of Massively Parallel Codes," in Proceedings of Eos Transactions, American Geophysical Union, Fall Meeting Supplement, San Francisco, California, December 2005.

43. Homa Karimabadi, Yuri Omelchenko, Jonathan Driscoll, Richard Fujimoto and Kalyan Perumalla, "A New Simulation Technique for Study of Collision-less Shocks: Self Adaptive Simulations," in Proceedings of 4th Annual International Astrophysics Conference (IGPP), Palm Springs, CA, June 2005.

44. Homa Karimabadi, Yuri Omelchenko, Jonathan Driscoll, Richard Fujimoto and Kalyan Perumalla, "A New Methodology for Multi-scale Simulation of Plasmas," in Proceedings of 7th International Symposium for Space Simulations (ISSS), Kyoto, Japan, March 2005.

45. Yarong Tang, Kalyan Perumalla, Richard Fujimoto, Homa Karimabadi, Jonathan Driscoll and Yuri Omelchenko, "Optimistic Parallel Discrete Event Simulations of Physical Systems using Reverse Computation," in Proceedings of ACM/IEEE/SCS Workshop on Parallel and Distributed Simulation (PADS), Monterey, CA, May 2005. [**Best Paper Award**]

46. Kalyan Perumalla, "μsik – A Micro-kernel for Parallel/Distributed Simulation Systems," in Proceedings of ACM/IEEE/SCS Workshop on Parallel and Distributed Simulation (PADS), Monterey, CA, May 2005.

47. Kalyan Perumalla and Srikanth Sundaragopalan, "High Fidelity Modeling of Computer Network Worms," in Proceedings of Annual Computer Security Applications Conference (ACSAC), Tucson, AZ, December 2004.

48. Homa Karimabadi, Yuri Omelchenko, Jonathan Driscoll, N. Omidi, Richard Fujimoto and Kalyan Perumalla, "A New Approach to Modeling Physical Systems: Discrete Event Simulations of Grid-based Models," in Proceedings of Workshop on State-Of-The-Art in Scientific Computing (PARA), June 2004.

49. Alfred Park, Richard Fujimoto and Kalyan Perumalla, "Conservative Synchronization of Large-scale Network Simulations," in Proceedings of ACM/IEEE/SCS Workshop on Parallel and Distributed Simulation (PADS), Austria, June 2004.

50. Richard Fujimoto, Kalyan Perumalla, Alfred Park, Hao Wu, Mostafa Ammar, and George Riley, "Large-Scale Network Simulation – How Big? How Fast?" in Proceedings of IEEE/ACM International Symposium on Modeling, Analysis and Simulation of Computer Telecommunication Systems (MASCOTS), October 2003.

51. Weidong Shi, Kalyan Perumalla and Richard Fujimoto, "Power-aware State Dissemination in Mobile Distributed Virtual Environments," in Proceedings of ACM/IEEE/SCS Workshop on Parallel and Distributed Simulation (PADS), San Diego, California, June 2003.

52. Kalyan Perumalla, Alfred Park, Richard Fujimoto and George Riley, "Scalable RTI-based Parallel Simulation of Networks," in Proceedings of ACM/IEEE/SCS Workshop on Parallel and Distributed Simulation (PADS), San Diego, California, June 2003.

53. Kalyan Perumalla, and Richard Fujimoto, "Using Reverse Circuit Execution for Efficient Parallel Simulation of Logic Circuits," in Proceedings of The International Society for Optical Engineering (SPIE) Annual Meeting, Seattle, Washington, July 2002.

54. Kalyan Perumalla, Richard Fujimoto, Thom McLean and George Riley, "Experiences Applying Parallel and Interoperable Network Simulation Techniques in On-line Simulations of Military Networks," in Proceedings of ACM/IEEE/SCS Workshop on Parallel and Distributed Simulation (PADS), Washington, D.C., May 2002.

55. Steve Ferenci, Richard Fujimoto, Mostafa Ammar, Kalyan Perumalla and George Riley, "Updateable Simulations," in Proceedings of ACM/IEEE/SCS Workshop on Parallel and Distributed Simulation (PADS), Washington, D.C., May 2002. [**Best Paper Award**]

56. Kalyan Perumalla, "Web Services for Extensible Modeling and Simulation," in Proceedings of Workshop on Extensible Modeling and Simulation Framework (XMSF), Monterey, California, August 2002.

57. Kalyan Perumalla and Richard Fujimoto, "Virtual Time Synchronization over Unreliable Network Transport," in Proceedings of ACM/IEEE/SCS Workshop on Parallel and Distributed Simulation (PADS), Lake Arrowhead, California, May 2001.

58. George Riley, Mostafa Ammar, Richard Fujimoto, Donghua Xu and Kalyan Perumalla, "Distributed Network Simulations using the Dynamic Simulation Backplane," in Proceedings of the International Conference on Distributed Computing Systems, April 2001 (ICDCS), April 2001.

59. Richard Fujimoto, Thom McLean, Kalyan Perumalla and Ivan Tacic, "Design of High-performance RTI software," in Proceedings of Distributed Simulations and Real-time Applications (DS-RT), August 2000.

60. Steve Ferenci, Kalyan Perumalla and Richard Fujimoto, "An Approach to Federating Parallel Simulators," in Proceedings of ACM/IEEE/SCS Workshop on Parallel and Distributed Simulation (PADS), Bologna, Italy, May 2000.

61. Christopher Carothers, Kalyan Perumalla and Richard Fujimoto, "The Effect of State Saving in Optimistic Simulation on a Cache-coherent Non-uniform Memory Access (CC-NUMA) Architecture," in Proceedings of the Winter Simulation Conference, December 1999.

62. Christopher Carothers, Kalyan Perumalla and Richard Fujimoto, "Efficient Optimistic Parallel Simulation using Reverse Computation," in Proceedings of ACM/IEEE/SCS Workshop on Parallel and Distributed Simulation (PADS), Atlanta, Georgia, May 1999. **[Best Paper Award]**

63. Jeff Linderoth, Kalyan Perumalla and Martin Savelsbergh, "PARINO: A Parallel Branch and Cut Code," in Proceedings of INFORMS National Meeting, Cincinnati, Ohio, May 1999.

64. Kalyan Perumalla and Richard Fujimoto, "Efficient Large-scale Process-oriented Parallel Simulations", in Proceedings of the Winter Simulation Conference, December 1998.

65. Ioannis Nikolaidis, Anthony Cooper, Kalyan Perumalla and Richard Fujimoto, "Time Parallel Generation of Self-similar ATM Traffic," in Proceedings of the Winter Simulation Conference, December 1997.

66. Kalyan Perumalla, Matthew Andrews and Sandeep Bhatt, "A Virtual PNNI Network Testbed," in Proceedings of the Winter Simulation Conference, December 1997.

67. Martin Savelsbergh, Kalyan Perumalla, Jeff Linderoth, Umakishore Ramachandran, "PARINO, A Parallel Integer Optimizer", in Proceedings of International Symposium on Mathematical Programming, August 1997.

68. Kalyan Perumalla, Anthony Cooper, Richard Fujimoto, "An Efficiency Prediction Method for ATM Multiplexer," in Proceedings of Broadband Communications, April 1996.

69. Ivan Yanasak, Gautam Shah, Kalyan Perumalla, et al, "Parallelizing Sequential Algorithms for the Generalized Assignment Problem," DIMACS Challenge of Parallel Computing, Rutgers University, October 1994.

70. Kalyan Perumalla and Narsingh Deo, "Parallel Algorithms for Maximum Sub-sequence and Sub-array," in Proceedings of International Conference on Combinatorics, Graph Theory and Computing, West Palm Beach, April 1994.

71. Sridhar Hannenhalli, Kalyan Perumalla and Narayan Chandrasekharan, "A Distributed Algorithm for Ear Decomposition," in Proceedings of International Conference on Computing and Information (ICCI), 1993.

72. Uday Vemulapati and Kalyan Perumalla, "A Debugging Environment for PVM," Distributed Computing for Aeroscience Applications, October 1993.

73. Clark Karr, Robert Franceschini and Kalyan Perumalla, "Integrating Aggregate and Vehicle Level Simulations," in Proceedings of the 3rd Conference on Computer Generated Forces and Behavioral Representation, March 1993.

74. Clark Karr, Robert Franceschini and Kalyan Perumalla, "Integrating Battlefield Simulations of Different Granularity," in Proceedings of the Southeastern Simulation Conference, 1992.

J. Technical Reports

1. Maksudul Alam and Kalyan Perumalla, "Rapid Generation of Scale-Free Graph Networks with Trillions of Edges using 1008 GPUs," ORNL Technical Memorandum, ORNL/TM-2020/1725, September 2020.

2. Pablo Moriano and Kalyan Perumalla, "On the Robustness of Network Community Structure under Addition of Edges," ORNL Technical Memorandum, ORNL/TM-2020/1696, September 2020.

3. Maksudul Alam, and Kalyan Perumalla, "Generating Billion-Edge Scale-Free Networks in Seconds: Performance Study of a Novel GPU-based Preferential Attachment Model," Technical Report ORNL/TM-2017/486, Oak Ridge National Laboratory, October 2017.

4. Kalyan Perumalla, "Computing a Non-Trivial Lower Bound on the Joint Entropy of Two Images," Technical Report ORNL/TM-2017/85, Oak Ridge National Laboratory, March 2017.

5. Kalyan Perumalla, Maksudul Alam, and Devin White, "Computational Speed and Matching Quality using an Upper Bound on the Normalized Mutual Information (NMI) between Two Images," Technical Report ORNL/TM-2017/87, Oak Ridge National Laboratory, May 2017.

6. Maksudul Alam, and Kalyan Perumalla, "GPU-based Parallel Algorithms for Generating Massive Scale-Free Networks using Preferential Attachment Model," Technical Report ORNL/TM-2017/100, Oak Ridge National Laboratory, September 2017.

7. Srikanth Yoginath and Kalyan Perumalla, "Reversible Non-Uniform Random Number Generator," Technical Report ORNL/TM-2015/335, Oak Ridge National Laboratory, September 2015.

8. Kalyan Perumalla and Vladimir Protopopescu, "Reversible Simulations of Elastic Collisions," Cornell University Library arXiv:1302.1126 [physics.comp-ph], *http://arxiv.org/abs/1302.1126*, February 2013.

9. Srikanth Yoginath, Kalyan Perumalla, Paul Williams and Richard Bass, "An Incremental Parallelization Approach Applied to the ORNL/NRC FAVOR Code," Technical Report ORNL/TM-2010/176, Oak Ridge National Laboratory, September 2010.

10. Sudip K. Seal and Kalyan Perumalla, "Scalable Parallel Execution of an Event-based Radio Signal Propagation Model for Cluttered 3D Terrains," Technical Report ORNL-2009/165, Oak Ridge National Laboratory, September 2009.

11. Kalyan Perumalla, John Wright and Phani Kuruganti, "On the Reversibility of Newton-Raphson Root-Finding Method," Technical Report ORNL-2007/152, Oak Ridge National Laboratory, July 2008.
12. Alfred Park and Kalyan Perumalla, "Integrated Analysis of Environment-Driven Operational Effects in Sensor Networks," Technical Report, Oak Ridge National Laboratory, August 2006.
13. Kalyan Perumalla, "Generating Perfect Reversals of Simple Linear Codes," Technical Report GIT-CERCS-TR-03-04, Center for Experimental Research in Computing Systems, Georgia Institute of Technology, May 2003.
14. Kalyan Perumalla, "Techniques for Improving Accuracy and Usability in Large-scale Network Emulation," Technical Report GIT-CC-03-04, College of Computing, Georgia Institute of Technology, January 2003.
15. Richard Fujimoto, Kalyan Perumalla and Liang Xiao, Giorgio Casinovi, Madhavan Swaminathan, Siddharth Dalmia, J. Mao, "Parallel Simulation Backplanes for Mixed Signal Circuit Design," Yamacraw Research Report, Georgia Institute of Technology, IAB-10-2000, October 2000.
16. Kalyan Perumalla and Richard Fujimoto, "Source Code Transformations for Efficient Reversibility," Technical Report GIT-CC-99-21, College of Computing, Georgia Institute of Technology, September 1999.
17. Kalyan Perumalla, Martin Savelsbergh and Umakishore Ramachandran, "PARINO: An Extensible Framework for Solving Mixed Integer Programs in Parallel," Technical Report GIT-CC-97-07, College of Computing, Georgia Institute of Technology, March 1997.
18. Kalyan Perumalla and Richard Fujimoto, "GTW++ -- An Object Oriented Interface in C++ to the Georgia Tech Time Warp System," Technical Report GIT-CC-96-09, College of Computing, Georgia Institute of Technology, March 1996.
19. Kalyan Perumalla, Richard Fujimoto and Andrew Ogielski, "MetaTeD – A Meta Language for Modeling Telecommunication Networks," Technical Report GIT-CC-96-32, College of Computing, Georgia Institute of Technology, December 1996.
20. Kalyan Perumalla and Richard Fujimoto, "A C++ Instance of TeD," Technical Report GIT-CC-96-33, College of Computing, Georgia Institute of Technology, December 1996.
21. C. Anthony Cooper and Kalyan Perumalla, "A Performance Prediction Method for ATM Multiplexers," Technical Memorandum TM-25152, Bell Communications Research (Bellcore), August 1995.

K. White Papers and Position Papers

1. Kalyan Perumalla, "Next in Reversible Computing: Breaking the Memory-Computation Asymmetry," Physics and Engineering Issues in Adiabatic/Reversible Classical Computing, October 2020.
2. Kalyan Perumalla, "Empowered Extreme Science Forward," Department of Energy Future of Science Workshop, April 2020.

L. Drafts in Preparation

1. Kalyan Perumalla, Viveck Cadambe and Arthur Maccabe, "Opportunities and Challenges in Information Theoretical Research in Emerging Applications," Technical Memorandum, Oak Ridge National Laboratory, ORNL/TM-2019/1383.
2. With Kimia Ameri et al, "Smart Accumulation of Large Repositories of Cyber-physical Device Information," International Conference on Cyber Warfare and Security.
3. With Borges Hink et al, "A Digital Twin Framework for Testing, Evaluation and Deployment of Resilient Cyberphysical Ssytems," IEEE Access Journal.
4. Srikanth Yoginath, Maksudul Alam, Aravind Ramanathan and Kalyan Perumalla, "DeepEx: Scalable Variational Autoencoders Performance Studies," Technical Memorandum, Oak Ridge National Laboratory
5. Mark Buckner, Juan Lopez, Ryan Kerekes, et al, "Experiences and Insights in Applying Scrum for Research," Software Engineering.
6. With Doug Kothe et al, "Exascale Applications: Opportunities, Challenges, Requirements," Technical Memorandum, Oak Ridge National Laboratory.
7. Kalyan Perumalla and Christopher Johnson, "Message Passing Interface over JavaScript with nodejs" Technical Memorandum, Oak Ridge National Laboratory.

XII. TECHNICAL TALKS

A. Tutorials

1. "Reversible Programming Paradigms and Models," Tutorial, International Conference on Reversible Computation (RC), Kolkata, India, July 2017.
2. "Parallel Discrete Event Simulation," Tutorial, International Conference on High Performance Computing and Simulation (HPCS), Bologna, Italy, July 2014.
3. "Introduction to Reversible Computing," Tutorial, International Conference on High Performance Computing and Simulation (HPCS), Bologna, Italy, July 2014.
4. "Parallel Discrete Event Simulation using Supercomputers, Cloud/VMs, and Accelerators," Tutorial, ACM SIGSIM Principles of Advanced Discrete Simulation (PADS), Denver, CO, May 2014.
5. "Parallel Simulation on Supercomputers," Tutorial, Winter Simulation Conference (WSC), Berlin, Germany, December 2012.
6. "Introduction to Simulation on GPUs," Tutorial, IEEE/ACM International Symposium on Distributed Simulations and Real-time Applications (DS-RT), Singapore, October 2009.
7. "Agent-based Simulations using GPUs," Tutorial, IEEE/ACM/SCS Principles of Advanced and Distributed Simulation (PADS), Lake Placid, NY, June 2009.
8. "Handling Time Management under the HLA," Tutorial, Interservice/Industry Training, Simulation and Education Conference (I/ITSEC), Orlando, Florida, December 2007.

9. "Parallel and Distributed Simulation: Traditional Techniques and Recent Advances," Tutorial, IEEE/ACM/SCS Principles of Advanced and Distributed Simulation (PADS), San Diego, California, June 2007.
10. "Parallel and Distributed Simulation: Traditional Techniques and Recent Advances," Tutorial, Winter Simulation Conference (WSC), Monterey, California, December 2006.
11. "Handling Time Management under the HLA," Tutorial, Interservice/Industry Training, Simulation and Education Conference (I/ITSEC), Orlando, Florida, December 2006.
12. "Distributed Simulation Systems & the High Level Architecture (HLA)," Tutorial, Interservice/Industry Training, Simulation and Education Conference (I/ITSEC), Orlando, Florida, December 2005.
13. "Distributed Simulation Systems & the High Level Architecture (HLA)," Tutorial, Interservice/Industry Training, Simulation and Education Conference (I/ITSEC), Orlando, Florida, December 2004. [*Presented to over 115 attendees from industry, government & military*].
14. "The High Level Architecture for Simulation," Tutorial, ACM/IEEE/SCS Workshop on Parallel and Distributed Simulation, Atlanta, Georgia, May 1999 (co-presented with R. Fujimoto, K. Morse and R. Weatherly).

B. Distinguished/Public Lectures and Keynotes

- "Relating the Limits of Computational Reversibility to Emergence," Invited Keynote Talk, 9th International Conference on Reversible Computation (RC), www.reversible-computation.org, Kolkata, India, July 2017.
- "Effective Exascale Computing using Computational Cloning," Distinguished Lecture Series Talk, Michigan Technological University, MI, April 2017.
- "Theoretical and Practical Relations between Low Energy Computation and Reversible Computing Software," Invited Keynote Talk, IEEE International Symposium on Nanoelectronic Information Systems (IEEE-iNIS), www.ieee-inis.org, India, December 2016.
- "From Desktops to Supercomputers: The Wide Computational Spectrum in Simulating Emergence," Invited Public Lecture, Durham University, Durham, UK, March 2015.
- "Reversible Computing Software for Large-scale Parallel Execution," Distinguished Lecture, Florida International University, Miami, FL, November 2013.
- "Switching to High Gear: Opportunities for Grand-scale Real-time Parallel Simulations," Invited Keynote at the IEEE/ACM Distributed Simulations and Real-time Applications (DS-RT), Singapore, October 2009.

C. Invited Talks and Seminars

- Invited participation at the Dagstuhl Seminar "Computer Science Methods for Effective and Sustainable Simulation Studies," Schloss Dagstuhl – Leibniz Center for Informatics, Dagstuhl, Germany, *www.dagstuhl.de/20461*, November 2020.
- "Towards Enabling GPU-Accelerated Massively Parallel Mixed Integer Programming," Department of Industrial and Systems Engineering, University of Tennessee, Knoxville, TN, November 2018.

- "On Enabling and Exploiting Reversibility in Large-scale High-Performance Computing," Innovative Computing Laboratory, University of Tennessee, Knoxville, TN, December 2015.
- "Reversible Software Execution Systems," DOE Advanced Scientific Computing Research Advisory Board, Washington, DC, December 2015.
- "Intersections of Emergence with Reversibility and Simulation," Institute of Advanced Study, Durham University, Durham, UK, February 2015.
- "Computational Challenges in the Design of Secure Smart Electric Grids of the Future," Durham University, Durham, UK, February 2015.
- "Reversible Computing: Revisiting and Revising Certain Critical Assumptions in Serial and Parallel Computing," University of Kentucky, Lexington, Kentucky, December 2014.
- "ReveR-SES: Reversible Software Execution Systems," (plenary) DOE Exascale Computing PI Meeting, Washington, DC, October 2012.
- "ReveR-SES: Reversible Software Execution Systems," DOE Advanced Scientific Computing Research Advisory Board, Washington, DC, November 2011.
- "Supercomputing Applications of the other Kind: Real-time Parallel Discrete Event Simulations of Large, Smart Infrastructures," IBM T.J.Watson Research Center, York Town, New York, July 2010.
- "High Performance Computing-based Experimentation for Cyber Infrastructure and Security," Lawrence Livermore National Laboratory, Livermore, California, July 2008.
- "Feasibility, Efficiency and Limits of Compiler-based Automation for Reversibility of Codes," Lawrence Livermore National Laboratory, Livermore, California, July 2008.
- "Application-Level Asynchronous Speculative Execution," IBM T.J.Watson Research Center, York Town, New York, September 2007.
- "Computational Tools for Efficient Large-scale Discrete-Event Models," Oak Ridge National Laboratory, Oak Ridge, Tennessee, May 2005.
- "Computational Methods for Efficient Large-scale System Models," Indiana University Purdue University, Indianapolis, Indiana, March 2005.
- "Achieving Interoperability and Scalability in Simulation of Networks," University of Louisville, Louisville, Kentucky, February 2003.
- "Using Reverse Computation towards Efficient Parallel/Distributed Computation," Bell Labs, Lucent Technologies, Murray Hill, New Jersey, May 2000.
- "Using Reverse Computation towards Efficient Parallel/Distributed Computation," IBM T. J. Watson Research Center, York Town, New York, April 2000.
- "Using Reverse Computation towards Efficient Parallel/Distributed Computation," Purdue University, Lafayette, Indiana, April 2000.
- "Using Reverse Computation towards Efficient Parallel/Distributed Computation," University of Arizona, Tucson, Arizona, April 2000.

- "Using Reverse Computation towards Efficient Parallel/Distributed Computation," University of Central Florida, Orlando, Florida, April 2000.
- "Towards Reusable Modeling and Parallel Simulation of Telecommunication Networks," Bell Labs, Lucent Technologies, Murray Hill, New Jersey, February 1998.
- "Reusable Modeling and Parallel Simulation of Networks using the TeD Language," WINLAB, Rutgers University, Piscataway, New Jersey, January 1997.

XIII. OTHER DATA

A. Citizenship and Security Clearance

- **Citizenship**: USA
- **Clearance**: DOE Q (Top Secret) Clearance (active, 2014-present)

B. Erdős Number

- Three (3) – in two ways:
  Paul Erdős » (*Frank Harrary* » *Narsingh Deo*) | (*Fan Chung* » *Sandeep Bhatt*)) » *Kalyan Perumalla*

C. Personal

- Wife Vijaya (married for 25 years)
- Two sons (22 and 20 years old).

D. Contact Information

- Work: Oak Ridge National Laboratory, PO Box 2008 MS-6015, Oak Ridge, TN 37831-6015 Phone: (865) 241-1315 Email: perumallaks@ornl.gov
- Personal: Mobile: (865) 776-8542 Email: kalyan.s.perumalla@gmail.com

E. Online Profiles

- Personal Site: *kalper.net/kp*
- ORNL Profile: *www.ornl.gov/staff-profile/kalyan-s-perumalla*
- CSMD Profile: *csmd.ornl.gov/profile/kalyan-perumalla*
- LinkedIn Profile: *www.linkedin.com/in/kalyan-perumalla-0b61114*
- ACM Profile: *dl.acm.org/profile/81100589429*
- ORCID Profile: *orcid.org/0000-0002-7458-0832*
- Google Scholar Profile: *scholar.google.com/citations?user=_bKPZs4AAAAJ*
- DBLP Profile: *dblp.org/pers/p/Perumalla:Kalyan_S=*
- ResearchGate: *www.researchgate.net/scientific-contributions/7764131_Kalyan_S_Perumalla*
- GitHub: *github.com/perumallaks*