Davide Valeriani

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Computer engineer with 10+ years of experience in analyzing neural (EEG/fMRI) and other physiological (eye movements, heart rate) signals, and developing machine learning algorithms for medical, defense, and consumer applications. Leader in the development of non-invasive brain-computer interfaces for enhancing cognition and decision-making. Advocate of explainable artificial intelligence. Strong coding, communication and management skills.

WORK EXPERIENCE

Senior Research Scientist
10/2022 - now

Google LLC - Cambridge, MA, USA

- Part of Consumer Health Research Team (CHRT), within Fitbit team

Lead Data Scientist
2/2021 - 10/2022

Neurable Inc. - Boston, MA, USA

- Developed signal processing pipeline to extract neural oscillations from noisy EEG signals and machine learning algorithm to estimate focus from them
- Implemented REST APIs and three successful prototypes for focus visualization in real-time
- Scrum master of engineering team

Postdoctoral Research Fellow
9/2018 - 2/2021

Massachusetts Eye and Ear - Boston, MA, USA

- Developed a deep learning algorithm for automatic diagnosis of dystonia from brain imaging MRI data, significantly improving current clinical diagnostic accuracy (99%) and time to diagnosis (5s)
- Researched neural representations of speech production via estimation of effective brain connectivity from fMRI data through dynamic causal modeling
- Implemented EEG/fMRI protocol to develop and validate multimodal brain-computer interfaces

Senior Research Officer
2/2017 - 8/2018

University of Essex - Colchester, UK

- Developed and validated framework to use brain-computer interfaces to facilitate integration between human and AI agents in face recognition
- Trained research lab at University of Southern California on collecting data from high-density EEG systems

Lecturer
10/2017 - 12/2017

University of Essex - Colchester, UK

- Taught course Large Scale Software Systems and Extreme Programming through classes and lab activities
- Designed and assessed coursework and exams
- Received high ratings from students

EDUCATION

Certificate in Systems Design
2021

Cornell University, Ithaca, NY, USA

Ph.D. Computing and Electronic Systems
2017

University of Essex, Colchester, UK

Thesis: *Improving group decision making with collaborative brain-computer interfaces*

M.Sc. Computer Engineering *cum laude*
2013

University of Parma, Parma, Italy

Dissertation: *A 3D perception system for mobile robot navigation and object detection*

B.Sc. Computer Engineering *cum laude*
2010

University of Parma, Parma, Italy

Dissertation: *Development of a software library for programming the Comau Smart Six robot manipulator*

TECHNICAL SKILLS

Programming Languages

Python (numpy, scipy, sklearn, pandas, matplotlib), Matlab, R, C++, Java, Javascript, HTML/CSS

Software Engineering

Test-driven development, object-oriented programming, Git, SVN, MLOps, REST API, system design

Machine Learning

Classification, regression, convolutional neural network, deep learning, MLflow, MLOps, Tensorflow, Keras

Project Management

Agile, communication, organization, flexibility, planning

Neuroscience

EEG, fMRI, preprocessing, feature extraction, statistics

Research

Grant writing, experimental design, data collection, data analysis, presentation of results, supervision of trainees

HOBBIES & INTERESTS

Bonsai   Photo   Diving   Cooking   Traveling

SELECTED PUBLICATIONS

Valeriani D, O'Flynn LC, Worthley A, Hamzehei Sichani A, Simonyan K (2022). *Multimodal collaborative brain-computer interfaces aid human-machine team decision-making in a pandemic scenario*. J. Neural Eng.

Valeriani D, Santoro F, Ienca M (2022). *The present and future of neural interfaces*. Frontiers in Neurorobotics.

Simonyan K, Ehrlich SK, Andersen R, Brumberg J, Guenther F, Hallett M, Howard MA, Millán JDR, Reilly RB, Schultz T, **Valeriani D** (2022). *Brain-Computer Interfaces for Treatment of Focal Dystonia*. Movement Disorders.

Salvatore C*, **Valeriani D***, Piccialli V, Bianchi L (2022). *Optimized collaborative brain-computer interfaces for enhancing face recognition*. IEEE Trans. Neural Syst. Rehabil. Eng.

Easttom C, Bianchi L, **Valeriani D**, Nam CS, Hossaini A, Zapala D, Roman-Gonzalez A, Singh AK, Antonietti A, Sahonero-Alvarez G, Balachandran P (2021). *A functional BCI model by the P2731 working group: control interface*. Brain-Computer Interfaces.

Valeriani D, Ayaz H, Kosmyna N, Poli R, Maes P (2021). *Editorial: Neurotechnologies for human augmentation*. Frontiers in Neuroscience.

Valeriani D, Simonyan K (2021). *The dynamic connectome of speech control*. Phil. Trans. Royal Society B

Antonietti A, Balachandran P, Hossaini A, Hu Y, **Valeriani D** (2021). *The BCI Glossary: a first proposal for a community review*. Brain-Computer Interfaces.

Bhattacharyya S, **Valeriani D**, Cinel C, Citi L, Poli R (2021). *Anytime collaborative brain-computer interfaces for enhancing perceptual group decision-making*. Scientific Reports.

Fernandez-Vargas J, Tremmel C, **Valeriani D**, Bhattacharyya S, Cinel C, Citi L, Poli R (2021). *Subject- and task-independent neural correlates and prediction of decision confidence in perceptual decision making*. J. Neural Eng.

Easttom C, Bianchi L, **Valeriani D**, Nam C S, Hossaini A, Zapala D, Roman-Gonzalez A, Singh A K, Antonietti A, Sahonero-Alvarez G, Balachandran P (2021). *A Functional Model for Unifying Brain Computer Interface Terminology*. IEEE Open J. Eng. Med. Biol.

Valeriani D, Simonyan K (2020). *A microstructural neural network biomarker for dystonia diagnosis identified by a DystoniaNet deep learning platform*. Proc. Natl. Acad. Sci. U.S.A.

Valeriani D, Poli R (2019). *Cyborg groups enhance face recognition in crowded environments*. PLoS One.

Cinel C, **Valeriani D**, Poli R (2019). *Neurotechnologies for human cognitive augmentation: current state of the art and future prospects*. Frontiers Human Neuroscience.

Valeriani D, Cinel C, Poli R (2017). *Group augmentation in realistic visual-search decisions via a hybrid brain-computer interface*. Scientific Reports.

Valeriani D, Poli R, Cinel C (2016). *Enhancement of group perception via a collaborative brain-computer interface*. IEEE Trans. Biomed. Eng.

SELECTED AWARDS

Study UK Alumni Award: Innovation — 2022
British Council

Best Poster Award: Non-Invasive BCI — 2021
BCI Society

Abstract Award — 2020
2nd Annual Computational Data Neuroscience Symposium

Radcliffe Exploratory Seminar Award — 2020
Radcliffe Institute at Harvard University

OHBM People's Choice Abstract Award — 2019
Organization for Human Brain Mapping

Bronze Medal — 2016
Cybathlon BCI Race

Best Paper Award — 2015
7th IEEE EMBS Neural Engineering Conference

London Science Museum Award — 2015
HackTheBrain UK

Best Paper Award — 2015
4th International Conference on Robotics in Education

Winner — 2012
Sick Robot Day robotic competition

LEADERSHIP

Board Member and Committee Chair — 2020-now
BCI Society

- Organized and led Postdoc and Student Committee to organize initiatives for BCI trainees
- Increased society membership by 30% in one year
- Implemented policies to promote diversity

Lead Guest Editor — 2020-21
Frontiers in Neuroscience - Neural Technology

- Led a peer-reviewed article collection on neurotechnologies for human augmentation
- 13 articles published, over 100,000 views received
- First author of e-book produced at the end of the project

Chair — 2020
Neuromatch Academy - Observers Track

- Enabled 6,000+ students to access content and resources of Neuromatch Academy
- Developed and implemented algorithms of mind-matching to improve networking of students
- Implemented online platform for abstract review