



**FORM 100**  
**Personal Data Form**  
**PART I**

Date

2012/10/11

Family name <b>Hoos</b>	Given name <b>Holger</b>	Initial(s) of all given names <b>HH</b>	Personal identification no. (PIN) <b>Valid 242347</b>
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☐ I hold a faculty position at an eligible Canadian college  
(complete Appendices B1 and C)

☐ I do not or will not hold an academic appointment at a  
Canadian postsecondary institution

Place of employment other than a Canadian postsecondary  
Institution (give address in Appendix A)

**APPOINTMENT AT A POSTSECONDARY INSTITUTION**

Title of position <b>Professor</b>	Tenured or tenure-track academic appointment Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Department <b>Computer Science</b>	Part-time appointment <input type="checkbox"/> Full-time appointment <input checked="" type="checkbox"/>
Campus <b>Vancouver (Point Grey)</b>	<ul style="list-style-type: none"><li>For all non-tenured or non tenure-track academic appointment and Emeritus Professors, complete Appendices B &amp; C</li><li>For life-time Emeritus Professor and part-time positions, complete Appendix C</li></ul>
Canadian postsecondary institution <b>British Columbia</b>	

**ACADEMIC BACKGROUND**

Degree	Name of discipline	Institution	Country	Date yyyy/mm
Bachelor's	Computer Science	Technische Universitaet Darmstadt	GERMANY	1992 / 09
Master's	Computer Science	Technische Universitaet Darmstadt	GERMANY	1996 / 04
MSc/Minor	Mathematics, Molecular Biology (Minors)	Technische Universitaet Darmstadt	GERMANY	1996 / 04
Doctorate	Computer Science	Technische Universitaet Darmstadt	GERMANY	1998 / 11

**TRAINING OF HIGHLY QUALIFIED PERSONNEL**

Indicate the number of students, fellows and other research personnel that you:

	Currently		Over the past six years (excluding the current year)		
	Supervised	Co-supervised	Supervised	Co-supervised	Total
Undergraduate			6		6
Master's	3		2	2	7
Doctoral	3	3	8		14
Postdoctoral	1		1	1	3
Others	1		2		3
Total	8	3	19	3	33

**ACADEMIC, RESEARCH AND INDUSTRIAL EXPERIENCE (use one additional page if necessary)**

Position held (begin with current)	Organization	Department	Period (yyyy/mm to yyyy/mm)
Professor	British Columbia	Computer Science	2010/07
Associate Professor	University of British Columbia	Computer Science	2005/07 to 2010/06
Assistant Professor	University of British Columbia	Computer Science	2000/07 to 2005/06
Postdoctoral Fellow, Research & Teaching	University of British Columbia	Computer Science	1998/11 to 2000/06
Academic Assistant ("Wissenschaftlicher Mitarbeiter")	Technische Universitaet Darmstadt (Germany)	Computer Science	1996/04 to 1998/10
Research and Teaching Assistant	Technische Universitaet Darmstadt (Germany)	Computer Science	1994/09 to 1996/03
Director, SALIERI Project	Technische Universitaet Darmstadt (Germany)	Computer Science	1994/09 to 2000/09
Research Assistant	Technische Universitaet Darmstadt (Germany)	Computer Science	1993/09 to 1994/08
Assistant Software Developer	Technische Universitaet Darmstadt (Germany)	Central Computing Services	1993/01 to 1993/08

Personal identification no. (PIN)

**Valid** 242347

Family name

Hoos

**RESEARCH SUPPORT**Family name and initial(s)  
of applicantTitle of proposal, funding source and program,  
and time commitment (hours/month)Amount  
per yearYears of  
tenure  
(yyyy)

List all sources of support (including NSERC grants and university start-up funds) held as an applicant or a co-applicant: a) support held in the past four (4) years but now completed; b) support currently held, and c) support applied for. For group grants, indicate the percentage of the funding directly applicable to your research. Use additional pages as required.

**a) Support held in the past 4 years**

Hoos, H.H.

Hybrid Stochastic Local Search Algorithms for  
Complex Combinatorial Problems

NSERC

Discovery Grant

55 hours/month

32,000

32,000

32,000

32,000

32,000

2005

2006

2007

2008

2009

Condon, A. and 7 others

Advancing Computational Tools for Molecular  
Structure Prediction

NSERC

MITACS NCE

10 hours/month

110,000 (10%)

27,500 (8%)

2007

2008

Wagner, A.S. and Hoos, H.H.

Financial market miner system

NSERC

Idea to Innovation

10 hours/month

124,355 (20%)

2008

Holger, H.H.

(Infrastructure Budget)

UBC Peter Wall Institute for Advanced Studies

Distinguished Scholar in Residence Program

8 hours/month

15,000

2010

**RESEARCH SUPPORT**

Family name and initial(s) of applicant	Title of proposal, funding source and program, and time commitment (hours/month)	Amount per year	Years of tenure (yyyy)
List all sources of support (including NSERC grants and university start-up funds) held as an applicant or a co-applicant: a) support held in the past four (4) years but now completed; b) support currently held, and c) support applied for. For group grants, indicate the percentage of the funding directly applicable to your research. Use additional pages as required.			
<b>a) Support held in the past 4 years</b>			
Hoos, H.H.	Automated scheduling tool for grant reviewing NSERC Miscellaneous Project 8 hours/month	52,500	2011
<b>b) Support currently held</b>			
Hoos, H.H. and Leyton-Brown, K.	Automated Configuration of Heuristic Algorithms from Components (computing support of research funded by NSERC, NCE grants) Compute Canada Resource Allocation (equiv. dollar value shown below) 0 hours/month	140,060 (60%)	
Holger, H.H. and Leyton-Brown, K.	Automated Design of Heuristic Algorithms from Components NSERC MITACS NCE Seed Project 20 hours/month	72,900 (60%) 72,900 (60%) 98,500 (60%)	2009 2010 2011
Hoos, H.H.	Programming by Optimisation: Computer-Aided Design of High-Performance Algorithms for Hard Combinatorial Problems NSERC Discovery Grant 55 hours/month	60,000 60,000 60,000 60,000 60,000	2010 2011 2012 2013 2014

Personal identification no. (PIN)

**Valid** 242347

Family name

Hoos

**RESEARCH SUPPORT**Family name and initial(s)  
of applicantTitle of proposal, funding source and program,  
and time commitment (hours/month)Amount  
per yearYears of  
tenure  
(yyyy)

List all sources of support (including NSERC grants and university start-up funds) held as an applicant or a co-applicant: a) support held in the past four (4) years but now completed; b) support currently held, and c) support applied for. For group grants, indicate the percentage of the funding directly applicable to your research. Use additional pages as required.

**b) Support currently held**

Holger H. Hoos

Programming by Optimisation: Computer-Aided  
Design of High-Performance Algorithms for Hard  
Combinatorial Problems  
NSERC  
Discovery Accelerator Supplement

40,000

2010

40,000

2011

40,000

2012

Hoos, H.H.

Improving Monte-Carlo Search in Games using  
Automated Algorithm Configuration  
NCE  
GRAND

40,000

2010

34,000

2011

25,000

2012

8 hours/month

## Highly Qualified Personnel (HQP)

Provide personal data about the HQP that you currently, or over the past six years, have supervised or co-supervised.

			Personal identification no. (PIN) <b>Valid 242347</b>	Family name <b>Hoos</b>
Name	Type of HQP Training and Status	Years Supervised or Co-supervised	Title of Project or Thesis	Present Position
Alexandre Fréchette	Doctoral (In Progress)	Supervised 2012 -	Next-generation algorithm configuration and selection	PhD student, UBC/CS
Chris Thornton	Master's (In Progress)	Supervised 2012 -	Configuration and selection of machine learning algorithms)	MSc student, UBC/CS
Quinn Hsu	Technician (In Progress)	Supervised 2012 -	Development environment for programming by optimisation	Research Programmer, UBC/CS
Steven Ramage	Master's	Supervised 2012 -	(Model-based algorithm configuration and performance ...)	MSc student, UBC/CS
Schneider, Marius	Doctoral (In Progress)	Co-supervised 2011 -	(Parallel Algorithm Configuration)	PhD student, University of Potsdam (Germany)
Aghaeepour, Nima	Doctoral (In Progress)	Co-supervised 2010 -	Computational Exploratory Analysis of Flow Cytometry	PhD student, CIHR/MSFHR Training Programme in
Bayless, Sam	Doctoral (In Progress)	Supervised 2010 -	(Computer-aided Design of SAT Solvers)	PhD student, UBC/CS
Hutter, Frank	Postdoctoral (In Progress)	Supervised 2009 -	Model-based Methods for Algorithm Configuration	Postdoctoral Fellow, UBC/CS
Styles, James	Master's (In Progress)	Supervised 2009 -	Computer-aided algorithm design for the TSP	MSc student, UBC/CS
Fawcett, Chris	Doctoral (In Progress)	Supervised 2007 -	(Automatic configuration and synthesis of SLS algorithms)	PhD student, UBC/CS
Xu, Lin	Doctoral (In Progress)	Co-supervised 2006 -	Run-time prediction and algorithm selection	PhD student, UBC/CS
Quinn Hsu	Undergraduate (Completed)	Supervised 2012 - 2012	Development environment for programming by optimisation	Research Programmer, UBC Department of Computer Science
Steven Ramage	Undergraduate (Completed)	Supervised 2012 - 2012	Efficient implementation of the SMAC algorithm configurator	MSc student, UBC/CS
Chan, Maverick	Undergraduate (Completed)	Supervised 2011 - 2011	Sequential Model-based Automated Configuration of ...	(unknown)
Tompkins, Dave A.D.	Postdoctoral (Completed)	Supervised 2010 - 2011	Computer-aided Design of Highly Parametric SAT Solvers	Instructor, University of Waterloo
Nell, Christopher	Master's (Completed)	Supervised 2009 - 2011	Automating Meta-algorithmic Analysis and Design	Software Engineer, deviantART Canada, Inc.
Tompkins, Dave A. D.	Doctoral (Completed)	Supervised 2000 - 2010	Dynamic Local Search for SAT [delayed by long sick leave]	Instructor, University of Waterloo
Aghaeepour, Nima	Lab rotation (Completed)	Supervised 2009 - 2009	Enhanced RNA Secondary Structure Prediction	PhD student, CIHR/MSFHR Training Programme in
Cheu, John	Undergraduate (Completed)	Supervised 2009 - 2009	Automated algorithm design for protein structure prediction	(unknown)
Patitsas, Elizabeth	Undergraduate (Completed)	Supervised 2009 - 2009	Automated parameter configuration for sorting	Undergraduate student at UBC/CS

## Highly Qualified Personnel (HQP)

Provide personal data about the HQP that you currently, or over the past six years, have supervised or co-supervised.

			Personal identification no. (PIN) <b>Valid</b> 242347	Family name <b>Hoos</b>
Name	Type of HQP Training and Status	Years Supervised or Co-supervised	Title of Project or Thesis	Present Position
Khorvash, Massih	Master's (Completed)	Supervised 2007 - 2009	On uniform sampling of cliques	(unknown)
KhudaBukhsh Ashiqur	Master's (Completed)	Co-supervised 2007 - 2009	SATenstein: Automatically Building Local Search SAT	PhD student, Carnegie Mellon University (USA)
Hutter, Frank	Doctoral (Completed)	Supervised 2004 - 2009	Automating the Configuration of Algorithms for Solving Hard	Postdoctoral Fellow, UBC/CS
Miao, Kay	Undergraduate (Completed)	Supervised 2007 - 2008	RNA Secondary Structure Drawing	(unknown)
Andronesco, Mirela	Doctoral (Completed)	Supervised 2004 - 2008	RNA Secondary Structure Prediction	Postdoctoral Fellow, University of Washington (USA)
Rogic, Sanja	Postdoctoral (Completed)	Co-supervised 2007 - 2007	The Role of RNA Secondary Structure in Splicing	Postdoctoral fellow, UBC Centre for High-throughput Biology
Rostoker, Camilo	Master's (Completed)	Co-supervised 2005 - 2007	Parallel Workflow for Online Correlation and Clique-finding	Co-founder and developer at Scalable Analytics, Inc.
Aguirre-Hernandez, R.	Doctoral (Completed)	Supervised 2001 - 2007	Computational RNA Secondary Structure Design	Postdoc at iCapture Ctr, St. Paul's Hospital, Vancouver
Thachuk, Chris	Lab rotation (Completed)	Supervised 2006 - 2006	Replica Exchange Monte Carlo for Protein Folding ...	PhD student, CIHR/MSFHR Training Programme in
Rogic, Sanja	Doctoral (Completed)	Supervised 2002 - 2006	Role of pre-mRNA secondary structure in splicing	Postdoctoral Fellow, UBC Centre for High-Throughput Biology
Huggett, Michael	Doctoral (Not Completed)	Supervised 2001 - 2006	Biomimetic Associative Information Networks	Research Associate at UBC / Library and Information Sciences
Shmygelska, Olena	Doctoral (Completed)	Supervised 2001 - 2006	Ant Colony Algorithms for Protein Folding ...	Senior Researcher at Carnegie Mellon University / NASA Ames
Tulpan, Dan	Doctoral (Completed)	Supervised 2000 - 2006	DNA Code Design	Research Officer at NRC

## 1 Most Significant Research Contributions

My research is focussed on solving hard combinatorial problems as effectively as possible, using and developing principled empirical methods. My most significant research contributions are advances in algorithm design that substantially improve the state of the art in solving fundamental and application-relevant problems in artificial intelligence, operations research and bioinformatics. Especially prominent amongst those problems are molecular structure prediction problems and the satisfiability problem in propositional logic (SAT). The latter is a fundamental and widely studied problem in computing science, and algorithms for solving SAT have applications in electronic systems design, software verification, planning and scheduling.

Since 2007, my primary research activities have been focussed on computer-aided algorithm design & parameter optimisation, building on my earlier work in stochastic local search and empirical algorithmics, in particular on my work on adaptive SAT algorithms.

My work on *automated algorithm configuration* is motivated by the fact that many, if not most state-of-the-art algorithms for hard combinatorial problems have parameters that have a large impact on their behaviour; methods for automatically determining performance-optimising settings of these parameters are useful during development of such algorithms as well as when applying them to the specific types of instances arising in an application context [5]. My work has resulted in the first and still best automatic configuration procedures capable of effectively dealing with dozens of parameters and up to  $10^{47}$  distinct combinations of parameter settings [38,11,30,23]. Using one of these procedures, we have substantially improved the state of the art in solving SAT-encoding software verification problems [35]; this is significant, because formal verification is one of the key approaches to improving software reliability, and the SAT-based approach we have followed is widely seen as a key enabling technology in this context. Our automated algorithm configuration approach has also resulted in significant improvements in solving SAT-encoded hardware verification problems [35] and in solving a widely studied class of lattice-based protein structure prediction methods [15]; most recently, it has also produced large improvements in the state of the art for solving several widely studied types of SAT instances [32,25], and has led to large improvements in the performance of the commercial CPLEX solver for mixed integer programming problems (which is widely used in industry) [11,30]. Furthermore, we have recently achieved advancements in the state of the art in model-based parameter optimisation [33,23]; this approach uses methods from machine learning and statistics to model the dependency of an algorithm's performance on its parameter settings and has some advantages, but also some disadvantages compared to the previously mentioned, so-called model-free procedures.

My work on *portfolio-based algorithm selection* is based on the idea of choosing from a set of algorithms the one that is expected to be most efficient based on cheaply computable characteristics of a given problem instance. It has recently allowed my group to automatically construct solvers that substantially advanced the state of the art in solving several prominent classes of SAT instances [37,36,14,21] and placed first in two of the three tracks of the 2012 SAT Challenge, after winning prizes in 5 out of the 9 categories of the 2007 and 2009 SAT Competitions.

My work on the *improvement of energy models for RNA secondary structures* has a similar flavour in that it is based on the idea of automatically optimising parameters in a principled way, based on empirical data. RNA secondary structures play an important role in many fundamental biological processes, including ones associated with human diseases, as well as in designing RNA molecules that could be used in molecular therapy approaches. Good energy models are key to the performance of a large and widely-used class of RNA structure prediction methods. The parameter optimisation techniques I developed jointly with Anne Condon and our Ph.D. student Mirela Andronescu automatically derive optimised models from thermodynamic data and a collection of trusted secondary structures; these energy models have considerably improved the accuracy of state-of-the-art energy-based RNA secondary structure prediction approaches [16,10]. This work crucially depends on a collection of trusted RNA secondary structures. My group has assembled such a collection and made it available as a publicly accessible data base; statistical analysis of this data has produced some interesting insights in the occurrence and prevalence of RNA structural elements [12]. Enabled by this resource, we have shed light on the circumstances under which various state-of-the-art energy-based algorithms for RNA secondary structure prediction perform well, producing further evidence for the utility of our improved energy models [6].

Finally, in collaboration with Dr. Ryan Brinkman at the BC Cancer Agency and others, my Ph.D. student Nima Aghaeepour and I improved the state of the art in the computational analysis of high-dimensional flow cytometry data [9] and demonstrated how our new tools and techniques can be used to predict progression to AIDS [7].



## 2 Research Contributions and Practical Applications (last 6 years)

**Note:** Names of student or postdoc co-authors are shown in **bold face**. Author order conventions vary depending on the area of publication and co-authors involved. In many cases, student co-authors are listed first, followed by faculty authors in alphabetical order. I often work with collaborators from UBC or elsewhere, whose expertise complements mine. I am very actively engaged in all stages of collaborative work and frequently play a leadership role within the respective team.

### Books and Book Chapters (peer-reviewed):

1. Holger H. Hoos: *Automated Algorithm Configuration and Parameter Tuning*. Autonomous Search, Chapter 3, pp. 37–71, Springer Verlag, 2012.
2. **Frank Hutter**, Thomas Bartz-Beielstein, Holger H. Hoos, Kevin Leyton-Brown and Kevin P. Murphy: Sequential Model-Based Parameter Optimisation: an Experimental Investigation of Automated and Interactive Approaches. Empirical Methods for the Analysis of Optimization Algorithms, Chapter 15, pp. 363–414, Springer Verlag, 2010.
3. **Frank Hutter**, Thomas Bartz-Beielstein, Holger H. Hoos, Kevin Leyton-Brown and Kevin P. Murphy: *Sequential Model-Based Parameter Optimisation: an Experimental Investigation of Automated and Interactive Approaches*. Empirical Methods for the Analysis of Optimization Algorithms, Chapter 15, pp. 363–414, Springer Verlag, 2010.
4. Holger H. Hoos and Edward Tsang: *Local Search Methods*. Handbook of Constraint Programming, Chapter 5, pp. 135–167, Elsevier, 2006.

### Journal Articles (peer-reviewed):

5. Holger H. Hoos: *Programming by Optimisation – Towards a new Paradigm for Developing High-Performance Software*. Communications of the ACM 55(2): 70–80, February 2012.
6. Monir Hajiaghayi, Anne Condon and Holger H. Hoos: *Analysis of Energy-based Algorithms for RNA Secondary Structure Prediction*. BMC Bioinformatics 2012, 13:22, 2012. (11 pages)
7. **Nima Aghaeepour**, Pratip K. Chattopadhyay, Anuradha Ganesan, Kieran O'Neill, Habil Zare, Adrin Jalali, Holger H. Hoos, Ryan R. Brinkman and Mario Roederer: *Early Immunologic Correlates of HIV Protection can be Identified from Computational Analysis of Complex Multivariate T-cell Flow Cytometry Assays*. Bioinformatics 28(7): 1009–1016, 2012.
8. Therese Biedl, Stephane Durocher, Holger H. Hoos, Shuang Luan, Jared Saia and **Maxwell Young**: *A Note on Improving the Performance of Approximation Algorithms for Radiation Therapy*. Information Processing Letters 111(7):326–333, 2011.
9. **Nima Aghaeepour**, Radina Nikolic, Holger H. Hoos and Ryan R. Brinkman: *Rapid Cell Population Identification in Flow Cytometry Data*. Cytometry Part A 79A(1): 6–13, 2011.
10. **Mirela Andronescu**, Anne Condon, Holger H. Hoos, David H. Mathews and Kevin P. Murphy: *Computational approaches for RNA energy parameter estimation*. RNA 16(12): 2304–2318, 2010.
11. **Frank Hutter**, Holger H. Hoos, Kevin Leyton-Brown and Thomas Stützle: *ParamILS: An Automatic Algorithm Configuration Framework*. J. of Artificial Intelligence Research, Volume 36, pp. 267–306, 2009.
12. **Mirela Andronescu**, **Vera Bereg**, Holger H. Hoos and Anne Condon: *RNA STRAND: The RNA Secondary Structure and Statistical Analysis Database*. BMC Bioinformatics, 9:340, 2008.
13. **Sanja Rogic**, **Ben Montpetit**, Holger H. Hoos, Alan K. Mackworth, B.F. Francis Ouellette, Philip Hieter: *Correlation between the secondary structure of pre-mRNA and efficiency of splicing in Saccharomyces cerevisiae*. BMC Genomics, 9:355, 2008.
14. **Lin Xu**, **Frank Hutter**, Holger H. Hoos and Kevin Leyton-Brown: *SATzilla: Portfolio-based Algorithm Selection for SAT*. J. of Artificial Intelligence Research, Vol. 32, pp. 565–606, 2008.
15. **Chris Thachuk**, **Alena Shmygelska** and Holger H. Hoos: *Replica Exchange Monte Carlo for Protein Folding in the HP Model*. BMC Bioinformatics, 8:342, 2007.

16. **Mirela Andronescu**, Anne Condon, Holger H. Hoos, David H. Mathews and Kevin P. Murphy: *Efficient parameter estimation for RNA secondary structure prediction*. Bioinformatics, 23(13):i19-i28, 2007.
17. **Alena Shmygelska** and Holger H. Hoos: *An Adaptive Bin Framework Search Method for a Beta-Sheet Protein Homopolymer Model*. BMC Bioinformatics, 8:136, 2007.
18. **Rosalía Aguirre-Hernández**, Holger H. Hoos and Anne Condon: *Computational RNA Secondary Structure Design: Empirical Complexity and Improved Methods*. BMC Bioinformatics 8:34, 2007.
19. Wayne Pullan and Holger H. Hoos: *Dynamic Local Search for the Maximum Clique Problem*. J. of Artificial Intelligence Research, Vol. 25, pp. 159–185, 2006.

#### Conference Papers (peer-reviewed):

20. **Lin Xu**, Holger Hoos and Kevin Leyton-Brown: *Predicting Satisfiability at the Phase Transition*. Proceedings of the 26th Conference on Artificial Intelligence (AAAI 2012), pp. 584–590, 2012.
21. **Lin Xu, Frank Hutter**, Holger Hoos and Kevin Leyton-Brown: *Evaluating Component Solver Contributions to Portfolio-Based Algorithm Selectors*. Proceedings of the 15th International Conference on Theory and Applications of Satisfiability Testing (SAT 2012), LNCS 7317, pp. 228–241, Springer, 2012.
22. **James Styles**, Holger H. Hoos and Martin Müller: *Automatically Configuring Algorithms for Scaling Performance*. Proceedings of the 6th International Conference on Learning and Intelligent Optimization (LION 6), LNCS 7219, pp. 205–219, Springer, 2012.
23. **Frank Hutter**, Holger H. Hoos and Kevin Leyton-Brown: *Parallel Algorithm Configuration*. Proceedings of the 6th International Conference on Learning and Intelligent Optimization (LION 6), LNCS 7219, pp. 55–70, Springer, 2012.
24. **Marius Schneider** and Holger H. Hoos: *Quantifying Homogeneity of Instance Sets for Algorithm Configuration*. Proceedings of the 6th International Conference on Learning and Intelligent Optimization (LION 6), LNCS 7219, pp. 190–204, Springer, 2012.
25. **Dave Tompkins, Adrian Balint** and Holger H. Hoos: *Captain Jack – New Variable Selection Heuristics in Local Search for SAT*. Proceedings of the 14th International Conference on Theory and Applications of Satisfiability Testing (SAT 2011), LNCS 6695, pp. 302–316, Springer, 2011.
26. **Christopher W. Nell, Chris Fawcett**, Holger H. Hoos and Kevin Leyton-Brown: *HAL: A Framework for the Automated Design and Analysis of High-Performance Algorithms*. Proceedings of the 5th International Conference on Learning and Intelligent Optimization (LION 5), LNCS 6683, pp. 600–615, Springer, 2011.
27. **Frank Hutter**, Holger H. Hoos and Kevin Leyton-Brown: *Extending Sequential Model-Based Optimization to General Algorithm Configuration*. Proceedings of the 5th International Conference on Learning and Intelligent Optimization (LION 5), LNCS 6683, pp. 507–523, Springer, 2011. (Officially recognised as runner-up for best paper award.)
28. **Dave A.D. Tompkins** and Holger H. Hoos: *Dynamic Scoring Functions with Variable Expressions: New SLS Methods for Solving SAT*. Proc. of the 13th International Conference on Theory and Applications of Satisfiability Testing (SAT 2010), LNCS 6185, pp. 278–292, Springer, 2010.
29. **Lin Xu**, Holger H. Hoos and Kevin Leyton-Brown: *Hydra: Automatically Configuring Algorithms for Portfolio-Based Selection*. Proc. of the 24th Conference on Artificial Intelligence (AAAI-10), pp. 210–216, 2010.
30. **Frank Hutter**, Holger H. Hoos and Kevin Leyton-Brown: *Automated Configuration of Mixed Integer Programming Solvers*. Proc. of the 7th International Conference on Integration of Artificial Intelligence and Operations Research techniques in Constraint Programming (CPAIOR 2010), LNCS 6140, pp. 186–202, Springer, 2010.
31. **Frank Hutter**, Holger H. Hoos and Kevin Leyton-Brown: *Tradeoffs in the Empirical Evaluation of Competing Algorithm Designs*. Proc. of the 4th Learning and Intelligent Optimization Conference (LION 4), LNCS 6073, pp. 281–298, Springer, 2010.

32. **Ashiqur R. KhudaBukhsh, Lin Xu**, Holger H. Hoos, Kevin Leyton-Brown: *SATenstein: Automatically Building Local Search SAT Solvers From Components*. Proc. 21st Intl. Joint Conf. on Artificial Intelligence (IJCAI-09), pp. 517–524, 2009.
33. **Frank Hutter**, Holger H. Hoos, Kevin Leyton-Brown, Kevin Murphy: *An Experimental Investigation of Model-Based Parameter Optimisation: SPO and Beyond*. Proc. 2009 Genetic and Evolutionary Computation Conference (GECCO'09), pp. 271–278, 2009.
34. Marco Chiarandini, **Chris Fawcett** and Holger H. Hoos: *A Modular Multiphase Heuristic Solver for Post Enrollment Course Timetabling (Extended Abstract)*. Proc. 7th Intl. Conf. on the Practice and Theory of Automated Timetabling (PATAT 2008), 2008.
35. **Frank Hutter, Domagoj Babić**, Holger H. Hoos and Alan Hu: *Boosting Verification by Automatic Tuning of Decision Procedures*. Proc. 7th Intl. Conf. on Formal Methods in Computer Aided Design (FMCAD-07), pp. 27–34, 2007.
36. **Lin Xu, Frank Hutter**, Holger H. Hoos and Kevin Leyton-Brown: *SATzilla-07: The Design and Analysis of an Algorithm Portfolio for SAT*. Proc. 13th Intl. Conf. on Principles and Practice of Constraint Programming (CP-07), pp. 712–727, 2007.
37. **Lin Xu**, Holger H. Hoos and Kevin Leyton-Brown: *Hierarchical Hardness Models for SAT*. Proc. 13th Intl. Conf. on Principles and Practice of Constraint Programming (CP-07), pp. 696–711, 2007.
38. **Frank Hutter**, Holger H. Hoos and Thomas Stützle: *Automatic Algorithm Configuration based on Local Search*. Proc. 22nd Conf. on Artificial Intelligence (AAAI-07), pp. 1152–1157, 2007.
39. **Frank Hutter**, Youssef Hamadi, Holger H. Hoos and Kevin Leyton-Brown: *Performance Prediction and Automated Configuration of Randomized Algorithms*. Proc. 12th Intl. Conf. on Principles and Practice of Constraint Programming (CP-06), pp. 213–228, 2006.
40. **Dave A.D. Tompkins** and Holger H. Hoos: *On the Quality and Quantity of Random Decisions in Stochastic Local Search for SAT*. Proc. 19th Canadian Artificial Intelligence Conf. (AI 2006), Vol. 4013 of Lecture Notes in Artificial Intelligence, pp. 146–158, Springer Verlag, 2006.

*Note: Due to limited space, 3 refereed journal papers, 2 refereed conference papers, 5 refereed workshop papers, as well as several invited (non-refereed) book chapters and non-refereed technical papers have been omitted from this list.*

**Selected contributions to practical knowledge:** I am co-inventor (with Craig Boutilier) on two US Patents (7,475,035, issued 2009, and 7,010,505, issued 2006); both inventions have been acquired by CombineNet, one of the leading sourcing technology companies whose services have been used by 15 of the Fortune 100 companies. I am also a technical consultant to Actenum, Inc., a provider of advanced decision support and optimisation software for the resource sector who uses core technology that is based on some of my published research on stochastic local search algorithms for hard combinatorial decision and optimisation problems. I work with the CPLEX team at IBM to improve their CPLEX solver – arguably, the most widely used commercial optimisation software world-wide.

### 3 Other Evidence of Impact and Contributions (last 6 years)

#### Awards and Honours:

- ▷ 2012: 1st prizes in 2 of the 3 main tracks of the 2012 SAT Challenge
- ▷ 2011: 2nd place in the 7th International Planning Competition (IPC 2011)
- ▷ 2010: Distinguished Scholar in Residence at the Peter Wall Institute for Advanced Studies – each year, 5–6 outstanding UBC scholars are competitively selected for this position, which comes with a 15 000 CAD infrastructure budget.
- ▷ 2010: IJCAI-JAIR Best Paper Prize for [14] – each year, this prize is awarded to an outstanding paper published in the Journal of AI Research in the preceding five calendar years.
- ▷ 2009: IJCAI-JAIR Best Paper Prize for [??] – each year, this prize is awarded to an outstanding paper published in the Journal of AI Research in the preceding five calendar years.
- ▷ 2009: 3 first prizes and 2 second prizes in 5 of the 9 categories of the 2009 SAT Competition

- ▷ 2008: 3rd prize in the Post Enrolment based Course Timetabling Track of the 2nd Intl. Timetabling Competition (ITC2007)
- ▷ 2007: 3 first prizes, 1 second and 1 third prize in 5 of the 9 categories of the 2007 SAT Competition
- ▷ First prize in the QF\_BV category of the 2007 Satisfiability Modulo Theories (SMT) Competition
- ▷ 2006: Best Paper Award, 19th Conference of the Canadian Society for Computational Studies of Intelligence (now Canadian AI Association) – out of 220 papers submitted to the conference, 47 were accepted for publication, of which our paper [40] was distinguished as the best.

Three of my recent publications [12,13] have been awarded the designation ‘**highly accessed**’ by the publisher, who uses this designation to identify articles that have been especially highly accessed; once an article has qualified as ‘highly accessed’ it will remain permanently flagged as such.

I currently serve as President of the Canadian AI Association (CAIAC), as Associate Editor for the Journal of Artificial Intelligence Research (JAIR) as Area Editor for Metaheuristic Methodologies, and as Member of the Editorial Boards for the Journal on Boolean Modeling, Reasoning and Computation (JSAT). I have been guest editor for the Special issue on Stochastic Search Algorithms of Annals of Operations Research (2007), and for the Special Issue on Music Information Retrieval of Computer Music Journal (2004). I have chaired the 7th International Conference on Theory and Applications of Satisfiability Testing (SAT 2004) and the 7th International Conference on Music Information Retrieval (ISMIR 2006), as well as the Intelligent Systems Demonstrations Tracks of the 22nd and 23rd Conferences on Artificial Intelligence (AAAI-07 and AAAI-08). I served on the Advisory Committee for IJCAI-11, I was an area chair for AAAI-12 and AAAI-10 and I serve regularly on programme committees for major international conferences in artificial intelligence and related areas (IJCAI, AAAI, CP, SAT).

I regularly give invited presentations at meetings and at academic institutions in North America and Europe. Recent highlights include a keynote talk at the IEEE Congress on Evolutionary Computation (CEC 2011); one of three plenary talks at the 9th Metaheuristics International Conference (MIC 2011); invited talks at the 20th International Conference on Automated Planning and Scheduling (ICAPS) in Toronto (Canada), at Harvard University and at IBM ILOG, all in 2010; and at the Massachusetts Institute of Technology, University of Toronto, McGill University, University of Waterloo, Carnegie Mellon University, AT&T Research, the Institute for Advanced Studies in Glasgow (Scotland) and the CORS/INFORMS Conference in Toronto, all in 2009;

## 4 Contributions to the Training of Highly Qualified Personnel

Over the last 6 years, I have been involved in supervising 3 post-doctoral fellows, 14 Ph.D. students and 7 M.Sc. students. 12 of these were co-supervised symmetrically by me and a colleague. This arrangement is relatively common at our department; it involves both supervisors taking full responsibility for the student and meeting jointly with the student, typically on a weekly basis. In 6 other cases, I formally acted as co-supervisor; in terms of involvement in the student’s research, regular meetings and funding, I treat these exactly like students for which I am the main or sole supervisor.

Of the graduate students I supervised since 2006, 8 have completed a Ph.D. (six of these are currently post-doctoral fellows, one is a research officer at NRC and one is an instructor at the University of Waterloo), and 4 have completed an M.Sc. (two of these are enrolled in doctoral programmes at UBC or elsewhere, one has founded an IT company, and two work as software engineers). I have also supervised individual research laboratory rotations of two graduate students from the CIHR/MSFHR Training Programme in Bioinformatics, as well as three undergraduate honours, NSERC USRA and directed studies students.

My post-doctoral fellow, Frank Hutter (who also completed his Ph.D. under my supervision) has been awarded a Emmy Noether Junior Research Group Leadership at the University of Freiburg (Germany), a Government of Canada Post-Doctoral Research Fellowship, and a Best Dissertation Award of the Canadian AI Association, and one of my doctoral students, Mirela Andronesu (jointly supervised with Anne Condon) has been awarded a Governor General’s Gold Medal for her Ph.D. thesis. My former doctoral student and post-doctoral fellow, David Tompkins, has received several university awards for excellence as a teaching assistant.



**APPENDIX A  
Personal Data  
(Form 100)**

Complete this appendix (i) if you are an applicant or co-applicant applying for the first time; (ii) if you need to update information submitted with a previous application; or (iii) if you do not hold an appointment at a Canadian postsecondary institution. For updates, include only the revised information in addition to the date, your name and your PIN.

This information will be used by NSERC primarily to contact applicants and award holders. It may also be used to identify prospective reviewers and committee members, and to generate statistics. It will not be seen or used in the adjudication process.

Date 2012/10/11			
Family name Hoos	Given name Holger	Initial(s) of all given names HH	Personal identification no. (PIN) <b>Valid</b> 242347
Position and complete mailing address if your primary place of employment is not a Canadian postsecondary institution or if your current mailing address is temporary  2366 Main Mall  Vancouver BC V6T1Z4 CANADA			If address is temporary, indicate:  Starting date  Leaving date
Telephone number 1 (604) 8221964	Facsimile number (604) 8225485	E-mail address hoos@cs.ubc.ca	
Telephone number (alternate) 1 (604) 8226281	Give an alternate telephone number only if you can be reached at that number during business hours.		Gender (completion optional) <input checked="" type="checkbox"/> Male <input type="checkbox"/> Female
<b>LANGUAGE CAPABILITY</b>			
English	Read <input checked="" type="checkbox"/>	Write <input checked="" type="checkbox"/>	Speak <input checked="" type="checkbox"/>
French	Read <input checked="" type="checkbox"/>	Write <input type="checkbox"/>	Speak <input type="checkbox"/>
I wish to receive my correspondence:		in English <input checked="" type="checkbox"/>	in French <input type="checkbox"/>
<b>AREA(S) OF EXPERTISE</b>			
Provide a maximum of 10 key words that describe your area(s) of expertise. Use commas to separate them. If you have expertise with particular instruments and techniques, specify which one(s).  stochastic search algorithms, combinatorial problems, constraint satisfaction, propositional satisfiability, algorithm portfolios, algorithm design, empirical analysis of algorithms, nature-inspired optimisation algorithms, computer music, bioinformatics			Research subject code(s)  Primary 2800  Secondary 2713