

Yngvi Björnsson

Curriculum Vitae

Associate Professor
School of Computer Science
Reykjavik University
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Research Interests

- Heuristic search, learning search control, artificial intelligence in computer games and industrial optimization.

Academic Positions

- **Associate Professor / CADIA co-director** 2004-present
School of Computer Science, Reykjavik University
- **Acting Chair** 2005-2006
Department of Computer Science, Reykjavik University
- **Research Associate** 2002-2003
Department of Computing Science, University of Alberta
- **Faculty Lecturer** 2000-2001
Department of Computing Science, University of Alberta

Education

- **Ph.D. in Computer Science**, University of Alberta 2002
Thesis: Selective Depth-First Game-Tree Search
Advisor: Professor Tony Marsland
- **B.S. Computer Science**, University of Iceland 1988

Awards and Honors

- **International General Game Playing Competition** 2007-2008
GGP World Champion (software)
- **Solving Checkers** 2007
Named by Science magazine as one of the top ten scientific achievements of the year.
- **IJCAI Distinguished Paper Prize** 2005
For co-authored conference paper "Solving Checkers"
- **Computer Olympiad** 2000-2002
Gold-medal winner in Lines-of-Action competition (software)
- **Andrew Steward Memorial Graduate Award** 1999
University of Alberta, for doctoral research.

Publications

Journal Articles

- Yngvi Björnsson and Hilmar Finnsson (2009). CadiaPlayer: A Simulation-Based General Game Player. *IEEE Transactions on Computational Intelligence and AI in Games*, 1(1), pp.4-15.
- Vadim Bulitko, Mitja Luvstrek, Jonathan Schaeffer, Yngvi Björnsson, Sverrir Sigmundarson (2008). Dynamic Control in Real-Time Heuristic Search. *Journal of Artificial Intelligence Research*, 32, pp. 419–452.
- Mark Winands and Yngvi Björnsson (2008). Enhanced Realization Probability Search. *New Mathematics and Natural Computation*, 3(6), pp. 329-342.
- Jonathan Schaeffer, Neil Burch, Yngvi Björnsson, Akihiro Kishimoto, Martin Müller, Rob Lake, Paul Lu, Steve Sutphen (2007). Checkers is Solved. *Science*, vol. 317(5844), pp. 1518-1522. **Named one of the top ten scientific achievements of the year 2007.**
- Ryan Hayward, Yngvi Björnsson, Michael Johanson, Morgan Kan, Nathan Po and Jack van Rijswijk (2005). Solving 7x7 Hex with domination, fill-in, and virtual-connections, *Theoretical Computer Science*, vol. 349 (2), pp. 123-139.
- Yngvi Björnsson and Tony Marsland (2003). Learning Extension Parameters in Game-Tree Search, *Information Sciences*, vol. 154, pp. 95-118.
- Yngvi Björnsson and Tony Marsland (2001). Multi-cut Alpha-Beta Pruning in Game-Tree Search, *Theoretical Computer Science*, vol. 252, pp. 177-196.
- *Yngvi Björnsson and Tony Marsland (2000). Risk Management in Game-Tree Pruning, Information Sciences, vol. 122, pp. 23-41.*
- Yngvi Björnsson, Tony Marsland, Jonathan Schaeffer and Andreas Junghanns (1997). Searching with Uncertainty Cut-Offs, *International Computer Chess Association Journal*, vol. 29, pp. 29-37.

Books Edited

- Jaap van der Herik, Nathan Netanyahu, Yngvi Björnsson (2006). *Computers and Games. Revised papers from the Forth International Conference on Computers and Games (CG 2004)*, Ramat-Gan, Israel. Springer-Verlag.
- Jonathan Schaeffer, Martin Müller, Yngvi Björnsson (2003). *Computers and Games. Revised papers from the Third International Conference on Computers and Games (CG 2002)*, Edmonton, Canada. Springer-Verlag.

Refereed Conferences

- Hilmar Finnsson and Yngvi Björnsson. Learning Simulation Control in General Game-Playing Agents. In *The Twenty-Fourth AAAI Conference on Artificial Intelligence*, AAAI Press, 2010. In press.
- Nathan Sturtevant, Vadim Bulitko, and Yngvi Björnsson (2010). On Learning in Real-Time Heuristic Search. In *Proceedings of the 9th International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, Toronto, Canada. In press.
- Vadim Bulitko, Yngvi Björnsson. (2009). kNN LRTA*: Simple Subgoaling for Real-Time Search. *Artificial Intelligence and Interactive Digital Entertainment (AIIDE)*. AAAI Press. Stanford, California. October 14.
- Yngvi Björnsson, Vadim Bulitko, and Nathan Sturtevant (2009). TBA*: Time-Bounded A*. In *Proceedings of the Twenty-first International Joint Conference on Artificial Intelligence (IJCAI'09)*, July 11-17, Pasadena, CA, USA, pp. 431-436.

- Pálmi Skowronski, Yngvi Björnsson, and Mark H. M. Winands (2009). Automatic Discovery of Search-Control Features. In Proceedings of the Twelfth International Advances in Computer Games Conference (ACG'09), Pamplona, Spain, May 11-13, pp. 182-194.
- Mark H.M. Winands and Yngvi Björnsson. Evaluation Function Based Monte-Carlo LOA (2009). In Proceedings of the Twelfth International Advances in Computer Games Conference (ACG'09), Pamplona, Spain, May 11-13, pp. 33-44.
- Hilmar Finnsson and Yngvi Björnsson (2008). Simulation-Based Approach to General Game Playing. In Proceedings of the Twenty-Third AAAI Conference on Artificial Intelligence, pp. 259–264.
- Jónheiður Ísleifsdóttir and Yngvi Björnsson (2008). GTQ: A Language and Tool for Game-Tree Analysis. In Proceedings of the Sixth International Computers and Games Conference (CG'08), Beijing, China, September, pp. 217-228.
- Mark Winands and Yngvi Björnsson, Jahn-Takeshi Saito (2008). Monte-Carlo Tree Search Solver. In Proceedings of the Sixth International Computers and Games Conference (CG'08), Beijing, China, September , pp. 25–36.
- Vadim Bulitko, Yngvi Björnsson, Mitja Luvstrek, Jonathan Schaeffer, Sverrir Sigmundarson (2007). Dynamic Control in Path-Planning with Real-Time Heuristic Search. *Proceedings of the International Conference on Automated Planning and Scheduling (ICAPS'07)*. Providence, RI, pp. 49-56.
- Yngvi Björnsson, Ryan Hayward, Michael Johanson, and Jack van Rijswijck (2006). Dead Cell Analysis in Hex and the Shannon Game, *Graph Theory, Trends in Mathematics* , pp. 45-59.
- Yngvi Björnsson, Jonathan Schaeffer, Nathan Sturtevant (2006). Partial Information Endgame Databases, *Lecture Notes in Computer Science Vol. 4250. Proc. Advances in Computer Games 11*, Taipei, Taiwan, pp. 11-22.
- Yngvi Björnsson and Kári Halldórsson (2006). Improved Heuristics for Optimal Pathfinding on Game Maps, *Proceedings of the 2nd International Conference on Artificial Intelligence and Interactive Entertainment (AIIDE'06)*, Marina Del Ray, CA.
- Jonathan Schaeffer, Yngvi Björnsson, Neil Burch, Akihiro Kishimoto, Martin Muller, Rob Lake, Paul Lu and Steve Sutphen (2005). Solving Checkers, *International Joint Conference on Artificial Intelligence (IJCAI '05)*, Edinburgh, pp. 292-297. **Distinguished Paper Prize**
- Yngvi Björnsson, Markus Enzenberger, Rob Holte and Jonathan Schaeffer (2005). Fringe Search: Beating A* at Pathfinding on Computer Game Maps, *Proceedings of the IEEE Symposium on Computational Intelligence and Games*, pp. 125-132.
- Yngvi Björnsson, Vignir Hafsteinsson, Ársæll Jóhannsson, Einar Jónsson (2004). Efficient Use of Reinforcement Learning in a Computer Game, in *Proceedings of the International Conference on Computer Games: Artificial Intelligence, Design and Education*, pp. 379-383.
- Yngvi Björnsson and Darse Billings (2003). Search and Knowledge in Lines of Action, *Advances in Computer Games*, J. van den Herik, H. Iida, E. Heinz (eds.), Kluwer, pp. 231-248.
- Ryan Hayward, Yngvi Björnsson, Michael Johanson, Morgan Kan, Nathan Po and Jack van Rijswijck (2003). Solving 7x7 HEX: Virtual Connections and Game-State Reduction, *Advances in Computer Games*, J. van den Herik, H. Iida, E. Heinz (eds.), Kluwer, pp. 261-278.
- Jonathan Schaeffer, Yngvi Björnsson, Neil Burch, Robert Lake, Paul Lu and Steve Sutphen (2003). Building the Checkers 10-piece Endgame Databases, *Advances in Computer Games*, J. van den Herik, H. Iida, E. Heinz (eds.), Kluwer, pp. 193-210.
- Yngvi Björnsson, Markus Enzenberger, Rob Holte, Jonathan Schaeffer, and Peter Yap (2003). Comparison of Different Abstractions for Pathfinding on Maps, The 19th *International Joint Conference on Artificial Intelligence (IJCAI 03)*, pp. 1511-1512.

- Yngvi Björnsson and Tony Marsland (2001). Learning Search Control in Adversary Games, *Advances in Computer Games 9*, J. van den Herik and B. Monien (eds.), University of Maastricht, pp. 157-174.
- Yngvi Björnsson and Tony Marsland (1999). Multi-cut Alpha-Beta Pruning, *Computers and Games (CG'98)*, pp. 15-24. Springer-Verlag, *Lecture Notes in Computer Science #1558*.
- Yngvi Björnsson and Tony Marsland (1999). Selective Depth-First Search Methods, *Games in AI Research*, J. van den Herik and H. Iida (eds.), University of Maastricht, pp. 31-56.
- Andreas Junghanns, Jonathan Schaeffer, Mark Brockington, Yngvi Björnsson and Tony Marsland (1997). Diminishing Returns for Additional Search in Chess, *Advances in Computer Chess VIII*, J. van den Herik and J. Uiterwijk (eds.), University of Maastricht, pp. 53-67.

Refereed Workshops

- Hilmar Finnsson and Yngvi Björnsson (2009). Simulation Control in General Game Playing Agents. In IJCAI'09 Workshop on General Intelligence in Game Playing Agents.
- Yngvi Björnsson and Jónheiður Ísleifsdóttir (2007). GTQL: A Query Language for Game Trees. *Computer Games Workshop 2007*. Amsterdam, The Netherlands.
- Sverrir Sigmundarson and Yngvi Björnsson (2006). Value Back-Propagation vs. Backtracking in Real-Time Heuristic Search, *21st National Conference on Artificial Intelligence (AAAI'06)*, Workshop on Learning for Search, pp. 136-141.

Unrefereed Publications

- Winands, Mark H. M and Yngvi Björnsson (2007). Enhanced Realization Probability Search. *Proceedings of the 10th Joint Conference on Information Sciences*. pp. 643-649 (Invited).
- Yngvi Björnsson and Jónheiður Ísleifsdóttir (2006). Tools for Debugging Large Game Trees". *The 11th Games Programming Workshop*. Extended abstract (Invited).
- Yngvi Björnsson (2005). Report on the 13th World Computer Chess Championship. BNVKI Newsletter of the Belgium-Netherlands Association for Artificial Intelligence, Vol 22, No. 5, pp. 110-111.
- Yngvi Björnsson (2005). Report on Pieter Spronck's Ph.D. Thesis Defense and the Machine Learning for Commercial Game AI Symposium. BNVKI Newsletter of the Belgium-Netherlands Association for Artificial Intelligence, Vol 22, No. 3, pp. 53-54.
- Yngvi Björnsson and Tony Marsland (2002). Learning Control of Search Extensions, *Proceedings of the Sixth Joint Conference on Information Sciences (JCIS'02)*, pp. 446-449. (Invited).
- Yngvi Björnsson and Mark Winands (2002). YL wins Lines-of-Action Tournament, *International Computer Games Journal*, vol. 25, pp.185-186. (Technical note).
- Yngvi Björnsson (2002). Selective Depth-First Game-Tree Search. Phd thesis, Department of Computing Science, University of Alberta.
- Yngvi Björnsson and Mark Winands (2001). YL wins Lines-of-Action Tournament, *International Computer Games Journal*, vol. 24, pp.180-181. (Technical note).
- Yngvi Björnsson (2000). YL wins Lines-of-Action Tournament, *International Computer Games Journal*, vol. 23, pp.178-179. (Technical note).

Other Professional Activities

Executive Posts

- Associate Editor, IEEE Transactions of Computational Intelligence and AI in Games. 2008-present

- International Computer Games Association
Vice President 2005-present

Recent Invited Talks

- "General Game Playing". IEEE Computational Intelligence and Games Conference (CIG'09), Milan, Italy, September 2009. (Keynote speaker)
- "Simulation-Based Approach to General Game Playing". Department of Computing Science, Games Group Lecture Series, University of Alberta, April 2008.
- "CADIA-Player". Department of Computer Science Lecture Series, Dresden Technical University (DTU). November, 2007.
- "Tools for Debugging Large Game Trees". *The 11th Games Programming Workshop*, November 2006, Hakone, Japan.
- "Enhanced Heuristics for Optimal Path-finding on Game Maps". *Japan Advanced Institute for Science and Technology (JAIST)*, November 2006, Nomi, Japan.
- "Using User-Input to Speed-up Reinforcement Learning in Computer Games", *Machine Learning for Commercial Game AI, IKAT-SIKS Symposium*, May 2005, Maastricht, The Netherlands.
- "*Reinforcement Learning in Computer Games*", Machine Intelligence Seminar, Department of Computer Science, Aalborg University, April 2005, Aalborg, Denmark

Program (Co-)Chair

- General Intelligence in Game-Playing Agents (IJACI Workshop) 2009
- Fourth International Conference on Computers and Games (CG'04) 2004
- Third International Conference on Computers and Games (CG'02) 2002

Program Committee Member

- Twenty-Fourth National Conference on Artificial Intelligence (AAAI'10) 2010
- Nineteenth European Conference on Artificial Intelligence (ECAI'10) 2010
- International Conference on Computers and Games (CG'10) 2010
- Symposium on Abstraction, Reformulation and Approximation (SARA'09) 2009
- Advances in Computer Games (ACG12) 2009
- Joint International Conference on Artificial Intelligence (JICAI'09) 2009
- International Conference on Computers and Games (CG'08) 2008
- ECAI Workshop on Artificial Intelligence in Games (AIG'08) 2008
- Fifth International Conference on Computers and Games (CG'06) 2006
- Advances in Computer Games (ACG11) 2005
- Twenty-First International Conference on Machine Learning (ICML'04) 2004
- Third International Conference on Entertainment Computing (ICEC'04) 2004
- Nineteenth National Conference on Artificial Intelligence (AAAI'04) 2004
- Eighteenth National Conference on Artificial Intelligence (AAAI'02) 2002
- Symposium on Abstraction, Reformulation and Approximation (SARA'02) 2002

Industrial Ties and Experience

- **Valka ehf.** 2006- ...
Common research grant; using informed search, integer programming techniques and, probabilistic models to improve software for controlling a production line.
- **TM software (Computer Images Inc.)** 1988-1994
Worked as software developer and project manager.

Personal Information

Citizenship: Iceland

Birthday: November 9th, 1964