Sasha Rubin – Curriculum Vitae, February 2014

Contact

Current Residence: Vienna, Austria
Nationality: New Zealand
Date of Birth: 16.02.1976
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University

Postdoctoral Researcher (3.2014 – present)
TU Vienna, Austria.

Postdoctoral Researcher (3.2012 – 2.2014)
IST Austria and TU Vienna, Austria.

Visiting Lecturer (2.2010 – 5.2010)
Department of Mathematics, University of Cape Town, South Africa.

Visiting Assistant Professor (08.2008 – 12.2009)
Department of Mathematics, Cornell University, USA.

Honorary Research Fellow (12.2004 – 02.2008)
Department of Computer Science, University of Auckland, New Zealand.
Supported by New Zealand Science and Technology Postdoctoral Fellowship.

PhD Mathematics and Computer Science (2004)
University of Auckland, New Zealand.
Supervisor: Bakhadyr Khoussainov
Title: Automatic Structures
Awards: Vice-chancellor's prize for the best doctoral thesis in the Faculty of Science, and Montgomery memorial prize in logic from the Department of Philosophy.

Research Interest

I work in theoretical computer science studying the power of automata theory and mathematical logic for describing mathematical structures. Concretely, I have contributed to the following areas: automatic structures, formal verification, and finite model theory. I am currently working on the theory of distributed systems applying logical and automata-theoretic methods.

Recent Invited Workshop-Talks

Finite and Algorithmic Model Theory, Les Houches, France (05.2012)
Automata theory and Applications, IMS programme, Singapore (09.2011)
Computational Model Theory, CNRS SIG, Bordeaux, France (06.2008)
Algorithmic-Logical Theory of Infinite Structures, Dagstuhl, Germany (10.2007)

Undergraduate Teaching philosophy

My goal as a teacher is to guide students through the material (eg. I point out which ideas are fundamental and which are technicalities), show students how the material is relevant to their degree, and help students think deeply. I regularly self-evaluate and engage colleagues in order to discover good teaching principles. I employ questions which encourage students to express themselves clearly and internalise the material, eg. 'can anyone help A with her answer?', 'can you explain

B's idea to me?', 'what do you mean by X?', 'are you sure?'. Another technique I have used is administering an easy online quiz that requires students to read the relevant section of the textbook before coming to class; as a result students ask deeper questions than they otherwise would, a sign that they are better prepared to understand the material discussed in class.

Recent Supervision and Teaching

Supervision

Summer undergraduate project
Topic: Edit-distance and Formal Languages.
IST Austria (2012)

Summer research experience for undergraduates
Topic 1: Parity Games.
Topic 2: Automatic Structures with Advice.
Cornell University, Department of Mathematics (2009)

Teaching

Logic and Computation (undergraduate)
University of Cape Town, Department of Mathematics (2010)

Logical Definability and Random Graphs (graduate)
Cornell University, Department of Mathematics (2009)

Totally Awesome Mathematics (undegraduate)
Two interactive lectures:
i) Hilbert's Hotel and Infinite Cardinals
ii) Algorithms and Termination
Cornell University, Department of Mathematics (2009)

Calculus for Engineers (undergraduate)
Cornell University, Department of Mathematics (2008 – 2009)

Recent community service

Besides ongoing refereeing for journals and conferences, I am currently involved in reviewing and assisting the editors with the Handbook of Model Checking.

In 2012/2013 I was one of the organisers of the IST Austria Young Scientist Symposium on the topic 'Understanding Shape: *in silico* and *in vivo*'.
ist.ac.at/young-scientist-symposium-2013/

In 2012 I formed the computer science seminar at IST Austria whose goal is to foster collaborations within the institute.
ist.ac.at/computer-science-seminar/

In 2010 I briefly volunteered at a secondary school school in Accra, Ghana, teaching, observing and commenting on grade 5 mathematics classes. I also briefly volunteered in Khayelitsha, South Africa, helping high-school students prepare for their high-school mathematics exams.

Refereed Publications

Book chapters

Automatic Structures in *Automata: From mathematics to applications*, J.E. Pin, Ed., to be published by EMS.

Automata based presentations of infinite structures with V. Bárány and E. Grädel, in *Finite and Algorithmic Model Theory*, J. Esparza, C. Michaux, and C. Steinhorn, Eds., Series: London Mathematical Society Lecture Note Series (379), 1 – 76, 2011.

LICS Proceedings

Interpretations in trees with countably many branches, with A. Rabinovich, 551 – 560, 2012.

Automatic Structures: Richness and Limitations, with B. Khoussainov, A. Nies and F. Stephan, 44 – 53, 2004.

Automatic Partial Orders, with B. Khoussainov and F. Stephan, 168 – 177, 2003.

Some Results on Automatic Structures, with B. Khoussainov and H. Ishihara, 235 – 244, 2002.

STACS Proceedings

Cardinality and counting quantifiers on omega-automatic structures, with V. Bárány and Ł. Kaiser, 385 – 396, 2008.

Order invariant MSO is stronger than counting MSO,with T. Ganzow, 313 – 324, 2008.

Definability and Regularity in Automatic Structures, with B. Khoussainov and F. Stephan, 440 – 451, 2004.

CAV Proceedings

Verifying ω-regular Properties of Markov Chains, with D. Bustan and M. Vardi, 189 – 201, 2004.

VMCAI Proceedings

Parameterized Model Checking of Token-Passing Systems, with B. Aminof, S. Jacobs and A. Khalimov. to appear, Jan 2014.

Other Refereed Proceedings

Finite Cycle Games with B. Aminof, *Strategic Reasoning*, 2014.

How to Travel Between Languages with K. Chatterjee and S. Chaubal, *LATA*, 2013.

A Myhill-Nerode Theorem for Automata with Advice with A. Kruckman, J. Sheridan and B. Zax, *GandALF*, 238 – 246, 2012.

Journals

Alternating Traps in Parity Games with P. Phalitnonkiat, A. Grinshpun, A.Tarfulea, Theoretical Computer Science, 73 – 91, 2014.

Automata presenting structures: A survey of the finite-string case, The Bulletin of Symbolic Logic, 14(2), 169 – 209, 2008.

Automatic Structures: Richness and Limitations, with B. Khoussainov, A. Nies and F. Stephan, Logical Methods in Computer Science, Vol 3, 2007.

Automatic linear orders and trees, with B. Khoussainov and F. Stephan, ACM Transactions on Computational Logic, 6(4), 675 – 700, 2005.

Automatic Structures - Overview and Future Directions, with B. Khoussainov, Journal of Automata, Languages and Combinatorics, $8(2), 287 - 301, 2003$.

Graphs with Automatic Presentations over a Unary Alphabet Journal of Automata, Languages and Combinatorics, $6(4), 467 - 480, 2001$.

Finite Automata and Well Ordered Sets, New Zealand Journal of Computing, $7(2), 39 - 46, 1999$.

Academic References

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Teaching References

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Supervision References

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