ALESSANDRO MARIN VARGAS

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Avenue De-Luserna 44, 1203, Geneve, Switzerland

EDUCATION

PhD student in NEUROSCIENCE *October 2020 - present*
Mathis Group - EPFL, Geneva (CH)
Topic: "Modeling the sensorimotor system through deep learning techniques"
Expected graduation date: October 2024

Master of science in BIONICS ENGINEERING *August 2017 - December 2019*
Scuola Superiore Sant'Anna - Universitá di Pisa, Pisa (IT)
Final Grade: 110/110 *summa cum laude*
Department of Information Engineering
GPA: 4/4

Undergraduate degree in ELECTRONIC ENGINEERING *July 2014 - June 2017*
Department of Information Engineering, Universitá 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

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 Supreriore 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 Wurdemann, 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. (2023). Task-driven neural network models predict neural dynamics of proprioception. (Under review)
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.**, 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.
2. **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.

TALKS

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.

TEACHING

Brain-like computation and intelligence *2023 - present*
As a teaching assistance, I am preparing the exercise sessions/projects ex-novo as well as helping in the organization of the course.

Applied software engineering for life sciences *2021 - 2022*
As a teaching assistance, 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*
I am supervising every 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

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, LaTeX
Intermediate - Matlab, C++, LabView, R, SolidWorks, Java, Photoshop
Basic - Pascal, ROS, $\mu Vision$, 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.
It consists of a 2-phase challenge track to thoroughly assess control policy solutions to manipulate objects with a musculoskeletal arm.

CLVISION CVPR Workshop *June 2020*
Selected as one of the 11 finalist teams (79 teams in total) of the competition.
It consists of a 2-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.

EXTRA-CURRICULAR

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

Invited talk at Swiss Computational Neuroscience Retreat - with the following talk: "Investigating proprioceptive processing with task-driven neural network models". Crans Montana (CH), 2023.

Invited talk at Giessbach meeting - Cellular and Molecular Neurobiology of Mental Diseases - with the following talk: "Modeling proprioception with deep learning". Brienz (CH), 2021.

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 (Universitá di Pisa, Pisa (IT)) and Italian Natural Language Processing Lab (National Research Council, Pisa (IT))