Valerio Senni

CURRICULUM VITAE

PERSONAL INFORMATION AND CONTACTS

Name	Valerio Senni
Academic Degree	PhD in Computer Systems Engineering
Birth	July 11, 1980 - Milan, Italy
Citizenship	Italian
Current Affiliation	Department of Computer Science, Systems, and Production University of Rome "Tor Vergata" Via del Politecnico, 1 I-00133 Roma, Italy & Research associate at Institute for Systems Analysis and Computer Science National Research Council Viale Manzoni, 60 I-00185 Roma, Italy
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RESEARCH INTERESTS

Logic-based formal methods for *modelization* and *analysis* of systems. Directions: (1) development of a general framework based on *transformation* techniques for *static analysis* of *software* and *implementation* of a library of automated techniques for the verification of properties (such as temporal properties, termination, etc.), (2) analysis of *concurrent and reactive infinite-state systems* and verification of their temporal properties, (3) development of *decision procedures* based on *combination* techniques (á la Nelson-Oppen) to be used in *SMT solvers* (Satisfiability Modulo Theories), in particular, theories combining data structures and arithmetics. Techniques: (i) *constraint logic programming* and *program transformation*, (ii) *constraint manipulation and solution techniques*, development of generalization operators, quantifier elimination, unification and matching modulo equational theories, decision procedures for constraints on $\mathbb{R}$, $\mathbb{Q}$, $\mathbb{Z}$, (iii) superposition-based *deductive techniques*.

EMPLOYMENT HISTORY

May 2011 – present	Research grant at the University of Rome "Tor Vergata", Italy. Hosted by the Department of Computer Science, Systems, and Production, Faculty of Engineering. Topic: *Theoretical Bases and Technological Instruments for the Proof of Programs Properties*.
May 2010 – April 2011	ERCIM postdoc fellowship (12 months) at LORIA - INRIA Grand Est Nancy, France, Equipe CASSIS. Topic: *Combination of decision procedures for the verification of software*.
April 2008 – April 2010	Research grant at the University of Rome "Tor Vergata", Italy. Hosted by the Department of Computer Science, Systems, and Production, Faculty of Engineering. Topic: *Theoretical Bases and Technological Instruments for the Proof of Programs Properties*.
December 2007 – March 2008	Research assistant at the Department of Computer Science, Systems, and Production, University of Rome "Tor Vergata", Faculty of Engineering. Topic: *Development of an Experimental System for Software Verification using the Constraint Logic Programs Transformation technique*.

EDUCATION

June 2009	Games Spring School 2009, 1 week, organized by the ESF Research Networking Programme *Games for Design and Verification*
28 May 2008	**PhD in Computer Systems Engineering** University of Rome "Tor Vergata" Title: *Transformation Techniques for Constraint Logic Programs with Applications to Protocol Verification* Advisor: Alberto Pettorossi Judging Commission: Paolo Atzeni, Maurizio Lenzerini, Fabio Fioravanti Winner of a three years scholarship
August 2005	Summer School in Logic, 1 week, organized by the Italian Association of Logic and its Applications (AILA) and the University of Milan
11 November 2004	**Laurea Specialistica in Ingegneria Informatica** (*Master Degree in Computer Systems Engineering*) University of Rome "Tor Vergata" Title: *Automated Verification and Synthesis of Constraint Logic Programs* Final Grade: 110 out of 110 *cum laude*
13 November 2002	**Laurea di Primo Livello in Ingegneria Informatica** (*Bachelor Degree in Computer Systems Engineering*) University of Rome "Tor Vergata". Title: *Automated Deduction and Software Verification* Final Grade: 110 out of 110 *cum laude*

GRANTS AND RESEARCH PROJECTS

2009 – 2011	Joint CNR-CNRS project 2009–11 *Verification of Infinite State and Real Time Reactive Systems* Istituto di Analisi dei Sistemi ed Informatica, Consiglio Nazionale delle Ricerche (IASI-CNR) and Laboratoire Spécification et Vérification Centre National de la Recherche Scientifique (LSV-CNRS). Coordinators: Maurizio Proietti (IASI-CNR) e Laurent Fribourg (LSV-CNRS).
November 2009	ERCIM (European Research Consortium for Informatics and Mathematics) 12 months fellowship funding a (12 months) postdoc at LORIA - INRIA Grand Est Nancy, France, CASSIS (Combining ApproacheS for the Security of Infinite state Systems) group.
May 2009 – July 2010	Grant covering conference expenses from the GNCS (National Group for Scientific Computing) group of INdAM (Italian National Institute of Advanced Mathematics), assigned through competitive selection.
2008 – 2009	PRIN Italian project 2008 *Innovative and multi-disciplinary approaches for reasoning with constraints and preferences*. Scientific coordinator: Francesca Rossi, University of Padova, Italy.

ACADEMIC AND PROFESSIONAL EXPERIENCE

RESEARCH SOFTWARE

MAP Transformation System

A tool for interactive transformation of logic programs based on the so-called unfold/fold rewriting technique. It implements a framework for program transformation that ensures correctness w.r.t. several notions of equivalence (depending on the desired application). Developed in collaboration with researchers of IASI-CNR, of the University of Rome "Tor Vergata", and of the University of Chieti-Pescara. This tool implements several automated techniques for the analysis of software, such as reachability analyses and model checking (CTL, LTL, etc.) of reactive infinite-state systems, using advanced constraint manipulation and generalization techniques. The core of the system, that is, the transformation engine, is developed in SICStus Prolog, and has a graphical user interface as well as a web interface developed in PHP.

RESEARCH VISITS

October 2011

Visiting researcher in the Laboratoire d'Informatique de l'Université de Franche-Comté (LIFC), Besançon, France, professor Alain Giorgetti. Topic: *Program transformation for automatic optimization of test generation software*. Funded by the INRIA equipe CASSIS.

July 2011

Visiting researcher in the Laboratoire Spécification et Vérification Centre National de la Recherche Scientifique (LSV-CNRS). Topic: *Transformation-based techniques for the improvement of reachability analysis of infinite state reactive systems*. Visit funded by the joint CNR-CNRS 2009–2011 project.

March 2011

Visiting researcher in the PLIS group (Programming, Logic, and Intelligent Systems), professor John Gallagher, Roskilde University, Denmark. Topic: *Applications of program transformation and partial evaluation to the verification of infinite-state reactive systems*. Visit funded by the ERCIM fellowship.

August 2010

Visiting researcher at the LARA research group, lead by professor Viktor Kuncak, Ecole Polytechnique Federale de Lausanne (EPFL), Switzerland. Topic: *Dissemination of the program transformation technique and studying applications of this technique to the efficient and automated generation of test cases*. Visit funded by the ERCIM fellowship.

SCIENTIFIC COLLABORATIONS

August 2010 – present

LARA group and professor Viktor Kuncak at Ecole Polytechnique Federale de Lausanne (EPFL), Switzerland.

Maggio 2010 – present

Christophe Ringeissen, LORIA-INRIA Grand Est, France.

2010 – present

Laurent Fribourg, Laboratoire Spécification et Vérification Centre National de la Recherche Scientifique (CNRS).

2004 – present

Maurizio Proietti, Institute of Systems Analysis and Computer Science (IASI), National Research Council (CNR), Rome.

November 2003

Writing of a draft paper entitled "The Coherence and Concreteness of Mathematics", on the basis of the notes I have taken at a lecture given by Prof. Maurice Nivat at the Pontificia Università Lateranense, July 2003. This work has been then published, with author Prof. Nivat, in the volume "Information: Science and Technology for the New Century", Lateran University Press, 2007, of which I am co-editor.

INVITED TALKS

October 2011

Improving Reachability Analysis of Infinite State Systems by Specialization, invited by Alain Giorgetti, Lab. d'Informatique de l'Université de Franche-Comté (LIFC), Besançon, France

March 2011	*Program Specialization for Verifying Infinite State Systems*, invited by Flemming Nielson, head of the MT-LAB Centre of Exellence, Danish Technical University, Copenhagen, Denmark
August 2010	*Program Transformation for Verification and Synthesis*, invited by Viktor Kuncak, Ecole Polytechnique Federale de Lausanne (EPFL), Switzerland
May 2010	*Program Transformation for Verification and Synthesis*, Michael Rusinowitch, INRIA Equipe CASSIS, LORIA-INRIA Grand Est, Nancy, France

TEACHING

Academic year 2011/2012	University of Rome "Tor Vergata" – Faculty of Engineering. Tutor for the course Fundamentals of Computing (9CFU) (taught in English).
Academic years from 2006/2007 to 2011/2012	University of Rome "Tor Vergata" – Faculty of Engineering. Teaching Assistant (Theoretical Computer Science – Prof. Alberto Pettorossi) (Six academic years)
Academic year 2009/2010	University of Rome "Tor Vergata" – Faculty of Engineering. Teaching Assistant (Introduction to Programming – Prof. Michele Angelaccio)
Academic year 2005/2006	University of Rome "Tor Vergata" – Faculty of Engineering. Teaching Assistant (Automata, Languages, and Translators – Prof. Alberto Pettorossi)

ORGANIZATION OF CONFERENCES

2012	Member of the *Program Committee* of the 22nd International Symposium on Logic-Based Program Synthesis and Transformation (LOPSTR 2012), Leuven, Belgium.
2012	Member of the *Program Committee* of the 27th Italian Congress of Computational Logic (CILC 2012), Rome, Italy.
2012	Member of the *Organizing Committee* of the 68th meeting of the IFIP Working Group 2.1 on Algorithmic Languages and Calculi, Rome, Italy.
August 2011	Member of the *Program Committee* of the 26th Italian Congress of Computational Logic (CILC 2011), 31 August – 2 September, 2011, Pescara, Italy.
June 2005	Member of the *Organizing Committee* of the 20th Italian Congress of Computational Logic (CILC 2005), Rome, Italy.
January 2004	Member of the *Organizing Committee* of the 58th meeting of the IFIP Working Group 2.1 on Algorithmic Languages and Calculi, Rome, Italy.

PEER REVIEW

I served as a reviewer for the journals *Fundamenta Informaticae* and *Information and Computation*, for the international conferences PEPM, LOPSTR, ICLP, and SOFSEM, and for the CILC national conference.

PARTICIPATION TO CONFERENCES

October 2011	8th International Symposium on Frontiers of Combining Systems (FroCoS 2011), Saarbrucken, Germany
September 2011	5th International Workshop on Reachability Problems (RP 2011), Genova, Italy
September 2011	Congresso Italiano di Logica Computazionale (CILC 2011), Pescara, Italy
July 2011	21st International Symposium on Logic-Based Program Synthesis and Transformation (LOPSTR 2011), Odense, Denmark
June 2011	International Workshop on First-Order Theorem Proving (FTP 2011), Bern, Switzerland
July 2010	Federated Logic Conference (FloC 2010), 26th International Conference on Logic Programming (ICLP 2010), University of Edinburgh, UK

December 2008	24th International Conference on Logic Programming (ICLP 2008), University of Udine, Italy
July 2008	Italian Congress of Computational Logic (CILC 2008), 23rd annual meeting of the Italian Association of Researchers and Users of Logic Programming (GULP), University of Perugia, Italy
June 2007	Italian Congress of Computational Logic (CILC 2007), 22nd annual meeting of the Italian Association of Researchers and Users of Logic Programming (GULP), University of Messina, Italy
June 2006	Italian Congress of Computational Logic (CILC 2006), 21st annual meeting of the Italian Association of Researchers and Users of Logic Programming (GULP), University of Bari, Italy
September 2005	International Symposium on Logic-based Program Synthesis and Transformation (LOPSTR 2005), Imperial College, London, UK
June 2005	Italian Congress of Computational Logic (CILC 2005), 20th annual meeting of the Italian Association of Researchers and Users of Logic Programming (GULP), CNR, Rome, Italy
January 2004	The 58th meeting of the International Federation for Information Processing (IFIP), Working Group 2.1 – Algorithmic Languages and Calculi, Rome, Italy

Results Obtained at Selections

July 2011	Idoneity (idoneità) acquired at a selection for permanent researcher position at the National Research Council (CNR), IASI Institute: scientific area (A.2) Informatics and Computer Science, selection n. 364.96, shortlist July 29, 2011
November 2004	Professional engineer habilitation (Esame di stato)

Publications

Refereed Journals

1. Fioravanti, F., Pettorossi, A., Proietti, M., Senni, V.: Generalization Strategies for the Verification of Infinite State Systems. To appear in *Theory and Practice of Logic Programming*.

2. Fioravanti F., Pettorossi A., Proietti M., Senni V.: Program Transformation for Development, Verification, and Synthesis of Software. *Intelligenza Artificiale*, ISSN 1724-8035, Vol 5, Number 1, 2011, pp. 119-125.

3. Pettorossi A., Proietti M., Senni V.: . Transformations of Logic Programs on Infinite Lists. *Theory and Practice of Logic Programming*, ISSN 1471-0684, Volume 10, Special Issue 4-6, 383-399, 2010, Special Issue on the 26th International Conference on Logic Programming (ICLP 2010), Edinburgh, Scotland, UK, July 16-19, 2010.
[A full version including proofs is downloadable as arXiv:1007.4157v1]

4. Senni V., Pettorossi A., Proietti, M.: A Folding Rule for Eliminating Existential Variables from Constraint Logic Programs. *Fundamenta Informaticae*, ISSN 0169-2968, Vol. 96, Number 3, 2009, pp. 121.

Chapters in Books

1. Pettorossi A., Proietti M., Senni V.: The Transformational Approach to Program Development. In: A. Dovier and E. Pontelli (Eds.) *A 25 Year Perspective on Logic Programming* (Achievements of the Italian Association for Logic Programming, GULP), ISBN 978-3-642-14308-3, Lecture Notes in Computer Science Vol. 6125, Springer, 2010.

Books as Editor

1. Information: Science and Technology for the New Century, Pettorossi, A., Iacovitti, G., Consolo, R., and Senni, V., (Eds.), Quaderni Sefir 7, 270 pages, Lateran University Press, 2007, Italy, Rome, ISBN 978-88-465-0562-0.

2. Scienze Informatiche e Biologiche. Istanze Epistemologiche e Ontologiche. Gennaro Cicchese, Alberto Pettorossi, Stefano Crespi Reghizzi, Valerio Senni. ISBN: 9788831135054 Città Nuova, 2011, Italy, Rome.

INTERNATIONAL CONFERENCES (WITH PEER REVIEW)

1. Fioravanti, F., Pettorossi, A., Proietti, M., Senni, V.: Using Real Relaxations During Program Specialization. In: Preliminary Proceedings of the 21th International Symposium on Logic-Based Synthesis and Transformation (LOPSTR 2010), Odense, Denmark. To appear in *Lecture Notes in Computer Science*, Springer.

2. Ringeissen, C., Senni, V.: Modular Termination and Combinability for Superposition Modulo Counter Arithmetic. In: Proceedings of the 8th International Symposium on Frontiers of Combining Systems (FroCoS 2011), October 5-7, Saarbruecken, Germany, *Lecture Notes in Artificial Intelligence* Vol. 6989, pp. 211–226, Springer, 2011.

3. Fioravanti, F., Pettorossi, A., Proietti, M., Senni, V.: Improving Reachability Analysis of Infinite State Systems by Specialization. In: Proceedings of the 5th International Workshop on Reachability Problems (RP 2011), Genova, Italy, *Lecture Notes in Computer Science* Vol. 6945, Springer, 2011.

4. Fioravanti, F., Pettorossi, A., Proietti, M., Senni, V.: Program Specialization for Verifying Infinite State Systems: An Experimental Evaluation. In: Proceedings of the 20th International Symposium on Logic-Based Synthesis and Transformation (LOPSTR 2010), July 23-25, 2010, Hagenberg, Austria. *Lecture Notes in Computer Science* Vol. 6564, pp. 164-183, Springer, 2011.

5. Pettorossi, A., Proietti, M., Senni, V.: Deciding Full Branching Time Logic by Program Transformation. In: Danny De Schreye (Ed.) 19th International Symposium on Logic-Based Synthesis and Transformation (LOPSTR 2009), September 9-11, 2009, Coimbra, Portugal, *Lecture Notes in Computer Science* 6037, pp. 5–21. Springer, Heidelberg (2010).

6. Senni, V., Pettorossi, A., Proietti, M.: A Folding Algorithm for Eliminating Existential Variables from Constraint Logic Programs. In: M. Garcia de la Banda and E. Pontelli (Eds.): Proceedings of the 24th International Conference on Logic Programming (ICLP 2008), December 9-13, 2008, Udine, Italy. *Lecture Notes in Computer Science* 5366, Springer 2008, pp. 284-300.

7. Pettorossi, A., Proietti, M., Senni, V.: Automatic Correctness Proofs for Logic Program Transformations In: V. Dahl and I. Niemelä (Eds.): Proceedings of the 23rd International Conference on Logic Programming (ICLP 2007), September 8-13, 2007, Porto, Portugal. *Lecture Notes in Computer Science* 4670, Springer, 2007, pp. 364-379.

8. Pettorossi, A., Proietti, M., Senni, V.: Proving Properties of Constraint Logic Programs by Eliminating Existential Variables. In: S. Etalle and M. Truszczyński (Eds.): Proceedings of the Twenty Second International Conference on Logic Programming (ICLP 2006), August 17-20, 2006, Seattle, Washington, USA. *Lecture Notes in Computer Science* 4079, Springer, 2006, pp. 179-195.

9. Pettorossi, A., Proietti, M., Senni, V.: Transformational Verification of Parameterized Protocols Using Array Formulas, In Patricia M. Hill (Ed.): Proceedings of the 15th International Symposium on Logic Based Program Synthesis and Transformation, (LOPSTR 2005), Imperial College, London, UK, September 7-9, 2005, Revised Selected Papers. *Lecture Notes in Computer Science* 3901, Springer 2006, pp. 23-43.

10. Pettorossi, A., Proietti, M., Senni, V.: Proofs of Program Properties via Unfold/Fold Transformations of Constraint Logic Programs (Abstract) In J. R. Cordy, R. Lämmel, A. Winter (Eds.) *Proceedings of the Dagstuhl Seminar* 05161, Transformation Techniques in Software Engineering, 17–22 April, 2005.

NATIONAL CONFERENCES (WITH PEER REVIEW)

1. Fioravanti, F., Pettorossi, A., Proietti, M., Senni, V.: Controlling Polyvariance for Specialization-based Verification. In: Fabio Fioravanti (Ed.), CEUR-WS, Vol-810, urn:nbn:de:0074-810-0, ISSN 1613-0073, Proceedings of the 26th Italian Conference on Computational Logic (CILC 2011), University of Chieti-Pescara, Pescara, Italy, August 31 - September 2, 2011.

2. Fioravanti, F., Pettorossi, A., Proietti, M., Senni, V.: Generalization Strategies for the Verification of Infinite State Systems. In: Wolfgang Faber and Nicola Leone (Eds.), CEUR-WS, Vol-598, urn:nbn:de:0074-598-1, ISSN 1613-0073, Proceedings of the 25th Italian Conference on Computational Logic (CILC 2010), University of Calabria, Rende, Italy, July 7-9, 2010.

3. Pettorossi, A., Proietti, M., Senni, V.: A Transformation Strategy for Verifying Logic Programs on Infinite Lists. In: Wolfgang Faber and Nicola Leone (Eds.), CEUR-WS, Vol-598, urn:nbn:de:0074-598-1, ISSN 1613-0073, Proceedings of the 25th Italian Conference on Computational Logic (CILC 2010), University of Calabria, Rende, Italy, July 7-9, 2010.

4. Pettorossi, A., Proietti, M., Senni, V.: Transformational Verification of Linear Temporal Logic. Online proceedings of the 24th Italian Conference on Computational Logic (CILC 2009), June 24-26, 2009, Ferrara, Italy.

5. Senni, V., Pettorossi, A., Proietti, M.: Folding Transformation Rules for Constraint Logic Programs. Online proceedings of the 2008 *Italian Conference on Computational Logic* (CILC 2008), 10-12 July, 2008, Perugia, Italy.

6. Pettorossi, A., Proietti, M., Senni, V.: Program Transformation for Development, Verification, and Synthesis of Software. in *Il Milione* (i.e. 2 H6, June 3rd 2008), A Journey in the Computational Logic in Italy, Proc. of the Day Dedicated to Prof. Alberto Martelli, CEUR-WS, Vol-487, pages 7-14, urn:nbn:de:0074-487-5, ISSN 1613-0073, Turin, Italy, June 3, 2008.

7. Pettorossi, A., Proietti, M., Senni, V.: Automatic Correctness Proofs for Logic Program Transformations. Online proceedings of the 22nd *Italian Conference on Computational Logic* (CILC 2007), 21-22 June, 2007, Messina, Italy.

8. Pettorossi, A., Proietti, M., Senni, V.: Proving Properties of Constraint Logic Programs by Eliminating Existential Variables. Online proceedings of the 21st *Italian Conference on Computational Logic* (CILC 2006), 26-27 June, 2006, Bari, Italy.

9. Pettorossi, A., Proietti, M., Senni, V.: Verifying parameterized protocols by transforming stratified logic programs, Online Proceedings of the *Italian Conference on Computational Logic* (CILC 2005), June 21-22, 2005, Roma, Italy.

10. Formica, E., Lima, A., Senni, V., Nicosia, S., Zaccarian, L., Robot2004: Sistemi Robotici per la Didattica basati su Linux-RTAI, in *Web Learning per la qualità del capitale umano*, II Annual Workshop, Ferrara, May 2004.

TECHNICAL REPORTS

1. Pettorossi, A., Proietti, M., Senni, V.: Deciding Full Branching Time Logic by Program Transformation. Tech. Report R. 09-04, IASI-CNR, Rome, Italy, 2009.

2. Fioravanti, F., Pettorossi, A., Proietti, M., Senni, V.: Program Specialization for Verifying Infinite State Systems: An Experimental Evaluation. RISC-Linz Report Series No. 10-14, pp. 93-112, 2010.

3. Pettorossi A., Proietti M., Senni V.: The Transformational Approach to Program Development. Techn. Report R. 09-06, IASI-CNR, Rome, Italy, 2009.

4. Pettorossi A., Proietti M., Senni V.: . Transformations of Logic Programs on Infinite Lists. Full version including proofs as Tech. Report R. 10-04, IASI-CNR, Rome, Italy, 2010.

5. Pettorossi, A., Proietti, M., Senni, V.: Transformational Verification of Linear Temporal Logic. Tech. Report R. 09-03, IASI-CNR, Rome, Italy, 2009.

6. Pettorossi, A., Proietti, M., Senni, V.: Program Transformation for Development, Verification, and Synthesis of Software. Tech. Report of Dipartimento di Informatica, Università degli Studi di Torino, RT 110/08, Italy, 2008.

7. Pettorossi, A., Proietti, M., Senni, V.: Proving Properties of Constraint Logic Programs by Eliminating Existential Variables. Tech. Report 07.62, Dip. Informatica, Sistemi e Produzione, Univ. of Rome Tor Vergata, Italy, 2007.

LANGUAGES

Italian	Native speaker.
English	Very good, both spoken and written.
French	Intermediate.

TECHNICAL SKILLS

Programming Languages	Prolog, Standard ML, C, C++, Java, Pascal, PHP, Bash, SQL, Html
Operating Systems	Unix (Linux), Mac OS X, Windows 2000/XP

REFERENCES

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