

Marko Cvjetko

PhD Student

Inria, [Flowers AI & CogSci Lab](#) – Bordeaux, France

marko.cvjetko@inria.fr

[\[GitHub\]](#)

[\[personal website\]](#)

[\[Google Scholar\]](#)

I am a 2nd year PhD student supervised by [Pierre-Yves Oudeyer](#) and [Clément Moulin-Frier](#), working on curiosity-driven AI methods for scientific discovery. I draw on computational models of curiosity, goal-conditioned reinforcement learning, foundation models, and evolutionary search to build methods that autonomously explore, characterize, and control complex systems. I am interested in developing AI methods that allow human researchers to stay in control with minimal supervision. I have applied these methods to models of artificial life, such as [continuous cellular automata](#). Aside from developing these tools, I am interested in questions they help study, in particular, open-ended evolution, collective intelligence, and minimal models of memory.

PUBLICATIONS

Journal (invited, in preparation)

Extension of [Exploring Flow-Lenia Universes with a Curiosity-Driven AI Scientist](#) (ALIFE 2025) for the *Artificial Life* journal special issue.

Conference papers

The Artificial Experimentalist: Discovery and Control of Self-Organizing Phenomena with Autotelic Reinforcement Learning. M. Cvjetko, B. Hartl, M. Levin, C. Moulin-Frier, P.-Y. Oudeyer. In *Proc. ALIFE 2026*. doi:10.1162/ISAL.a.971. [\[project page\]](#).

Exploring Flow-Lenia Universes with a Curiosity-Driven AI Scientist: Discovering Diverse Ecosystem Dynamics. T. Michel, M. Cvjetko, G. Hamon, P.-Y. Oudeyer, C. Moulin-Frier. In *Proc. ALIFE 2025*. doi:10.1162/ISAL.a.896. [\[project page\]](#).

Expedition & Expansion: Leveraging Semantic Representations for Goal-Directed Exploration in Continuous Cellular Automata. S. Khajehabdollahi, G. Hamon, M. Cvjetko, P.-Y. Oudeyer, C. Moulin-Frier, C. Colas. In *Proc. ALIFE 2025*. doi:10.1162/ISAL.a.901. [\[project page\]](#).

Workshop paper

Evolving Symbiosis, from Barricelli's Legacy to Collective Intelligence: A Simulated and Conceptual Approach. J. Ashford, M. Cvjetko, R. Löffler, B. Sakalliglu, A. Valerio, M. Tataryn, B. Hartl, L. Pio-Lopez, S. Nichele. Accepted to *GECCO 2026 Workshop Proceedings*. doi:10.1145/3795101.3814707.

Late-breaking abstract

Discovering and Controlling Diverse Self-Organised Patterns in Cellular Automata Using Autotelic Reinforcement Learning. M. Cvjetko, G. Hamon, C. Moulin-Frier, P.-Y. Oudeyer. *ALIFE 2025*, Kyoto, Japan. [\[paper\]](#).

HONORS, FELLOWSHIPS & RESEARCH VISITS

Diverse Intelligences Summer Institute (DISI) Fellow, Geneva, New York

June 2026

- Selected for a 3-week transdisciplinary residency on the origins, nature, and future of intelligence; cohort of ~40 fellows funded by the John Templeton Foundation.

Research visit, [Clément Hongler's group](#) (EPFL)

May 2026

- Two-week visit, coinciding with the [Demeco 2026](#) workshop.

[ALICE Workshop](#) Runner-up Award, Copenhagen

Feb 2026

- Awarded for "Evolving Symbiosis, from Barricelli's Legacy to Collective Intelligence".

EDUCATION

University of Bordeaux, Inria, Flowers Team, France

PhD thesis – Studying the emergence of open-ended evolution in cellular automata using curiosity-driven AI

Oct 2024 –
current

- **Supervised by** [Pierre-Yves Oudeyer](#) and [Clément Moulin-Frier](#)
- Designing AI tools for assisted scientific discovery: agents that autonomously discover, characterize, and steer self-organizing phenomena, applied to Artificial Life substrates such as [Lenia](#) and the study of open-ended evolution.
- **Supervision:** co-supervising a Master's intern on the emergence of memory and learning in cellular automata, and two BSc students on a project investigating Turing-completeness in Lenia.
- **Service:** reviewer for *ALIFE 2026*.
- **Collaborations:** ongoing collaboration with Levin Lab (Tufts University) on autotelic agents for the discovery and control of self-organizing patterns; upcoming 2-week funded research visit hosted by [Clément Hongler \(EPFL\)](#), coinciding with the [Demeco 2026](#) workshop (May 2026).

University of Zagreb, Faculty of Electrical Engineering and Computing (FER), Croatia

MSc, Computer Science

Sep 2021 – Jul
2024

- **MSc thesis:** Recognition of the respiratory signal from thermal video.
Supervised by [Prof. Sebastian Haesler](#) and [Prof. Siniša Šegvić](#)
In collaboration with [Neuro-Electronics Research Flanders \(imec/KU Leuven/VIB\)](#), project described in [work experience](#) section.
- **Selected courses:** *Machine Learning, Deep Learning, Soft Computing, Parallel Programming*

Erasmus student exchange at KU Leuven, Flanders, Belgium

Sep 2022 – Jul
2023

- Coursework from the [Advanced Master AI programme](#)
- **Selected courses:** *Cognitive Science, Philosophy of Mind, Linguistics and AI, Uncertainty in AI, Neural Computing,*

BSc, Computing

Sep 2016 – Sep
2021

- **BSc thesis:** *Music Synthesis using Artificial Intelligence* – LSTM next-note prediction on symbolically represented music. Supervised by [Prof. Domagoj Jakobović](#).

WORK EXPERIENCE

Graduate Researcher, [Neuro-Electronics Research Flanders \(imec/KU Leuven/VIB\)](#), [Haesler Lab](#) ([GitHub](#))

Mar 2023 – Jul
2024

- **Supervised by** [Prof. Sebastian Haesler](#)
- Developed a machine learning framework for extracting and analyzing respiratory responses of head-restrained mice from thermal video, in collaboration with experimental neuroscientists at Haesler Lab.
- Tackled low-data and domain-shift challenges via unsupervised and self-supervised learning with vision transformers and deep CNNs.
- Configured the data annotation platform, oversaw annotation tasks and trained students on annotation guidelines. Presented in a [poster session](#) at the institute's yearly retreat.

Machine Learning Engineer Internship, [DoXray](#)

Jun 2022 – Sep
2022

- Fine-tuned LayoutXLM — a multilingual multimodal (text + layout + vision) transformer — for named-entity recognition on German invoice documents, benchmarked against a BERT baseline. [Blogpost](#).

PROJECTS

Generative models for unsupervised behavioral spaces in open-ended discovery (GitHub)	2026 – current
• Training diffusion models and variational autoencoders to represent complex system behavior and sample their parameters for open-ended diversity search • Goal: replace hand-designed semantic descriptors with learned, generative behavior spaces that enable scalable goal-directed search and quality–diversity over continuous cellular automata.	
Music-reactive cellular automata	Nov 2024
• Real-time music-driven Lenia animations: tempo and frequency features drive a continuous cellular automaton (example). Built during the hack1robo hackathon.	
Automatic Universal Taxonomies for Multi-Domain Semantic Segmentation (GitHub)	2023 – 2024
• Joint label space for semantic segmentation datasets via cross-dataset confusion matrices, enabling training of a single classification head on the union.	
Can Augmentation Make Better Doctors? Data Augmentation in a Low-Resource Sequence Labeling Task	2022
Benchmarked data augmentations for BERT-based sequence labeling on a low-resource medical named entity recognition dataset.	

SKILLS

Programming	Python (PyTorch, JAX, NumPy, Hugging Face Transformers, Stable-Baselines3, CleanRL, QDax, Optuna), C, Bash
HPC	Slurm, Singularity (parallel multi-node, multi-GPU workers, asynchronous coordination)
Tooling	Linux, Docker, Git, LaTeX, vLLM
Languages	Croatian (native), English (fluent), French (intermediate), German (beginner)