

Florent Delgrange

Doctor of Science: Computer Science
Artificial Intelligence and Formal Methods

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Work Experience

- 2024 – Today **Postdoctoral researcher**, *AI Lab, VUB — Vrije Universiteit Brussel*, Belgium, since September 2024
with Ann Nowé and Guillermo A. Pérez, funded by the multidisciplinary collaborative iBOF project DESCARTES — infectious DisEaSe eEconomics and Ai with guaRanTEeS (VUB, University of Antwerp, Hasselt University).
- 2020 – 2024 **Doctoral researcher**, *AI Lab, VUB & University of Antwerp (UAntwerpen)*, Belgium
Formal verification of deep reinforcement learning policies
○ **Supervisors:** Ann Nowé (VUB) and Guillermo A. Pérez (UAntwerpen)
○ **Research output:** 3 conference papers (AAAI, ICLR×2), 1 journal paper (NCAA), 4 workshop papers (ALA @ AAMAS×2, EWRL×2), 1 preprint.
- 2018 – 2019 **Scientific researcher**, *RWTH Aachen University & UMONS – Université de Mons*, Germany and Belgium, 1 year
with Joost-Pieter Katoen and Mickael Randour, Many-sided synthesis for stochastic systems.
○ **Research output:** 2 conference papers (CONCUR, TACAS), 1 journal paper (LMCS), 1 best paper award.
- 2017 **Internship**, *Nokia Bell Labs*, Antwerp, Belgium, 3 months
Trained machine learning models to detect, identify, and troubleshoot several impairments impacting data transmission technologies (such as DSL lines).

Education

- 2020 – 2024 **Doctor of Science**, *Computer Science*, VUB & UAntwerpen, Belgium
○ **Title of the dissertation:** Activating Formal Verification of Deep Reinforcement Learning Policies by Model Checking Bisimilar Latent Space Models.
- 2016 – 2018 **Master of Science**, *Computer Science*, UMONS, Belgium
○ **Grade:** *Magna Cum Laude* (Ranking: 1/15).
○ **Master's thesis:** Multi-objective synthesis in Markov decision processes, 19/20.
○ **Master's project:** Stochastic shortest path in Markov decision processes, 18.5/20.
- 2013 – 2016 **Bachelor of Science**, *Computer Science*, UMONS, Belgium
○ **Grade:** *Cum Laude*.
○ **Research internship:** UML statecharts visualizer for Sismic, a statechart library for Python, *in the software engineering lab*, 1 month.

Research interests

- General Artificial Intelligence, Computer Science, Formal Verification, Machine Learning.
Focus (Deep) Reinforcement Learning, Model Checking and Automated Controller Synthesis for Stochastic Systems, Representation Learning, Generative Modeling.

Honors

- 2019 **Best paper award (CONCUR 2019)**, The 30th International Conference on Concurrency Theory, Amsterdam, The Netherlands
- 2019 **Best MIMA poster award (Mathematics, Information technology, Modeling and Applications)**, MdC 2019: Mardi des Chercheurs, UMONS & Université Polytechnique Hauts-de-France
- 2018 **Award for the best Master's thesis in Computer Science**, UMONS
- 2016 **Research Initiation Grant**, UMONS, in the Software engineering lab, 1 grant per department.

Teaching

- 2024 – 2025 **Theory of Computation**, *Lecturer*, VUB
CS: Master (3 ECTS, 24 hours).
- 2021 – 2023 **Theory of Computation**, *Teaching Assistant*, VUB
CS: Master. Exercise sessions (12 hours / year).
- 2018 – 2019 **Formal methods for system design**, *Teaching Assistant*, UMONS
CS and Maths: Master. Exercise sessions (15 hours).
- 2018 **University certificate in artificial intelligence (“Hands-on AI”)**, *Teaching Assistant*, UMONS
Non-university persons, engineers and science students: Master and PhD. Reinforcement learning practical sessions (12 hours).
- 2018 **Computer programming and algorithms II**, *Student teaching assistant*, UMONS
CS and Maths: 1st year. Practical sessions (15 hours) in Java 8.
- 2017 **Computer programming and algorithms I**, *Student teaching assistant*, UMONS
CS, Maths and Physics: 1st and 2nd year. Practical sessions (20 hours) in Python 3.

Other

- Aug *Student Tutor*, UMONS
- 2013–2014 Gave computer science lectures to university students retaking exams.

Students

- Bachelor Thesis**, VUB, *CS: Bachelor*
Olivier Delattre (2020 – 2021), Cédric Simon Segers (2020 – 2021), Abdoullah El Yachouti (2021 – 2022)
- Master's project & Scientific reading and writing**, UMONS, *CS: Master*
Dimitri Waelkens (2018 – 2019)

Academic Service and Community Engagement

Program committee

AAAI (2023), EWRL (2023), AAMAS (2024, 2025), NeurIPS (2024), and MO-DeM (2024)

Reviewer

RP (2019), SETTA (2019), AAMAS (2020, 2023), and the journal LMCS (2024)

Organization

2023 **The 16th European Workshop on Reinforcement Learning**, *Organizing committee*, VUB

Local organization of EWRL 2023 at VUB, attracting 235 researchers.

Publications

- EWRL 2024 **Controller Synthesis from Deep Reinforcement Learning Policies**, Florent Delgrange, Guy Avni, Anna Lukina, Christian Schilling, Guillermo A. Pérez, Ann Nowé, Seventeenth European Workshop on Reinforcement Learning, 2024
- ICLR 2024 **The Wasserstein Believer: Learning Belief Updates for Partially Observable Environments through Reliable Latent Space Models**, Raphael Avalos[†], Florent Delgrange[†], Ann Nowé, Guillermo A. Pérez, Diederik M. Roijers, The Twelfth International Conference on Learning Representations, 2024
- ALA @ AAMAS 2023 **WAE-PCN: Wasserstein-autoencoded Pareto Conditioned Networks**, Florent Delgrange[†], Mathieu Reymond[†], Ann Nowe, Guillermo A. Pérez, Proceedings of the Adaptive and Learning Agents Workshop, 2023
- ICLR 2023 **Wasserstein Auto-encoded MDPs: Formal Verification of Efficiently Distilled RL Policies with Many-sided Guarantees**, Florent Delgrange, Ann Nowé, Guillermo A. Pérez, The Eleventh International Conference on Learning Representations, 2023
- AAAI 2022 **Distillation of RL Policies with Formal Guarantees via Variational Abstraction of Markov Decision Processes**, Florent Delgrange, Ann Nowé, Guillermo A. Pérez, Proceedings of the AAAI Conference on Artificial Intelligence Vol. 36 No. 6: AAAI-22 Technical Tracks 6, 6497-6505, 2022
- NCAA **A Framework for Flexibly Guiding Learning Agents**, Mahmoud Elbarbari, Florent Delgrange, Ivo Vervlimmeren, Kyriakos Efthymiadis, Bram Vanderborcht, Ann Nowé, Neural Computing and Applications, Special Issue on Adaptive and Learning Agents 2021, 2022
- LMCS **Life is Random, Time is Not: Markov Decision Processes with Window Objectives**, Thomas Brihaye, Florent Delgrange*, Youssouf Oualhadj, Mickael Randour, Logical Methods in Computer Science, Volume 16, 2020
- TACAS 2020 **Simple Strategies in Multi-Objective MDPs**, Florent Delgrange*, Joost-Pieter Katoen, Tim Quatmann, Mickael Randour, Tools and Algorithms for the Construction and Analysis of Systems - 26th International Conference, TACAS 2020, Held as Part of the European Joint Conferences on Theory and Practice of Software, ETAPS 2020, Dublin, Ireland, April 25-30, 2020, Proceedings, Part I
- CONCUR 2019 **Life is Random, Time is Not: Markov Decision Processes with Window Objectives**, Thomas Brihaye, Florent Delgrange*, Youssouf Oualhadj, Mickael Randour, 30th International Conference on Concurrency Theory, August 27-30, 2019, Amsterdam, the Netherlands.

[†] Equal contribution; * alphabetical order.

Programming skills

Languages Python, Java, C++, OCaml, Scala

Tools Model checkers PRISM and STORM, TensorFlow (including *tf-agent*, *-probability*)

Attended events

Talks

- **The Wasserstein Believer: Learning Belief Updates for Partially Observable Environments through Reliable Latent Space Models**
 - BNAIC/BeNeLearn 2024: Joint International Scientific Conferences on AI and Machine Learning (2024, *Utrecht, The Netherlands*)
- **Activating Formal Verification of Deep RL Policies by Model Checking Bisimilar Latent Space Models**
 - CFV seminar (2024, *ULB – Université Libre de Bruxelles*)
 - Flanders AI Day 2024 (*Ghent, Belgium*)
 - Dagstuhl seminar on Stochastic Games (2024)
 - LiVe: Learning in Verification Workshop (ETAPS 2024 satellite event, *Luxembourg*)
- **Wasserstein-autoencoded Pareto Conditioned Networks**
 - ALA: Adaptive and Learning Agents Workshop (2023, AAMAS workshop, *London, UK*)
- **Wasserstein Auto-encoded MDPs: Formal Verification of Efficiently Distilled RL Policies with Many-sided Guarantees**
 - BNAIC/BeNeLearn 2022: Joint International Scientific Conferences on AI and Machine Learning (2022, *Mechelen, Belgium*)
- **Distillation of RL Policies with Formal Guarantees via Variational Abstraction of Markov Decision Processes**
 - Logic and AI workshop (2022, AI Flanders Day, *Leuven*)
 - iVerif: Workshop on artificial intelligence and Verification (2021, FSTTCS Virtual Pre-Conference Workshop)
- **Life is Random, Time is not: Markov Decision Processes with Window Objectives.**
 - CONCUR (2019, *Amsterdam, The Netherlands*)
 - MoRe: Multi-objective Reasoning in Verification and Synthesis (2019, LICS workshop, *SFU, Vancouver, Canada*)
 - UnRAVeL: invited talk (2019, *RWTH Aachen, Germany*)
 - CFV seminar (2019, *ULB – Université Libre de Bruxelles*).

Posters

- **Controller Synthesis from Deep Reinforcement Learning Policies**
 - BNAIC/BeNeLearn 2024 (*Utrecht, The Netherlands*)
 - EWRL 2024: Seventeenth European Workshop on Reinforcement Learning (*Toulouse, France*)
 - Multi-Objective Decision Making Workshop at ECAI 2024 (*Santiago de Compostela, Spain*)
- **The Wasserstein Believer: Learning Belief Updates for Partially Observable Environments through Reliable Latent Space Models**
 - BNAIC/BeNeLearn 2024 (*Utrecht, The Netherlands*)
 - BeNeRL 2024: the Belgium-Netherlands workshop on Reinforcement Learning (2024, *Amsterdam, The Netherlands*)
 - ICLR 2024: The Twelfth International Conference on Learning Representations (2024, *Vienna*,

- Austria)
- EWRL: European Workshop on Reinforcement Learning (2023, *Brussels, Belgium*)
- ALA 2023 (*London, UK*)
- **Wasserstein-autoencoded Pareto Conditioned Networks**
 - ALA 2023 (*London, UK*)
- **Wasserstein Auto-encoded MDPs: Formal Verification of Efficiently Distilled RL Policies with Many-sided Guarantees**
 - EWRL 2023 (*Brussels, Belgium*)
 - ICLR 2023: The Eleventh International Conference on Learning Representations (2023, *Kigali, Rwanda*)
 - BNAIC/BeNeLearn 2022 (*Mechelen, Belgium*)
- **Distillation of RL Policies with Formal Guarantees via Variational Abstraction of Markov Decision Processes**
 - Highlights of logic, games and automata (2022, conference, *Paris, France*)
 - BeNeRL: the Belgium-Netherlands workshop on Reinforcement Learning (2022, *Leiden University*)
 - AAI-2022 (2022, *Virtual*)
 - iVerif (2021, *FSTTCS Virtual Workshop*)
 - AI Flanders Research Days (2021, *Virtual, Belgium*)
- **Life is Random, Time is not: Markov Decision Processes with Window Objectives.**
 - Theory and Algorithms in Graph and Stochastic Games (2019, *Mons, Belgium*)
 - MdC: Mardi des Chercheurs (2019, *UMONS*).

Full list

- 2024 ○ **LiVe 2024: Learning in Verification** (ETAPS workshop, *Luxembourg*)
- **ICLR 2024** (conference, *Vienna, Austria*)
- **Schloss Dagstuhl**, seminar on Stochastic Games (Germany)
- **BeNeRL 2024** (workshop, *Amsterdam, The Netherlands*)
- **AI Flanders Research Day** (*Gent, Belgium*)
- **MODeM 2024** (ECAI 2024 workshop, *Santiago de Compostela, Spain*)
- **EWRL 2024** (workshop, *Toulouse, France*)
- **Meta's GenAI Forum** (workshop, by invitation only, *Brussels, Belgium*)
- **BNAIC/BeNeLearn 2024** (conference, *Utrecht, The Netherlands*)

- 2023 ○ **ICLR 2023** (conference, *Kigali, Rwanda*)
- **AAMAS 2023** (conference, *London, UK*)
- **EWRL 2023** (conference, *Brussels, Belgium*)

- 2022
 - **BNAIC/BeNeLearn 2022** (conference, *Mechelen, Belgium*)
 - **EWRL 2022**: The 15th European Workshop on Reinforcement Learning (workshop, *Milano, Italy*)
 - **Highlights of Logic, Games, and Automata** (conference, *Paris, France*)
 - **AI Flanders Research Day** (*Leuven, Belgium*)
 - **BeNeRL: the Belgium-Netherlands workshop on Reinforcement Learning** (workshop, *Leiden, the Netherlands*)
 - **AAAI-2022** (conference, *Virtual*)

- 2021
 - **iVerif** (FSTTCS Virtual Workshop)
 - **AAMAS: 20th International Conference on Autonomous Agents and Multiagent Systems** (*Virtual*)
 - **ALA: Adaptive and Learning Agents** (AAMAS Virtual Workshop)
 - **AI Flanders Research Days** (*Online, Belgium*)

- 2019
 - **CONCUR: 30th International Conference on Concurrency Theory** (conference, *Amsterdam, The Netherlands*)
 - **LearnAut: Learning and Automata** (LICS workshop, *SFU, Vancouver, Canada*)
 - **MoRe** (LICS workshop, *SFU, Vancouver, Canada*)
 - **FMAI: Formal Methods and AI** (workshop, *IRISA Rennes, France*)
 - **SYNT Camp** (ETAPS workshop, *Prague, Czech Republic*)
 - **LiVe: Learning in Verification** (ETAPS workshop, *Prague, Czech Republic*)
 - **Theory and Algorithms in Graph and Stochastic Games** (workshop, *Mons, Belgium*)
 - **MdC: Mardi des Chercheurs** (*UMONS, Mons, Belgium*)

- 2018
 - **Highlights of Logic, Games, and Automata** (conference, *Berlin, Germany*)
 - **MOVEP: Modeling and verification of parallel processes** (summer school, *ENS Paris-Saclay, Cachan, France*)
 - **MoRe** (FLoC workshop, *University of Oxford, UK*)
 - **Logic and Learning** (FoPSS summer school, *University of Oxford, UK*)
 - **Logic and Learning** (workshop, *The Alan Turing Institute, London, UK*)

Miscellaneous

- Pop. science
 - Pint of Science, *organization of the event, Mons, 2019.*
 - Spring of science: "How Mario learns to play", *popular introduction to reinforcement learning, Mons, 2019.*
 - Math & science days: "It's your turn to play!", *popular talk about game theory, UMONS, 2019.*

- Activities and Societies
 - During studies*: member of the Computer Science Club, General Association of Science Students, council of the Faculty of Science, and council of the Department of Computer Science, *UMONS, 2013 – 2018.*