


# Sergei VOLODIN

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Chemin du Devin 47C, 1012-Lausanne, Switzerland  
Birth date: 3rd October 1994 (26 years), Russian

## EDUCATION

 **EPFL** Swiss Federal Institute of Technology in Lausanne (EPFL)  
Lausanne, Switzerland

Sep 2017 – Apr 2021

- Master's degree in **Computer Science**, GPA: **5.67/6**
- Minor in Computational **Neurosciences**
- Research Assistant position (2017–2019)
- Thesis  "CauseOccam: Learning Interpretable Abstract Representations in Reinforcement Learning Environments via Model Sparsity"

 **Moscow Institute of Physics and Technology**  
Moscow, Russia

June 2017

Bachelor's degree in **Applied Mathematics**, GPA: **4.84/5**

## SKILLS

**Relevant courses:** **Machine Learning**, **Software Engineering**, Unsupervised and Reinforcement Learning, Convex Optimization, Distributed Algorithms, Algorithms, Random graph theory, Functional Programming, Set Theory, Random Processes, Functional Analysis, Biological modeling of neural networks, Complexity theory, Learning theory, Neuroscience: behavior and cognition, Neuroprosthetics, Theory and methods for Reinforcement Learning, Optimization for Machine Learning, Computer Vision

**Scientific programming:** **Keras**, **TensorFlow**, ray/tune/rllib, tf-agents, scikit-learn, PyTorch, Brian 2, MATLAB, Mathematica, R

**Programming languages:** Python, C/C++, Java, Scala, nasm, C#, AVR C++

**Frameworks:** Qt/QML, Django, Android Studio, OpenGL/GLSL, Unity 3D, Blender

**Environment:** Git, L<sup>A</sup>T<sub>E</sub>X, Bash, Debian/Ubuntu Linux

**Scientific skills:** **experimental** sections of research papers, working on **theoretical** problems, scientific presentation, data analysis

**Software development:** **agile** software development (Scrum), debugging, design patterns, concurrent and distributed systems, TCP/IP networking, AVR microcontrollers, Arduino platform, team and project management in small startups

**Languages:** English: TOEFL iBT **113/120**, French: A1, Russian: native


## RESEARCH EXPERIENCE

  **Center for Human-Compatible AI (CHAI), Berkeley**

Berkeley, CA, United States (remote due to COVID-19, from Zurich, Switzerland)

Summer Intern

June 2020 – Sep 2020



- Designed  better defenses against adversarial policies in Multi-Agent Reinforcement Learning via alternating training of opponents
- Ran hyperparameter sweeps on multiple machines with ray and rllib
- Converted legacy code using stable baselines and Tensorflow 1.0 to rllib and Tensorflow 2.0
- Publication expected soon at the BAIR blog

 **Google Research**

Mountain View, CA, United States

Software Engineering Intern

Nov 2019 – Feb 2020


- Designed  an algorithm to uncover the **Causal Model** of a **Reinforcement Learning** environment using interventions
- Used TensorFlow and tf-agents to conduct the experiments with large hyperparameter sweeps
- Results  published as an ICLR CLDM workshop paper

**EPFL, Distributed Computing Laboratory**

Lausanne, Switzerland

Research Assistant

Sep 2018 – Oct 2019



- Investigated **fault tolerance** of a neural network using **Taylor approximation**
- Introduced the *continuous limit* to bound the error, and compared to the Neural Tangent Kernel limit case
- Conducted  experiments to test the theory using Keras including the **implementation** of custom layers and regularizers

**EPFL, Computer-Human Interaction in Learning and Instruction laboratory**

Lausanne, Switzerland

Research Assistant

Sep 2017 – Aug 2018


- Created  a **library** QML-AR for seamless **augmented reality** using OpenCV with competitive performance on Android and small visual negative impact
- Designed an  activity for kids for learning math using AR, tested the application in a classroom setting, analyzed the obtained data

**Skolkovo Institute of Science and Technology,**  
**Center for Energy Systems**

Moscow, Russia

Research Intern

Sep 2016 – Jul 2017

- Characterized using **numerical optimization** and **theoretically** the structure of the set of boundary non-convexities of an image of a quadratic map in case the number of non-convexities is infinite
- Designed and implemented  the Convexity Analysis of Quadratic Maps **library** which gives approximate solutions to a number of problems involving quadratic maps

## RESEARCH INTERESTS

Artificial Intelligence, Machine Learning, Artificial Intelligence Safety, Causal Reasoning, Adversarial policies, Mathematical Optimization, Robotics

## SCHOLARSHIPS

- ☑ Research Scholars, a paid **Research Assistant** position, Swiss Federal Institute of Technology in Lausanne (EPFL), 2017 – 2019
- ☑ Abramov Fund's scholarship for excellent **grades**, 2014

## PUBLICATIONS

- 📄 **ICLR Sergei Volodin**, Nevan Wichers, Jeremy Nixon. ☑ Resolving Spurious Correlations in Causal Models of Environments via Interventions, 2020. Topic choice, experiments, theory, writing. ☑ ICLR CLDM workshop 2020.
- El-M. El-Mhamdi, R. Guerraoui, A. Kucharavy, **S. Volodin**. ☑ The Probabilistic Fault Tolerance of Neural Networks in the Continuous Limit, 2019. Experiments, theory, writing.
- A. Dymarsky, E. Gryazina, B. Polyak, **S. Volodin**. ☑ Geometry of quadratic maps via convex relaxation, 2018. Exp-s, theory, writing.
- A. Petrov, **S. Volodin** ☑ Janibekov's effect and the laws of mechanics. Doklady Akademii Nauk, 2013. Graphics for the article, experiments, **first year** of my BSc

## WORK EXPERIENCE

- ☑ **Tournesol** May 2020 – present  
*Startup designing better recommender systems, Lausanne, Switzerland*
  - **Co-created a startup** working on expert-driven recommender systems
  - **Responsible** for ☑ back-end Machine Learning engineering, the API server
  - **Responsible** as well for system administration, (partially) front-end development
- ☑ **EscapeControl** Jul 2015 – Feb 2016  
*Own b2b startup for escape rooms, Moscow, Russia*
  - **Created a startup** selling software and hardware for ☑ real-world escape room games which allows to speed up the construction and reduce maintenance costs
  - **Responsible** for back-end software engineering, servers administration, sales and customer support
  - **Managed** a team of two web developers until a successful launch of the web interface
  - Sold more than forty solutions which are currently running in different countries across the globe and provided remote support
- ITBrat** Jul 2015 – Feb 2016  
*Algorithmic trading startup, Moscow, Russia*
  - **Developed** algorithmic trading application from initial discussion with the team to deployment and supporting
  - Added low-level user-space networking to the project which allowed to decrease latency and increase profit
  - **Responsible** for the performance of the code

## PROJECTS

- Learning Interpretable Abstract Representations in Reinforcement Learning via Model Sparsity** 2020  
*EPFL semester/thesis project, advised by Dr. Johannì Brea and Prof. Wulfram Gerstner*
  - ☑ Designed an algorithm to learn **Abstract Representations** for **Causal Models of Reinforcement Learning** environments via **Model Sparsity Constraint**
  - ☑ Implemented the proposed algorithm in Tensorflow/pytorch and tested it on a proof-of-concept setting
  - ☑ Presented the project at the MLSS 2020 summer school (remote due to COVID-19)
  - ☑ Extended the framework to non-linear environments and grid worlds
- Safe Proximal Policy Optimization** 2019  
*EPFL EE-618 course project, advised by Dr. Kamalaruban Parameswaran and Prof. Volkan Cevher*
  - ☑ Added a projection step to the **Proximal Policy Optimization** algorithm to comply with requirements of **Constrained Markov Decision Processes**
  - ☑ Implemented code in Tensorflow and tested it in simple environments
  - Presented the project at the RLSS 2019 summer school (Lille, France)
- Quadcopter drone from scratch project** 2012 – 2014
  - Developed ☑ an algorithm in C++ for stabilization of a quadcopter drone from scratch using AVR microcontrollers, IMU sensors and PID regulators
  - **Managed** the project consisting of 2-5 developers
  - Conducted the analysis of launches to improve ☑ flying quality
  - Results were **published** as a ☑ popular science article (*in Russian*)

## CONFERENCES AND SUMMER SCHOOLS

- ☑ Machine Learning Summer School, 2020 (virtual due to COVID-19), **poster presenter**
- ☑ Reinforcement Learning Summer School, 2019 (Lille, France), **poster presenter**, *selected to receive financial help*
- ☑ Data science summer school, 2019 (Paris, France), **poster presenter**

📄 QtDay 2019 (Firenze, Italy), **speaker**, *one hour session on qml-ar*

📄 P.A.I.S.S. (AI Summer School) (INRIA Grenoble, 2018), *participant in tutorials given by top experts; 📄 selected to receive financial help*

📄 Information Technologies and Systems (Saint-Petersburg, Repino, 2016), **speaker**, *poster presenter*

## COMPETITIONS

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📄 Google HashCode Qualification round coding contest, **top 6%** (team EPFL-Noobs), managed the team, developed algorithms and did the coding, 2019

📄 DeepHack.RL hackathon on Deep **Reinforcement** Learning for Atari games, managed the team and developed an 📄 evolutionary algorithm with an autoencoder, MIPT, Moscow, Russia, 2017

## INTERESTS

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**Effective Altruism**, Philosophy, Running (1/2 marathon 2018), Snowboarding, Swimming, Dancing Rock'n'Roll

## VOLUNTEERING

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### Effective Altruism Lausanne

2019

Local 📄 EA community

Lausanne, Switzerland

Co-founding the group, 📄 introduction workshop speaker, running a 📄 discussion group on AI safety and theory, newsletter management and writing, Facebook events announcements, managing open discussions

### Artificial Intelligence Governance Forum

2019, 2020

📄 AI governance conference

Geneva, Switzerland (2019), virtual due to COVID-19 (2020)

Time-keeping, technical support, small tutorial on neural networks

### Applied Machine Learning Days

2019

Machine learning 📄 conference

Lausanne, Switzerland

Technical help for presenters, badge check

### Anti-corruption foundation (A. Navalny)

2017

A 📄 non-profit aimed at investigating corruption

Moscow, Russia

Conveyed the results of the investigations by talking to people on the streets as a volunteer