

## Curriculum Vitae — Domagoj Babić

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| CONTACT INFORMATION         | <i>Phone:</i> +1 (510) 331-8993<br><i>Email:</i> babic@eecs.berkeley.edu<br><i>WWW:</i> <a href="http://www.domagoj.info/">http://www.domagoj.info/</a><br><i>Address:</i> Soda Hall 421, Computer Science Division, University of California, Berkeley, CA 94720-1776  |
| EDUCATION                   | 2008 Ph.D. in Computer Science, University of British Columbia, Canada<br>2003 M.Sc. in Computer Science, University of Zagreb, Croatia<br>2001 Dipl.Ing. in Electrical Engineering, major in industrial electronics, University of Zagreb, Croatia   |
| CITIZENSHIP                 | Citizen of Croatia and Canada, US Permanent Resident  |
| LANGUAGES                   | English, Croatian, passive German   |
| SELECTED HONOURS AND AWARDS | 2010–2012 PDF Research Award from the Canadian Natural Science and Engineering Research Council (NSERC)<br>2005–2007 Microsoft Research Graduate Fellowship<br>2007 1 <sup>st</sup> place, International Satisfiability Modulo Theories competition, quantifier-free bit-vector arithmetic category<br>2004–2005 Fulbright Fellowship, declined in order to attend UBC<br>2004–2005 UBC University Graduate Fellowship<br>2000 University of Zagreb Rector Award  |
| SELECTED INVITED TALKS      | 2012 Princeton University, Computer Science Department<br>2012 University of Maryland, College Park, MD, USA<br>2012, 2009 NASA Ames, Moffett Field, USA<br>2011, 2010 Lawrence Livermore National Lab, Livermore, USA<br>2011, 2008 Microsoft Research Redmond, Redmond, USA<br>2011, 2007 Stanford Research Institute, Menlo Park, USA<br>2011, 2007 Intel, Strategic CAD Labs, Portland, USA<br>2009, 2007, 2005 Microsoft Research Cambridge, Cambridge, UK<br>2007 Stanford, Computer Science Department<br>2007 UC Berkeley, EECS<br>2007 Carnegie Mellon University, Department of Computer Science<br>2007 MIT, Computer Science and Artificial Intelligence Laboratory<br>2007 Schloss Dagstuhl, Wadern, Germany<br>2007 Max Planck Institute for Software Systems |
| PROGRAM COMMITTEE SERVICE   | 2010 Program committee member, International Conference on Computer Aided Verification (CAV'10)<br>2010 Program committee member, International Symposium on Stabilization, Safety, and Security of Distributed Systems (SSS'10)<br>2009 Program committee member, Satisfiability Modulo Theories workshop (SMT'09)<br>2008 Co-chair and co-organizer of the Bit-Precise Reasoning workshop (affiliated with CAV 2008)  |

RESEARCH  
EXPERIENCE

**University of California at Berkeley, Computer Science Division**, Berkeley, USA  
*Research Scientist* since Feb 2010

**Synopsys**, Mountain View, USA  
*Senior R&D Eng.* Jul 2009 – Feb 2010

**Fujitsu Labs America**, Sunnyvale, USA  
*Research Consultant* Feb 2009 – Jun 2009

**Cadence Research Laboratories**, Berkeley, USA  
*Research Scientist* Jun 2008 – Jan 2009

**University of British Columbia**, Vancouver, Canada  
*Research Assistant* Sep 2003 – Aug 2008

**Microsoft Research**, Redmond, USA  
*Visiting Graduate Researcher* Apr 2005 – Jul 2005

**University of Zagreb**, Zagreb, Croatia  
*Research and Teaching Assistant* Sep 2001 – Aug 2003

TEACHING

2010 Advanced Topics in Computer Security (UCB CS294-50), guest lecturer  
2004 Models of Computation (UBC CPSC 121), teaching assistant  
2001–2003 Computer Architecture, Modeling and Simulation (at the University of Zagreb), teaching assistant

PROFESSIONAL  
SERVICE

**Panels.** NSF panelist in 2011, USA.

**Reviewing.** Reviewer for International Journal on Software Tools for Technology Transfer (STTT), International Conference on Computer Aided Verification (CAV), Symposium on Principles of Programming Languages (POPL), International Static Analysis Symposium (SAS), Design Automation Conference (DAC), International Conference on Tools and Algorithms for the Construction and Analysis of Systems (TACAS), Design and Test Europe (DATE), International Symposium on Automated Technology for Verification and Analysis (ATVA), International Workshop on Satisfiability Modulo Theories (SMT), Haifa Verification Conference (HVC), Asia and South Pacific Design Automation Conference (ASP-DAC), International Conference on Computer-Aided Design (ICCAD), IEEE Transactions on Software Engineering.

**Involvement in Creation of Standards.** Participated in formulation of the Satisfiability Modulo Theories (SMT) standard for bit-vector arithmetic (QF.BV), which is now used as a standard SMT input format.

**Creation of Benchmarks.** Generated and delivered software verification benchmarks used in several SMT competitions, generated and made available malware system call dependency graphs for the benefit of other researchers.

ACADEMIC  
RESEARCH  
SOFTWARE

- 2011 Tree automata inference engine — Automated library for inference of tree automata from system call dependency graphs. Useful for classifying software and recognizing malicious behaviors.
- 2010 Static analysis engine for binary analysis — The static analysis engine presented in the ISSTA 2011 paper.
- 2008 Calysto extended static checker — Scalable extended static checker capable of handling up to 300 KLOC of code.
- 2007 Spear bit-vector arithmetic decision procedure — Award-winning bit-vector arithmetic decision procedure, won on the 2007 SMT competition in the bit-vector arithmetic category.
- 2005 HyperSAT boolean satisfiability solver — Experimental boolean satisfiability solver, won 3rd place on the 2005 SAT competition in the handcrafted category.

BOOKS

1. **Domagoj Babić** and Zvonimir Rakamarić. “Guidebook for Graduate Studies Abroad”, *P.O.I.N.T.*, ISBN: 978-953-99805-1-9, Croatia, 2007. (in Croatian)

THESES

1. **Domagoj Babić**. “Exploiting Structure for Scalable Software Verification”, *Ph.D. thesis*, University of British Columbia, Computer Science Department, Vancouver, Canada, 2008.
2. **Domagoj Babić**. “Discrete Cosine Transform Algorithms for FPGA Devices”, *M.Sc. thesis*, Faculty of El. Eng. and Computing, University of Zagreb, Croatia, 2003.
3. **Domagoj Babić**. “Designing RISC processors in FPGA”, *Dipl.Ing. thesis*, Faculty of El. Eng. and Computing, University of Zagreb, Croatia, 2001. (in Croatian)

PEER-REVIEWED  
JOURNAL  
PUBLICATIONS

1. **Domagoj Babić**, Daniel Reynaud, and Dawn Song. “Recognizing Malicious Software Behaviors with Tree Automata Inference”. *Formal Methods in System Design journal*, pg. 1–22, Springer, 2012.
2. **Domagoj Babić** and Alan J. Hu. “Approximating the Safely Reusable Set of Learned Facts”. *International Journal on Software Tools for Technology Transfer (STTT)*, 11(4), pg. 325–338, Springer Verlag, 2009.
3. **Domagoj Babić**, Jesse Bingham, and Alan J. Hu. “B-Cubing: New Possibilities for Efficient SAT-Solving”, *IEEE Transactions on Computers*, 55(11), pg. 1315–1324, IEEE Computer Society, 2006.

PEER-REVIEWED  
PUBLICATIONS

1. **Domagoj Babić**, Daniel Reynaud, and Dawn Song. “Malware Analysis with Tree Automata Inference”, *Proceedings of the 23rd Int. Conference on Computer Aided Verification (CAV’11)*, pg. 116–131, LNCS vol. 6806, Springer, 2011. [acceptance rate for regular papers 35/161 = **28%**]
2. **Domagoj Babić**, Lorenzo Martignoni, Stephen McCamant, and Dawn Song. “Statically-Directed Dynamic Automated Test Generation”, *Proceedings of the International Symposium on Software Testing and Analysis (ISSTA’11)*, pg. 12–22, ACM Press, 2011. [acceptance rate 35/121 = **29%**]
3. Chia Yuan Cho, **Domagoj Babić**, Pongsin Poosankam, Kevin Chen, Edward XueJun Wu, and Dawn Song. “MACE: Model-inference-Assisted Concolic Exploration for Protocol and Vulnerability Discovery”, *Proc. of the 2011 USENIX Security Symposium*, 2011. [acceptance rate 35/204 = **17%**]

4. Chia Yuan Cho, **Domagoj Babić**, Richard Shin, and Dawn Song. "Inference and Analysis of Formal Models of Botnet Command and Control Protocols", *Proc. of the 2010 ACM Conference on Computer and Communications Security (CCS'10)*, pg. 426–440, ACM Press, 2010. [acceptance rate 55/325 = **16%**]
5. Juan Caballero, Pongsin Poosankam, Stephen McCamant, **Domagoj Babić** and Dawn Song. "Input Generation via Decomposition and Re-Stitching: Finding Bugs in Malware", *Proc. of the 2010 ACM Conference on Computer and Communications Security (CCS'10)*, pg. 413–426, ACM Press, 2010. [acceptance rate 55/325 = **16%**]
6. **Domagoj Babić** and Alan J. Hu. "Calysto: Scalable and Precise Extended Static Checking", *Proc. of the 30<sup>th</sup> Int. Conference on Software Engineering (ICSE'08)*, pg. 211–220, ACM Press, 2008. [acceptance rate 56/371 = **15%**]
7. **Domagoj Babić** and Alan J. Hu. "Structural Abstraction of Software Verification Conditions", *Proc. of the 19<sup>th</sup> Int. Conference on Computer Aided Verification (CAV'07)*, pg. 371–383, LNCS vol 4590, Springer, 2007. [acceptance rate 33/134 = **25%**]
8. **Domagoj Babić**, Byron Cook, Alan J. Hu, and Zvonimir Rakamarić. "Proving Termination by Divergence", *Proc. of the 19<sup>th</sup> Int. Conference on Software Engineering and Formal Methods (SEFM'07)*, pg. 93–102, IEEE Computer Society, 2007.
9. **Domagoj Babić** and Alan J. Hu. "Exploiting Shared Structure in Software Verification Conditions", *Proc. of Haifa Verification Conference (HVC'07)*, pg. 169–184, LNCS vol 4899, Springer, 2007. [acceptance rate 15/32 = **47%**]
10. Frank Hutter, **Domagoj Babić**, Holger H. Hoos, and Alan J. Hu. "Boosting Verification by Automatic Tuning of Decision Procedures", *Proc. of Int. Conference on Formal Methods in Computer-Aided Design (FMCAD'07)*, pg. 27–37, IEEE Computer Society, 2007. [acceptance rate 23/65 = **35%**]
11. **Domagoj Babić**, Jesse Bingham, and Alan J. Hu. "B-Cubing Theory: New Possibilities for Efficient SAT-Solving", *Proc. of 10<sup>th</sup> IEEE International High-Level Design Validation and Test Workshop (HLDVT'07)*, pg. 192–199, IEEE Press, 2005. [acceptance rate 29/62 = **47%**]
12. **Domagoj Babić**, Jesse Bingham, and Alan J. Hu. "Efficient SAT Solving: Beyond Supercubes", *Proc. of the 42<sup>nd</sup> Design Automation Conference (DAC'05)*, pg. 744–749, ACM Press, 2005. [acceptance rate 154/735 = **21%**]
13. **Domagoj Babić** and Alan J. Hu. "Integration of Supercubing and Learning in a SAT Solver", *Proc. of the 10<sup>th</sup> Asia and South Pacific Design Automation Conference (ASPDAC'05)*, Vol 1, pg. 438–444, ACM Press, 2005. [acceptance rate 99/692 = **14%**]
14. **Domagoj Babić** and Mario Kovač. "Polynomial Transform Based DCT Implementation", *Student Contest Proc. of the 4<sup>th</sup> Electronic Circuits and Systems Conference (ESC'03)*, pg. 5–9, 2003.
15. **Domagoj Babić** and Zvonimir Rakamarić. "Bytecode Optimization", *Proc. of the 24<sup>th</sup> International Conference on Information Technology Interfaces (ITI'02)*, pg. 377–383, 2002.
16. **Domagoj Babić** Goran Jakovljević and Zvonimir Rakamarić. "Java simulator of real-time scheduling algorithms" *Proc. of the 24<sup>th</sup> International Conference on Information Technology Interfaces (ITI'02)*, pg. 411–416, 2002.

TOOL PAPERS

1. **Domagoj Babić** and Frank Hutter. “Spear Theorem Prover”, *In Proc. of the SAT 2008 Race*, Guangzhou, China, 2008.
2. **Domagoj Babić** and Frank Hutter. “Spear”, *In Proc. of the SAT 2007 competition*, Berlin, Germany, Jan 2007.
3. **Domagoj Babić** and Alan J. Hu. “HyperSAT”, *In Proc. of the SAT 2005 competition*, St. Andrews, Scotland, UK.

TECHNICAL  
REPORTS

1. **Domagoj Babić** and Zvonimir Rakamarić. “Asynchronously Communicating Visibly Pushdown Systems”, *UCB Technical Report UCB/EECS-2011-108*, EECS Department, University of California, Berkeley, 2011.
2. **Domagoj Babić** and Madanlal Musuvathi. “Modular Arithmetic Decision Procedure”, *MSR Technical Report TR-2005-114*, Microsoft Research, 2005.

PUBLICATIONS IN  
SUBMISSION OR  
PREPARATION

1. **Domagoj Babić** and Zvonimir Rakamarić. “Asynchronously Communicating Visibly Pushdown Systems”.
2. **Domagoj Babić**, Byron Cook, Alan J. Hu, and Zvonimir Rakamarić. “Proving Termination of Non-Linear Command Sequences”. Invited paper in submission to a special issue of the *Formal Aspects of Computing* journal.
3. **Domagoj Babić** and Matko Botinčan. “Sigma\*: Symbolic Grey-Box Learning of Infinite-State Transductive Programs.”