Gianfranco Ciardo

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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] [C136] 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] [P129] [P130] and Markovian [P120] analysis

- Load balance and performance analysis of Web servers [J18] [J22] [P80] [P81] [P83] [P86] [P94] [P125] [P128] [M162]

- Distributed algorithms [J12] [J13] [J33] [P96], compositional techniques [J17] [P66] [P67] [P91] [P92] [M154] [M166], 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] [C133] [M152], particularly concurrent software [J6] and avionics applications [P97] [C138]

- Specification formalisms and solution algorithms for modeling tools [J25] [P121] [P49] [P65] [P69] [P75] [P90] [C135] [M155] [M158] [M163] [M164], particularly Petri nets [J38], [J36], [P60] [B142], stochastic Petri nets [J5] [J14] [P55] [P56] [P70] [P68] [C132] [C134] [B139] [B141], 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" [M147]. Advisor: Dr. Kishor S. Trivedi

July 1982 Laurea *summa cum laude*, Università di Torino, Italy, Dipartimento di Informatica
Thesis: "Le Reti di Petri Stochastiche Generalizzate: uno strumento per la modellizzazione di sistemi distribuiti" [P48] [M146]. 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] [M154], 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] [C131].

HONORS AND AWARDS

Invited speaker at SEMISH, 39th Seminar on Hardware and Software, Curitiba, Brazil, July 2012 [M170]

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 Associate Editor, *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* [M165]

September 1996 Guest Editor: special issue on stochastic Petri nets, *IEEE Transactions on Software Engineering* [M156]

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, K. Rozier Co-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. Luettgen 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 [M153]

December 1989 "SPN Applications", PNPM'89, Kyoto, Japan

Partipant 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 [B145]

September 2010 Program Co-Chair, Quantitative Evaluation of Systems (QEST), Williamsburg, VA [B144]

December 2006 Program Co-Chair, IEEE Pacific Rim International Symposium on Dependable Computing (PRDC), Riverside, CA [B143]

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 [B142]

September 2003 Program Co-Chair, Petri Nets and Performance Models (PNPM), Urbana-Champaign, IL [B141]

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 [B139]

May 1995 Co-Organizer, Dagstuhl Seminar on Performance and Dependability Modelling with Stochastic Petri Nets, Saarbrücken, Germany [B140]

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 (IC^{3}N), 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 [M149]

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 [M155] [M158] [M163] [M164] [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 probabilistc 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] [M150]. 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 [M169]

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.) [M169]

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 [M162]

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 [M157]

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 [C137]

June 2006 "Symbolic encodings for stochastic processes", SIGMETRICS, Saint-Malo, France [M168]

September 2005 "Decision diagrams for logic and stochastic modeling", QEST, Torino, Italy [M167]

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 Neteherlands [M166]

July 2000 "Distributed and structured analysis", 1st European Summer School in Trends in Computer Science: Formal Methods and Performance Analysis, Nijmegen, The Netherlands [C136]

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 [M161]

June 1998 "Kronecker operators for the description and solution of large Markov models", SIGMETRICS'98, Madison, WI [M160]

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 [M159]

May 1994 "Stochastic Petri nets: a formalism to describe stochastic processes", SIGMETRICS'94, Nashville, TN [M151]

October 1993 "PNs ⇒ SPNs ⇒ GSPNs ⇒ 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 [M148]

JOURNAL PUBLICATIONS ($\star$ indicates student co-author; $\bullet$ 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.

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[M170] 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).

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ACADEMIC COURSES TAUGHT

Undergraduate courses at Iowa State University:

ComS 331 Theory of Computing: Fall 2017

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 Rohit Dureja (Co-Advisor: Dr. Kristin Rozier, AerE)
   current Zahra Hosseini
   current Chuan Jiang
   current Benjamin Smith

MS advisor, Iowa State University:
   current Nitesh Gupta
   2017 Swarn Priya

Member of the PhD committee, Iowa State University:
   current Alaa Al-Ghazo (ECpE)
   current Junaid Babar
   current Shruti Biswal
   current Md Johirul Islam
   current Andrei Migunov
   current Hung Phan
   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 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: 7531, h-index: 44, i10-index: 94 (as of March 20, 2018)

Member, ACM (SIGMETRICS)

Senior member, IEEE (Computer Society)

US Citizen