

# HORST SAMULOWITZ

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## Research Positions

- **Researcher**, Constraint Programming Platform (G12), **National ICT Australia (NICTA)**, Victoria Research Laboratory, Melbourne, Australia, *August 2009 - present*.
- **Honorary Research Fellow**, **University of Melbourne**, Melbourne, Australia, *August 2009 - present*.
- **Post-Doctoral Researcher**, Constraint Reasoning and Machine Learning Group, **Microsoft Research**, Cambridge, England, *September 2007 - July 2009*.
- **Research Internship**, Constraint Reasoning Group, **Microsoft Research**, Cambridge, England, *July 2006 - October 2006*.
- **Research Assistant**, Artificial Intelligence and Knowledge Representation Group, **University of Toronto**, Canada, *September 2003 - August 2007*.

## Education

- **Ph.D.** Computer Science, University of Toronto, Artificial Intelligence Group. Advisor: Professor Fahiem Bacchus. Project: *Quantified Boolean Formulas*, **September 2003 - August 2007**
- **M.Sc.** Computer Science (*Minor: Neurobiology*), University of Technology (RWTH), Aachen, Germany, Knowledge Representation Group. Advisor: Professor Gerhard Lakemeyer. Project: *Evaluation-Based Reasoning in First-Order Knowledge Bases*, **October 1997 - February 2003**

## Refereed Conference Publications

- [AAAI2010] David Stern, Horst Samulowitz, Luca Pulina, Armando Tacchella, Ralf Herbrich, Thore Graepel: **Collaborative Portfolio Manager**, *AAAI 2010, The Twenty-Fourth AAAI Conference on Artificial Intelligence*, to be published
- [IJCAI2009] Lucas Bordeaux, Youssef Hamadi, Horst Samulowitz: **Experiments with Massively Parallel Constraint Solving**, *IJCAI 2009, International Joint Conference on Artificial Intelligence*, 2009
- [AAAI2007] Horst Samulowitz, Roland Memisevic: **Learning to Solve QBF**, *AAAI 2007, The Twenty-Second AAAI Conference on Artificial Intelligence*, 2007
- [SAT2007] Horst Samulowitz, Fahiem Bacchus: **Dynamically Partitioning for Solving QBF**, *SAT 2007, Tenth International Conference on Theory and Applications of Satisfiability Testing*, 2007

- [SAC2007] Lucas Bordeaux, Horst Samulowitz: **On the Stochastic Constraint Satisfaction Framework**, SAC2007, *The 22nd Annual ACM Symposium on Applied Computing*, 2007
- [JFPC2007] Lucas Bordeaux, Youssef Hamadi, Claude-Guy Quimper, and Horst Samulowitz: **Expressions itres en programmation par contraintes** In Proceedings of Troisième Journées Franco-phones de Programmation par Contraintes (JFPC 07), 2007
- [CP2006] Horst Samulowitz, Jessica Davies, Fahiem Bacchus: **Preprocessing QBF**, CP 2006, *Principles and Practice of Constraint Programming*, Springer New York, 2006
- [SAT2006] Horst Samulowitz, Fahiem Bacchus: **Binary Clause Reasoning in QBF**, SAT 2006, *Ninth International Conference on Theory and Applications of Satisfiability Testing*, Springer New York, 2006
- [CP2005] Horst Samulowitz, Fahiem Bacchus: **Using SAT in QBF**, CP2005, *Principles and Practice of Constraint Programming*, Springer New York, 2005
- [GI2001] Alexander Hornung, Horst Samulowitz: **3D-Visualization of Music**, German Society for Computer Science (GI), *Computer Science Days*, Ulm, 2001
- [CGI2000] Walter Oberschelp, Alexander Hornung, Horst Samulowitz: **Visualization of Eclipses and Planetary Conjunction Events: The Interplay between Model Coherence, Scaling and Animation**, CGI 2000, *Computer Graphics International*, Geneva, 2000

### Refereed Workshop Publications

- [LION2009] Yuehua Xu, David Stern, Horst Samulowitz: **Learning Adaptation to Solve Constraint Problems**, short paper, LION 2009, *Learning and Intelligent Optimization*, 2009
- [NESCAI2007] Jessica Davies, Eric Hsu, Horst Samulowitz: **Solution Backtracking for #SAT**, NESCAI 2007, *North East Student Colloquium on Artificial Intelligence*, 2007
- [NESCAI2006] Horst Samulowitz, Fahiem Bacchus: Updated and compacted version of **Using SAT in QBF**, NESCAI 2006, *North East Student Colloquium on Artificial Intelligence*, 2006
- [NESCAI2006] Horst Samulowitz, Jessica Davies, Fahiem Bacchus: Preliminary version of **Preprocessing QBF**, NESCAI 2006, *North East Student Colloquium on Artificial Intelligence*, 2006

### Journal Publications

- [JVC2001] Walter Oberschelp, Alexander Hornung, Horst Samulowitz: **Visualization of eclipses and planetary conjunction events. The interplay between model coherence, scaling and animation.** *The Visual Computer*, Vol. 17(5): 310-317, 2001

### Theses

- Horst Samulowitz, **Solving Quantified Boolean Formulas**, *PhD Thesis*, University of Toronto, 2008
- Horst Samulowitz, **The Efficiency and Implementation of an Evaluation-Based Reasoning Procedure with Disjunctive Information in First-Order Knowledge Bases**, *Master Thesis*, RWTH Aachen, 2003

## Patents

- **Collaborative Expert Portfolio Management at Microsoft Research**  
This work enables to manage a portfolio of experts such as automated problem solvers, algorithms, services or human experts in order to select the most appropriate expert for a given task online at a negligible cost.  
*Patent pending*

## Software

- Contributing to the **G12 - Constraint Reasoning Platform**  
[http://www.nicta.com.au/research/projects/constraint\\_programming\\_platform](http://www.nicta.com.au/research/projects/constraint_programming_platform)
- Contributed to the **Microsoft Solver Foundation**  
<http://www.solverfoundation.com>
- Developed an extensible and lightweight search-based QBF solver called **MiniQBF** (written in C++)  
<http://miniqbf.spaces.live.com/>
- The following software to solve Quantified Boolean Formulas (QBF) is available:
  - QBF Preprocessor **PreQuel**
  - QBF Solver **SQBF**
  - QBF Solver **2clsQ**

The software (mostly developed in Microsoft Visual Studio) can be found at:  
<http://www.cs.toronto.edu/~fbacchus/qbf.html>.

## Other Work Experience

- **Founder and Executive Board, IT-DEVELOP, Aachen, Germany, May 2001 - January 2003.** The main activities were related to the development of a contemporary communication platform that enabled interactive location-based event management. Mobility is becoming evermore important and present in our society - both in business and in private life. People use mobile phones, PDAs and laptop computers, drive to work and to events, fly to business meetings and on holidays. Although mobility is increasing and peoples geographical horizons are broadening, information sources did not keep up.
- **Editor, March 2003.** German translation of the book "The Essence of Artificial Intelligence" by Alison Cawsey.
- **Research Assistant, Virtual Reality Lab, RWTH Aachen, Germany, February 1999 - August 2002.** The work mainly concentrated on developing a virtual reality software that supported multiple projectors and operated on a distributed system (Linux Cluster). This work was presented at several conferences and computer trade fairs (*e.g.*, CeBIT Hannover).
- **Software Developer and System Administrator, HEWATT Corp., Stolberg, Germany, 1995 - 2003.** The software projects were mainly focused on embedded systems and the simulation of prototypes (*e.g.*, blood pressure meter). The duties as a system administrator included the installation and support of Windows/Linux machines and networking (SAMBA).

## Teaching and Mentoring

- Supervision of Honours Project, NICTA/University of Melbourne, 2010  
*Topic:* Constraint-Based Local Search.
- Co-Supervision of Summer Student, NICTA/University of Melbourne, 2009  
*Topic:* Partial Booleanization of Constraints defined in more Expressive Modelling Languages (*e.g.*, ZINC).
- Leading Internship in the Constraint Reasoning Group at Microsoft Research, 2008  
*Topic:* Using Reinforcement Learning to Dynamically Adapt Search when solving Constraint Problems.
- Teaching Assistant for **The How and Why of Computing** (CSC 147, University of Toronto), Spring 2007.  
*Topics:* HTML, JAVA, Algorithms and Data Structures, Database Systems, Theory of Computation  
Duties included marking assignments and exams, conducting weekly one hour classroom tutorials/lab sessions, maintaining newsgroup and also setting up assignments, tutorials, and lab questions.
- Mentoring Undergraduate and Master students at the University of Toronto, 2005-2007
- Research Group Organizer, Knowledge Representation Group, University of Toronto, 2004-2007
- Teaching Assistant for **Introduction to Artificial Intelligence** (CSC 384, University of Toronto), Winter 2003, Spring 2004, Winter 2004, Spring 2005, Winter 2005, Spring 2006, Winter 2006.  
*Topics:* What is AI, Search (*e.g.*, Backtracking/Game Tree Search), Knowledge Representation, Reasoning Under Uncertainty, Planning  
Duties included marking assignments and exams, conducting weekly one hour classroom tutorials, office hours, and also setting up assignments/exams.

## Academic Awards, Scholarships and Funding

- **Winner of the International QBF Competition 2006**  
1st, 2nd, and 3rd place on the industrial benchmarks (see <http://www.qbflib.org> for more details)
- **PhD. Scholarship**,  $\approx$  CAD100,000, University of Toronto, 2003
- **Interest-free Loan for Start-Up**,  $\approx$  EUR200,000, Sparkasse Aachen, Germany, 2001

## Other Skills

- Computer Languages: C#, C, C++, F#, Python, Java, HTML, PHP, SQL, Prolog, Mercury
- Familiar with High-Performance Computing Clusters (Microsoft Windows HPC and Linux clusters)
- Fluent in English, German, and Dutch; at an intermediate level in Spanish; basic knowledge in French.

## Program Committee

- Twenty-Fourth AAAI Conference on Artificial Intelligence, **AAAI**, 2010
- Learning and Intelligent Optimization, **LION**, 2010
- Doctoral Symposium on Engineering Stochastic Local Search Algorithms, **SLDS-DS**, 2009
- The International Joint Conference on Artificial Intelligence, **IJCAI**, 2009
- Twenty-Third AAAI Conference on Artificial Intelligence, **AAAI**, 2008
- Workshop on Autonomous Search at the Principles and Practice of Constraint Programming Conference, **CP**, 2007

## Reviewing

- International Conference on Integration of Artificial Intelligence (AI) and Operations Research (OR) techniques in Constraint Programming, CPAIOR, 2010
- International Conference on Theory and Applications of Satisfiability Testing, SAT, 2006, 2007, 2010
- Design, Automation and Testing Conference, DATE, 2010
- Journal of Heuristics, 2009
- Journal of Satisfiability, JSAT, 2008, 2009
- Principles and Practice of Constraint Programming, CP, 2005, 2007, 2009
- Grant Proposal Review for the Government of Chile, 2009
- Letters to Constraint Processing, Special Issue on Autonomous Search, 2008
- Twenty-Third AAAI Conference on Artificial Intelligence, AAAI, 2008
- PhD. Proposals at Microsoft Research, Cambridge, 2008
- STAIR workshop at the Conference on Artificial Intelligence, AAAI, 2008
- North East Student Colloquium on Artificial Intelligence, NESCAI, 2007, 2008

## References

- **Fahiem Bacchus, Professor**  
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