

ALESSANDRO MARIN VARGAS

(+39)3476399775 ◇ alessandro.marinvargas@epfl.ch ◇ Website ◇ GitHub

EDUCATION

PhD student in NEUROSCIENCE

October 2020 - present

Mathis Group - EPFL, Geneva (CH)

Master of science in BIONICS ENGINEERING

August 2017 - December 2019

Scuola Superiore Sant'Anna - Università di Pisa, Pisa (IT)

Final Grade: 110/110 *summa cum laude*

GPA: 4/4

Undergraduate degree in ELECTRONIC ENGINEERING

July 2014 - June 2017

Department of Information Engineering, Università di Padova, Padova (IT)

Final Grade: 110/110 *summa cum laude*

Thesis: "Energy harvesters for implantable devices" | Advisor: Paolo TENTI

GPA: 3.8/4

RESEARCH EXPERIENCE

PhD student

October 2020 - present

Mathis Group - EPFL, Geneva (CH)

Topic: "Modeling the sensorimotor system through deep learning techniques"

Supervisors: Alexander MATHIS

Research fellow

February 2020 - June 2020

Neural computation lab, Italian Institute of Technology, Rovereto (IT)

Topic: "Modeling high-dimensional dependencies with non-parametric copula"

Supervisors: Stefano PANZERI, Houman SAFAAI

Master research fellow - Master's thesis

July 2019 - December 2019

Harvey lab, Neurobiology department, Harvard Medical School, Boston (USA)

Title: "A novel, efficient and reliable copula algorithm for the study of neural population coding"

Advisors: Stefano PANZERI, Christopher HARVEY, Alberto MAZZONI | Co-advisor: Silvestro MICERA

- Developing non-parametric copula models for GPUs in Tensorflow, Python
- Modeling high-dimensional dependencies between variables of neural population activity
- Applying the copula to analyze single cell resolution neural populations: prediction and correlations.

Student Intern

February 2019 - April 2019

Biorobotics Institute, Scuola Superiore Sant'Anna, Pisa (IT)

Topic: "Indoor robot magnetic localization"

Supervisors: Angelo Maria SABATINI, Michelangelo GUAITOLINI

- Data acquisition with VICON system and magnetic sensor
- Processing of magnetic and tridimensional time series data: synchronization and filtering
- Data analysis, magnetic map development and localization algorithm

Student Trainee

August 2018 - September 2018

Mechanical Engineering department, University College London, London (UK)

Topic: "Designing 3D printed body-powered prosthetic hands and hydraulic soft-structured sensors"

Supervisors: Helge WURDEMAN, Ge SHI

- Developing, rendering and 3D printing of a sensorized prosthetic hand and of the haptic sensor
- Data acquisition using Arduino and Robot Operating System
- Data analysis and characterization of Force and Pressure sensors

PUBLICATIONS

1. **Marin Vargas A.***, Bisi A.*, Chiappa A., Versteeg C., Miller L., Mathis A. (2024). Task-driven neural network models predict neural dynamics of proprioception. *Cell*.
2. Chiappa A., **Marin Vargas A.**, Huang A. Z., Mathis A. (2023). Latent exploration for Reinforcement learning. *NeurIPS*.
3. Chiappa A., **Marin Vargas A.**, Mathis A. (2022). DMAP: a Distributed Morphological Attention Policy for Learning to Locomote with a Changing Body. *NeurIPS*.
4. Hausmann* S. B., **Marin Vargas* A.** (*Co-first), Mathis A., & Mathis M. W. (2021). Measuring and modeling the motor system with machine learning. *Current Opinion in Neurobiology*.
5. **Marin Vargas A.**, Cominelli L., Dell’Orletta F., & Scilingo E. P. (2021). Verbal communication in robotics: a study on salient terms, research fields and trends in the last decades based on a computational linguistic analysis. *Frontiers in Computer Science*.
6. Shi G., Palombi A., Lim Z., Astolfi A., Burani A., Campagnini S., Lo Preti M., Loizzo F.G.C., **Marin Vargas A.**, E. Peperoni, Oddo C.M., Hardwicke J., Venus M., Homer-Vanniasinkam S. & Wurdemann H.A. (2020). Fluidic haptic interface for mechano-tactile feedback. *IEEE transaction on haptics*.

CONFERENCES

1. **Marin Vargas A.**, Chiappa A., Rotondo A. & Mathis A. Modeling the sensorimotor system with deep reinforcement learning. Poster at FENS 2024.
2. **Marin Vargas* A.**, Bisi* A., (*Co-first), Chiappa A., Versteeg C., Miller L. & Mathis A. Task-driven neural network models predict neural dynamics of proprioception. Poster at Bernstein conference 2023.
3. **Marin Vargas* A.**, Bisi* A., (*Co-first), Chiappa A., Versteeg C., Miller L. & Mathis A. Action recognition best explains neural activity in the cuneate nucleus. Poster at Cosyne 2022.

SELECTED TALKS

Junior Scientists Workshop on Recent Advances in Theoretical Neuroscience *2024*
Selected for a contributed talk entitled "Modeling the sensorimotor system with task-driven modeling" in Trieste, Italy.

Computational Neuroscience Next Generation Symposium *2023*
One of the eight selected graduate student to give a talk entitled "Task-driven neural network models predict neural dynamics of proprioception" at the Washington University in St. Louis, United States.

INVITED TALKS

Seminar at Bocconi University *2024*
Title: "Task-driven neural network models predict neural dynamics of proprioception". Milano (IT).

Swiss Computational Neuroscience Retreat *2023*
Title: "Investigating proprioceptive processing with task-driven neural network models". Crans Montana (CH).

Giessbach meeting - Cellular and Molecular Neurobiology of Mental Diseases *2021*
Title: "Modeling proprioception with deep learning". Brienz (CH).

MENTORSHIP AND TEACHING ACTIVITY

Exercise session at Systems neuroscience 2024

I developed an exercise session to play pong in real-time through EMG decoding.

Teaching assistance: Brain-like computation and intelligence 2023 - 2024

I prepared the exercise sessions/projects ex-novo as well as helping in the organization of the master course.

Teaching assistance: Applied software engineering for life sciences 2021 - 2022

I helped in the organization of the bachelor course and writing of the exercises and projects material ex-novo. I supervised the students progress during the exercise sessions and guided them to achieve their project's goals.

Student supervision 2020 - present

Supervising semester bachelor and master students (projects or master thesis) to acquire the necessary skills for addressing the research questions of their projects.

AWARDS & RECOGNITIONS

“Swiss Government Excellence Scholarship” from 2021 to 2024

Scholarship for 500 excellent post-graduate researchers of the PhD/post-doc at Swiss institutions (extendable up to 3 years)

“Armenise Harvard Research Fellowship” 2019

Scholarship for 10 Italian excellent students for 2 months of biomedical research at Harvard Medical School (Boston)

“Mentee at LeadTheFuture” 2018

Selected as mentee for LeadTheFuture, a leading mentorship non-profit organization for students in STEM, with acceptance rate below 20 %

“Incentivo alle lauree scientifiche” 2017

Scholarship for the best students of the course by the University of Padova

“Mille e una lode” 2016

Scholarship for the best 3% students of the course by the University of Padova

SERVICE TO THE SCIENTIFIC COMMUNITY

Reviewer at ICLR 2024 Workshop AGI 2024

Reviewer at Computational and Systems Neuroscience (Cosyne) 2022

SKILLS AND ABILITIES

Languages: ITALIAN (Native), ENGLISH (Fluent - TOEFL 108)

Tests: GRE: VR 157 (76th PCTL), QR 160 (73th PCTL), AW 4 (57th PCTL)

Software: *Advanced* - Python, Tensorflow, Pytorch, L^AT_EX
Intermediate - Matlab, C++, LabView, R, SolidWorks, Java, Photoshop
Basic - Pascal, ROS, μ Vision, CLIPS, Vivado, ANSYS

Analytic skills: Deep learning, neural predictions, reinforcement learning, regression analysis, filtering, parallel computing, non-parametric modeling, data mining, microcontroller programming, data acquisition, prototyping, SLAM, 3D rendering and simulations

CHALLENGES

Myochallenge - 1st place Manipulation track

September 2023

Winners of the Manipulation track - Myochallenge 2023.

Two-phase NeurIPS challenge track for learning policies to manipulate objects with a musculoskeletal arm (63D).

CLVISION CVPR Workshop

June 2020

Selected as one of the 11 finalist teams (79 teams in total) of the competition.

Two-phase challenge track to thoroughly assess novel continual learning solutions in the computer vision context based on 3 different continual learning (CL) protocols.

SUMMER SCHOOLS

Deep Learn 2022

July 2022

One week - Topics: deep learning, deep generative model, multi-modal machine learning, reinforcement learning, explainable AI and graph neural network.

Neuromatch Academy 2020 - Interactive student

July 2020

Three weeks - Topics: models, machine learning, Bayesian statistics, decision making, optimal control, reinforcement learning, dynamic networks, network causality and deep learning.

LxMLS 2020 - 10th Lisbon Machine Learning School

July 2020

Two weeks - Topics: Classification, Structured Prediction (sequences, trees, graphs), Deep Learning and Reinforcement Learning.

Virtual Brain, Minds and Machine summer school (2020)

August 2020

Two weeks - Topics: Neuroscience, Cognitive science, and biologically inspired AI.

SCIENTIFIC OUTREACH

Science communication with an article about the first bionic hand on “Il Dolomiti” (Italian local newspaper).

EXTRA-CURRICULAR

Honorable mention at the “LifeScience Hackathon”. Project: Shared RL-EMG control to guide hand prosthesis for hand-writing. 2024

President of the SCBA (Social Campus Biotech Association). 2021 - present

Participated to the “HackaHealth 2022” for developing personalized solutions for people with disabilities.

Attendee at the Neuromatch 2.0 unconference in Computational Neuroscience, 2020.

Attendee at the Neuromatch unconference in Computational Neuroscience, 2020.

Attendee at High Performance and Embedded Architecture and Compilation (HiPEAC), Bologna (IT), 2020.

Attendee at the Warren Alpert Foundation Prize Symposium, Boston (USA), 2019.

Attendee at the International Conference of Neurorehabilitation, Pisa (IT), 2018.

Coordinator of a collaboration between Social Robotics lab (Università di Pisa, Pisa (IT)) and Italian Natural Language Processing Lab (National Research Council, Pisa (IT)), 2018.