

Jakub Kowalski

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Research interests

AI Algorithms for Games, General Game Playing, Procedural Content Generation, Evolutionary Computations, Černý conjecture

Work experience

- 2018 – 2019 ASYSTENT (~ASSISTANT PROFESSOR), University of Wrocław, Institute of Computer Science
- 2016 – 2018 RESEARCH ASSISTANT, University of Wrocław, Institute of Computer Science
- 2014 – 2016 COMPUTER SCIENCE TEACHER, 3rd High School in Wrocław

Education

- 2011 – 2016 PHD STUDIES, Computer Science, University of Wrocław, Department of Mathematics and Computer Science
PhD Thesis: *General Game Description Languages*
Supervisor: Prof. Andrzej Kisielewicz
Defended: 09.06.2017
- 2009 – 2011 MASTER STUDIES, Computer Science, University of Wrocław, Department of Mathematics and Computer Science
Master Thesis: *Programming games management system „Meridius”*
Supervisor: Prof. Krzysztof Loryś
- 2006 – 2009 BACHELOR STUDIES, Computer Science, University of Wrocław, Department of Mathematics and Computer Science
Bachelor Project: *AI fight environment „QUAIKE”*

Grants and scholarships

- 2018 – 2021 Investigator in the National Science Centre, Poland, Opus grant number 2017/25/B/ST6/01920: *Classical problems in the theory of finite automata: new approaches, variants, and applications.*
- 2016 – 2019 Investigator in the National Science Centre, Poland, Opus grant number 2015/17/B/ST6/01893: *Algorithmic aspects of synchronization.*

- 2015 – 2018 Principal investigator of the National Science Centre, Poland, Preludium grant number 2014/13/N/ST6/01817: *Languages and Learning in General Game Playing*. 148,200 PLN
- 2013 – 2015 Investigator in the Iuventus Plus grant number IP2012 052272: *Finite automata synchronization - theory, algorithms, tools, and applications*.
- 2012 – 2018 Six faculty grants for smaller projects from Department of Mathematics and Computer Science, University of Wrocław.

Peer-reviewed publications

- 2019 J. Kowalski, M. Mika, J. Sutowicz, M. Szykuła, *Regular Boardgames*, AAAI Conference on Artificial Intelligence (to appear).
- 2018 C. Siwek, J. Kowalski, C. Sironi, M. Winands, *Implementing Propositional Networks on FPGA*, Australasian Joint Conference on Artificial Intelligence (to appear).
- 2018 J. Kowalski, A. Kisielewicz, *Regular Language Inference for Learning Rules of Simplified Boardgames*, IEEE Conference on Computational Intelligence and Games, pages 78–85.
- 2018 J. Kowalski, R. Miernik, P. Pytlik, M. Pawlikowski, K. Piecuch, J. Sękowski *Strategic Features and Terrain Generation for Balanced Heroes of Might and Magic III Maps*, IEEE Conference on Computational Intelligence and Games, pages 86–93.
- 2018 J. Kowalski, A. Liapis, Ł. Żarczyński, *Mapping Chess Aesthetics onto Procedurally Generated Chess-Like Games*, EvoApplications 2018: Applications of Evolutionary Computation, Volume 10784 of LNCS, pages 325–341.
- 2017 B. Kostka, J. Kwiecień, J. Kowalski, P. Rychlikowski, *Text-based Adventures of the Golovin AI Agent*, IEEE Conference on Computational Intelligence and Games (*best paper nominee*), pages 181–188.
- 2017 J. Kowalski, Ł. Żarczyński, A. Kisielewicz, *Evaluating Chess-like Games Using Generated Natural Language Descriptions*, Fifteenth International Conference on Advances in Computer Games, Volume 10664 of LNCS, pages 127–139.
- 2017 J. Kowalski, A. Roman, *A New Evolutionary Algorithm for Synchronization*, EvoApplications 2017: Applications of Evolutionary Computation, Volume 10199 of LNCS, pages 620–635.
- 2016 A. Kisielewicz, J. Kowalski, M. Szykuła, *Experiments with Synchronizing Automata*, Implementation and Application of Automata, Volume 9705 of LNCS, pages 176–188.
- 2016 J. Kowalski, M. Szykuła, *Evolving Chess-like Games Using Relative Algorithm Performance Profiles*, Applications of Evolutionary Computation, Volume 9597 of LNCS, pages 574–589.
- 2016 J. Kowalski, A. Kisielewicz, *Towards a Real-time Game Description Language*, Proceedings of the 8th International Conference on Agents and Artificial Intelligence, Volume 2, pages 494–499.
- 2015 J. Kowalski, A. Kisielewicz, *Game Description Language for Real-time Games*, Proceedings of the IJCAI-15 Workshop on General Game Playing (GIGA'15), pages 23–30.
- 2015 J. Kowalski, A. Kisielewicz, *Testing General Game Players Against a Simplified Boardgames Player Using Temporal-difference Learning*, IEEE Congress on Evolutionary Computation, pages 1466–1473.
- 2015 A. Kisielewicz, J. Kowalski, M. Szykuła, *Computing the shortest reset words of synchronizing automata*, Journal of Combinatorial Optimization, Volume 29, Issue 1, pages 88–124.
- 2014 J. Kowalski, *Embedding a Card Game Language into a General Game Playing Language*,

- Frontiers in Artificial Intelligence and Applications, Volume 264: STAIRS 2014, pages 161–170
- 2013 J. Kowalski, M. Szykuła, *Game Description Language Compiler Construction*, Proceedings of 26th Australasian Joint Conference on Artificial Intelligence, volume 8272 of LNCS, pages 234–245.
- 2013 A. Kisielewicz, J. Kowalski, M. Szykuła, *A Fast Algorithm Finding the Shortest Reset Words*, Computing and Combinatorics, volume 7936 of LNCS, pages 182–196.

Teaching

INSTITUTE OF COMPUTER SCIENCE, UNIVERSITY OF WROCLAW

- 2018/2019 Artificial Intelligence for Games (lecture; laboratory, 1 group).
- 2017/2018 Lua Course (lecture; laboratory, 1 group).
- 2017/2018 Artificial Intelligence for Games: group projects (project, 1 group).
- 2017/2018 Artificial Intelligence for Games (lecture; laboratory, 1 group).
- 2017/2018 Introduction to Python Programming (laboratory, 2 groups).
- 2016/2017 Lua Course (lecture; laboratory, 1 group).
- 2016/2017 Artificial Intelligence for Games: group projects (project, 1 group).
- 2016/2017 Artificial Intelligence for Games (lecture; laboratory, 2 groups).
- 2016/2017 Introduction to Python Programming (laboratory, 2 groups).
- 2015/2016 Artificial Intelligence (exercises+laboratory, 1 group).
- 2015/2016 Extended Python Course (laboratory, 1 group).
- 2015/2016 Introduction to Python Programming (laboratory, 1 group).
- 2014/2015 Introduction to Python Programming (laboratory, 2 groups).
- 2013/2014 Introduction to Python Programming (laboratory, 1 group).
- 2013/2014 Artificial Intelligence (in English) (exercises+laboratory, 1 group).
- 2012/2013 Seminar: General Game Playing (seminar, 1 group).
- 2012/2013 Introduction to Python Programming (laboratory, 2 groups).
- 2011/2012 Creating Interactive Applications in Python (laboratory, 2 groups).
- 2011/2012 Introduction to Python Programming (laboratory, 2 groups).

SUPERVISED THESES

- 2018 Łukasz Żarczyński, *Procedural Content Generation for Simplified Boardgames*, master thesis
- 2018 Tymoteusz Kaczorowski, *Wykorzystanie sztucznej inteligencji w symulowaniu zachowań biologicznych* (eng. *Utilizing artificial intelligence to model biological behaviours*), engineer thesis
- 2017 Tomasz Musiała, Adrian Witek, *Implementacja agenta do Visual Doom AI* (eng. *Implementation of the Visual Doom AI agent*), bachelor thesis/engineer thesis
- 2017 Cezary Siwek, *System for autonomous control of a racing car*, engineer thesis

Ongoing:

Piotr Pytlik, *Algorithm for Procedural Generation of Balanced Maps for Heroes of Might and Magic III*, master thesis

Cezary Siwek, *Hardware Acceleration for General Game Playing using FPGA*, master thesis
Radosław Miernik, *Evolutionary Algorithms for Strategic Card Games*, engineer thesis
Kamila Adamczyk, *Implementacja Gry Programistycznej Roguelike: Proceduralne Generowanie Map Kontra Algorytm Poszukiwacza Przygód* (eng. *Programming Game Implementation: Procedural Map Generation Versus Adventurer AI*), bachelor thesis
Cezary Kosiński, *Generating Infinite Cave Levels using Cellular Automata*, bachelor thesis

3RD HIGH SCHOOL IN WROCLAW

2015/2016 Computer Science, III year (2 groups).
2014/2015 Computer Science, II year (2 groups).