# Alberto Silvio **CHIAPPA**

## Engineer | PhD Student in Computational Neuroscience and AI

linkedin.com/in/albertochiappa albertochiappa93@gmail.com
+41 76 814 61 55 alberto.chiappa@epfl.ch
Chemin de la Colline 4, 1007 Lausanne (VD), Switzerland Italian Citizen

Passionate about scientific research, after completing my MSc in Computational Science and Engineering I started a career in industry. I spent over 3 years at Schindler's R&D, where I have worked as a researcher and as leader of a small research team. Since 2021 I have been pursuing a PhD in Computational Neuroscience and Artificial Intelligence, supervised by Prof. Alexander Mathis. My research interests are motor learning and adaptation, with a focus on Reinforcement Learning in complex and high-dimensional control systems.

## Education

**Present – January 2021** — PhD student | Computational Neuroscience, A. Mathis Group, Lausanne, EPFL, Switzerland

- Exploration in high-dimensional (musculoskeletal) systems (NeurIPS 2023)
- Adaptive Reinforcement Learning (NeurIPS MyoChallenge 2022 and 2023, winner)
- Inductive biases to enable locomotion with a variable body shape (NeurIPS 2022)
- Teaching assistant : Software Engineering, Brain-inspired Machine Learning, Numerical Mathematics

Reinforcement Learning | Computational Neuroscience | PyTorch | MuJoCo | PyBullet | MyoSuite

**July 2018 – September 2015** — Double MSc in Computational Science and Engineering | EPFL and Polytechnic University of Milan, Lausanne, Switzerland and Milan, Italy

- Strong background in theoretical Mathematics (*Functional Analysis, Partial Differential Equations*)
- Specialization in Computational Science (*Machine Learning, Software Engineering, Parallel Computing, Image Processing, Signal Processing*)
- Final results : 5.65/6 GPA (EPFL), 110/110 cum laude (PoliMi)

Machine Learning | Software engineering | Partial Differential Equations

**September 2015 – October 2012** — BSc in Mathematical Engineering | Polytechnic University of Milan, Milan, Italy

- Solid Mathematical fundamentals (*Analysis, Algebra, Statistics, Probability, Numerical Analysis*)
- Broad-spectrum engineering preparation (*Physics, Electronics, Construction Science, Fluid Dynamics)*
- Thesis : *Soil profile reconstruction from the superficial response to acoustic signals*. Final result : 110/110

Analysis | Probability Theory | Numerical Mathematics | Mechanics

## Professional Experience

**December 2020 – August 2018** — Engineer R&D | Schindler New Technologies, Lausanne, Switzerland

- Mulit-Agent Reinforcement Learning : optimization of elevator group control
- Project management : development of a maintenance robot ; stress detection of workers with wearable sensors
- Data science : prediction of maintenance contracts termination ; estimation of budget overrun in new installation projects
- Technology scouting at EPFL laboratories and local startups

Project Management | Python | Machine Learning | Computer Vision | Agile Development

**July 2018 – July 2017** — Intern and Master's Thesis student | Schindler New Technologies, Luzern, Switzerland

- Crowd-sourced phone sensor data analysis to report the operation status of the elevator
- Real-time context recognition with mobile phone sensor data : time series forecast with Recurrent Neural Networks to predict when passengers enter an elevator
- Oral presentation at the Applied Machine Learning Days 2019, track *Machine Learning and Transportation*

TensorFlow | Android development | scikit-learn | Firebase | AirFlow | Power BI

## Papers and publications

1. **Alberto Silvio Chiappa***, Pablo Tano*, Nisheet Patel*, Alexandre Pouget, and Alexander Mathis. Acquiring musculoskeletal skills with curriculum-based reinforcement learning, 2023 (preprint, under review).
   https://doi.org/10.1101/2024.01.24.577123
2. **Alberto Silvio Chiappa**, Alessandro Marin Vargas, Ann Zixiang Huang, and Alexander Mathis. Latent exploration for reinforcement learning. Advances in Neural Information Processing Systems 35 (NeurIPS), 2023 (in print).
   https://doi.org/10.48550/arXiv.2305.20065
3. Alessandro Marin Vargas*, Axel Bisi*, **Alberto Silvio Chiappa**, Christopher Versteeg, Lee E. Miller, Alexander Mathis. Task-driven neural network models predict neural dynamics of proprioception. bioRxiv, 2023 (in print, accepted by Cell).
   https://doi.org/10.1101/2023.06.15.545147
4. Nisheet Patel*, Pablo Tano*, **Alberto Silvio Chiappa***, Alex Pouget, Alexander Mathis. Musculoskeletal skill learning with curriculum-based Static to Dynamic Stabilization. Cosyne 2023 (peer-reviewed extended abstract)
5. Vittorio Caggiano, Guillaume Durandau, Huwawei Wang, **Alberto Silvio Chiappa**, Alexander Mathis, Pablo Tano, Nisheet Patel, Alexandre Pouget, Pierre Schumacher, Georg Martius, Daniel F.B. Haeufle, Yiran Geng, Boshi An, Yifan Zhong, Jiaming Ji, Yuanpei Chen, Hao Dong, Yaodong Yang, Rahul Siripurapu, Luis Eduardo Ferro Diez, Michael Kopp, Vihang Patil, Sepp Hochreiter, Yuval Tassa, Josh Merel, Randy Schultheis, Seungmoon Song, Massimo Sartori, Vikash Kumar. MyoChallenge 2022 : Learning contact-rich manipulation using a musculoskeletal hand, PMLR, 2022.
6. **Alberto Silvio Chiappa**, Alessandro Marin Vargas, Alexander Mathis. DMAP : a Distributed Morphological Attention Policy for learning to locomote with a changing body. Advances in Neural Information Processing Systems 35 (NeurIPS), 2022.
   https://doi.org/10.48550/arXiv.2209.14218
7. Alessandro Marin Vargas, Axel Bisi, **Alberto Silvio Chiappa**, Chris Versteeg, Lee E Miller, Alexander Mathis. Action recognition best explains neural activity in cuneate nucleus. Cosyne 2022 (peer-reviewed extended abstract)
8. Khushdeep Singh Mann, Steffen Schneider, **Alberto Silvio Chiappa**, Jin Hwa Lee, Matthias Bethge, Alexander Mathis, and Mackenzie W. Mathis. Out-of-distribution generalization of internal models is correlated with reward. Self-Supervision for Reinforcement Learning Workshop-ICLR, 2021.
9. **Alberto Silvio Chiappa**, Stefano Micheletti, Riccardo Peli, Simona Perotto. Mesh adaptation-aided image segmentation. Communications in Nonlinear Science and Numerical Simulation 74, 2019. https://doi.org/10.1016/j.cnsns.2019.03.010

## Tecnical Skills

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| **Software development** | Python, Agile Development (SCRUM), GitHub, Jira, Confluence, Bitbucket |
| **Machine Learning** | PyTorch, RLLib, StableBaselines3, scikit-learn, TensorFlow, Pandas |
| **Others** | Docker, MuJoCo, Azure, Firebase |

## Languages

**English** ●●●●● **Italian** ●●●●● **French** ●●○○○

## Awards, prizes and recognition

- **MyoChallenge NeurIPS competition, 1st place (2022 and 2023)**
  *Member of the winning team in both editions of the challenge. We used Reinforcement Learning to train a musculoskeletal model of a human arm to perform dexterous object manipulation tasks. Oral presentation at the MyoChallenge workshop, NeurIPS 2023.*
- **Contributions at international conferences of Artificial Intelligence and Computational Neuroscience**
  *NeurIPS (2022 and 2023), Cosyne (2022 and 2023), Bernstein (2022), AMLD (2019).*
- **Double master scholarship, Polytechnic University of Milan (2017-2018)**
  *Financial support from Polytechnic University of Milan for the 5 best students of Computational Science and Engineering to pursue a second MSc at EPFL.*
- **Polytechnic University of Milan enrollment fee exemption scholarship, (every year, 2012-2018)**
  *Reduction of the University tax due to excellent grades.*
- **Applied Mathematics competition, Catholic University of Milan, 3rd place (2012)**
  *Competition about Mathematics and Statistics.*
- **Lions youth exchange scholarship (2011)**
  *Summer school scholarship financed by the Lions Club, offered to the 10 best students of the high school.*
- **High school Mathematics Olympics, 1st place (2009)**
  *Mathematical problem solving competition.*