

Curriculum Vitae

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Research Positions

Research Fellow

Alan Turing Institute of Data Science, London

Formal Methods for Machine Learning Algorithms

Jan. 2017 – Dec. 2021

Convenor for the Logical Foundations of Data Science research group

Research Fellow

Simons Institute, University of California, Berkeley

Logical Structures in Computation

July 2016 – Dec. 2016

Mentored by Prakash Panangaden

Research Assistant

University of Oxford

Dynamical Systems

Nov. 2015 – July 2016

Jointly supervised by Joël Ouaknine and James Worrell

Education

PhD in Computer Science

Paris 7 & Warsaw

Counting and Randomising in Automata Theory

Sept. 2012 – Oct. 2015

Jointly supervised by Mikołaj Bojańczyk and Thomas Colcombet

Normalien (alumnus)

École Normale Supérieure de Cachan

Majoring in Computer Science

Sept. 2008 – Aug. 2012

M.Sc. MPRI (Computer Science)

Paris 7

with high honours

2010 – 2012

Specialisation in Automata Theory and Logics

M.Sc. LMFI (Mathematical Logics)

Paris 7

with high honours

2009 – 2011

Research

My research is in Theoretical Computer Science, more specifically Automated Verification. I have been working on Games, Logics, and Automata, with a focus on Probabilistic Models.

Journal Publications.....

1. CHARACTERISATION OF AN ALGEBRAIC ALGORITHM FOR PROBABILISTIC AUTOMATA.
In **TCS**: *Theoretical Computer Science*, 2017, 31 pages.
2. MONADIC SECOND-ORDER LOGIC WITH ARBITRARY MONADIC PREDICATES, with Charles Paperman.
In **ToCL**: *Transactions on Computational Logic*, 2017, 17 pages.
3. DECIDING THE VALUE 1 PROBLEM FOR PROBABILISTIC LEAKTIGHT AUTOMATA, with Hugo Gimbert, Edon Kelmendi and Youssef Oualhadj.
In **LMCS**: *Logical Methods in Computer Science*, Volume 11, Issue 1, 2015, 37 pages.
4. PARITY AND STREETT GAMES WITH COSTS, with Martin Zimmermann.
In **LMCS**: *Logical Methods in Computer Science*, Volume 10, Issue 2, 2014, 28 pages.
5. GENERALISED REACHABILITY GAMES, with Florian Horn.
In **TSI**: *Techniques et Sciences Informatiques*, June 2013, 9/10.

Conferences Proceedings.....

1. PROBABILISTIC AUTOMATA OF BOUNDED AMBIGUITY, with Cristian Riveros and James Worrell.
In **CONCUR'17**: *International Conference on Concurrency Theory*, 13 pages.
2. EXPRESSIVENESS OF PROBABILISTIC MODAL LOGICS, REVISITED, with Bartek Klin and Prakash Panangaden.
In **ICALP'17**: *International Colloquium on Automata, Languages, and Programming*, 12 pages.
3. STAMINA: STABILISATION MONOIDS IN AUTOMATA THEORY, with Hugo Gimbert, Edon Kelmendi and Denis Kuperberg.
In **CIAA'17**: *Conference on Implementations of Automata and Applications*, 12 pages.
4. SEMIALGEBRAIC INVARIANT SYNTHESIS FOR THE KANNAN-LIPTON ORBIT PROBLEM, with Pierre Ohlmann, Joël Ouaknine, Amaury Pouly et James Worrell.
In **STACS'17**: *Symposium on Theoretical Aspects of Computer Science*, 13 pages.
5. THE BRIDGE BETWEEN REGULAR COST FUNCTIONS AND OMEGA-REGULAR LANGUAGES, with Thomas Colcombet.
In **ICALP'16**: *International Colloquium on Automata, Languages, and Programming*, 12 pages.
6. CHARACTERISATION OF AN ALGEBRAIC ALGORITHM FOR PROBABILISTIC AUTOMATA.
In **STACS'16**: *Symposium on Theoretical Aspects of Computer Science*, 12 pages.
7. TRACE REFINEMENT IN LABELLED MARKOV DECISION PROCESSES, with Stefan Kiefer and Mahsa Shirmohammadi.
In **FoSSaCS'16**: *Foundations of Software Science and Computation Structures*, 15 pages.
8. ONLINE SPACE COMPLEXITY OF PROBABILISTIC LANGUAGES.
In **LFCS'16**: *Logical Foundations of Computer Science*, 12 pages.
9. TRADING BOUNDS FOR MEMORY IN GAMES WITH COUNTERS, with Florian Horn, Denis Kuperberg and Michał Skrzypczak.
In **ICALP'15**: *International Colloquium on Automata, Languages, and Programming*, 12 pages.
10. IRREGULAR BEHAVIOURS FOR PROBABILISTIC AUTOMATA, with Michał Skrzypczak.
In **RP'15**: *Reachability Problems*, 4 pages.
11. PLAYING SAFE, with Thomas Colcombet and Florian Horn.
In **FSTTCS'14**: *Foundations of Software Technology and Theoretical Computer Science*, 12 pages.
12. TWO RECURSIVELY INSEPARABLE PROBLEMS FOR PROBABILISTIC AUTOMATA, with Hugo Gimbert, Florian Horn and Youssef Oualhaj.
In **MFCS'14**: *Mathematical Foundations of Computer Science*, 12 pages.
13. MONADIC SECOND-ORDER LOGIC WITH ARBITRARY MONADIC PREDICATES, with Charles Paperman.
In **MFCS'14**: *Mathematical Foundations of Computer Science*, 12 pages.
14. ACME: AUTOMATA WITH COUNTERS, MONOIDS AND EQUIVALENCE, with Denis Kuperberg.
In **ATVA'14**: *International Symposium on Automated Technology for Verification and Analysis*.
15. EMPTINESS OF ALTERNATING TREE AUTOMATA USING GAMES WITH IMPERFECT INFORMATION, with Sophie Pinchinat and Olivier Serre.
In **FSTTCS'13**: *Foundations of Software Technology and Theoretical Computer Science*, 12 pages.
16. INFINITE-STATE GAMES WITH FINITARY CONDITIONS, with Krishnendu Chatterjee.
In **CSL'13**: *Computer Science and Logic*, 15 pages.
17. COST-PARITY AND COST-STREETT GAMES, with Martin Zimmermann.
In **FSTTCS'12**: *Foundations of Software Technology and Theoretical Computer Science*, 12 pages.
18. DECIDING THE VALUE 1 PROBLEM FOR PROBABILISTIC LEAKTIGHT AUTOMATA, with Hugo Gimbert and Youssef Oualhaj.
In **LICS'12**: *Logics in Computer Science*, 10 pages.
19. A REDUCTION FROM PARITY GAMES TO SIMPLE STOCHASTIC GAMES, with Krishnendu Chatterjee.
In **GanDALF'11**: *Games, Automata, Logics and Formal Verification*, 12 pages.

20. FINITARY LANGUAGES, with Krishnendu Chatterjee.

In **LATA'11**: *Languages, Automata Theory and Applications*, 12 pages.

Software.....

1. FLIDES. Flides is written in Javascript, to create slides in HTML5 format.
2. STAMINA, with Hugo Gimbert, Edon Kelmendi and Denis Kuperberg. Stamina is written in C++, it is the successor of Acme, geared towards solving the starheight problem from automata theory.
3. ACME, with Denis Kuperberg. Acme is written in OCaml, implementing algebraic techniques to solve decision problems from automata theory.

Research Projects.....

ERC AVS-ISS

Analysis, Verification, and Synthesis for Infinite Systems (Joël Ouaknine)

Participant

2015 – 2020

EPSRC

Counter Automata: Verification and Synthesis (James Worrell)

Participant

2015 – 2017

ANR STOCH-MC

Stochastic Models: Scalable Model Checking (Blaise Genest)

Participant

2014 – 2018

ERC GALE

Games, Automata and Logics Extensions (Thomas Colcombet)

Participant

2010 – 2015

ANR FREC

Frontiers of Recognisability (Pascal Weil)

Participant

2010 – 2014

ERC SOSNA

Expressive Power of Tree Logics (Mikołaj Bojańczyk)

Participant

2009 – 2014

Awards.....

PhD thesis distinguished by Warsaw University

January 2016

Participant in the Heidelberg Laureate Forum

September 2015

Invited Talks.....

Casding, FoSSaCS affiliated workshop

Eindhoven, Holland

02/04/2016

AutoMathA final conference

Leipzig, Germany

08/05/2015

Seminar Talks.....

I gave seminar talks in the following research groups: Simons Institute (Berkeley, USA), 68NQRT (Rennes, France), LSV (Cachan, France), MoVe (Marseille, France), LaBRI (Bordeaux, France), Theory group (Cambridge, UK), Algorithms group (Liverpool, UK), PUMA (Munich, Germany), LACL (Créteil, France), Verification group (Oxford, UK), ONERA (Toulouse, France), ULB (Brussels, Belgium), Reactive Systems group (Saarebrücken, Germany), LIGM (Marne-la-Vallée, France), Automata group (Warsaw, Poland) and Automata group (Paris, France).

Administration.....

- **Referee**: I have been an external referee for more than 40 conference and journal articles. I am also a reviewer for Mathematical Reviews, part of the American Mathematical Society (AMS).
- **Seminars**: I organise the Logics seminar series at the Turing. I co-organised the Fellows Logic Open seminar in Berkeley, the Verification seminar in Oxford, and the Automata seminar in Université Paris 7.

- **Duties:** I was the PhD student representative, and in this capacity sat on the Université Paris 7 council.
- **Organisation:** I co-organised the annual meeting of GT ALGA at Université Paris 7. I was a local organiser of three scientific events organised at Université Paris 7 (GAMES'2011, Highlights'2013 and Highlights'2014).

Teaching

Tutorials.....

I led the following practical sessions at Université Paris 7 between 2012 and 2015: Object-oriented Programming in C (64h), Programming in Java (128h), Web Technologies (64h), and Coding Projects (64h).

I taught Functional Programming in OCaml between 2010 and 2012 at Lycée Henri IV and Louis-le-grand (128h).

I gave tutorials in Mathematics at Lycée Fénélon Sainte-Marie (32h).

Student Supervision.....

- Pierre Ohlmann (masters): *Invariants for the Kannan-Lipton Orbit Problem*, co-supervised with Joël Ouaknine and James Worrell, April - July 2016.
- Magdalena Bojarska (masters): *Simulation for Probabilistic Automata*, co-supervised with Mikołaj Bojańczyk, Sept. 2015 - June 2015.
- Abderrahmane Ben Moumen (undergraduate): *Knowledge, a LaTeX package*, co-supervised with Thomas Colcombet, July - August 2014.
- Laureline Pinault (undergraduate): *Probabilistic Tree Automata*, co-supervised with Olivier Serre, June - July 2014.

Popular Science.....

- I co-organise a Mathematics Club for High School students in Pristina, Kosovo, for the French association Animath.
- I led a project in collaboration with Vientiane's faculty of Pedagogy in Laos.
- I wrote two articles for the RMS (Revue des Mathématiques Spéciales).

Skills

- **Languages:** *French* (mother tongue), *English* (proficient), and *Polish* (some knowledge).
- **Programming:** Strong programming experience in OCaml.
Programming experience in C, C++, Java, Prolog, x86 ASM, and Maple.
- **Web Technologies:** Strong programming experience in HTML, PHP, MySQL, Javascript, and JQuery.