

September 13, 2005

# CURRICULUM VITAE

Grigore Roşu

Born on 12 December 1971, Bucharest, Romania.  
Married, one child.

*Current Position:* Assistant Professor

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## **Research Interests**

Software and software related aspects. Design, semantics and implementation of programming and specification languages. Automated software engineering and formal methods, especially “push-button” techniques for certification, monitoring, synthesis and modularization. Automated reasoning about computer systems, applications of logics, theorem proving. Algorithms, (co)algebra, category theory.

## **Education**

PhD in Computer Science	University of California at San Diego, 2000
M.S. in Fundamentals of Computing	University of Bucharest, Romania, 1996
B.A. in Mathematics	University of Bucharest, Romania, 1995

## **Professional and Academic Experience**

- 2002 to present. Assistant Professor. Department of Computer Science, University of Illinois at Urbana-Champaign, USA.
- 2000-2002. Research Scientist. NASA Ames Research Center, California, USA. Automated Software Engineering Group, hired by the Research Institute for Advanced Computer Science of the Universities Space Research Association.
- Summer 2000. Instructor for “Data Structures & Algorithms.” Department of Computer Science & Engineering, University of California at San Diego, USA.

- 1996-2000. Research assistant, teaching assistant and Ph.D. student. Department of Computer Science & Engineering, University of California at San Diego, USA. Ph.D. and research advisor: Joseph Goguen.
- 1998-2002. Assistant Professor. Chair of Fundamentals of Computer Science, Department of Mathematics at the University of Bucharest, Romania.
- 1996-1998. Preparator. Chair of Fundamentals of Computer Science, Department of Mathematics at the University of Bucharest, Romania.
- 1995-1996. Teaching assistant, research assistant and M.A. student in Fundamentals of Computer Science, Department of Mathematics at the University of Bucharest, Romania. M.A. and research advisor: Virgil Emil Căzănescu.
- 1994-1996. Consultant to Automation Research Institute IPA, Romania. Working on European Community projects. Advisor and coordinator: Gheorghe Săndulescu.

## **Awards and Distinctions**

Reverse chronological order:

- “C.W. Gear Junior Faculty Award”, 2005, offered by the Department of Computer Science of the University of Illinois at Urbana-Champaign for research and teaching accomplishments.
- “CAREER” award, 2005, offered by the National Science Foundation (NSF), under the program “Software Engineering and Languages”.
- “European Association for the Study of Science and Technology” award winner for the best software science paper at ETAPS 2002.
- “Irina Gorun-Bercovici memorial prize”, 22 December 1997, offered by the Society of Mathematicians from Romania (once a year to a young researcher in computer science).
- 1st place, National Symposium “Info-Junior,” Iași 1995, Romania, with *Inclusive Equational Logics*.
- 2nd place, National Symposium “Info-Junior,” Iași 1993, Romania, with *Knuth-Bendix Completion in Prolog*.

## **Grants**

- (co-PI, CNS-0509321) “CSR—SMA: Dynamic Analysis and Control for Robust Scalable Open Distributed Systems”, with Gul Agha (PI) and Mahesh Viswanathan (co-PI). National Science Foundation (NSF). \$700,000 for the period 2005-2009.
- (PI, CCF-0448501) “CAREER: Runtime Verification and Monitoring”. National Science Foundation (NSF). \$400,000 for the period 2005-2010.
- (PI, NNA04CI49A) “Scalable Formal Methods for Multidimensional Components”, with José Meseguer (co-PI). National Aeronautics and Space Administration (NASA) cooperative agreement, \$80,000 for the period 2003-2004.

- (PI, CCF-0234524) “Scalable Formal Methods for Multidimensional Components”, with José Meseguer (co-PI). National Science Foundation (NSF). \$400,000 for the period 2002-2006.

## Visiting Positions

- 7-17 December 2001  
University of Illinois at Urbana-Champaign, invited by José Meseguer.

## Publications

All papers are available on line from <http://fsl.cs.uiuc.edu/~grosu>.

## Journal Papers

- 1) “Online Efficient Predictive Safety Analysis of Multithreaded Programs,” with Koushik Sen and Gul Agha. *Software Tools and Technology Transfer*, to appear, 2005.
- 2) “An Instrumentation Technique for Online Analysis of Multithreaded Systems,” with Koushik Sen. *Concurrency and Computation: Practice and Experience*, to appear, 2005.
- 3) “An Equational Specification for the Scheme Language,” with Marcelo d’Amorim. *Universal Computer Science*, Volume 11, Number 7, 2005, pages 1327-1348.
- 4) “Combining Test Case Generation and Runtime Verification,” with Cyrille Artho, Howard Barringer, Allen Goldberg, Klaus Havelund, Sarfraz Khurshid, Mike Lowry, Corina Păsăreanu, Koushik Sen, Willem Visser, Rich Washington. *Theoretical Computer Science*, Volume 336, Issues 2-3, 26 May 2005, pages 209-234.
- 5) “Rewriting-based Techniques for Runtime Verification,” with Klaus Havelund. *Automated Software Engineering*, Volume 12, Number 2, 2005, pages 151-197.
- 6) “Behavioral Abstraction is Hiding Information.” *Theoretical Computer Science*, Volume 327, Number 1-2, 2004, pages 197-221.
- 7) “Efficient Monitoring of Safety Properties,” with Klaus Havelund. *Software Tools and Technology Transfer*, Volume 6, Number 2, 2004, pages 158-173.
- 8) “An Overview of the Runtime Verification Tool Java PathExplorer,” with Klaus Havelund. *Formal Methods in System Design*, Volume 24, Issue 2, 2004, pages 189-215.
- 9) “Institution Morphisms,” with Joseph Goguen. *Formal Aspects of Computing*, Volume 13, Issue 3-5, 2002, pages 274-307.
- 10) “Axiomatizability in Inclusive Equational Logic.” *Mathematical Structures in Computer Science*, Volume 12, Number 5, 2002.
- 11) “Equational Axiomatizability for Coalgebra.” *Theoretical Computer Science*, Volume 260, Issue 1-2, 2001, pages 229-247.

- 12) “Weak Inclusion Systems; part two,” with Virgil Emil Căzănescu. *Journal of Universal Computer Science*, Volume 6, Issue 1, 2000, pages 5-21.
- 13) “On Equational Craig Interpolation”, with Joseph Goguen. *Journal of Universal Computer Science*, Volume 6, Issue 1, 2000, pages 194-200.
- 14) “Kan Extensions of Institutions.” *Journal of Universal Computer Science*, Volume 5, Issue 8, 1999, pages 482-493.
- 15) “Weak Inclusion Systems,” with Virgil Emil Căzănescu. *Mathematical Structures in Computer Science*, Volume 7, Number 2, 1997, pages 195-206.

### **Editing: Proceedings Books, Special Issues of Journals**

- 16) “Runtime Verification 2004 (RV’04),” proceedings book of a satellite workshop to TACAS’04 at ETAPS’04 held on 3 April 2004, Barcelona, Spain, edited with Klaus Havelund. *Electronic Notes in Theoretical Computer Science*, Volume 113, 2005.
- 17) “Runtime Verification,” with Klaus Havelund. Special issue of the International Journal on *Formal Methods in System Design*, by Kluwer Academic Publishers, to appear 2005. Dedicated to the Second Runtime Verification Workshop held in Copenhagen, Denmark, 26 July 2002. Satellite event to CAV’02.
- 18) “Runtime Verification 2002 (RV’02),” proceedings book of a satellite workshop to CAV’02 held on 26 July 2002, Copenhagen, Denmark, edited with Klaus Havelund. *Electronic Notes in Theoretical Computer Science*, Volume 70.4, 2002.
- 19) “Runtime Verification,” with Klaus Havelund. Special issue of the International Journal on *Formal Methods in System Design*, by Kluwer Academic Publishers, Volume 24, Issue 2, 2004. Dedicated to the First Runtime Verification Workshop held in Paris, France, 23 July 2001. Satellite event to CAV’01.
- 20) “Runtime Verification 2001 (RV’01),” proceedings book of a satellite workshop to CAV’01 held on 23 July 2001, Paris, France, edited with Klaus Havelund. *Electronic Notes in Theoretical Computer Science*, Volume 55.2, 2001.

### **Book Contributions**

- 21) “Composing Hidden Information Modules over Inclusive Institutions,” with Joseph Goguen. In *Essays in Memory of Ole-Johan Dahl, 2004*. Edited by O. Owe, S. Krogdahl and T. Lyche. *Lecture Notes in Computer Science*, Volume 2635, pages 96-123. Springer.
- 22) “An Overview of the Tatami Project,” with Joseph Goguen, Kai Lin, Akira Mori and Bogdan Warinschi. Chapter 3 of *Cafe: An Industrial-Strength Algebraic Formal Method*, pages 61-78. Edited by Kokichi Futatsugi, Tetsuo Tamai and Ataru Nakagawa. Elsevier, 2000.

## Invited Papers

- 23) “The Rewriting Logic Semantics Project”, with José Meseguer. Proceedings of the Second Workshop on *Structural Operational Semantics, SOS’05*, Lisbon, Portugal, 10 July 2005. *Electronic Notes in Theoretical Computer Science*, to appear 2005.
- 24) “Rewriting Logic Semantics: From Language Specifications to Formal Analysis Tools”, with José Meseguer. Proceedings of the Second *International Joint Conference on Automated Reasoning, IJ-CAR’04*, Cork, Ireland, 04 July - 08 July, 2004. *Lecture Notes in Computer Science*, Volume 3097, 2004, pages 1–44. Acceptance rate 26/74 (35%).
- 25) “Experiments with Test Case Generation and Runtime Analysis”, with Cyrille Artho, Doron Drusinski, Allen Goldberg, Klaus Havelund, Mike Lowry, Corina Păsăreanu, Willem Visser. Proceedings of the 10th International Workshop on *Abstract State Machines, ASM’03*, Taormina, Italy, 3-7 March 2003. *Lecture Notes in Computer Science*, Volume 2589, 2004, pages 87-107.
- 26) “An Instrumentation Technique for Online Analysis of Multithreaded Programs”, with Koushik Sen. Proceedings of *Parallel and Distributed Systems: Testing and Debugging PADTAD’04*, Santa Fe, New Mexico, USA, 26-30 April, 2004. *IEEE Digital Library*.
- 27) “Towards Behavioral Maude: Behavioral Membership Equational Logic,” with José Meseguer. Proceedings of *Coalgebraic Methods in Computer Science, CMCS’02*, Grenoble, France, 6-7 April 2002. *Electronic Notes in Theoretical Computer Science*, Volume 65.1, 2002.
- 28) “Behavioral and Coinductive Rewriting,” with Joseph Goguen and Kai Lin. Proceedings of *Workshop on Rewriting Logic and its Applications, WRLA’00*, Kanazawa, Japan, 19 September 2000. *Electronic Notes in Theoretical Computer Science*, Volume 36, 2001.
- 29) “A Protocol for Distributed Cooperative Work,” with Joseph Goguen. Proceedings of *Workshop on Distributed Systems, WDS’99*, Iași, Romania, 2 September 1999. *Electronic Notes in Theoretical Computer Science*, Volume 28, 1999.

## Conference, Workshop and Symposium Papers

- 30) “Checking and Correcting Behaviors of Java Programs at Runtime with Java-MOP”, with Feng Chen and Marcelo d’Amorim. Proceedings of the *International Workshop on Runtime Verification, RV’05*, Edinburgh, Scotland, UK, 12 July 2005. *Electronic Notes in Theoretical Computer Science*, to appear. Acceptance rate 8/14 (57%).
- 31) “Towards Formally Defining and Verifying Master/Slave Speculative Parallelization”, with Pierre Salverda and Craig Zilles. Proceedings of the *International Conference on Formal Methods, FM’05*, University of Newcastle upon Tyne, UK, 18-22 July 2005. *Lecture Notes in Computer Science*, Volume 3582, 2005, pages 123-138. Acceptance rate 31/129 (24%).
- 32) “Behavioral Extensions of Institutions”, with Andrei Popescu. Proceedings of the 1st *Conference on Algebra and Coalgebra in Computer Science, CALCO’05*, University of Wales Swansea, UK, 3-6 September 2005. *Lecture Notes in Computer Science*, Volume 3629, 2005, pages 331-147. Acceptance rate 25/62 (40%).

- 33) “Efficient Monitoring of Omega-Languages”, with Marcelo D’Amorim. Proceedings of the 17th *International Conference on Computer Aided Verification, CAV’05*, Edinburgh, Scotland, UK, 6-10 July 2005. *Lecture Notes in Computer Science*, Volume 3576, 2005, pages 364-378. Acceptance rate 32/125 (26%).
- 34) “Detecting Errors in Multithreaded Programs by Generalized Predictive Analysis of Executions”, with Koushik Sen, Gul Agha. Proceedings of the 7th *International Conference on Formal Methods for Open Object-based Distributed Systems, FMOODS’05*, Athens, Greece, 15-17 June 2005. *Lecture Notes in Computer Science*, Volume 3535, 2005, pages 211-226. Acceptance rate 19/42 (45%).
- 35) “A Tree Based Router Search Engine Architecture With Single Port Memories”, with Florin Baboescu, Dean M. Tullsen, Sumeet Singh. Proceedings of the 32nd *International Symposium on Computer Architecture, ISCA’05*, Madison, Wisconsin, USA, 4-8 June 2005. *IEEE*, pages 123-133. Acceptance rate 45/194 (23%).
- 36) “An Equational Specification for the Scheme Language,” with Marcelo d’Amorim. Proceedings of the 9th *Brazilian Symposium on Programming Languages, (SBLP’05)*, Recife, PE, Brazil, 23-25 May 2005.
- 37) “Java-MOP: A Monitoring Oriented Programming Environment for Java”, with Feng Chen. Proceedings of the 11th *International Conference on Tools and Algorithm for the Construction and Analysis of Systems, TACAS’05*, Edinburgh, U.K., 4-8 April 2005. *Lecture Notes in Computer Science*, Volume 3440, 2005, pages 546-550. Tool paper. Acceptance rate for tool papers 8/20 (40%).
- 38) “A Formal Monitoring-based Framework for Software Development and Analysis”, with Feng Chen, Marcelo D’Amorim. Proceedings of the 6th *International Conference on Formal Engineering Methods, ICFEM’04*, Seattle, USA, 8-12 November 2004. *Lecture Notes in Computer Science*, Volume 3308, 2004, pages 357-372. Acceptance rate 30/110 (27%).
- 39) “From Conditional to Unconditional Rewriting”. *Recent Trends in Algebraic Development Techniques; Proceedings with selected papers presented at WADT’04*, Barcelona, Spain, 27-29 March 2004. *Lecture Notes in Computer Science*, Volume 3423, 2004, pages 218-233. Acceptance rate 14/33 (42%).
- 40) “Extensional Theories and Rewriting”. Proceeding of the 31st *International Colloquium on Automata, Languages and Programming, ICALP’04*, Turku, Finland, 12-16 July 2004. *Lecture Notes in Computer Science*, Volume 3142, 2004, pages 1066-1079. Acceptance rate 28/107 (26%).
- 41) “Formal Analysis of Java Programs in JavaFAN”, with Azadeh Farzan, Feng Chen, and José Meseguer. Proceedings of the 16th *International Conference on Computer Aided Verification, CAV’04*, Boston, Massachusetts, USA, 13-17 July 2004. *Lecture Notes in Computer Science*, Volume 3114, 2004, pages 501-505. Acceptance rate 48/144 (33%).
- 42) “On Specifying and Monitoring Epistemic Properties of Distributed Systems”, with Koushik Sen, Abhay Vardan, Gul Agha. Proceedings of the 2nd *International Workshop on Dynamic Analysis, WODA’04*, Edinburgh, Scotland, UK, 25 May 2004. *British Institution of Electrical Engineers (IEE)*, 2004. Acceptance rate 11/22 (50%).

- 43) “Formal JVM Code Analysis in JavaFAN”, with Azadeh Farzan and José Meseguer. Proceedings of 10th International Conference on *Algebraic Methodology And Software Technology, AMAST’04*, Stirling, Scotland, UK, 12-16 July 2004. *Lecture Notes in Computer Science*, Volume 3116, 2004, pages 132-147. Acceptance rate 35/63 (55%).
- 44) “Monitoring Algorithms for Metric Temporal Logic Specifications”, with Prasanna Thati. Proceedings of the 4th International Workshop on *Runtime Verification, RV’04*, Barcelona, Spain, 3 April 2004. *Electronic Notes in Theoretical Computer Science*, Volume 113, 2005, pages 145-162.
- 45) “Efficient Decentralized Monitoring of Safety in Distributed Systems”, with Koushik Sen, Abhay Vardhan, and Gul Agha. Proceedings of the 26th *International Conference on Software Engineering, ICSE’04*, Edinburgh, Scotland, UK, 23-28 May 2004. *IEEE*, 2004, pages 418-427. Acceptance rate 58/436 (13%).
- 46) “Online Efficient Predictive Safety Analysis of Multithreaded Programs,” with Koushik Sen and Gul Agha. Proceedings of the 10th International Conference on *Tools and Algorithm for the Construction and Analysis of Systems, TACAS’04*, Barcelona, Spain, 29 March - 2 April, 2004. *Lecture Notes in Computer Science*, Volume 2988, 2004, pages 123-138. Acceptance rate 37/145 (26%).
- 47) “Generating Optimal Linear Temporal Logic Monitors by Coinduction,” with Koushik Sen and Gul Agha. Proceedings of the 8th Asian Computing Science Conference, *ASIAN’03*, Mumbai, India, 10-13 December 2003. *Lecture Notes in Computer Science*, Volume 2896, 2003, pages 260-275. Acceptance rate 16/53 (30%).
- 48) “Certifying Measurement Unit Safety Policy,” with Feng Chen. Proceedings of the *IEEE International Conference on Automated Software Engineering, ASE’03*, Helsinki, Finland, September 2003. *IEEE*, 2003, pages 304-309. Short paper. Acceptance rate 48/170 (28%).
- 49) “Generating Optimal Monitors for Extended Regular Expressions,” with Koushik Sen. Proceedings of the 3rd International Workshop on *Runtime Verification, RV’03*, Boulder, Colorado, USA, 13 July 2003. *Electronic Notes in Theoretical Computer Science*, Volume 89.2, 2003.
- 50) “Towards Monitoring-Oriented Programming: A Paradigm Combining Specification and Implementation,” with Feng Chen. Proceedings of the 3rd International Workshop on *Runtime Verification, RV’03*, Boulder, Colorado, USA, 13 July 2003. *Electronic Notes in Theoretical Computer Science*, Volume 89.2, 2003.
- 51) “Certifying and Synthesizing Membership Equational Proofs,” with Steven Eker, Patrick Lincoln and José Meseguer. Proceedings of the 12th International *Formal Methods Symposium, FME’03*, Pisa, Italy, 8-14 September 2003. *Lecture Notes in Computer Science*, Volume 2805, 2003, pages 359-380. Acceptance rate 44/144 (31%).
- 52) “Runtime Safety Analysis of Multithreaded Programs,” with Koushik Sen and Gul Agha. Proceedings of *European Software Engineering Conference and ACM SIGSOFT Symposium on the Foundations of Software Engineering, ESEC/FSE’03*, Helsinki, Finland, 1-5 September 2003. *ACM*, 2003, pages 337-346. Acceptance rate 42/168 (25%).
- 53) “Conditional Circular Coinductive Rewriting with Case Analysis,” with Joseph Goguen. *Recent Trends in Algebraic Development Techniques; Proceedings with selected papers presented at WADT’02*,

- Frauenchiemsee, Germany, 24-27 September 2002. *Lecture Notes in Computer Science*, Volume 2755, 2003, pages 216-232. Acceptance rate 20/44 (45%).
- 54) “Certifying Optimality of State Estimation Programs,” with Ram Prasad Venkatesan, Jon Whittle, Laurentiu Leustean. Proceedings of the 15th International conference on *Computer Aided Verification, CAV’03*, Boulder, Colorado, USA, 8-12 July 2003. *Lecture Notes in Computer Science*, Volume 2725, 2003, pages 301-314. Acceptance rate 32/87 (37%).
  - 55) “Testing Extended Regular Language Membership Incrementally by Rewriting,” with Mahesh Viswanathan. Proceedings of the 14-th International Conference on *Rewriting, Techniques and Applications, RTA’03*, Valencia, Spain, 9-11 June 2003. *Lecture Notes in Computer Science*, Volume 2706, 2003, pages 499-514. Acceptance rate 32/61 (52%).
  - 56) “Rule-Based Analysis of Dimensional Safety,” with Feng Chen and Ram Prasad Venkatesan. Proceedings of the 14-th International Conference on *Rewriting, Techniques and Applications, RTA’03*, Valencia, Spain, 9-11 June 2003. *Lecture Notes in Computer Science*, Volume 2706, 2003, pages 197-207. Acceptance rate 32/61 (52%).
  - 57) “Inductive Behavioral Proofs by Unhiding.” Proceedings of the 6th International Workshop on *Coalgebraic Methods in Computer Science, CMCS’03*, Warsaw, Poland, 5-6 April 2003. *Electronic Notes in Theoretical Computer Science*, Volume 86, 2003.
  - 58) “On Implementing Behavioral Rewriting.” Proceedings of the 3rd ACM SIGPLAN International Workshop on *Rule Based Programming, RULE’02*, Pittsburg, Pensilvania, USA, 5 October 2002. *ACM Digital Library*. Acceptance rate 8/13 (62%).
  - 59) “Towards Certifying Domain-Specific Properties of Synthesized Code,” with Jon Whittle. Proceedings of the 3rd ACM International Workshop on *Verification and Computational Logic, VCL’02*, Pittsburg, Pensilvania, USA, 5 October 2002.
  - 60) “Towards Certifying Domain-Specific Properties of Synthesized Code - Extended Abstract,” with Jonathan Whittle. Proceedings of the 17th IEEE International Conference on *Automated Software Engineering, ASE’02*, Edinburgh, UK, 23-27 September 2002. *IEEE Computer Society*, pages 289-194. Acceptance rate 38/94 (40%).
  - 61) “A Total Approach to Partial Algebraic Specification,” with José Meseguer. Proceedings of the 29-th *International Colloquium on Automata, Languages, and Programming, ICALP’02*, Málaga, Spain, 8-13 July 2002. *Lecture Notes in Computer Science*, Volume 2380, 2002, pages 572-584. Acceptance rate 19/65 (29%).
  - 62) “Synthesizing Monitors for Safety Properties,” with Klaus Havelund. Proceedings of the 8th International Conference on *Tools and Algorithms for Construction and Analysis of Systems, TACAS’02*, Grenoble, France, 8-12 April 2002. *Lecture Notes in Computer Science*, Volume 2280, 2002, pages 342-356. EASST best paper award at ETAPS’02. Acceptance rate 29/95 (31%).
  - 63) “Certifying Domain Specific Policies,” with Michael Lowry and Thomas Pressburger. Proceedings of the 16th IEEE International Conference on *Automated Software Engineering, ASE’01*, San Diego, California, USA, 26-29 November 2001. *IEEE Computer Society*, pages 81-90. Acceptance rate 32/164 (20%).



- 64) “Monitoring Programs using Rewriting,” with Klaus Havelund. Proceedings of the 16th IEEE International Conference on *Automated Software Engineering, ASE’01*, San Diego, California, USA, 26-29 November 2001. *IEEE Computer Society*, pages 135-143. Also *RIACS Technical Report TR 01-19*, June 2001. Acceptance rate 32/164 (20%).
- 65) “Specification and Error Pattern Based Program Monitoring,” with Klaus Havelund. Proceedings of the 1st *European Space Agency Workshop on On-Board Autonomy ESA-ESTEC*, Noordwijk, The Netherlands, 17-19 October 2001.
- 66) “Complete Categorical Equational Deduction.” Proceedings of the 10th Annual Conference of the European Association for *Computer Science Logic, CSL’01*, Paris, France, 10-13 September 2001. *Lecture Notes in Computer Science*, Volume 2142, 2001, pages 528-538. Acceptance rate 39/91 (43%).
- 67) “Interpreting Abstract Interpretations in Membership Equational Logic,” with Bernd Fischer. Proceedings of the Second International Workshop on *Rule-Based Programming, RULE’01*, Florence, Italy, 4 September 2001. *Electronic Notes in Theoretical Computer Science*, Volume 59, Number 4. Also *RIACS TR 01-16*, May 2001.
- 68) “Monitoring Java programs with Java PathExplorer,” with Klaus Havelund. Proceedings of *Runtime Verification, RV’01*, Paris, France, 23 July 2001. *Electronic Notes in Theoretical Computer Science*, Volume 55, Number 2, pages 97-114. Acceptance rate 11/20 (55%).
- 69) “Circular Coinduction,” with Joseph Goguen. Proceedings of short papers at the *International Joint Conference on Automated Reasoning, IJCAR’01*, Siena, Italy, 18-23 June 2001, pages 140-149. Refines *UCSD TR CS-647*, March 2000.
- 70) “The AutoBayes Program Synthesis System - System Description,” with Bernd Fischer, Tom Pressburger, Johann Schumann. Proceedings of the 9th Symposium on the Integration of Symbolic Computation and Mechanized Reasoning, *CALCULEMUS’01*, Siena, Italy, 21-22 June 2001. Also *RIACS TR 01-18*, 2001.
- 71) “Java PathExplorer - A Runtime Verification Tool,” with Klaus Havelund. Proceedings of the 6th International Symposium on *Artificial Intelligence, Robotics and Automation in Space: A New Space Odyssey, ISAIRAS’01*, Montreal, Canada, 18-22 June 2001.
- 72) “Circular Coinductive Rewriting,” with Joseph Goguen and Kai Lin. Proceedings of *Automated Software Engineering, ASE’00*, Grenoble, France, 11-15 September 2000. *IEEE*. Acceptance rate 23/100 (23%).
- 73) “Incompleteness of Behavioral Logics,” with Samuel Buss. Proceedings of *Coalgebraic Methods in Computer Science, CMCS’00*, Berlin, Germany, 25-26 March 2000. *Electronic Notes in Theoretical Computer Science*, Volume 33, 2000, pages 61-79.
- 74) “Hiding More of Hidden Algebra,” with Joseph Goguen. Proceedings of *World Congress on Formal Methods, FM’99*, Toulouse, France, 20-24 September 1999. *Lecture Notes in Computer Science*, Volume 1709, 1999, pages 1704-1719. Acceptance rate 92/259 (36%).
- 75) “Behavioral Coinductive Rewriting.” Proceedings of the *OBJ/CafeOBJ/Maude Workshop at FM’99*, Toulouse, France, 20-22 September 1999.

- 76) “Hidden Congruent Deduction,” with Joseph Goguen. Proceedings of *First Order Theorem Proving, FTP’99*, Vienna, Austria, 23-25 November 1998. *Lecture Notes in Artificial Intelligence*, Volume 1761, 2000, pages 252-266, *Automated Deduction in Classical and Non-Classical Logics*.
- 77) “Tools for Distributed Cooperative Design and Validation,” with Joseph Goguen, Kai Lin, Akira Mori, Akiyoshi Sato. Proceedings of *CafeOBJ Symposium*, Numazu, Japan, 26-29 April 1998.
- 78) “A Birkhoff-like Axiomatizability Result for Hidden Algebra and Coalgebra.” Proceedings of *Coalgebraic Methods in Computer Science, CMCS’98*, Lisbon, Portugal, 28-29 March 1998. *Electronic Notes in Theoretical Computer Science*, Volume 11, 1998.
- 79) “Distributed Cooperative Formal Methods Tools,” with Joseph Goguen, Kai Lin, Akira Mori and Akiyoshi Sato. Proceedings of *Automated Software Engineering, ASE’97*, Lake Tahoe, Nevada, USA, 3-5 November 1997. *IEEE*, pages 55-62. Acceptance rate 32/108 (30%).

### **Unpublished Technical Reports, Bulletin Papers.**

- 80) “Certifying Kalman Filters,” with Laurențiu Leuştean. *RIACS Technical Report TR 03-02*, January 2003.
- 81) “Synthesizing Dynamic Programming Algorithms from Linear Temporal Logic Formulae,” with Klaus Havelund. *RIACS Technical Report TR 01-15*, May 2001.
- 82) “Testing Linear Temporal Logic Formulae on Finite Execution Traces,” with Klaus Havelund. *RIACS Technical Report TR 01-08*, May 2001.
- 83) “Abstract Semantics for Module Composition.” *University of California at San Diego*, Technical Report CS2000-0653, May 2000. Written in August 1997.
- 84) “Proofs of Safety for Untrusted Code,” with Nathan Segerlind. *University of California at San Diego*, Technical Report CS1999-633, 1999.
- 85) “The Institution of Order-Sorted Equational Logic.” *Bulletin of the European Association of Theoretical Computer Science*, Number 53, 1994, pages 250-255.

### **PhD Thesis**

- 86) “Hidden Logic.” *Department of Computer Science and Engineering, University of California at San Diego*, 4 September 2000.

### **Presentations**

- “Design and Semantics of Programming Languages using Rewriting Logic”, Swansea, Wales, UK, 7 September 2005.
- “Behavioral Extensions of Institutions”, Swansea, Wales, UK, 5 September 2005.
- “Runtime Verification and Monitoring”, Rennes, France, 13 July 2005.

- “Checking and Correcting Behaviors of Java Programs at Runtime with Java-MOP”, the 5th Workshop on Runtime Verification (RV’05), Edinburgh, Scotland, UK, 12 July 2005.
- “Efficient Monitoring of  $\Omega$ -Languages”, the 17th International Conference on Computer Aided Verification (CAV’05), Edinburgh, Scotland, UK, 9 July 2005.
- “Runtime Verification and Monitoring”, ETH Zurich, Switzerland, 21 June 2005.
- “Detecting Errors in Multithreaded Programs by Generalized Predictive Analysis of Executions”, the 7th International Conference on Formal Methods for Open Object-based Distributed Systems (FMOODS’05), Athens, Greece, 16 June 2005.
- “A Formal Monitoring-based Framework for Software Development and Analysis”, the 6th International Conference on Formal Engineering Methods (ICFEM’04), Seattle, USA, 12 November 2004.
- “Formal Systems and Tools”, Lockheed-Martin & UIUC Workshop on System Integration, Urbana, Illinois, USA, 13 April 2004.
- “Monitoring Algorithms for Metric Temporal Logic Specifications”, Runtime Verification (RV’04), Barcelona, Spain, 3 April 2004.
- “Towards Eliminating Conditional Rewrite Rules”, Workshop on Algebraic Development Techniques (WADT’04), Barcelona, Spain, 27 March 2004.
- “Formal Methods Research at UIUC,” with José Meseguer, Microsoft Research, Redmond, USA, 20 January 2004.
- “Generating Optimal Monitors for Extended Regular Expressions,” Runtime Verification (RV’03), Boulder, Colorado, USA, 13 July 2003.
- “Towards Monitoring-Oriented Programming: A Paradigm Combining Specification and Implementation,” Runtime Verification (RV’03), Boulder, Colorado, USA, 13 July 2003.
- “Certifying Optimality of State Estimation Programs,” Computer Aided Verification (CAV’03), Boulder, Colorado, USA, 8-12 July 2003.
- “Runtime Analysis of Multithreaded Programs,” Laboratoire Spécification et Vérification, Ecole Normale Supérieure de Cachan, France, 24 June 2003.
- “Domain Specific Certification,” Université de Paris-Sud, Paris, France, 23 June 2003.
- “Runtime Analysis of Multithreaded Programs,” VERIMAG, Grenoble, France, 17 June 2003.
- “On Scalable Software Formal Analysis Techniques,” Departament de Llenguatges i Sistemes Informàtics and Universitat Politècnica de Catalunya, Barcelona, Spain, 13 June 2003.
- “Testing Extended Regular Language Membership Incrementally by Rewriting,” Rewriting Techniques and Applications (RTA’03), Valencia, Spain, 11 June 2003.
- “Rule-based Analysis of Dimensional Safety,” Rewriting Techniques and Applications (RTA’03), Valencia, Spain, 9 June 2003.

- “Monitoring Extended Regular Expressions,” IFIP W.G.1.3, Menorca Island, Spain, 4 June 2003.
- “On Scalable Software Formal Analysis Techniques,” Universidad Complutense Madrid, Spain, 30 May 2003.
- “On Scalable Formal Methods,” University of Illinois at Urbana-Champaign, USA, 31 March 2003.
- “Hidden Logic - Circular Coinductive Rewriting -,” Indiana University, USA, 24 October 2002.
- “Increasing Mission Critical Software Reliability using Algebraic Specification,” Indiana University, USA, 23 October 2002.
- “Towards Certifying Domain-Specific Properties of Synthesized Code,” Verification and Computational Logic (VCL’02), Pittsburgh, PA, USA, 5 October 2002.
- “On Implementing Behavioral Rewriting,” ACM SIGPLAN Workshop on Rule-Based Programming (RULE’02), Pittsburgh, PA, USA, 5 October 2002.
- “On Lightweight Formal Methods in System Specification and Verification,” IFIP W.G.1.3, 16th International Workshop on Algebraic Development Techniques, Frauenchiemsee, Germany, 23 September 2002.
- “Experiments and Methods in Dynamic Analysis of Programs,” Los Alamos National Laboratory, USA, 23 May 2002.
- “Synthesizing Monitors for Safety Properties,” Tools and Algorithms for Construction and Analysis of Systems (TACAS’02), Grenoble, France, 10 April 2002. Best software science presentation award winner at ETAPS’02 (offered by EASST).
- “Experiments and Methods in Dynamic Analysis of Programs,” University of Illinois at Urbana-Champaign, USA, 28 February 2002.
- “Monitoring Programs using Rewriting,” with Klaus Havelund, Automated Software Engineering (ASE’01), San Diego, California, USA. 28 November 2001.
- “Certifying Domain-Specific Policies,” with Michael Lowry, Automated Software Engineering (ASE’01), San Diego, California, USA. 27 November 2001.
- “Behavioral Verification with BOBJ and Kumo,” with Joseph Goguen and Kai Lin, Automated Software Engineering (ASE’01), San Diego, California, USA. 26 November 2001. Tutorial.
- “Complete Categorical Equational Deduction,” Annual Conference on Computer Science Logic (CSL’01), Paris, France, 10-13 September 2001.
- “Interpreting Abstract Interpretations in Membership Equational Logic,” Workshop on Rule-Based Programming (RULE’01), Florence, Italy, 4 September 2001.
- “Monitoring Java programs with Java PathExplorer,” with Klaus Havelund, Runtime Verification (RV’01), Paris, France, 23 July 2001.
- “Hidden Logic,” Stanford University, California, USA, 19 January 2001.

- “BOBJ Behavioral Specification and Reasoning System,” Formal Methods for Open Object-Based Distributed Systems (FMOODS’00), Stanford University, California, USA, 7 September 2000.
- “Recent Results in Hidden Logic,” University of Bucharest, 29 August 2000.
- “Hidden Logic,” University of California at San Diego, California, USA, 8 June 2000. PhD Thesis Defense.
- “Some Hidden Logic Gems,” SRI International, California, USA, 18 May 2000.
- “Some Hidden Logic Gems,” National University of Singapore, 4 April 2000.
- “Incompleteness of Behavioral Logics,” Workshop on Coalgebraic Methods in Computer Science (CMCS’00), Berlin, Germany, 26 March 2000.
- “Hidden Logic Gems,” Microsoft Research, Seattle, USA, 28 February 2000.
- “Hidden Logic Gems,” NASA Ames, California, USA, 23 February 2000.
- “Hiding More of Hidden Algebra,” with Joseph Goguen, World Congress on Formal Methods (FM’99), Toulouse, France, 23 September 1999.
- “Behavioral Coinductive Rewriting,” OBJ/CafeOBJ/Maude Workshop at Formal Methods 1999 (FM’99), Toulouse, France, 22 September 1999.
- “Abstract Semantics for Module Composition,” 14th International Workshop on Algebraic Development Techniques (WADT’99), Bonas, France, 17 Sept 1999.
- “A Protocol for Distributed Cooperative Work,” with Joseph Goguen, Workshop on Distributed Systems, Iași, Romania, 2 September 1999. Invited lecture.
- “Injectivity and Projectivity in Axiomatizability and Co-Axiomatizability,” 9th Workshop on Foundational Methods in Computer Science (FMCS’99), University of Alberta, Calgary, Canada, 5 June 1999.
- “Hidden Congruent Deduction,” Hidden Algebra Day in Bucharest (HADIB’98), Bucharest, Romania, 17 December 1998.
- “Institution-based Semantics for Horizontal Module Composition,” 8th Workshop on Foundational Methods in Computer Science (FMCS’98), Portland, Oregon, USA, 30 May 1998.
- “Support for Distributed Cooperative Software Engineering,” 13th Workshop on Algebraic Development Techniques (WADT’98), Lisbon, Portugal, 4 April 1998.
- “A Birkhoff-like Axiomatizability Result for Hidden Algebra and Coalgebra,” First Workshop on Coalgebraic Methods in Computer Science (CMCS’98), Lisbon, Portugal, 19 March 1998.
- “Inclusive Equational Logics,” National Symposium “Info-Junior,” Iași, Romania, 1995.
- “Knuth-Bendix Completion in Prolog,” National Symposium “Info-Junior,” Iași, Romania, 1993.

## Software Systems Work

- Dame.** With Koushik Sen, Abhay Vardan and Gul Agha at UIUC. A decentralized monitoring system for multithreaded applications.
- MoP.** With Feng Chen and Marcelo D’Amorim. A monitoring-oriented programming environment, aiming at combining specification and implementation by synthesizing configurable monitors from specifications.
- Diana.** With Koushik Sen, Abhay Vardan and Gul Agha at UIUC. A decentralized monitoring system, based on a synthesis algorithm for efficient monitors from epistemic formulae.
- Java MultiPathExplorer.** With Koushik Sen and Gul Agha at UIUC. An extension of Java PathExplorer with distributed systems techniques to extract a partial order from a flat execution. Runtime verification is then performed on that partial order, so it covers multiple paths.
- Java PathExplorer.** With Klaus Havelund at NASA Ames, Automated Software Engineering Group. A runtime verification environment for monitoring programs.
- AutoBayes.** With Bernd Fischer and Johann Schumann at NASA Ames, Automated Software Engineering Group. A data analysis software synthesis system.
- Tatami.** With Joseph Goguen and Kai Lin at UCSD. System aims to produce an industrial strength library of formal methods examples, with tool support, for distributed cooperative proofs of concurrent object systems on the web.
- BOBJ.** With Joseph Goguen and Kai Lin at UCSD. Specification language in the OBJ family whose underlying logic is behavioral logic. Intended for specification and verification of object-oriented, concurrent and distributed systems.
- Neural Network Library.** Implemented library of known (in 1995) neural networks and tested them on wind speed forecasting as a consultant to IPA, Romania.

## Mentored Students

Traian-Florin Şerbănuţă. UIUC. 2004-.

Popescu Andrei. UIUC. 2004-.

Sanjit Saluja. UIUC. 2004-.

Mark Hills. UIUC. 2004-.

Sophie Quinton. ENS Cachan. UIUC 2004 summer internship.

Marcelo D’Amorim. UIUC. 2004-2005.

Koushik Sen. UIUC. 2002-.. Main advisor: Gul Agha.

Feng Chen. UIUC. 2002-.

Ram Prasad Venkatesan. UIUC. 2002 - 2004. M.S.

Laurenţiu Leuştean. University of Bucharest. NASA 2002 summer internship.

Scott Johnson. University of Wyoming. NASA 2001 summer internship.

PhD Thesis Committee Member for:

Hong-Seok Kim. UIUC. 2004.  
Yixin Chen. UIUC. 2005. Hired by Washington University.  
Girish Baliga. UIUC. 2005. Hired by Google.

## **Professional Activities**

- Organizer:
  - 4th Runtime Verification workshop, RV'04, 3 April 2004, Barcelona, Spain. Satellite workshop to European Joint Conferences on Theory and Practice of Software 2004 (ETAPS'04).
  - 2nd Runtime Verification workshop, RV'02, 26 July 2002, Copenhagen, Denmark. With Klaus Havelund. Satellite workshop to Computer Aided Verification 2002 (CAV'02).
  - 1st Runtime Verification workshop, RV'01, 23 July 2001, Paris, France. With Klaus Havelund. Satellite workshop to Computer Aided Verification 2001 (CAV'01).
- Steering Committee member:
  - 5th Runtime Verification workshop, RV'05, 12 July 2005, Edinburgh, Scotland, UK. Satellite workshop to Computer Aided Verification 2005 (CAV'05).
  - 4th Runtime Verification workshop, RV'04, 3 April 2004, Barcelona, Spain. Satellite workshop to European Joint Conferences on Theory and Practice of Software 2004 (ETAPS'04).
  - 3rd Runtime Verification workshop, RV'03, 13 July 2003, Boulder, Colorado, USA. Satellite workshop to Computer Aided Verification 2003 (CAV'03).
- Program Committee member:
  - 5th Runtime Verification workshop, RV'05, 12 July 2005, Edinburgh, Scotland, UK. Satellite workshop to Computer Aided Verification 2005 (CAV'05).
  - 7th Coalgebraic Methods in Computer Science workshop, CMCS'04, 27 - 29 March, 2004, Barcelona, Spain. Satellite workshop to European Joint Conferences on Theory and Practice of Software 2004 (ETAPS'04).
  - 5th Workshop on Rewriting Logic and its Applications, WRLA'04, Barcelona, Spain. Satellite workshop to European Joint Conferences on Theory and Practice of Software 2004 (ETAPS'04).
  - 6th Coalgebraic Methods in Computer Science workshop, CMCS'03, 5-6 April 2003, Warsaw, Poland. Satellite workshop to European Joint Conferences on Theory and Practice of Software 2003 (ETAPS'03).
  - 2nd Runtime Verification workshop, RV'02, 26 July 2002, Copenhagen, Denmark. Satellite workshop to Computer Aided Verification 2002 (CAV'02).
  - 1st Runtime Verification workshop, RV'01, 23 July 2001, Paris, France. Satellite workshop to Computer Aided Verification 2001 (CAV'01).
- Refereed papers for:
  - Journals** (alphabetically):  
ACM Transactions on Programming Languages and Systems (2 papers),  
Algebra Universalis,

Annals of Mathematics and Artificial Intelligence,  
IEEE Software Magazine,  
IEEE Transactions on Software Engineering,  
Information Processing Letters (2 papers),  
Journal of Computer and System Sciences (3 papers),  
Journal of Logic and Algebraic Programming,  
Mathematical Structures in Computer Science (4 papers),  
Theoretical Computer Science (5 papers).

**Conferences, Workshops** (reversed chronological order):

Specification and Verification of Component-Based Systems, SAVCBS 2005,  
Foundations of Software Technology and Theoretical Computer Science, FSTTCS 2005,  
Programming Language Design and Implementation, PLDI 2005,  
International Conference on Distributed Computing Systems, ICDCS 2005,  
Verification, Model Checking and Abstract Interpretation, VMCAI 2005,  
Workshop on Rewriting Logic and its Applications, WRLA 2004 (5 papers),  
Coalgebraic Methods in Computer Science, CMCS 2004 (5 papers),  
Verification, Model Checking and Abstract Interpretation, VMCAI 2004,  
Coalgebraic Methods in Computer Science, CMCS 2003 (3 papers),  
Workshop on Runtime Verification, RV 2002 (4 papers),  
Mathematical Foundations of Computer Science, MFCS 2002,  
Coalgebraic Methods in Computer Science, CMCS 2002,  
International Conference on Aspect-Oriented Software Development, AOSD 2002,  
Automated Software Engineering, ASE 2001 (2 papers),  
Workshop on Runtime Verification, RV 2001 (8 papers),  
International Conference on Functional Programming, ICFP 2001,  
Intl. Colloquium on Automata, Languages, and Programming, ICALP 2001,  
SPIN Workshop on Model Checking of Software, SPIN 2001,  
Logic in Computer Science, LICS 2001,  
Coalgebraic Methods in Computer Science, CMCS 2001,  
Formal Methods for Open Object-Based Distributed Systems, FMOODS 2000.

- Moderator of the following discussion lists:

RUNTIME VERIFICATION: <http://mail.cs.uiuc.edu/mailman/listinfo/rv>

PROGRAMMING LANGUAGES: <http://mail.cs.uiuc.edu/mailman/listinfo/prog-lang>

BEHAVIOR: <http://www.cs.ucsd.edu/groups/tatami/behavior>

- Member of:

IFIP W.G. 1.3

Association for Computing Machinery (ACM).

## **Hobbies**

Flying (private pilot). Go (1 Dan - amatory; 2k\* on IGS, username Luta). Chess. Hiking. Outdoors. Fishing. Photography and Filming. Music. Cooking.