
Mail: Iowa State University
Department of Computer Science
226 Atanasoff Hall
2434 Osborn Drive
Ames, IA 50011-1040, USA

Office: 226 Atanasoff Hall
Tel: 515-294-4377
Fax: 515-294-0258
E-mail: ciardo@iastate.edu

RESEARCH INTERESTS

- Formal aspects of software engineering, in particular symbolic model-checking algorithms [J23] [J24] [J26] [J30] [J35] [J43] [P74] [P77] [P79] [P88] [P89] [P95] [P100] [P101] [P102] [P104] [P106] [P113] [P114] [P115] [P122] [C134] and testing [P117], as well as their parallel and distributed implementation [P98] [P103] [P107] [P108]
- Decision-diagram-based data structures and algorithms for logic [J40] [P82] [P85] [P87] [P111] [P112] [P116] [P124] and Markovian [P120] analysis
- Load balance and performance analysis of Web servers [J18] [J22] [P80] [P81] [P83] [P86] [P94] [P125] [P128] [M160]
- Distributed algorithms [J12] [J13] [J33] [P96], compositional techniques [J17] [P66] [P67] [P91] [P92] [M152] [M164], and approximation approaches [J34] [J28] [J29] [P78] for the logic and stochastic analysis of large models, including those with discrete-time and general distributions [J10] [J11] [J15] [P62] [P73] [P84] [P93] [P123]
- Performance, dependability, and safety evaluation of fault-tolerant and distributed computer systems [J9] [P61] [P63] [P64] [P72] [P105] [P109] [C131] [M150], particularly concurrent software [J6] and avionics applications [P97] [C136]
- Specification formalisms and solution algorithms for modeling tools [J25] [P121] [P49] [P65] [P69] [P75] [P90] [C133] [M153] [M156] [M161] [M162], particularly Petri nets [J38], [J36], [P60] [B140], stochastic Petri nets [J5] [J14] [P55] [P56] [P70] [P68] [C130] [C132] [B137] [B139], timed Petri nets [P110] [P127], and unbounded repetitive Markov models [J16] [J19] [J20] [J21] [P71] [P76]
- Bioinformatics algorithms for genome assembly [J37] [J39] [J41] [J44] [P118] [P119] [P126]

EDUCATION

April 1989 PhD, Duke University, Durham, NC, Department of Computer Science

Thesis: “Analysis of Large Stochastic Petri Net Models” [M145]. Advisor: Dr. Kishor S. Trivedi

July 1982 Laurea *summa cum laude*, Università di Torino, Italy, Dipartimento di Informatica

Thesis: “Le Reti di Petri Stocastiche Generalizzate: uno strumento per la modellizzazione di sistemi distribuiti” [P48] [M144]. Advisor: Dr. Gianfranco Balbo

ACADEMIC POSITIONS

January 2014–present Professor and Chair, Department of Computer Science, Iowa State University

January 2014–present Adjunct Professor, Department of Computer Science and Engineering, University of California at Riverside

July 2003–December 2013 Professor, Department of Computer Science and Engineering, University of California at Riverside

April 2007 On leave, Visiting Professor, Laboratoire d'Informatique de Paris 6, Paris, France
Worked on symbolic computation of linear Petri net invariants [P112]

January 2004–June 2006 Affiliated Professor, Department of Computer Science, The College of William and Mary, Williamsburg, VA

July 2002–December 2003 Professor, Department of Computer Science, The College of William and Mary, Williamsburg, VA

July 1997–June 2002 Associate Professor, Department of Computer Science, The College of William and Mary, Williamsburg, VA

August 1992–June 1997 Assistant Professor, Department of Computer Science, The College of William and Mary, Williamsburg, VA

October 1999–December 1999 and May 2000 On leave, Visiting Professor at the Università di Torino, Italy
Worked on approximate Markov modeling techniques based on structured state spaces [P78].

August 1992–December 1992 On leave, Visiting Professor at the Institut für Technische Informatik, Technische Universität Berlin, Federal Republic of Germany
Worked on extensions of the Deterministic and Stochastic Petri Net formalism, involving mixtures of exponential and discrete distributions [P58] [P59] and its modeling applications [P57]

OTHER POSITIONS

January 2000–April 2000 Visiting faculty, HP Labs, Palo Alto, CA
Worked on Web traffic models [P81] [P83].

July 1993–August 2000 Consultant, Institute for Computer Applications in Science and Engineering (ICASE), NASA Langley Research Center, Hampton, VA
Worked on reliability and performance models and solution techniques [J17] [M152], non-exponential timing [J11] [P62] [P65] [P70], and distributed approaches [J12] [J13]

Summer 1994 Consultant, HP Labs, Palo Alto, CA
Worked on approximate modeling of communication switches [P64]

September 1988–July 1992 Member Technical Staff, Software Productivity Consortium, Herndon, VA
Responsibilities in this research consortium sponsored by major aerospace and defense companies included research in modeling and technical direction for the specification and design of a hierarchical, hybrid stochastic modeling environment for software and system analysis.

August 1984–August 1988 Research Assistant, Duke University
Primary interests: stochastic processes [J3] [J4], Petri nets [P52], stochastic modeling [P50], performability and logic analysis of systems [J2], and parallel architectures.

June–August 1986 and June–August 1987 Summer internships at IBM T. J. Watson Research Center, Yorktown Heights, NY, supervised by Dr. S. Lavenberg

September 1982–July 1984 Researcher, Database Division, CSELT Research Center, Torino, Italy
Performed research on database interfaces and mappings. Developed a relational interface for CODASYL [J1] [P45] [P46] [P47] [C129].

HONORS AND AWARDS

Invited speaker at SEMISH, 39th Seminar on Hardware and Software, Curitiba, Brazil, July 2012 [M168]

Keynote speaker at PDMC 2009, Parallel and Distributed Methods in verification, Eindhoven, The Netherlands, November 2009 [J32]

Microsoft Research Cambridge Award for a Paper Co-Authored by a Student at TACAS 2007, to my PhD student Andy Jinqing Yu, for the joint paper [P104]

Keynote speaker at EPEW/WS-FM 2005, joint 2nd European Performance Engineering Workshop and 2nd International Workshop on Web Services and Formal Methods, Versailles, France, September 2005 [P99]

Keynote speaker at ATPN 2004, 25th International Conference on Application and Theory of Petri Nets, Bologna, Italy, June 2004 [P95]

Department of Computer Science Nominee for the William and Mary Margaret Hamilton Professorship, Spring 2003, a university-wide three-year non-renewable term professorship

Keynote speaker at PNPM 2001, joint Petri Nets and Performance Models, Process Algebra and Performance Models, and Probabilistic Methods in Verification Multiconference, Aachen, Germany, September 2001 [P85]

Thirteen conference articles [P51] [P54] [P59] [P68] [P73] [P88] [P90] [P97] [P104] [P108] [P114] [P116] [P122] invited by the conference organizers for publication in extended version in special issues of *IEEE Transactions on Software Engineering* [J2] [J8] [J14], *Performance Evaluation* [J7] [J15] [J25], *Software Tools for Technology Transfer* [J24] [J27] [J30], *Journal of Logic and Computation* [J33], *Innovations in Systems and Software Engineering* [J35], *International Journal of Foundations of Computer Science* [J40], and *Transactions on Petri Nets and Other Models of Concurrency* [J43]

IBM Graduate Fellowship, academic years 1985–86 and 1986–87

PATENTS

United States Patent 6,546,473 “Method for cache replacement of web documents”, April 8, 2003. Inventors: Ludmila Cherkasova and Gianfranco Ciardo. Assignee: Hewlett-Packard Company (Palo Alto, CA).

JOURNAL EDITORSHIPS

2016 Guest Editor: special issue from the 2014 Petri Nets Conference, *Fundamenta Informaticae*

January 2007–present Member Editorial Board, *Trans. Petri Nets and Other Models of Concurrency*, Springer (<http://www.springer.com/east/home/computer/lncs?SGWID=5-164-6-417809-0>)

January 2001–January 2005 Associate Editor, *IEEE Transactions on Software Engineering* [M163]

September 1996 Guest Editor: special issue on stochastic Petri nets, *IEEE Transactions on Software Engineering* [M154]

STEERING COMMITTEE MEMBERSHIPS

2007–present Petri Nets (PN) <http://www.informatik.uni-hamburg.de/TGI/PetriNets/>

2006–2011 Quantitative Evaluation of Systems (QEST) <http://www.qest.org>

GRANTS

January 2017–December 2019 Co-PI (A. Miner PI), “SI2-SSE: A Next-Generation Decision Diagram Library”, National Science Foundation ACI-1642397, \$498,672

November 2016–April 2017 Co-PI (S. Basu Co-PI, A. Miner PI), “Midwest Verification Day 2016”, National Science Foundation CCF-1707092, \$9,994 (participant support grant)

March 2010–February 2016 PI (S. Basu Co-PI, A. Miner Co-PI), “Advanced decision procedures for words, trees and lists”, National Science Foundation CCF-0954132, \$397,478 (transfer of PI)

January 2013–June 2014 Co-PI (G. Luetzgen PI, University of Bamberg, Germany), “Improving symbolic software verification via machine learning”, BaCaTeC – Bavaria California Technology Center, \$5,200 (travel grant)

July 2011–July 2014 Co-PI (A. Nikora PI, Jet Propulsion Lab, K. Trivedi Co-PI, Duke University), “Dependability quantification and assurance of mission-critical software systems”, NASA (UCR has a subcontract from Jet Propulsion Lab), \$510,000 (UCR portion: \$173,644)

August 2010–July 2013 PI, “A hierarchical symbolic framework to verify logic, timing, and probabilistic properties of computing systems”, National Science Foundation CCF-1018057, \$400,000 (transferred to Iowa State University as CCF-1442586, with an end date of July 31, 2016)

September 2009–January 2011 PI (X. Li Co-PI, CINVESTAV-IPN, Mexico), “Verification of active rule bases using timed Petri nets”, UC-MEXUS, \$25,000 (UCR portion: \$12,500)

September 2008–August 2009 PI, “Symbolic computation of bounds on timing and probabilistic properties of computing systems”, National Science Foundation CCF-0848463, \$74,810

July 2008–June 2009 PI, “Invariant computation using decision diagrams”, UCR Academic Senate (Omnibus grant) \$2,100

July 2007–June 2008 PI, “Techniques for complex, structured, discrete computations”, UCR Academic Senate, \$1,500

August 2006–July 2008 Co-PI (L. Bhuyan, PI, and W. Najjar, Co-PI), “Acquisition of an ultra low-latency multiprocessor system with on-board hardware accelerators”, National Science Foundation CNS-0619223, \$330,000

September 2006–June 2007 PI, “QEST 2006: 3rd International Conference on Quantitative Evaluation of Systems”, University of California Communications Research Program (CORE), \$9,000

October 2004–September 2008 Co-PI (G. Zank, PI, and N. Pogorelov, Co-PI, Department of Physics, University of California at Riverside), “ITR: A multi-scale combined hybrid-magnetohydrodynamic (MHD)-neutral atom code”, National Science Foundation ATM-0428880, \$1,662,650

September 2002–August 2007 PI (W. Stewart, North Carolina State University, co-PI), “Structured methods to evaluate the performance of distributed software”, National Science Foundation ACI-0203971, \$440,445 (total budget, including a \$214,597 subcontract to NC State)

September 2002–August 2006 PI, “ITR: Automated Verification of Asynchronous Software Systems”, National Science Foundation CCR-0219745, \$360,000

April 2002–September 2003 PI, “Formal verification of safety properties for aerospace systems through algorithms based on exhaustive state-space exploration”, National Aeronautics and Space Administration NAG-1-02095, \$154,037

July 2001–July 2004 PI (E. Smirni co-PI), “Effective techniques and tools for resource management in clustered web servers”, National Science Foundation CCR-0098278, \$279,485

May 2000 “Discrete-state systems: Model Checking and Performance Evaluation” (travel and educational grant), Lit. 2,500,000 plus living expenses

October 1999 “Distributed algorithms for the solution of structured Markov models”, Consiglio Nazionale delle Ricerche, Italy (Short-Term Mobility Grant Pos. 140-4 Prot. 048238), Lit. 1,800,000 plus living expenses

March 1999–February 2003 PI, “An advanced hierarchical hybrid environment for reliability and performance modeling”, National Aeronautics and Space Administration NAG-1-2168, \$333,788

September 1995–August 1997 co-PI 1st year (D. Nicol PI), PI 2nd year (D. Nicol co-PI), “Integrated Modeling Project”, CACC subcontract on National Science Foundation EEC-9418765, \$36,500

December 1994–September 1995 PI, “Integrated environment for performance, reliability, and availability modeling”, matching grant from the Virginia Center for Innovative Technology, \$39,989

September 1994–September 1995 PI, in collaboration with Genoa Software Systems, Inc., “Integrated environment for performance, reliability, and availability modeling”, Phase I STTR award from the Army Research Office, \$100,000

May 1993–May 1996 co-PI (D. Nicol PI), “Parallel algorithms for the simulation and analysis of stochastic Petri nets”, National Aeronautics and Space Administration, \$248,380

PANELS

May 2003 Dagstuhl Seminar 03201, Probabilistic Methods in Verification and Planning

June 2000 “What is the future for Petri nets in software engineering?”, Workshop on Software Engineering and Petri Nets, Aarhus, Denmark

May 1995 “Non-Markovian Petri Nets”, SIGMETRICS’95, Ottawa [M151]

December 1989 “SPN Applications”, PNPM’89, Kyoto, Japan

Participant in numerous National Science Foundation (NSF) proposal review panels

Proposal reviewer for the U.K. Engineering and Physical Sciences Research Council (EPSRC)

Proposal reviewer for the Netherlands Organization for Scientific Research (NWO)

CONFERENCE ORGANIZATIONS

October 2016 Co-Chair, Midwest Verification Day (MVD), Iowa State University, Ames, IA

June 2014 Program Co-Chair, Intl. Conf. Appl. and Theory of Petri Nets (ATPN), Tunis, Tunisia [B143]

September 2010 Program Co-Chair, Quantitative Evaluation of Systems (QEST), Williamsburg, VA [B142]

December 2006 Program Co-Chair, IEEE Pacific Rim International Symposium on Dependable Computing (PRDC), Riverside, CA [B141]

September 2006 General Chair, Quantitative Evaluation of Systems (QEST), Riverside, CA
June 2005 Program Co-Chair, Intl. Conf. Appl. and Theory of Petri Nets (ATPN), Miami, FL [B140]
September 2003 Program Co-Chair, Petri Nets and Performance Models (PNPM), Urbana-Champaign, IL [B139]
March 2000 Vice Program Chair, IEEE Intl. Computer Performance and Dependability Symposium (IPDS), Chicago, IL
September 1999 Tools Chair, Joint Petri Nets and Performance Models (PNPM), Process Algebras and Performance Models (PAPM) and Numerical Solution of Markov Chains (NSMC), Zaragoza, Spain
June 1999 Organization Chair, Intl. Conf. Appl. and Theory of Petri Nets (ATPN), Williamsburg, VA
September 1998 General Chair, Fourth Intl. Workshop on Performability Modeling of Computer and Communication Systems (PMCCS-4), Williamsburg, VA
September 1998 Vice General Chair, IEEE Intl. Computer Performance and Dependability Symposium (IPDS), Durham, NC
October 1995 Program Co-Chair, Petri Nets and Performance Models (PNPM), Durham, NC [B137]
May 1995 Co-Organizer, Dagstuhl Seminar on Performance and Dependability Modelling with Stochastic Petri Nets, Saarbrücken, Germany [B138]
September 1996 Software Demonstration Chair, IEEE Intl. Computer Performance and Dependability Symposium (IPDS), Urbana-Champaign, IL
 Member of the Program Committee:
Dec. 2017 EAI Intl. Conf. on Perf. Eval. Meth. and Tools (ValueTools), Venice, Italy
June 2017 Intl. Wkshp. on Petri Nets and Software Eng. (PNSE), Zaragoza, Spain
June 2016 Intl. Wkshp. on Petri Nets and Software Eng. (PNSE), Torun, Poland
June 2015 Intl. Wkshp. on Petri Nets and Software Eng. (PNSE), Brussels, Belgium
June 2015 Intl. Conf. Appl. and Theory of Petri Nets (ATPN), Brussels, Belgium
Sept. 2014 Quantitative Evaluation of Systems (QEST), Florence, Italy
May 2014 Wkshp. Research and Use of Multiformalism Mod. Meth. (WRUMMM), Brescia, Italy
Jan. 2014 Matrix Analytic Methods in Stochastic Models, Calicut, India
Aug. 2013 Quantitative Evaluation of Systems (QEST), Buenos Aires, Argentina
June 2013 Model Checking Contest, Milan, Italy
June 2013 Intl. Conf. Appl. and Theory of Petri Nets (ATPN), Milan, Italy
Sept. 2012 Wkshp. Research and Use of Multiformalism Mod. Meth. (WRUMMM), London, UK
Sept. 2012 Parallel and Distributed Methods in verifiCation (PDMC), London, UK
Sept. 2012 Quantitative Evaluation of Systems (QEST), London, UK
June 2012 Informatica Quantitativa (InfQ), Lucca, Italy
June 2012 Intl. Wkshp. on Petri Nets and Software Eng. (PNSE), Hamburg, Germany
June 2012 Model Checking Contest, Hamburg, Germany
June 2012 Intl. Conf. Appl. and Theory of Petri Nets (ATPN), Hamburg, Germany
Sept. 2011 Quantitative Evaluation of Systems (QEST), Aachen, Germany
June 2011 1st Wkshp. on Petri net Compositions (CompoNet), Newcastle, UK
June 2011 Intl. Conf. Appl. and Theory of Petri Nets (ATPN), Newcastle, UK
June 2011 Informatica Quantitativa (InfQ), Lipari, Italy

June 2011 Intl. Conf. Dependable Systems and Networks (DSN, PDS), Hong Kong, China
June 2010 Intl. Conf. Dependable Systems and Networks (DSN, PDS), Chicago, IL
June 2010 Application of Concurrency to System Design (ACSD), Braga, Portugal
June 2010 Intl. Conf. Appl. and Theory of Petri Nets (ATPN), Braga, Portugal
June 2010 Intl. Wkshp. on Scalable and Usable Model Checking (SUMo), Braga, Portugal
June 2010 Intl. Wkshp. on Petri Nets and Software Engineering (PNSE), Braga, Portugal
Sept. 2009 Intl. Wkshp. on Practical Appl. of Stoch. Modelling (PASM), London, UK
Sept. 2009 Quantitative Evaluation of Systems (QEST), Budapest, Hungary
July 2009 Application of Concurrency to System Design (ACSD), Augsburg, Germany
June 2009 Intl. Conf. Appl. and Theory of Petri Nets (ATPN), Paris, France
June 2009 Intl. Wkshp. on Petri Nets and Software Eng. (PNSE), Paris, France
Mar. 2009 SIMUTOOLS, Rome, Italy
June 2008 Application of Concurrency to System Design (ACSD), Xi'an, China
June 2008 Intl. Wkshp. on Petri Nets and Distributed Systems (PNDS), Xi'an, China
Mar. 2008 Parallel and Distributed Methods in verifiCation (PDMC), Budapest, Hungary
July 2007 Parallel and Distributed Methods in verifiCation (PDMC), Berlin, Germany
Sept. 2007 Quantitative Evaluation of Systems (QEST), Edimburgh, UK
Oct. 2007 IFIP WG 7.3 Symposium (PERFORMANCE) Cologne, Germany
Aug. 2006 Parallel and Distributed Methods in verifiCation (PDMC), Bonn, Germany
June 2006 SIGMETRICS, Saint-Malo, France
June 2006 Intl. Conf. Dependable Systems and Networks (DSN, PDS), Philadelphia, PA
June 2006 Intl. Conf. Appl. and Theory of Petri Nets (ATPN), Turku, Finland
June 2006 European Performance Engineering Wkshp. (EPEW), Budapest, Hungary
Mar. 2006 Tools and Algor. for the Constr. and Analysis of Syst. (TACAS), Vienna, Austria
Dec. 2005 Pacif Rim Dependable Computing (PRDC), Changsha, Hunan, China
Sept. 2005 Quantitative Evaluation of Systems (QEST), Torino, Italy
July 2005 Intl. Wkshp. on Practical Appl. of Stoch. Modelling (PASM), Newcastle, UK
June 2005 Intl. Conf. Dependable Systems and Networks (DSN, PDS), Yokohama, Japan
Sept. 2004 Quantitative Evaluation of Systems (QEST), Enschede, The Netherlands
Sept. 2004 Practical Applications of Stochastic Modelling, London, UK
June 2004 Intl. Conf. Dependable Systems and Networks (DSN, PDS), Firenze, Italy
June 2004 Intl. Conf. Appl. and Theory of Petri Nets (ATPN), Bologna, Italy
Sept. 2003 Numerical Solution of Markov Chains (NSMC), Urbana-Champaign, IL
Sept. 2003 Techniques and Tools for Computer Perf. Evaluation, Urbana-Champaign, IL
June 2003 Wkshp. on Stoch. Petri Nets and Related Formalisms, Eindhoven, The Netherlands
June 2003 Intl. Conf. Dependable Systems and Networks (DSN, PDS), San Francisco, CA
June 2003 Intl. Conf. Appl. and Theory of Petri Nets (ATPN), Eindhoven, The Netherlands
June 2003 SIGMETRICS, San Diego, CA
July 2002 Wkshp. on Software Performance (WOSP), Rome, Italy
June 2002 Intl. Conf. Dependable Systems and Networks (DSN, PDS), Washington, DC
June 2002 Intl. Conf. Appl. and Theory of Petri Nets (ATPN), Adelaide, Australia
Apr. 2002 Techniques and Tools for Computer Perf. Evaluation, London, UK
Oct. 2001 IEEE Intl. Conf. on Comp. Comm. and Networks (IC³N), Scottsdale, AZ
Sept. 2001 Proc. Alg. Perf. Mod.–Prob. Methods Verif. (PAPM-ProbMIV), Aachen, Germany
Sept. 2001 Petri Nets and Performance Models (PNPM), Aachen, Germany

Aug. 2001 Intl. Conf. Mod. Anal. Simul. Comp. Telecom. Syst. (MASCOTS), Cincinnati, OH
 June 2001 Intl. Conf. Appl. and Theory of Petri Nets (ATPN), Newcastle, UK
 Oct. 2000 IEEE Symp. on Reliable Distributed Systems (SRDS), Nürberg, Germany
 Sept. 2000 2nd Intl. Wkshp. on Software and Performance (WOSP), Ottawa, Canada
 June 2000 Intl. Conf. Appl. and Theory of Petri Nets (ATPN), Aarhus, Denmark
 Mar. 2000 IEEE Intl. Computer Perf. and Depend. Symp. (IPDS), Chicago, IL
 Mar. 2000 Techniques and Tools for Computer Perf. Evaluation, Chicago, IL
 Oct. 1999 IEEE Symp. on Reliable Distributed Systems (SRDS), Lausanne, Switzerland
 Sept. 1999 Numerical Solution of Markov Chains (NSMC), Zaragoza, Spain
 Sept. 1999 Petri Nets and Performance Models (PNPM), Zaragoza, Spain
 Oct. 1998 1st Intl. Wkshp. on Software and Performance (WOSP), Santa Fe, NM
 Oct. 1998 IEEE Symp. on Reliable Distributed Systems (SRDS), Purdue University, IN
 June 1998 Intl. Conf. Appl. and Theory of Petri Nets (ATPN), Lisbon, Portugal
 June 1998 12th European Simulation Multiconference, Manchester University, UK
 June 1997 Petri Nets and Performance Models (PNPM), Saint-Malo, France
 Sept. 1996 IEEE Intl. Computer Perf. and Depend. Symp. (IPDS), Urbana-Champaign, IL
 May 1996 SIGMETRICS'96, Philadelphia, PA
 Feb. 1996 Intl. Conf. Mod. Anal. Simul. Comp. Telecom. Syst. (MASCOTS), San Jose, CA
 Jan. 1995 Intl. Conf. Mod. Anal. Simul. Comp. Telecom. Syst. (MASCOTS), Durham, NC
 Jan. 1994 Intl. Conf. Mod. Anal. Simul. Comp. Telecom. Syst. (MASCOTS), Durham, NC
 Oct. 1993 Petri Nets and Performance Models (PNPM), Toulouse, France
 Dec. 1991 Petri Nets and Performance Models (PNPM), Melbourne, Australia [M147]

SOFTWARE TOOLS

SMART, Stochastic Model checking Analyzer for Reliability and Timing. This is a multi-formalism multi-solution tool made publicly available to universities and labs [M153] [M156] [M161] [M162] [P90] [J31]. Currently, it allows numerical solution of large Markov chains using traditional or Kronecker-based techniques, discrete-event simulation of general stochastic models, and CTL model-checking. Future planned enhancements include probabilistic model-checking capabilities and numerical-simulation hybrid solution.

SPNP, Stochastic Petri Net Package. Designed and implemented as part of doctoral work at Duke University [P49] [P53] [M148]. Distributed to academic and industrial sites throughout the U.S. and Europe.

GSPNA, Generalized Stochastic Petri Net Analyzer. Designed and implemented under contract from the Politecnico di Torino, Italy [P48]. The first tool written for the solution of Generalized Stochastic Petri Nets.

INVITED PRESENTATIONS

December 2014 “Beyond BDDs: Advanced decision diagrams and their applications”, University of Iowa, Department of Computer Science

July 2012 “Modern challenges in analyzing the correctness and performability of complex systems”, 39th Seminar on Hardware and Software (SEMISH), Curitiba, Brazil

May 2012 “Exploiting model structure to encode transition relations and transition rate matrices”, Carnegie-Mellon University, Department of Computer Science

November 2009 “Parallel symbolic state-space exploration is difficult, but what is the alternative?”, International Workshop on Parallel and Distributed Methods in verifiCation (PDMC), invited talk, Eindhoven, The Netherlands [M167]

October 2009 “Exploiting structural information to improve the analysis of discrete-state systems”, The Hong Kong University of Science and Technology

August 2009 “Using decision diagrams for the analysis of structured discrete-state models”, University of Savoie, Annecy, France

August 2009 “Approximate steady-state analysis of large Markov models based on the structure of their decision diagram encoding”, University of Savoie, Annecy, France

August 2008 “Parallel symbolic algorithms: a challenge” Dagstuhl Seminar No. 08332, Distributed Verification and Grid Computing (H. Bal, L. Brim, M. Leucker, eds.) [M167]

June 2007 “Static variable ordering and partitioning for symbolic state-space generation”, The University of York, York, UK

April 2007 “The importance of being structural (better decision diagram algorithms for asynchronous systems)”, Laboratoire d’Informatique de Paris 6, Paris, France

May 2006 “A general acceleration technique for symbolic state-space generation algorithms”, National Institute for Aerospace, Hampton, VA

September 2005 “Implicit representations and algorithms for the logic and stochastic analysis of discrete-state systems”, 2nd European Performance Engineering Workshop (EPEW) and 2nd International Workshop on Web Services and Formal Methods (WS-FM), keynote talk, Versailles, France [P99]

June 2004 “Reachability set generation for Petri nets: can brute force be smart?”, ATPN Conference keynote talk, Bologna, Italy [P95]

June 2003 “Structural symbolic methods for software verification”, NASA Ames Research Center, Automated Software Engineering group

May 2003 “Techniques to store Markov chains”, Dagstuhl Seminar No. 03201, Probabilistic Methods in Verification and Planning, (C. Boutilier, B. Haverkort, M. Kwiatkowska, M. Vardi, eds.)

December 2002 “Some notes on stochastic Petri nets”, Dagstuhl Event No. 02523, Validation of Stochastic Systems (B. Haverkort, ed.)

October 2002 “Exploiting structural information for efficient symbolic state-space generation”, Carnegie-Mellon University, Department of Computer Science

September 2001 “What a structural world”, Joint PNPM/PAPM/ProbMIV Multiconference, Aachen, Germany, PNPM keynote talk [P85]

October 2000 “Analytic modeling of allocation policies for tasks with heavy tail distributions”, Symposium on Advanced Performance Methods 2000, Orlando, FL [M160]

May 2000 “Using decision diagrams for the solution of large Markov chains”, Dagstuhl Seminar No. 00181, Report No. 273, Probabilistic Methods in Verification (U. Herzog, M. Kwiatkowska, C. Meinel, M. Vardi, eds.)

April 2000 “Structural approaches for SPN analysis”, High Performance Computing 2000, Washington, DC [P77]

- July 1998* “Distributed and parallel algorithms for state-space generation”, Politecnico di Torino, Torino, Italy
- May 1997* “Kronecker-based solution of large Markov models (with applications to the modeling of distributed software)”, at the Workshop on Software Performance Modeling and Analysis (WOSP), Ottawa, Canada [M155]
- June 1996* “Distributed State-Space Generation of Discrete-State Stochastic Models”, University of Twente, The Netherlands, and University of Aachen, Germany

SHORT COURSES AND TUTORIALS

- August 2012* “Continuous-time Markov models” (co-taught with C. Shelton), 28th Conference on Uncertainty in Artificial Intelligence, Catalina Island, CA [J42]
- June 2010* “Decision-diagram techniques for the analysis of Petri nets”, ATPN 2010, Braga, Portugal
- September 2009* “Petri net analysis using decision diagrams”, QEST 2009, Budapest, Hungary
- June 2007* “Data representation and efficient solution: a decision diagram approach”, 7th International School on Formal Methods for the Design of Computer, Communication and Software Systems: Performance Evaluation, Bertinoro, Italy [C135]
- June 2006* “Symbolic encodings for stochastic processes”, SIGMETRICS, Saint-Malo, France [M166]
- September 2005* “Decision diagrams for logic and stochastic modeling”, QEST, Torino, Italy [M165]
- March 2005* “Decision diagrams and their applications”, Bertinoro International Spring School, Bertinoro, Italy
- September 2004* “Modeling and analysis of Markov chains using decision diagrams”, QEST, Enschede, The Netherlands [M164]
- July 2000* “Distributed and structured analysis”, 1st European Summer School in Trends in Computer Science: Formal Methods and Performance Analysis, Nijmegen, The Netherlands [C134]
- May 2000* “Discrete-state systems: model checking and performance evaluation”, two-week intensive course for doctoral students, Dipartimento di Informatica, Università di Torino
- June 1999* “Tensor based GSPN solutions”, ATPN’99, Williamsburg, VA [M159]
- June 1998* “Kronecker operators for the description and solution of large Markov models”, SIGMETRICS’98, Madison, WI [M158]
- June 1997* “Kronecker operators for the description and solution of large Markov models generated by Stochastic Petri Nets”, joint PNPM’97 and Modelling Techniques and Tools Conferences, Saint-Malo, France [M157]
- May 1994* “Stochastic Petri nets: a formalism to describe stochastic processes”, SIGMETRICS’94, Nashville, TN [M149]
- October 1993* “PNs \Rightarrow SPNs \Rightarrow GSPNs \Rightarrow DSPNs”, PNPM’93, Toulouse, France
- January 1993* “SPNP Theory and Applications”, MASCOTS’93, San Diego, CA
- May 1991* “Putting Stochastic Petri Nets to Work”, a one-day live satellite broadcast course sponsored by the University of Southern California for the National Technical University [M146]

JOURNAL PUBLICATIONS (* indicates student co-author; • indicates visitor co-author)

- [J1] Mauro Bert, Gianfranco Ciardo, Maria Lorenza Demarie, and Cesare Iacobelli. Un' interfaccia relazionale interattiva per basi di dati reticolari. *Sistemi e Automazione*, pages 707–712, 1984.
- [J2] Joanne Bechta Dugan and Gianfranco Ciardo. Stochastic Petri net analysis of a replicated file system. *IEEE Trans. Softw. Eng.*, 15(4):394–401, 1989.
- [J3] Andrew L. Reibman, Kishor S. Trivedi, Sanjaya Kumar, and Gianfranco Ciardo. Analysis of stiff Markov chains. *ORSA J. Comp.*, 1(2):126–133, Spring 1989.
- [J4] Gianfranco Ciardo, Raymond A. Marie, Bruno Sericola, and Kishor S. Trivedi. Performability analysis using semi-Markov reward processes. *IEEE Trans. Comp.*, 39(10):1251–1264, 1990.
- [J5] Gianfranco Ciardo, Jogesh K. Muppala, and Kishor S. Trivedi. On the solution of GSPN reward models. *Perf. Eval.*, 12(4):237–253, 1991.
- [J6] Gianfranco Ciardo, Jogesh K. Muppala, and Kishor S. Trivedi. Analyzing concurrent and fault-tolerant software using stochastic Petri nets. *J. Par. and Distr. Comp.*, 15(3):255–269, 1992.
- [J7] Gianfranco Ciardo and Kishor S. Trivedi. A decomposition approach for stochastic reward net models. *Perf. Eval.*, 18(1):37–59, 1993.
- [J8] Gianfranco Ciardo, Reinhard German, and Christoph Lindemann. A characterization of the stochastic process underlying a stochastic Petri net. *IEEE Trans. Softw. Eng.*, 20(7):506–515, 1994.
- [J9] Jogesh K. Muppala, Gianfranco Ciardo, and Kishor S. Trivedi. Stochastic reward nets for reliability prediction. *Communications in Reliability, Maintainability and Serviceability*, 1(2):9–20, 1994.
- [J10] Gianfranco Ciardo and Christoph Lindemann. Comments on “Analysis of self-stabilizing clock synchronization by means of stochastic Petri nets”. *IEEE Trans. Comp.*, 43(12):1453–1456, 1994.
- [J11] Gianfranco Ciardo, Lawrence M. Leemis, and David Nicol. On the minimum of independent geometrically distributed random variables. *Statistics & Probability Letters*, 23:313–326, 1995.
- [J12] David Nicol and Gianfranco Ciardo. Automated parallelization of discrete state-space generation. *J. Par. and Distr. Comp.*, 47:153–167, 1997.
- [J13] Gianfranco Ciardo, Joshua Gluckman, and David Nicol. Distributed state-space generation of discrete-state stochastic models. *INFORMS J. Comp.*, 10(1):82–93, 1998.
- [J14] Gianfranco Ciardo, David Nicol, and Kishor Trivedi. Discrete-event simulation of fluid stochastic Petri nets. *IEEE Trans. Softw. Eng.*, 25(2):207–217, 1999.
- [J15] Gianfranco Ciardo and Guangzhi Li*. Approximate transient analysis for subclasses of deterministic and stochastic Petri nets. *Perf. Eval.*, 35:109–129, 1999.
- [J16] Gianfranco Ciardo and Evgenia Smirni. ETAQA: An efficient technique for the analysis of QBD-processes by aggregation. *Perf. Eval.*, 36-37:71–93, 1999.
- [J17] Peter Buchholz, Gianfranco Ciardo, Susanna Donatelli, and Peter Kemper. Complexity of memory-efficient Kronecker operations with applications to the solution of Markov models. *INFORMS J. Comp.*, 12(3):203–222, 2000.
- [J18] Gianfranco Ciardo, Alma Riska*, and Evgenia Smirni. EQUILOAD: A load balancing policy for clustered Web servers. *Perf. Eval.*, 46(2-3):101–124, 2001.

- [J19] Alma Riska*, Evgenia Smirni, and Gianfranco Ciardo. An aggregation-based method for the exact analysis of a class of GI/G/1-type processes. *ACM SIGMETRICS Perf. Eval. Rev.*, 31(2):28–30, 2003.
- [J20] Alma Riska*, Evgenia Smirni, and Gianfranco Ciardo. Exact analysis of a class of GI/G/1-type performability models. *IEEE Trans. Rel.*, 53(2):238–249, 2004.
- [J21] Gianfranco Ciardo, Alma Riska*, and Evgenia Smirni. ETAQA-MG1: An efficient technique for the analysis of M/G/1-type processes by aggregation. *Perf. Eval.*, 57(3):235–260, 2004.
- [J22] Qi Zhang, Alma Riska*, Wei Sun*, Evgenia Smirni, and Gianfranco Ciardo. Workload-aware load balancing for clustered web servers. *IEEE Trans. Par. and Distr. Syst.*, 16(3):219–233, 2005.
- [J23] Gianfranco Ciardo and Andrew S. Miner. Implicit data structures for logic and stochastic systems analysis. *ACM SIGMETRICS Perf. Eval. Rev.*, 32(4):4–9, 2005.
- [J24] Gianfranco Ciardo, Robert Marmorstein*, and Radu Siminiceanu*. The saturation algorithm for symbolic state space exploration. *Software Tools for Technology Transfer*, 8(1):4–25, 2006.
- [J25] Gianfranco Ciardo, Robert L. Jones*, Andrew S. Miner, and Radu Siminiceanu*. Logical and stochastic modeling with SMART. *Perf. Eval.*, 63:578–608, 2006.
- [J26] Gianfranco Ciardo, Gerald Lüttgen*, and Andrew S. Miner. Exploiting interleaving semantics in symbolic state-space generation. *Formal Methods in System Design*, 31:63–100, 2007.
- [J27] Radu Siminiceanu* and Gianfranco Ciardo. Formal verification of the NASA Runway Safety Monitor. *Software Tools for Technology Transfer*, 9(1):63–76, 2007.
- [J28] Gianfranco Ciardo, Andrew S. Miner, Min Wan*, and Andy Jinqing Yu*. Approximating stationary measures of structured continuous-time Markov models using matrix diagrams. *ACM SIGMETRICS Perf. Eval. Rev.*, 35(3):16–18, 2007.
- [J29] Gianfranco Ciardo. Decision diagrams for the approximate analysis of Markov models. *Wiley InterScience (online journal)*, 7(1):1080705–1080706, 2008.
- [J30] Andy Jinqing Yu*, Gianfranco Ciardo, and Gerald Lüttgen*. Decision-diagram-based techniques for bounded reachability checking of asynchronous systems. *Software Tools for Technology Transfer*, 11(2):117–131, 2009.
- [J31] Gianfranco Ciardo, Andrew S. Miner, and Min Wan*. Advanced features in SMART: the Stochastic Model checking Analyzer for Reliability and Timing. *ACM SIGMETRICS Perf. Eval. Rev.*, 36(4):58–63, 2009.
- [J32] Gianfranco Ciardo, Yang Zhao*, and Xiaoqing Jin*. Parallel symbolic state-space exploration is difficult, but what is the alternative? *EPTCS*, 14:1–17, 2009.
- [J33] Ming-Ying Chung* and Gianfranco Ciardo. Speculative image computation for distributed symbolic reachability analysis. *Journal of Logic and Computation*, 21(1):63–83, 2011.
- [J34] Min Wan*, Gianfranco Ciardo, and Andrew S. Miner. Approximate steady-state analysis of large Markov models based on the structure of their decision diagram encoding. *Perf. Eval.*, 68:463–486, 2011.
- [J35] Yang Zhao* and Gianfranco Ciardo. Symbolic computation of strongly connected components and fair cycles using saturation. *Innovations in Systems and Software Engineering*, 7(2):141–150, 2011.

- [J36] Hong Zheng[•], Yugang Niu, and Gianfranco Ciardo. Modelling and analysis of UPnP AV media player system based on Petri nets. *Int. J. Systems Science*, 42(9):1573–1580, 2011.
- [J37] Stefano Lonardi, Denisa Duma, Matthew Alpert, Francesca Cordero[•], Marco Beccuti[•], Prasanna Bhat, Yonghui Wu, Gianfranco Ciardo, Burair Alsaihati, Yaqin Ma, Steve Wanamaker, Josh Resnik, and Timothy J. Close. Barcoding-free BAC pooling enables combinatorial selective sequencing of the barley gene space. *CoRR*, abs/1112.4438, December 2011.
- [J38] Gianfranco Ciardo, Yang Zhao^{*}, and Xiaoqing Jin^{*}. Ten years of saturation: a Petri net perspective. *Trans. Petri Nets and Other Models of Concurrency*, V:51–95, 2012.
- [J39] Nils Stein, Andreas Graner, Axel Himmelbach, Burkhard Steuernagel, Daniela Schulte, Martin Mascher, Naser Poursarebani, Ruonan Zhou, Ruvini Ariyadasa, Thomas Schmutzer, Uwe Scholz, Heidrun Gundlach, Klaus Mayer, Manuel Spannagl, Matthias Pfeifer, Mihaela Martis, Thomas Nussbaumer, Arnis Druka, David Marshall, Hui Liu, Jenny Morris, Joanne Russell, Micha Bayer, John Brown, Pete Hedley, Robbie Waugh, Bujun Shi, Peter Langridge, Jan Svensson, Josh Resnik, Kavitha Madishetty, Matthew Moscou, Prasanna Bhat, Steve Wanamaker, Timothy Close, Yaqin Ma, Denisa Duma, Francesca Cordero, Gianfranco Ciardo, Marco Beccuti, Matthew Alpert, Stefano Lonardi, Hlne Bergs, Abraham Korol, Zeev Frenkel, Marco Groth, Marius Felder, Matthias Platzer, Stefan Taudien, Alan Schulman, Cdric Moisy, Jaakko Tanskanen, Takashi Matsumoto, Tsuyoshi Tanaka, Kazuhiro Sato, Geoffrey Fincher, David Swarbreck, Dharanya Sampath, Mario Caccamo, Melanie Febrer, Sarah Ayling, Rod Wing, Gary Muehlbauer, Andrea Zuccolo, Federica Cattonaro, Michele Morgante, Simone Scalabrin, Slobodanka Radovic, Vera Vendramin, Jesse Poland, and Roger Wise. A physical, genetic and functional sequence assembly of the barley genome. *Nature*, 491:711–717, November 2012.
- [J40] Malcolm Mumme^{*} and Gianfranco Ciardo. An efficient fully symbolic bisimulation algorithm for nondeterministic systems. *Int. J. Foundations of Computer Science*, 24(2):263–282, February 2013.
- [J41] Stefano Lonardi, Denisa Duma, Matthew Alpert, Francesca Cordero, Marco Beccuti, Prasanna R. Bhat, Yonghui Wu, Gianfranco Ciardo, Burair Alsaihati, Yaqin Ma, Steve Wanamaker, Josh Resnik, Ming-Cheng Luo, and Timothy J. Close. Combinatorial pooling enables selective sequencing of the barley gene space. *PLoS Computational Biology*, 9(4):e1003010, 2013.
- [J42] Christian Shelton and Gianfranco Ciardo. Tutorial on structured continuous-time Markov processes. *J. of Artificial Intelligence Research*, 51:725–778, 2014.
- [J43] Xiaoqing Jin^{*}, Yousra Lembachar^{*}, and Gianfranco Ciardo. Symbolic termination and confluence checking for ECA rules. *Trans. Petri Nets and Other Models of Concurrency*, IX:99–123, 2014.
- [J44] Stefano Lonardi, Hamid Mirebrahim, Steve Wanamaker, Matthew Alpert, Gianfranco Ciardo, Denisa Duma, and Timothy J. Close. When less is more: “slicing” sequencing data improves read decoding accuracy and de novo assembly quality. *Bioinformatics*, pages 1–8, May 2015.

PROCEEDING PUBLICATIONS (fully refereed except for invited or keynote papers)

- [P45] Mauro Bert, Gianfranco Ciardo, Maria Lorenza Demarie, and Cesare Iacobelli. Un’ interfaccia relazionale interattive per basi di dati CODASYL. In *Proc. 1983 AICA Congr.*, pages 3–19, 1983.

- [P46] Mauro Bert, Gianfranco Ciardo, Maria Lorenza Demarie, Cesare Iacobelli, and Pietro Marchisio. A relational interface for CODASYL databases. In *Proc. Congr. "Making Database Work - Trends and Applications"*. IEEE and NBS, 1984.
- [P47] Gianfranco Ciardo and Cesare Iacobelli. On the relational-CODASYL query translatability. In *Proc. 2nd Convención Informática Latina*, 1985.
- [P48] Marco Ajmone Marsan, Gianfranco Balbo, Gianfranco Ciardo, and Giovanni Conte. A software tool for the automatic analysis of generalized stochastic Petri net models. In *Modelling Techniques and Tools for Performance Analysis*, pages 155–170. INRIA, Elsevier Science Publishers B.V. (North-Holland), 1985.
- [P49] Joanne Bechta Dugan, Andrea Bobbio, Gianfranco Ciardo, and Kishor Trivedi. The design of a unified package for the solution of stochastic Petri net models. In *Proc. Int. Workshop on Timed Petri Nets*, pages 6–13. IEEE Comp. Soc. Press, 1985.
- [P50] Kishor S. Trivedi, Gianfranco Ciardo, and Joanne Bechta Dugan. Dependability evaluation of fault-tolerant multiple processor systems. In *Modelling Techniques and Tools for Performance Analysis '85*. Elsevier Science Publishers B.V. (North-Holland), 1986. Invited.
- [P51] Joanne Bechta Dugan and Gianfranco Ciardo. Stochastic Petri net analysis of a replicated file system. In *Proc. PNPM*, pages 84–92. IEEE Comp. Soc. Press, 1987.
- [P52] Gianfranco Ciardo. Toward a definition of modeling power for stochastic Petri net models. In *Proc. PNPM*, pages 54–62. IEEE Comp. Soc. Press, 1987.
- [P53] Gianfranco Ciardo, Kishor S. Trivedi, and Jogesh K. Muppala. SPNP: Stochastic Petri net package. In *Proc. PNPM*, pages 142–151. IEEE Comp. Soc. Press, 1989.
- [P54] Gianfranco Ciardo and Kishor S. Trivedi. A decomposition approach for stochastic Petri net models. In *Proc. PNPM*, pages 74–83. IEEE Comp. Soc. Press, 1991.
- [P55] Gianfranco Ciardo and Kishor S. Trivedi. Solution of large GSPN models. In *Numerical Solution of Markov Chains*, pages 565–595. Marcel Dekker, Inc., 1991.
- [P56] Jogesh K. Muppala, Gianfranco Ciardo, and Kishor S. Trivedi. Modeling using Stochastic Reward Nets. In *Proc. 1st Int. Workshop on Modeling, Analysis and Simulation of Computer and Telecommunication Systems (MASCOTS'93)*, pages 367–372. IEEE Comp. Soc. Press, 1993.
- [P57] Christoph Lindemann, Gianfranco Ciardo, Reinhard German, and Günter Hommel. Performability modeling of an automated manufacturing system with deterministic and stochastic Petri nets. In *Proc. IEEE Int. Conf. on Robotics and Automation*, pages 576–581. IEEE Press, 1993.
- [P58] Gianfranco Ciardo and Christoph Lindemann. Analysis of deterministic and stochastic Petri nets. In *Proc. PNPM*, pages 160–169. IEEE Comp. Soc. Press, 1993.
- [P59] Gianfranco Ciardo, Reinhard German, and Christoph Lindemann. A characterization of the stochastic process underlying a stochastic Petri net. In *Proc. PNPM*, pages 170–179. IEEE Comp. Soc. Press, 1993.
- [P60] Gianfranco Ciardo. Petri nets with marking-dependent arc multiplicity: properties and analysis. In *Proc. ATPN*, LNCS 815, pages 179–198. Springer, 1994.
- [P61] Kishor S. Trivedi, Gianfranco Ciardo, M. Malhotra, and S. Garg. Dependability and performability modeling using stochastic Petri nets. In *Proc. 11th Int. Conf. on Analysis and Optimization of Systems – Discrete Event Systems*, pages 144–157. Springer, 1994.

- [P62] Gianfranco Ciardo. Discrete-time Markovian stochastic Petri nets. In *Computations with Markov Chains*, pages 339–358. Kluwer, 1995.
- [P63] Gianfranco Ciardo, Lucy Cherkasova, Vadim Kotov, and Tomas Rokicki. Modeling a fibre channel switch with stochastic Petri nets. In *Proc. ACM SIGMETRICS*, pages 319–320, 1995.
- [P64] Gianfranco Ciardo, Lucy Cherkasova, Vadim Kotov, and Tomas Rokicki. Modeling a scalable high-speed interconnect with stochastic Petri nets. In *Proc. PNPM*, pages 83–92. IEEE Comp. Soc. Press, 1995.
- [P65] Gianfranco Ciardo and Robert Zijal[•]. Well-defined stochastic Petri nets. In *Proc. 4th Int. Workshop on Modeling, Analysis and Simulation of Computer and Telecommunication Systems (MASCOTS'96)*, pages 278–284. IEEE Comp. Soc. Press, 1996.
- [P66] Marco Tilgner[•], Yukio Takahashi, and Gianfranco Ciardo. SNS 1.0: Synchronized Network Solver. In *1st Int. Workshop on Manufacturing and Petri Nets*, pages 215–234, 1996.
- [P67] Gianfranco Ciardo. Advances in compositional approaches based on Kronecker algebra: Application to the study of manufacturing systems. In *Proc. PMCCS*, pages 61–65, 1996.
- [P68] Gianfranco Ciardo, David Nicol, and Kishor Trivedi. Discrete-event simulation of fluid stochastic Petri nets. In *Proc. PNPM*, pages 217–225. IEEE Comp. Soc. Press, 1997.
- [P69] Gianfranco Ciardo and Andrew S. Miner^{*}. Storage alternatives for large structured state spaces. In *Proc. 9th Int. Conf. on Modelling Techniques and Tools for Computer Performance Evaluation*, LNCS 1245, pages 44–57. Springer, 1997.
- [P70] Robert Zijal[•], Gianfranco Ciardo, and Günter Hommel. Discrete deterministic and stochastic Petri nets. In *9. ITG/GI-Fachtagung: Messung, Modellierung und Bewertung von Rechen- und Kommunikationssystemen (MMB'97), (Measurement, Modeling, and Valuation of Computer- and Communication-Systems)*, pages 103–117. VDE-Verlag, 1997.
- [P71] Gianfranco Ciardo and Evgenia Smirni. Projection: An efficient solution algorithm for a class of quasi birth-death processes. In *Proc. PMCCS*, pages 58–61, 1998.
- [P72] Guangzhi Li^{*} and Gianfranco Ciardo. Approximate analysis of a fault-tolerant join-the-shortest-queue policy. In *Proc. PMCCS*, pages 34–38, 1998.
- [P73] Gianfranco Ciardo and Guangzhi Li^{*}. Efficient approximate transient analysis for a class of deterministic and stochastic Petri nets. In *Proc. IEEE Int. Computer Performance and Dependability Symp. (IPDS'98)*, pages 34–43. IEEE Comp. Soc. Press, 1998.
- [P74] Andrew S. Miner^{*} and Gianfranco Ciardo. Efficient reachability set generation and storage using decision diagrams. In *Proc. ATPN*, LNCS 1639, pages 6–25. Springer, 1999.
- [P75] Gianfranco Ciardo and Andrew S. Miner^{*}. A data structure for the efficient Kronecker solution of GSPNs. In *Proc. PNPM*, pages 22–31. IEEE Comp. Soc. Press, 1999.
- [P76] Gianfranco Ciardo, Alma Riska^{*}, and Evgenia Smirni. An aggregation-based solution method for M/G/1-type processes. In *Numerical Solution of Markov Chains*, pages 21–40. Prensas Universitarias de Zaragoza, 1999.
- [P77] Gianfranco Ciardo and Andrew S. Miner^{*}. Structural approaches for SPN analysis. In *High Performance Computing 2000, Grand Challenges in Computer Simulation*, pages 345–356. SCS, 2000.

- [P78] Andrew S. Miner*, Gianfranco Ciardo, and Susanna Donatelli. Using the exact state space of a Markov model to compute approximate stationary measures. In *Proc. ACM SIGMETRICS*, pages 207–216. ACM Press, 2000.
- [P79] Gianfranco Ciardo, Gerald Lüttgen, and Radu Siminiceanu*. Efficient symbolic state-space construction for asynchronous systems. In *Proc. ATPN*, LNCS 1825, pages 103–122. Springer, 2000.
- [P80] Alma Riska*, Evgenia Smirni, and Gianfranco Ciardo. Analytic modeling of load balancing policies for tasks with heavy-tailed distributions. In *Proc. Workshop on Software Performance Analysis (WOSP)*, pages 147–157. ACM Press, 2000.
- [P81] Lucy Cherkasova and Gianfranco Ciardo. Characterizing temporal locality and its impact on Web server performance. In *Proc. IEEE Int. Conference on Computer Communication and Networks (ICCCN)*, pages 434–441. IEEE Comp. Soc. Press, 2000.
- [P82] Gianfranco Ciardo, Gerald Lüttgen, and Radu Siminiceanu*. Saturation: An efficient iteration strategy for symbolic state space generation. In *Proc. TACAS*, LNCS 2031, pages 328–342. Springer, 2001.
- [P83] Lucy Cherkasova and Gianfranco Ciardo. Role of aging, frequency, and size in Web cache replacement policies. In *Proc. European Conference on High Performance Computing and Networking Europe (HPCN)*, LNCS 2110, pages 114–123. Springer, 2001.
- [P84] Robert L. Jones* and Gianfranco Ciardo. On phased delay stochastic Petri nets: Definition and an application. In *Proc. PNPM*, pages 165–174. IEEE Comp. Soc. Press, 2001.
- [P85] Gianfranco Ciardo. What a structural world. In *Proc. PNPM*, pages 3–16. IEEE Comp. Soc. Press, 2001. Keynote paper.
- [P86] Alma Riska*, Wei Sun*, Evgenia Smirni, and Gianfranco Ciardo. AdaptLoad: effective balancing in clustered Web servers under transient load conditions. In *Proc. Int. Conf. Distr. Comp. Syst. (ICDCS)*, pages 104–111. IEEE Comp. Soc. Press, 2002.
- [P87] Gianfranco Ciardo and Radu Siminiceanu*. Using edge-valued decision diagrams for symbolic generation of shortest paths. In *Proc. FMCAD*, LNCS 2517, pages 256–273. Springer, 2002.
- [P88] Gianfranco Ciardo, Robert Marmorstein*, and Radu Siminiceanu*. Saturation unbound. In *Proc. TACAS*, LNCS 2619, pages 379–393. Springer, 2003.
- [P89] Gianfranco Ciardo and Radu Siminiceanu*. Structural symbolic CTL model checking of asynchronous systems. In *Proc. CAV*, LNCS 2725, pages 40–53. Springer, 2003.
- [P90] Gianfranco Ciardo, Robert L. Jones*, Andrew S. Miner, and Radu Siminiceanu*. Logical and stochastic modeling with SMART. In *Proc. Modelling Techniques and Tools for Computer Performance Evaluation*, LNCS 2794, pages 78–97. Springer, 2003.
- [P91] Gianfranco Ciardo, Massimo Forno*, Paul L. Grieco*, and Andrew S. Miner. Comparing implicit representations of large CTMCs. In *Numerical Solution of Markov Chains*, pages 323–327, 2003.
- [P92] Gianfranco Ciardo and Yingjie Lan*. Faster discrete-event simulation through structural caching. In *Proc. PMCCS*, pages 11–14, 2003.
- [P93] Robert* L. Jones and Gianfranco Ciardo. Regenerative simulation of stochastic Petri nets with discrete and continuous timing. In *Proc. PMCCS*, pages 23–26, 2003.

- [P94] Qi Zhang, Evgenia Smirni, and Gianfranco Ciardo. Profit-driven service differentiation in transient environments. In *Proc. 11th IEEE/ACM Int. Symposium on Modeling, Analysis and Simulation of Computer and Telecommunication Systems (MASCOTS)*, pages 230–233. IEEE Comp. Soc. Press, 2003.
- [P95] Gianfranco Ciardo. Reachability set generation for Petri nets: can brute force be smart? In *Proc. ATPN*, LNCS 3099, pages 17–34. Springer, 2004. Keynote paper.
- [P96] Ming-Ying Chung* and Gianfranco Ciardo. Saturation NOW. In *Proc. Quantitative Evaluation of SysTems (QEST)*, pages 272–281. IEEE Comp. Soc. Press, 2004.
- [P97] Radu Siminiceanu* and Gianfranco Ciardo. Formal verification of the NASA Runway Safety Monitor. In *Proc. Intl. Workshop on Automated Verification of Critical Systems (AVoCS)*, volume 128(6) of *ENTCS*, pages 179–194. Elsevier, 2005.
- [P98] Ming-Ying Chung* and Gianfranco Ciardo. A pattern recognition approach for speculative firing prediction in distributed saturation state-space generation. In *Workshop on Parallel and Distributed Model Checking (PDMC)*, ENTCS, pages 65–79. Elsevier, 2005.
- [P99] Gianfranco Ciardo. Implicit representations and algorithms for the logic and stochastic analysis of discrete-state systems. In *Formal Techniques for Computer Systems and Business Processes*, LNCS 3670, pages 15–17. Springer, 2005. Keynote paper.
- [P100] Gianfranco Ciardo and Andy Jinqing Yu*. Saturation-based symbolic reachability analysis using conjunctive and disjunctive partitioning. In *Proc. CHARME*, LNCS 3725, pages 146–161. Springer, 2005.
- [P101] Radu Siminiceanu* and Gianfranco Ciardo. New metrics for static variable ordering in decision diagrams. In *Proc. TACAS*, LNCS 3920, pages 90–104. Springer, 2006.
- [P102] Ming-Ying Chung*, Gianfranco Ciardo, and Andy Jinqing Yu*. A fine-grained fullness-guided chaining heuristic for symbolic reachability analysis. In *Proc. ATVA*, LNCS 4218, pages 51–66. Springer, 2006.
- [P103] Ming-Ying Chung* and Gianfranco Ciardo. A dynamic firing speculation to speedup distributed symbolic state-space generation. In *Proc. Intl. Parallel & Distributed Processing Symposium (IPDPS)*. IEEE Comp. Soc. Press, 2006. Electronic proceedings.
- [P104] Andy Jinqing Yu*, Gianfranco Ciardo, and Gerald Lüttgen•. Bounded reachability checking of asynchronous systems using decision diagrams. In *Proc. TACAS*, LNCS 4424, pages 648–663. Springer, 2007.
- [P105] Dhiman Barman, Piyush Satapathy*, and Gianfranco Ciardo. Detecting attacks in routers using sketches. In *Proc. IEEE Workshop on High Performance Switching and Routing*, 2007.
- [P106] Gianfranco Ciardo, Gerald Lüttgen•, and Andy Jinqing Yu*. Improving static variable orders via invariants. In *Proc. ATPN*, LNCS 4546, pages 83–103. Springer, 2007.
- [P107] Jonathan Ezekiel•, Gerald Lüttgen•, and Gianfranco Ciardo. Parallelising symbolic state-space generators. In *Proc. CAV*, LNCS 4590, pages 268–280. Springer, 2007.
- [P108] Ming-Ying Chung*, Gianfranco Ciardo, and Radu Siminiceanu. Caching, hashing, and garbage collection for distributed state space construction. In *Workshop on Parallel and Distributed Model Checking (PDMC)*, ENTCS, pages 121–136. Elsevier, 2007.

- [P109] Kishor S. Trivedi, Gianfranco Ciardo, Balakrishnan Dasarathy, Michael Grottke, Rivalino Matias Matias, Andy Rindos, and Bart Varshaw. Achieving and assuring high availability. In *Proc. 5th Intl. Service Availability Symposium (ISAS)*, LNCS 5017, pages 20–25. Springer, 2008.
- [P110] Min Wan* and Gianfranco Ciardo. Symbolic reachability analysis of integer timed Petri nets. In *Proc. SOFSEM*, LNCS 5404, pages 595–608. Springer, 2009.
- [P111] Min Wan* and Gianfranco Ciardo. Symbolic state-space generation of asynchronous systems using extensible decision diagrams. In *Proc. SOFSEM*, LNCS 5404, pages 582–594. Springer, 2009.
- [P112] Gianfranco Ciardo, Galen Mecham*, Emmanuel Paviot-Adet, and Min Wan*. P-semiflow computation with decision diagrams. In *Proc. ATPN*, LNCS 5606, pages 143–162. Springer, 2009.
- [P113] Yang Zhao* and Gianfranco Ciardo. Symbolic CTL model checking of asynchronous systems using constrained saturation. In *Proc. ATVA*, LNCS 5799, pages 368–381. Springer, 2009.
- [P114] Yang Zhao* and Gianfranco Ciardo. Symbolic computation of strongly connected components using saturation. In *Proc. 2nd NASA Formal Methods Symposium (NFM 2010)*, NASA/CP-2010-216215, pages 201–211. NASA, 2010.
- [P115] Yang Zhao*, Xiaoqing Jin*, and Gianfranco Ciardo. A symbolic algorithm for shortest EG witness generation. In *Proc. TASE*, pages 68–75. IEEE Comp. Soc. Press, 2011.
- [P116] Malcolm Mumme* and Gianfranco Ciardo. A fully symbolic bisimulation algorithm. In Giorgio Delzanno and Igor Potapov, editors, *Proc. Reachability Problems*, LNCS 6945, pages 218–230, Genoa, Italy, September 2011. Springer.
- [P117] Xiaoqing Jin*, Gianfranco Ciardo, Tae-Hyong Kim*, and Yang Zhao*. Symbolic verification and test generation for a network of communicating FSMs. In Tevfik Bultan and Pao-Ann Hsiung, editors, *Proc. ATVA*, LNCS 6996, pages 432–442, Taipei, Taiwan, October 2011. Springer.
- [P118] Stefano Lonardi, Denisa Duma, Matthew Alpert, Francesca Cordero*, Marco Beccuti*, Prasanna Bhat, Yonghui Wu, Gianfranco Ciardo, Burair Alsaihati, Yaqin Ma, Steve Wanamaker, Josh Resnik, and Timothy J. Close. Sequences of 14,600 gene-bearing minimal tiling path BACs of Morex barley. In *Proc. Intl. Conf. Plant and Animal Genome*, San Diego, CA, USA, January 2012. Abstract.
- [P119] D. Duma, M. Wootters, A. C. Gilbert, H. Q. Ngo, A. Rudra, M. Alpert, T. J. Close, Gianfranco Ciardo, and S. Lonardi. Accurate decoding of pooled sequenced data using compressed sensing. In *Proc. WABI*, LNBI 8126, pages 70–84. CEUR-WS.org, 2013.
- [P120] Yang Zhao* and Gianfranco Ciardo. A two-phase Gauss-Seidel algorithm for steady-state solution of structured CTMCs encoded with EVMDDs. In *Proc. QEST*, pages 74–83, London, UK, September 2012. IEEE Comp. Soc. Press.
- [P121] Xiaoqing Jin*, Alexandre Donzé, and Gianfranco Ciardo. Mining weighted requirements from closed-loop control models. In *Proc. 6th Intl. Workshop on Numerical Software Verification (NSV)*, pages 47–51, Philadelphia, PA, USA, April 2013.
- [P122] Xiaoqing Jin*, Yousra Lembachar*, and Gianfranco Ciardo. Symbolic verification of ECA rules. In D. Moldt, editor, *Joint Proc. PNSE'13 and ModBE'13*, CEUR 989, pages 41–59. CEUR-WS.org, 2013.

- [P123] Yang Zhao* and Gianfranco Ciardo. Tackling truncation errors in CSL model checking through bounding semantics. In *Proc. EPEW*, LNCS 8168, pages 58–73, Venice, Italy, September 2013. Springer.
- [P124] Hind Alhakami*, Gianfranco Ciardo, and Marek Chrobak. Sequence decision diagrams. In *Proc. SPIRE*, LNCS 8799, pages 149–160, Preto, Brazil, October 2014. Springer.
- [P125] Pietro Piazzolla•, Gianfranco Ciardo, and Andrew S. Miner. Power consumption analysis of replicated virtual applications. In *Proc. AMSTA 2015*, pages 188–202, Albena, Bulgaria, May 2015.
- [P126] Denisa Duma, Francesca Codero, Marco Beccuti, Gianfranco Ciardo, Timothy J. Close, and Stefano Lonardi. Scribe: ultra-accurate error-correction of pooled sequenced reads. In *Proc. WABI*, LNBI 9289, pages 162–174, 2015.
- [P127] Hamed Ghasemieh•, Anne Remke, Boudewijn R. Haverkort, and Gianfranco Ciardo. Approximate analysis of hybrid Petri nets with probabilistic timed transitions. In *Proc. VALUETOOLS 2015*, pages 127–134, Berlin, Germany, December 2015.
- [P128] Gianfranco Ciardo, Marco Gribaudo, Mauro Iacono, Andrew S. Miner, and Pietro Piazzolla•. Power consumption analysis of replicated virtual applications in heterogeneous architectures. In *Digitally Supported Innovation: A Multi-Disciplinary View on Enterprise, Public Sector and User Innovation*, volume 18 of *Lecture Notes in Information Systems and Organisation*, pages 285–297, 2016.

CHAPTERS IN BOOKS

- [C129] Mauro Bert, Gianfranco Ciardo, Barbara Demo, Antonio Di Leva, Piercarlo Giolito, Cesare Iacobelli, and Velia Marrone. The logical design in the DATAID project: the EASYMAP system. In *Computer Aided Database Design*, pages 97–113. North-Holland, 1985.
- [C130] Gianfranco Ciardo, Alex Blakemore, Philip F. Chimento, Jr., Jogesh K. Muppala, and Kishor S. Trivedi. Automated generation and analysis of Markov reward models using Stochastic Reward Nets. In *Linear Algebra, Markov Chains, and Queueing Models*, IMA Volumes in Mathematics and its Applications 48, pages 145–191. Springer, 1993.
- [C131] Kishor S. Trivedi, Gianfranco Ciardo, Manish Malhotra, and Robin Sahner. Dependability and Performability Analysis. In *Performance Evaluation of Computer and Communications Systems*, LNCS 729, pages 587–612. Springer, 1993.
- [C132] Gianfranco Ciardo. Stochastic Petri Nets: Introduction and Applications to the Modeling of Computer and Communication Systems. In *Advanced Computer Performance Modeling and Simulation*, pages 203–234. Gordon and Breach, 1998.
- [C133] Gianfranco Ciardo. Tools for formulating Markov models. In *Computational Probability*, volume 24 of *Operations Research and Management Science*, pages 11–41. Kluwer, 1999.
- [C134] Gianfranco Ciardo. Distributed and structured analysis approaches to study large and complex systems. In *Lectures on Formal Methods and Performance Analysis*, LNCS 2090, pages 344–374. Springer, 2001.
- [C135] Gianfranco Ciardo. Data representation and efficient solution: a decision diagram approach. In *Formal Methods for Performance Evaluation*, LNCS 4486, pages 371–394. Springer, 2007.

- [C136] Radu Siminiceanu and Gianfranco Ciardo. Symbolic model checking for avionics. In S. Gnesi and T. Margaria, editors, *Formal Methods for Industrial Critical Systems: A Survey of Applications*, pages 85–112. John Wiley & Sons, 2012.

BOOKS AND EDITED BOOKS

- [B137] Gianfranco Ciardo and Christoph Lindemann, editors. *Proc. 6th Int. Workshop on Petri Nets and Performance Models (PNPM'95)*. IEEE Comp. Soc. Press, 1995.
- [B138] Heinz Beilner, Gianfranco Ciardo, Christoph Lindemann, and Kishor Trivedi, editors. *Performance and Dependability Modelling with Stochastic Petri Nets*. IBFI GmbH, Schloss Dagstuhl, 1995. Dagstuhl-Seminar-Report; 115, 22.05.-26.05.95 (9521).
- [B139] Gianfranco Ciardo and William H. Sanders, editors. *Proc. 10th Int. Workshop on Petri Nets and Performance Models (PNPM'03)*. IEEE Comp. Soc. Press, 2003.
- [B140] Gianfranco Ciardo and Philippe Darondeau, editors. *Proc. ATPN 2005*, LNCS 3536, 2005.
- [B141] Daniel Jeske, Gianfranco Ciardo, and Yuan-Shun Dai, editors. *Proc. 12th Pacific Rim Intl. Symposium on Dependable Computing*. IEEE Comp. Soc. Press, 2006.
- [B142] Gianfranco Ciardo and Roberto Segala, editors. *Proc. Quantitative Evaluation of Systems (QEST 2010)*. IEEE Comp. Soc. Press, 2010.
- [B143] Gianfranco Ciardo and Ekkart Kindler, editors. *Proc. ATPN 2014*, LNCS 8489, 2014.

MISCELLANEA (theses, tutorials, reports, tool descriptions, video presentations, etc.)

- [M144] Gianfranco Ciardo. Le reti di Petri stocastiche generalizzate: uno strumento per la modellizzazione di sistemi distribuiti. Tesi di Laurea, Istituto di Scienze dell' Informazione, Università di Torino, Italy, July 1982.
- [M145] Gianfranco Ciardo. *Analysis of large stochastic Petri net models*. PhD thesis, Duke University, 1989.
- [M146] Kishor S. Trivedi and Gianfranco Ciardo. Putting Stochastic Petri Nets to Work. VHS videotape (5 hours), University of Southern California for the National Technical University, 1991.
- [M147] Gianfranco Ciardo. PNPM'91 — 4th Int. Workshop on Petri Nets and Performance Models. *Perf. Eval.*, 18(1):97–100, 1993.
- [M148] Gianfranco Ciardo and Kishor S. Trivedi. SPNP: The Stochastic Petri Net Package (Version 3.1). In *Proc. 1st Int. Workshop on Modeling, Analysis and Simulation of Computer and Telecommunication Systems (MASCOTS'93)*, pages 390–391. IEEE Comp. Soc. Press, 1993.
- [M149] Gianfranco Ciardo. Stochastic Petri nets: a formalism to describe stochastic processes. In *ACM SIGMETRICS Tutorials*, 1994.
- [M150] Gianfranco Ciardo, Lucy Cherkasova, Vadim Kotov, and Tomas Rokicki. Modeling a fibre channel switch with stochastic Petri nets. HP Labs Technical Report, Hewlett Packard, 1994.
- [M151] Kishor Trivedi, Andrea Bobbio, Gianfranco Ciardo, Reinhard German, Antonio Puliafito, and Miklos Telek. Non-Markovian Petri nets. In *Proc. ACM SIGMETRICS*, pages 263–264, 1995.

- [M152] Gianfranco Ciardo and Marco Tilgner*. On the use of Kronecker operators for the solution of generalized stochastic Petri nets. ICASE Report 96-35, Institute for Computer Applications in Science and Engineering (NASA Langley Research Center, Hampton, VA, USA), 1996.
- [M153] Gianfranco Ciardo and Andrew S. Miner*. SMART: Simulation and Markovian Analyzer for Reliability and Timing. In *Proc. IEEE Int. Computer Performance and Dependability Symp. (IPDS'96)*, page 60. IEEE Comp. Soc. Press, 1996.
- [M154] Gianfranco Ciardo and Carlo Ghezzi. Guest Editorial: Introduction to the Special Section. *IEEE Trans. Softw. Eng.*, 22(9):601–602, 1996.
- [M155] Gianfranco Ciardo. Kronecker-based solution of large Markov models (with applications to the modeling of distributed software). In *Workshop on Software Performance Analysis (WOSP)*, pages 140–153, 1997. Invited.
- [M156] Gianfranco Ciardo and Andrew S. Miner*. SMART: Simulation and Markovian Analyzer for Reliability and Timing. In *Tools Descriptions from the 9th Int. Conf. on Modelling Techniques and Tools for Computer Performance Evaluation and the 7th Int. Work. on Petri Nets and Performance Models*, pages 41–43, 1997.
- [M157] Gianfranco Ciardo and Susanna Donatelli. Kronecker operators for the description and solution of large Markov models generated by Stochastic Petri Nets. In *Joint tutorials of 7th Int. Workshop on Petri Nets and Performance Models and 9th Int. Conf. on Modelling Techniques and Tools for Computer Performance Evaluation*, 1997.
- [M158] Gianfranco Ciardo and Susanna Donatelli. Kronecker operators for the description and solution of large Markov models. In *ACM SIGMETRICS Tutorials*, 1998.
- [M159] Gianfranco Ciardo. Tensor based GSPN solutions. In *Petri Nets '99 Advanced Tutorial on Performance Evaluation Using Stochastic Petri Nets*, 1999.
- [M160] Gianfranco Ciardo, Alma Riska*, and Evgenia Smirni. Analytic modeling of allocation policies for tasks with heavy tail distributions. In *Proc. Symp. on Advanced Performance Methods*, 2000. Invited.
- [M161] Gianfranco Ciardo, Robert L. Jones*, Andrew S. Miner*, and Radu Siminiceanu*. SMART: Stochastic Model Analyzer for Reliability and Timing. In *Tools of Int. Multiconf. Measurement, Modelling and Evaluation of Computer-Communication Systems*, pages 29–34, 2001.
- [M162] Gianfranco Ciardo, Robert L. Jones*, Robert M. Marmorstein*, Andrew S. Miner, and Radu Siminiceanu*. SMART: Stochastic Model-checking Analyzer for Reliability and Timing. In *Proc. DSN*, page 545. IEEE Press, 2002.
- [M163] Gianfranco Ciardo, Reinhard German, and Boudewijn R. Haverkort. Introduction to the special section on Petri nets and performance models. *IEEE Trans. Softw. Eng.*, 28(10):913–914, 2002.
- [M164] Gianfranco Ciardo. Modeling and analysis of Markov chains using decision diagrams. In *Tutorials QEST'04*, 2004.
- [M165] Gianfranco Ciardo. Decision diagrams for logic and stochastic modeling. In *Tutorials QEST'05*, 2005.
- [M166] Gianfranco Ciardo. Symbolic encodings for stochastic processes. In *ACM SIGMETRICS Tutorials*, 2006.

- [M167] Gianfranco Ciardo. Parallel symbolic algorithms: a challenge. In *Distributed Verification and Grid Computing*, Dagstuhl Seminar No. 08332, pages 3–4, 2008.
- [M168] Gianfranco Ciardo. Modern challenges in analyzing the correctness and performability of complex systems, July 2012. Invited talk at SEMISH, 39th Seminar on Hardware and Software (Curitiba, Brazil).
- [M169] Gianfranco Ciardo and Andrew S. Miner. SMART: Stochastic Model checking Analyzer for Reliability and Timing, User Manual. Available at <http://smart.cs.iastate.edu>.

ACADEMIC COURSES TAUGHT

Graduate courses at the University of California at Riverside:

- CS 206 Testing and verification techniques in software engineering*: Winter 2009, Fall 2010, Fall 2013
- CS 237 Advanced topics in modeling and simulation*: Winter 2006
- CS 239 Performance evaluation of computer networks*: Winter 2004
- CS 246 Advanced verification techniques in software engineering*: Spring 2005, Winter 2007, Winter 2008, Fall 2008, Spring 2011
- CS 260 Seminar in computer science*: Fall 2005, Fall 2009
- CS 270 Special Topics in Advanced Computer Science*: Fall 2011

Undergraduate courses at the University of California at Riverside:

- CS 150 Theory of automata and formal languages*: Fall 2005, Fall 2006, Fall 2007, Fall 2008, Winter 2012
- CS 177 Modeling and simulation*: Spring 2011
- CS 179K Project in computer science: software engineering*: Winter 2005, Spring 2010, Fall 2011

Graduate courses at William and Mary:

- CSci 616 Stochastic models in computer science*: Fall 1996, Spring 1999, Spring 2001, Fall 2001, Fall 2002
- CSci 624 Computer systems performance analysis*: Spring 1995
- CSci 746 Discrete state stochastic models*: Fall 1993, Fall 1994, Spring 1996, Spring 1998, Spring 2001, Spring 2003

Undergraduate courses at William and Mary:

- CSci 243 Discrete structures in computer science*: Fall 1995, Spring 1996, Fall 1997
- CSci 421 Database systems*: Fall 1998
- CSci 423 Finite automata and theory of computation*: Spring 1993, Spring 1994, Fall 1994, Spring 1995, Fall 1995, Spring 1997, Fall 1997, Fall 2000, Fall 2001
- CSci 435 Software Engineering*: Spring 2002

RESEARCH SUPERVISION

Post-doctoral and senior visitors, Iowa State University:

October 2014–December 2014 Dr. Pietro Piazzolla (Università di Milano, Italy)

PhD advisor, Iowa State University:

current Chuan Jiang

current Benjamin Smith

MS advisor, Iowa State University:

current Nitesh Gupta

Member of the PhD committee, Iowa State University:

current Alaa Al-Ghazo (ECpE)

current Junaid Babar

current Md Johirul Islam

current Hung Phan

current Swarn Priya

current Hao Ren (ECpE)

2015 Yaping Jing

Member of the MS committee, Iowa State University:

2016 Priyanka Thyagarajan

Student visitor host, Iowa State University:

May 2014–July 2014 Hamed Ghasemieh (PhD, University of Twente, The Netherlands)

May 2014–July 2014 Maryam Haji Ghasemieh (MS, University of Twente, The Netherlands)

Post-doctoral and senior visitors, University of California at Riverside:

June 2011–September 2011 Dr. Marco Beccuti (Università di Torino, Italy)

June 2011–September 2011 Dr. Francesca Cordero (Università di Torino, Italy)

September 2009–August 2010 Prof. Hong Zheng (East China UST, Shanghai, China)

July 2008–July 2009 Prof. Tae-Hyong Kim (Kumoh National Institute of Technology, Korea)

PhD advisor, University of California at Riverside:

current Malcolm Mumme

2017 Hind Al Hakami

2013 Xiaoqing Jin (Toyota Technical Center)

2013 Yang Zhao (Microsoft)

2008 Min Wan (Software Engineer, Google)

2008 Jinqing “Andy” Yu (R&D Engineer, Synopsys)

2007 Ming-Ying Chung (Senior R&D Engineer, Synopsys)

Masters advisor, University of California at Riverside:

2013 Lei Wang

2012 Yousra Lemabachar

2012 Xin He

2010 Benjamin Smith

2009 Dhrumil Shah

2008 Galen Mecham

2008 Malcolm Mumme

2008 Min Wan

2006 Anwar Adi
2006 John Anderson
2006 Teddy Matinde
2006 Piyush Satapathi
2005 Honomount Rawat

Member of the PhD defense committee, University of California at Riverside:

2013 Denisa Duma
2013 Bing Hu
2013 Zakaria Jesin
2013 Changhui Lin
2012 Thanawin Rakthanmanon
2012 Pamela Bhattacharya
2009 Yu Fan
2009 Dennis Jeffrey
2008 Kin Kan
2007 Hang Li
2006 Arun Saha

Member of the MS committee, University of California at Riverside:

Yuan Tian
Jianbo Chen
Dien-Yen Lin
Cuixiong “Tony” Hu

Member of the PhD qualifying exam, University of California at Riverside:

Tanzirul Azim
Busra Celikkaya
Jonathan Dautrich
Zi Feng
Dan Grissom
Bing Hu
Monik Khare
Changhui Lin
Thanawin Rakthanmanon
Ricky Sethi
Moloud Shahbazi
Mohammad Shokoohi-Yekta
Vineet Singh
Li Tan
Chen Tian
Yonghui Wu
Jesin Zakaria
Bo Zhou
Zhenzhen Ye (Electrical Engineering Department)
Ronald Raymond Dolbin, Jr. (Mathematics Department)
Jeff Pettyjohn (Statistics Department)

Undergraduate research advisor, University of California at Riverside:

2011–2012 Mantej Singh Rajpal
2008–2010 Diego Villaseñor (UC LEADS program)
2008 Jevons Chen (summer internship)
2008 Miguel Rodriguez (summer internship)

PhD advisor, William and Mary:

2003 Radu I. Siminiceanu, 2003 (SDE, Amazon)
2002 Robert L. Jones (Chief Scientist, DSPlogic Inc., Germantown, MD)
2000 Andrew S. Miner (Associate Professor, Iowa State University)

Masters advisor, William and Mary:

2006 Raymond J. Plante
2003 Paul L. Grieco
2003 Hongri Jiang
2003 Robert M. Marmorstein
2002 Wei “Helen” Sun
2000 Michelle M. Griffith
2000 Arun Mangalam
1999 Jeff M. Maddalon
1999 Paul Sugden
1998 Guangzhi Li
1997 Dawn M. Galayda
1996 Xiaochun “Chris” Ji
1995 Andrew S. Miner

Undergraduate research advisor, William and Mary:

2003 Eric W. Davis
2003 Matthew F. Klinger
1995 Heji Kim, 1995 (Honors, Summa cum Laude)

Research advisor, William and Mary High-School Gifted Student Summer Program:

2003 Amanda Burch

External committee member:

2017 Hamed Ghasemieh, University of Twente, The Netherlands (PhD)
2016 Tom van Dijk, University of Twente, The Netherlands (PhD)
2012 Dario D’Amico, Università di Firenze, Italy (Laurea)
2012 José Vander Meulen, Université Catholique de Louvain, Belgium (PhD)
2003 Massimo Forno, Università di Torino, Italy (Laurea)
2002 Marco Gribaudo, Università di Torino, Italy (PhD)
1997 Ricardo Fricks, Duke University, North Carolina (PhD)
1996 Paolo Marenzoni, Università di Parma, Italy (PhD)
1994 James Coleman, University of Adelaide, Australia (PhD)
1994 Reinhard German, Technical University of Berlin, Germany (PhD)

Member of the Honors committee, William and Mary:

John E. Carro
Brian K. Dewey

Member of the Masters committee, William and Mary:

Vesselin A. Diev

Joshua Gluckman
Regina E. Jeter
Yingjie Lan
Leonidas Linardakis
Nathan T. Moore
Rachel I. Moore
Robert R. Painter
Richard Rummage

Member of the PhD committee, William and Mary:

Anna Brunstrom
Benjamin J. Coleman
Aaron T. Hawkins
Barry G. Lawson
Xiaowen “Jason” Liu
Louis Felipe Perrone
Zvezdan Petkovic
Alma Riska
Diann P. Smith

ACADEMIC SERVICE

Campus-wide at Iowa State University:

Spring 2017–present Member, VRAC Internal Review Committee
Fall 2015–present Member, HPC Advisory Committee
March 2016 Moderator: Grant Writing Workshop on NSF CAREER Awards

Departmental at Iowa State University:

January 2014–present Chair of the Computer Science Department

Departmental at the University of California at Riverside:

Summer 2008–Summer 2012 Graduate Advisor
Fall 2007–Spring 2008 Member, Graduate Committee
Fall 2004–Spring 2007 Associate Chair
Winter 2004–Fall 2013 Member of several Ad-Hoc Committees
Fall 2004–Spring 2007 Webmaster
Fall 2004–Spring 2005 Member, Hiring Committee

Campus-wide at the University of California at Riverside:

Fall 2008–Spring 2011 Member, Bourns College of Engineering Executive Committee
Winter 2008 Member, Administration and Infrastructure Committee for the Bourns College of Engineering Retreat, responsible for the Facilities Subcommittee
Fall 2005–Summer 2007 Member, Research Computing Advisory Group
November 2005 Session Chair, Southern California Conference on Undergraduate Research (SCCUR)

Departmental at William and Mary:

Fall 2002–Summer 2003 Member, Graduate Curriculum Committee

Fall 2001–Summer 2003 Chair, Graduate Admission Committee

Fall 2001–Summer 2003 Director of Graduate Studies

Fall 2001–Spring 2002 Chair, Faculty Search and Chair Search Committees

Fall 2000–Spring 2001 Chair, Personnel Committee

Fall 2000–Spring 2002 Member, Systems Committee

Fall 1998–Fall 2003 Member, Personnel Committee

Fall 1996–Spring 1999 Webmaster

Spring 1994–Fall 1999 Faculty member responsible for Communications and Publicity

Spring 1995, Spring 1997, Spring 2001 Member, Faculty Hiring Committee

Fall 1995–Spring 1996, Fall 1998–Spring 1999 Member, Curriculum Committee

Spring 1993–Spring 1995 Member, Examination Committee

1994–1998 Judge, departmental competition for the Regional ACM Programming Contest

Campus-wide at William and Mary:

Spring 2002–Fall 2002 Member, Internal Review Team, Biology Department

December 1998–February 1999 Member, Search Committee for the Director of Conference Services

Spring 1996–Fall 1998 Member, Ad-hoc Intellectual Property Policy Committee

ADDITIONAL INFORMATION

Google Scholar <http://scholar.google.com/citations?user=8rmks2cAAAAJ&hl=en>

Citations: 7097, h-index: 43, i10-index: 91 (as of April 11, 2017)

Member, ACM (SIGMETRICS)

Senior member, IEEE (Computer Society)

US Citizen