

ANDREW S. MINER

Associate Professor
Department of Computer Science
Iowa State University
Ames, IA 50011-1041
USA

Office: +1-515-294-2392
Fax: +1-515-294-0258

asminer@iastate.edu
<http://www.cs.iastate.edu/~asminer>

RESEARCH INTERESTS

- Performance and reliability analysis of systems.
- Model checking and formal methods.
- Binary decision diagrams and variants.
- Petri nets and stochastic modeling.
- Model analysis algorithms.
- Tool development.

EDUCATION

- Ph.D.** *July 2000* Computer Science
College of William and Mary, Williamsburg, VA.
Dissertation: “Data Structures for the Analysis of Large Structured Markov Models” [M3]. Advisor: DR. GIANFRANCO GIARDO
- M.S.** *May 1995* Computer Science
College of William and Mary, Williamsburg, VA.
- B.S.** *May 1993* Physics and Computer Science
Randolph–Macon College, Ashland, VA.

ACADEMIC POSITIONS

- Aug. 2006 — present* **Associate Professor**
Department of Computer Science, Iowa State University, Ames, IA
Nine-month (50% research, 50% teaching) academic year appointment.
- Aug. 2000 — Aug. 2006* **Assistant Professor**
Department of Computer Science, Iowa State University, Ames, IA
Nine-month (50% research, 50% teaching) academic year appointment.

SPONSORED FUNDING

- Aug. 2006 — Jul. 2011* NSF, #0546041, Computer Systems Research (\$400,000), PI
“CAREER: Composition approaches for the analysis of complex systems”
Software: [S1]
Publications: [J5], [J6], [J7], [J8], [M9], [C14], [C15], [C16], [C17]
- Jan. 2007 — Sep. 2007* Rockwell Collins, Inc. (\$36,662), Co-PI
“Addressing Resource Allocation Problem in IMA Software Design”
- Sep. 2005 — Aug. 2006* NSF, #0509340, Computer Systems Research Program (\$49,942), PI
“Software Verification Using Plug and Play Components”
Publications: [J5]
- Jul. 1998 — Jun. 2000* NASA GSRP Fellowships (\$44,000).
“Exact solution techniques for large Markov models”.
Publications: [J0], [C1], [C2], [C3]
- Aug. 1998 — May 2000* Virginia Space Grant Consortium supplemental grants (\$10,000)
“Exact analysis of large Markov models”.
Publications: [J0], [C1], [C2], [C3]

TEACHING ACTIVITIES

Courses Taught

- ComS 228 Introduction to Data Structures
Fall 2002
- ComS 229 Advanced Programming Techniques
Fall 2013, Spring 2013
- ComS 252 Linux Operating System Essentials
Fall 2014 (online), Fall 2013 (online), Fall 2012, Fall 2011, Fall 2010, Fall 2009, Fall 2006, Fall 2005, Fall 2004
- ComS 352 Introduction to Operating Systems
Fall 2002, Fall 2001, Spring 2001
- ComS 490 Independent Study
Fall 2001
- ComS 455/555 Discrete-event Simulation
Fall 2008, Fall 2006, Fall 2005, Fall 2004, Fall 2003
- ComS 556 Analysis algorithms for stochastic models
Spring 2012, Spring 2011, Spring 2009, Spring 2007, Spring 2005, Spring 2003

Ph.D. Students Advised

- current* Yaping Jing
Publications: [C15]
- current* Junaid Babar (co-advised with Samik Basu)
Publications: [C14], [C16], [C17]
- Fall 2009* Hsin-yi Jiang (co-advised with Carl Chang)

M.S. Students Advised

- Fall 2011* Ritu Mundhe, completed Fall 2011
Spr 2010 Nishtha Arora, completed Spring 2010
Spr 2005 Shuxing Cheng, completed Spring 2005
Publications: [C7], [C12]

Ph.D. Defenses (committee member)

- Spr 2014* Ru He (Comp. Sci., Iowa State University)
Sum 2013 Zachary Oster (Comp. Sci., Iowa State University)
Sum 2010 Asif Imran (Physics, Iowa State University)
Fall 2009 Hsin-yi Jiang (Comp. Sci., Iowa State University)
Spr 2009 Jinchun Xia (Comp. Sci., Iowa State University)
Spr 2008 Marco Beccuti (Comp. Sci., University of Torino, Italy)
Spr 2006 Changyan Zhou (Comp. Eng., Iowa State University)
Sum 2005 Wenbin Qiu (Comp. Eng., Iowa State University)
Sum 2004 Yanxin Wang (Comp. Sci., Iowa State University)
Publications: [C10], [C11], [M7]

Ph.D. Preliminary Exams (committee member)

- Fall 2012* Zachary Oster (Comp. Sci., Iowa State University)
Fall 2011 Ru He (Comp. Sci., Iowa State University)
Fall 2007 Asif Imran (Physics, Iowa State University)
Spr 2007 Hsin-yi Jiang (Comp. Sci., Iowa State University)
Spr 2007 Jinchun Xia (Comp. Sci., Iowa State University)
Spr 2005 Steven Jenkins (Comp. Sci., Iowa State University)
Spr 2004 Changyan Zhou (Comp. Eng., Iowa State University)
Spr 2004 Wenbin Qiu (Comp. Eng., Iowa State University)
Fall 2003 Yanxin Wang (Comp. Sci., Iowa State University)

M.S. Defenses (committee member)

- Sum 2014* Sneha Bankar (Comp. Sci., Iowa State University)
Sum 2014 Swapnanjan Chatterjee (Comp. Sci., Iowa State University)
Sum 2012 Katsuya Iwata (Comp. Sci., Iowa State University)
Fall 2011 Yuly Suvorov (Comp. Sci., Iowa State University)
Spr 2011 Paul Jennings (Comp. Sci., Iowa State University)
Spr 2010 Harish Narayanappa (Comp. Sci., Iowa State University)
Sum 2008 Rakesh Setty (Comp. Sci., Iowa State University)
Spr 2007 Joe Schneider (Comp. Eng., Iowa State University)
Fall 2005 Chad Brewbaker (Comp. Sci., Iowa State University)
Fall 2004 Natalia Stakhanova (Comp. Sci., Iowa State University)
Sum 2003 Paul Grieco (Comp. Sci., College of William and Mary)

UNIVERSITY SERVICE

Committee Chair

- Curriculum Revision Committee, Department of Computer Science
Spr 2010 — Sum 2012
- Multimedia and Interactive Computing Committee, Department of Computer Science
Spr 2009 — Spr 2013
- Graduate Admissions Committee, Department of Computer Science
Fall 2006 — Spr 2007

Committee Member

- Software Engineering Curriculum Committee
Spring 2011 — present
- DEO Evaluation Committee, Department of Computer Science
Summer 2007, Fall 2004
- Faculty Search Committee, Department of Computer Science
Fall 2008 — Spr 2009
- Graduate Committee, Department of Computer Science
Fall 2008 — Spr 2013, Fall 2006 — Spr 2007
- Graduate Admissions Committee, Department of Computer Science
Fall 2008 — Spr 2013, Fall 2000 — Spr 2002
- Promotion and Tenure Steering Committee, Department of Computer Science
Sum 2008 — Spr 2009
- Scholarship and Awards Committee, Department of Computer Science
Fall 2008 — Spr 2010, Fall 2003 — Spr 2007
- Teaching Evaluation Committee, Department of Computer Science
Fall 2006 — Spr 2007
- Undergraduate Committee, Department of Computer Science
Fall 2009 — present, Fall 2002 — Spr 2006
- Retention Committee, Department of Computer Science
Fall 2013 — present

PROFESSIONAL SERVICE

Steering Committees

Sep. 2010 — Sep. 2013 Int. Conf. on Quantitative Evaluation of Systems (QEST)

Program Committee Co-chair

Sep. 2006 3rd Int. Conf. on Quantitative Evaluation of Systems (QEST 2006)

Tools Chair

Sep. 2004 1st Int. Conf. on Quantitative Evaluation of Systems (QEST 2004)

Program Committees

Workshop on Multiformalism Modeling
2012

International Conference on Application and Theory of Petri Nets (ICATPN)
2014, 2013, 2012

Numerical Solution of Markov Chains (NSMC)
2010

Performance and Dependability Symposium (PDS track of DSN)
2010

International ICST Conference on Simulation Tools and Techniques (SIMUTools)
2013, 2012, 2011, 2010

IEEE International Computer Software and Applications Conference (COMPSAC)
2008

International Conference on Quantitative Evaluation of Systems (QEST)
2011, 2010, 2009, 2008, 2005

European Performance Evaluation Workshop (EPEW)
2006, 2005

International Workshop on Petri Nets and Performance Models (PNPM)
2003, 2001

Miscellaneous

Mar. 2013 National Science Foundation review panel

Apr. 2011 External reviewer for Computer Science Department,
Randolph–Macon College, Ashland, VA

May 2009 National Science Foundation review panel

INVITED PRESENTATIONS

- Jun. 2008* Dipartimento di Informatica, Università di Torino
Short course: “Advanced Data Structures and Algorithms”
- Feb. 2005* 2005 SIAM Conference on Computational Science & Engineering
Presentation title: “Representing and Solving Large Markov Chains”
- Jun. 2004* Dipartimento di Informatica, Università di Torino
Presentation title: “An Algebra for Decision Diagrams
(The grand unified theory of everything)”
- Dec. 2002* GI/Dagstuhl Research Seminar: Validation of Stochastic Systems
Presentation title: “Symbolic Representations and Analysis of Large State Spaces”
Joint presentation with Dave Parker, University of Birmingham
- Dec. 2000* Dipartimento di Informatica, Università di Torino
Presentation title: “A Novel Approximation Technique based on
Kronecker Products, MDDs, and Aggregation”
- Jan. 2000* Colloquium: Department of Computer Science, College of William and Mary
Presentation title: “Using decision diagrams for efficient model analysis”

SOFTWARE DEVELOPMENT

- Design and implementation of MEDDLY: Multi-terminal and Edge-valued Decision Diagram Library. Available online [S1]. Related publications: [C14], [C16], [C17]
- Design and implementation of SMART: Stochastic Model checking Analyzer for Reliability and Timing. Available online [S0]. Publications: [J3], [J7], [C9], [M1], [M2], [M4], [M5], [M6]

AWARDS

- Article [C18] received “The IFIP TC2 Manfred Paul Award for Excellence in Software: Theory and Practice”
- Conference article [C12] nominated for best paper award (top 7)
- Conference articles [C5], [C9], [C13] selected for journal publication in extended form [J1], [J3], [J4]
- Member of Φ BK honor society

JOURNAL ARTICLES

- [J8] 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(5):463–486, 2011.
- [J7] Gianfranco Ciardo, Andrew S. Miner, and Min Wan. Advanced features in SMART: the Stochastic Model checking Analyzer for Reliability and Timing. *SIGMETRICS Perform. Eval. Rev.*, 36(4):58–63, March 2009.
- [J6] Andrew S. Miner. Decision diagrams for the exact solution of Markov models. *Proceedings in Applied Mathematics and Mechanics (PAMM)*, 7(1):1080701–1080702, 2007.
- [J5] Gianfranco Ciardo, Gerald Lüttgen, and Andrew S. Miner. Exploiting interleaving semantics in symbolic state-space generation. *Formal Methods in System Design*, 31(1):63–100, August 2007.

- [J4] Andrew S. Miner. Saturation for a general class of models. *IEEE Trans. Softw. Eng.*, 32(8):559–570, August 2006.
- [J3] Gianfranco Ciardo, Robert Jones, Andrew Miner, and Radu Siminiceanu. Logic and stochastic modeling with SMART. *Perf. Eval.*, 63(6):578–608, June 2006.
- [J2] Gianfranco Ciardo and Andrew S. Miner. Implicit data structures for logic and stochastic systems analysis. *SIGMETRICS Perform. Eval. Rev.*, 32(4):4–9, March 2005.
- [J1] Andrew S. Miner. Implicit GSPN reachability set generation using decision diagrams. *Perf. Eval.*, 56(1-4):145–165, March 2004.
- [J0] Andrew S. Miner, Gianfranco Ciardo, and Susanna Donatelli. Using the exact state space of a Markov model to compute approximate stationary measures. *SIGMETRICS Perform. Eval. Rev.*, 28(1):207–216, June 2000.

BOOK CHAPTERS (PEER–REVIEWED)

- [B0] Andrew Miner and David Parker. Symbolic representations and analysis of large state spaces. In Christel Baier, Boudeewijn R. Haverkort, Holger Hermanns, Joost-Pieter Katoen, and Markus Siegle, editors, *Validation of Stochastic Systems*, LNCS 2925, pages 296–338. Springer-Verlag, 2004.

CONFERENCE PUBLICATIONS (PEER–REVIEWED)

- [C18] Samuel J. Ellis, Eric R. Henderson, Titus H. Klinge, James I. Lathrop, Jack H. Lutz, Robyn R. Lutz, Divita Mathur, and Andrew S. Miner. Automated requirements analysis for a molecular watchdog timer. In *Proceedings of the 29th ACM/IEEE International Conference on Automated Software Engineering, ASE '14*, pages 767–778, New York, NY, USA, 2014. ACM.
- [C17] Junaid Babar and Andrew Miner. Explicit state space and Markov chain generation using decision diagrams. In *11th European Workshop on Performance Engineering (EPEW'14)*, LNCS 8721, pages 240–254, September 2014.
- [C16] Junaid Babar and Andrew Miner. Meddly: Multi-terminal and Edge-valued Decision Diagram Library. In Gianfranco Ciardo and Roberto Segala, editors, *7th Int. Conf. on Quantitative Evaluation of Systems (QEST'10)*, pages 195–196, Williamsburg, VA, USA, September 2010.
- [C15] Andrew S. Miner and Yaping Jing. A formal language toward the unification of model checking and performance evaluation. In *17th Int. Conf. on Analytical and Stochastic Modelling Techniques and Applications (ASMTA'10)*, LNCS 6148, pages 130–144, June 2010.
- [C14] Junaid Babar, Marco Beccuti, Susanna Donatelli, and Andrew Miner. GreatSPN enhanced with decision diagram data structures. In *Application and Theory of Petri Nets 2010 (Proc. 31st Int. Conf. on Applications and Theory of Petri Nets)*, LNCS 6128, pages 308–317, June 2010.
- [C13] Andrew S. Miner. Saturation for a general class of models. In Giuliana Franceschinis, Joost-Pieter Katoen, and Murray Woodside, editors, *1st Int. Conf. on Quantitative Evaluation of Systems (QEST'04)*, pages 282–291, Enschede, The Netherlands, September 2004.
- [C12] Andrew S. Miner and Shuxing Cheng. Improving efficiency of implicit Markov chain state classification. In Giuliana Franceschinis, Joost-Pieter Katoen, and Murray Woodside, editors, *1st Int. Conf. on Quantitative Evaluation of Systems (QEST'04)*, pages 262–271, Enschede, The Netherlands, September 2004.
- [C11] Yanxin Wang, Johnny Wong, and Andrew Miner. Novel machine learning techniques for anomaly intrusion detection. In *Proceedings of the 10th Americas Conf. on Information Systems*, pages 4433–4440, New York, NY, August 2004.

- [C10] Yanxin Wang, Johnny Wong, and Andrew Miner. Anomaly intrusion detection using one class SVM. In *5th Annual IEEE Information Assurance Workshop*, pages 358–364, West Point, NY, June 2004. IEEE.
- [C9] Gianfranco Ciardo, Robert Jones, Andrew Miner, and Radu Siminiceanu. Logical and stochastic modeling with SMART. In Peter Kemper and William H. Sanders, editors, *Proc. 13th Int. Conf. on Modelling Techniques and Tools for Computer Performance Evaluation*, LNCS 2794, pages 78–97, Urbana, IL, USA, September 2003. Springer-Verlag.
- [C8] Andrew S. Miner. Computing response time distributions using stochastic Petri nets and matrix diagrams. In Gianfranco Ciardo and William H. Sanders, editors, *10th Int. Workshop on Petri Nets and Performance Models (PNPM'03)*, pages 10–19, Urbana-Champaign, IL, USA, September 2003. IEEE Comp. Soc. Press.
- [C7] Andrew S. Miner and Shuxing Cheng. Using distance to improve implicit state classification of Markov chains. In *6th Int. Workshop on Performability Modeling of Computer and Communication Systems (PMCCS-6)*, pages 66–69, September 2003.
- [C6] Gianfranco Ciardo, Massimo Forno, Paul Grieco, and Andrew Miner. Comparing implicit representations of large CTMCs. In Amy N. Langville and William J. Stewart, editors, *4th Int. Conf. on the Numerical Solution of Markov Chains (NSMC'03)*, pages 323–327, Urbana, IL, USA, September 2003.
- [C5] Andrew S. Miner. Efficient state space generation of GSPNs using decision diagrams. In *Proc. 2002 Int. Conf. on Dependable Systems and Networks (DSN 2002)*, pages 637–646, Washington, DC, June 2002.
- [C4] Andrew S. Miner. Efficient solution of GSPNs using Canonical Matrix Diagrams. In Reinhard German and Boudewijn Haverkort, editors, *9th Int. Workshop on Petri Nets and Performance Models (PNPM'01)*, pages 101–110, Aachen, Germany, September 2001. IEEE Comp. Soc. Press.
- [C3] Andrew S. Miner, Gianfranco Ciardo, and Susanna Donatelli. Using the exact state space of a Markov model to compute approximate stationary measures. In *Proc. 2000 ACM SIGMETRICS Conf. on Measurement and Modeling of Computer Systems*, pages 207–216, Santa Clara, CA, June 2000.
- [C2] Gianfranco Ciardo and Andrew S. Miner. A data structure for the efficient Kronecker solution of GSPNs. In Peter Buchholz, editor, *8th Int. Workshop on Petri Nets and Performance Models (PNPM'99)*, pages 22–31, Zaragoza, Spain, September 1999. IEEE Comp. Soc. Press.
- [C1] Andrew S. Miner and Gianfranco Ciardo. Efficient reachability set generation and storage using decision diagrams. In H.C.M. Kleijn and Susanna Donatelli, editors, *Application and Theory of Petri Nets 1999 (Proc. 20th Int. Conf. on Applications and Theory of Petri Nets)*, LNCS 1639, pages 6–25, Williamsburg, VA, USA, June 1999. Springer-Verlag.
- [C0] Gianfranco Ciardo and Andrew S. Miner. Storage alternatives for large structured state spaces. In R. Marie, B. Plateau, M. Calzarossa, and G. Rubino, editors, *Proc. 9th Int. Conf. on Modelling Techniques and Tools for Computer Performance Evaluation*, LNCS 1245, pages 44–57, Saint Malo, France, June 1997. Springer-Verlag.

INVITED PAPERS

- [I0] Gianfranco Ciardo and Andrew S. Miner. Structural approaches for SPN analysis. In *High Performance Computing 2000, Grand Challenges in Computer Simulation*, pages 345–356, Washington, DC, April 2000.

MISCELLANEOUS PUBLICATIONS

- [M9] Gianfranco Ciardo, Andrew S. Miner, Min Wan, and Andy Jinqing Yu. Approximating stationary measures of structured continuous-time Markov models using matrix diagrams. In *Performance (poster presentation)*, Cologne, Germany, October 2007.
- [M8] Andrew S. Miner and Samik Basu. Verification of software via integration of design and implementation. In *Parallel and Distributed Processing Symposium, 2006*, April 2006.
- [M7] Yanxin Wang, Andrew S. Miner, Johnny Wong, and Prem Uppuluri. Improving feature selection in anomaly intrusion detection using specifications. In *Int. Conf. on Distributed Computing and Internet Technology*, LNCS 3347, page 468. Springer-Verlag, December 2004.
- [M6] Gianfranco Ciardo and Andrew S. Miner. SMART: the Stochastic Model checking Analyzer for Reliability and Timing. In Giuliana Franceschinis, Joost-Pieter Katoen, and Murray Woodside, editors, *1st Int. Conf. on Quantitative Evaluation of Systems (QEST'04)*, pages 338–339, Enschede, The Netherlands, September 2004.
- [M5] 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. Int. Conf. on Dependable Systems & Networks (DSN)*, page 545, Washington, D.C., USA, June 2002.
- [M4] Gianfranco Ciardo, Robert L. Jones, Andrew S. Miner, and Radu Siminiceanu. SMART: Stochastic Model Analyzer for Reliability and Timing. In Peter Kemper, editor, *Tools of Int. Multiconf. Measurement, Modelling and Evaluation of Computer-Communication Systems*, pages 29–34, Aachen, Germany, September 2001.
- [M3] Andrew S. Miner. *Data Structures for the Analysis of Large Structured Markov Models*. PhD thesis, The College of William and Mary, Williamsburg, VA, 2000.
- [M2] Gianfranco Ciardo and Andrew S. Miner. SMART: Simulation and Markovian Analyzer for Reliability and Timing. In *Tool Descriptions from the 9th Int. Conf. on Modelling Techniques and Tools for Computer Performance Evaluation and the 7th Int. Workshop on Petri Nets and Performance Models*, pages 41–43, St. Malo, France, June 1997.
- [M1] Gianfranco Ciardo and Andrew S. Miner. SMART: Simulation and Markovian Analyzer for Reliability and Timing. In *Proc. IEEE International Computer Performance and Dependability Symposium (IPDS'96)*, page 60, Urbana-Champaign, IL, USA, September 1996. IEEE Comp. Soc. Press.
- [M0] David M. Nicol and Andrew S. Miner. The fluid stochastic Petri net simulator. In *6th Int. Workshop on Petri Nets and Performance Models (PNPM'95)*, pages 214–215, Durham, NC, October 1995. IEEE Comp. Soc. Press.

ONLINE SOFTWARE

- [S1] MEDDLY webpage. <http://meddly.sourceforge.net>.
- [S0] SMART webpage. <http://www.cs.ucr.edu/~ciardo/SMART>.