

# Davide Valeriani, PhD

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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

- Leading research and development of machine learning algorithms for estimating cardiovascular health from wearable sensors
- Analysis of health data at scale (25M users)
- Writing tech reports and research papers

**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  
Harvard Medical School - 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

For a full list, see Google Scholar.

**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.

**Valeriani D**, Ayaz H, Kosmyrna 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 - 2021  
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