



Francesca Peveri

Date of birth: 15/07/1996 | **Nationality:** Italian | **Email address:** peveri.francesca@gmail.com |

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EDUCATION AND TRAINING

01/11/2023 – CURRENT Genova, Italy

POSTDOCTORAL RESEARCHER IN BIOENGINEERING AND ROBOTICS University of Genoa - DIBRIS department

Progetto NIH "ARBi - Assessment and Rehabilitation of Binocular Sensorimotor Disorders" (R01-EY032162-01)

Field of study Bioengineering and Robotics

01/11/2020 – 01/05/2023

PHD IN BIOENGINEERING AND ROBOTICS University of Genoa - DIBRIS department

Using virtual reality tools and 3D stimulus delivery devices (3D monitors), I investigated stereoscopic perception and in particular how active motor training can influence depth visual cue integration processes. I performed psychophysics experiments and also investigated neural correlates using EEG techniques.

Field of study Bioengineering and Robotics |

Thesis Interactive manipulation of visuomotor contingencies . A visual stimulation paradigm to investigate depth cue integration in static and dynamic conditions. Supervisors: Andrea Canessa, Silvio P. Sabatini,

09/2018 – 12/2020 Genova, Italy

MASTER DEGREE IN BIOENGINEERING (MSC) University of Genoa

Address Via All'Opera Pia, 15, 16145, Genova, Italy | **Website** <https://www.dibris.unige.it/> | **Field of study** Neuroengineering |

Final grade 110 e Lode |

Thesis Cortical - like motion detectors based on neuromorphic spiking networks. Supervisor: Silvio P. Sabatini

09/2015 – 12/2018 Genova, Italy

BACHELOR DEGREE IN BIOMEDICAL ENGINEERING (BSC) University of Genoa

Address Via All'Opera Pia, 15, 16145, Genova, Italy | **Field of study** Bioengineering | **Final grade** 104/110 |

Thesis Experimental session for the assessment of attention in Immersive Virtual Reality (VR) environments. Supervisors: Manuela Chessa, Fabio Solari

2015 Ventimiglia, Italy

DIPLOMA FROM SCIENTIFIC HIGH SCHOOL Scientific High School "Angelico Aprosio"

Address Via Don Bruno Corti, 7, 18039, Ventimiglia, Italy | **Website** <http://www.liceoaprosio.it/> | **Final grade** 90/100

WORK EXPERIENCE

 **RESTAURANT "2F"** – GENOVA, ITALY

WAITRESS – 06/2019 – 01/2020

PUBLICATIONS

2021

[**A Cortically-inspired Architecture for Event-based Visual Motion Processing: From Design Principles to Real-world Applications**](#)

Abstract

We developed and tested the architecture of a bio-inspired Spiking Neural Network for motion estimation. The computation performed by the retina is emulated by the neuromorphic event-based image sensor DAVIS346 which

constitutes the input of our network. We obtained neurons highly tuned to spatial frequency and orientation of the stimulus through a combination of feed-forward excitatory connections modeled as an elongated Gaussian kernel and recurrent inhibitory connections from two clusters of neurons within the same cortical layers. Sums over adjacent nodes weighted by time-variable synapses are used to attain Gabor-like spatio-temporal V1 receptive fields with selectivity to the stimulus' motion. In order to gain the invariance to the stimulus phase, the two polarities of the events provided by the neuromorphic sensor were exploited, which allowed us to build two pairs of quadrature filters from which we obtain Motion Energy detectors as described in [2]. Finally, a decoding stage allows us to compute optic flow from the Motion Detector layers. We tested the approach proposed with both synthetic and natural stimuli.

Proc. of IEEE Conf. Comput. Vis. Pattern Recog. Workshops (CVPRW)

2023

Time - frequency analysis of brain response to 3D slant texture and stereo cues

Abstract

Visual system estimate surface slant from different visual cues, but on how and where these cues are integrated there is still much to be understood. The aim of this study is to fill the gap we identified regarding brain activity elicited by complex visual stimulation defined by different cue to slant. We used electroencephalography (EEG) and time - frequency analysis to characterize the cortical responses to monocular and binocular cues. We design slanted surfaces defined only by texture and binocular disparity, and surfaces defined by the two cues combined in a conflictual and non - conflictual configuration. The processing of these visual stimuli enhanced the same pattern of spectral modulation in all investigated ROIs but with different latencies and different patterns depending on the available visual cue.

Proc. of the Italian National Bioengineering Group Conference (GNB'23)

2025

Custom Monocular Calibration for Enhanced Eye-Tracking Accuracy

Authors: Federico Ferracini, Francesca Peveri, Eleonora Annamaria Borsani Villa, Silvio P. Sabatini, Agostino Gibaldi, Andrea Canessa | Journal Name: 47th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)

2025

Depth Perception Changes Following Adaptation to Cue-dependent Invariants

Abstract

How does our perceptual system adapt to new invariants? Can we adapt to ambiguous i.e., non veridical 3D object properties when are invariant to transformations? By using a two-cue depth stimulation paradigm where disparity and texture were in conflict, we verified that visuomotor interaction with a metameric 3D planar surface (i.e., self manipulation of a metameric 3D planar surface) yields an adaptation of the perceived match of different combination of stereo and texture information. Notably, this adaptation seems to rely solely on experiencing action- driven visual invariants, without the need of explicit sensorimotor error feedback. Adopting a 3D vector-sum model to jointly account for both slant and tilt weighting contribution, we found that dynamic and active training induces a post-training cue-reweighting - favoring one cue over the other - when comparing pre- vs post- training perceptual judgments. To test the effect of single cue invariant in isolation, two control experiments were performed where either texture or disparity change was yoked with motor action, only. In such conditions, the absence of a significant perceptual change is a clear evidence that consistently moving components cues (i.e., in a way that activates cue-integration mechanisms) is a necessary condition of agency that facilitates perceptual grouping, and promotes adaptation. Overall, these results evidence that new coherent percepts emerge when sensory cues are dynamically manipulated in a way that some high-level structures of the stimulus remain invariant.

Under revision

Authors: Francesca Peveri1, Federico Barban, Andrea Canessa and Silvio P. Sabatini | Journal Name: Scientific Reports

● LANGUAGE SKILLS

Mother tongue(s): ITALIAN

Other language(s):

	UNDERSTANDING		SPEAKING		WRITING
	Listening	Reading	Spoken production	Spoken interaction	
INGLESE	C1	C1	C1	C1	C1

● SKILLS

Programming & SW

Android Developer | C++ | C# | Shader Graph | MATLAB | Python | Arduino IDE | Base OpenGL | Psychopy | Unity 3D engine | C | Psychtoolbox | Unity shaders | openCV | Visual C - Visual Studio | Tobii Pro Studio (Eye-Tracking Software) | RStudio integrated development environment (IDE) | Pupil Eye Tracking Software

CAD

Autodesk Fusion360

EEG

Brainstorm, Matlab | Analyzing EEG Data with EEGLAB (Matlab) | BrainVision Recorder and Analyser

Technologies

Eye tracking (SMI and Pupil Labs) | Virtual Reality (VR) | HTC Vive | Pupil Core

● TEACHING ACTIVITY

Seminar (MSc students)

(12/2021) - **Title:** "Continuous active interchange of perception: a new motor perspective for perceptual learning"

(12/2022) - **Title:** "Dynamic manipulation of visuomotor contingencies"

(3/2024) - **Title:** "Assessment of functional vision and rehabilitative approaches for binocular visual impairments" for MSc Course in Bioengineering "*Neurosensory Engineering*" (Official teacher: Andrea Canessa)

2021 – 2024

Support of Didactic activity

MSc Course in Bioengineering: "*Perceptual System and Interaction*" (Official teacher: Silvio P. Sabatini)

Academic years: 2021-2022, 2022-2023, 2023-2024

Supervision of MSc Research Tracks in Bioengineering

- "*Eye tracking and visual assessment*" - (Official teacher: Andrea Canessa) - Academic years: 2021-2022, 2022-2023
- "*Multisensory EEG*" - (Official teacher: Gabriele Arnulfo) - Academic years: 2021-2022
- "*Vision Psychometrics*" - (Official teacher: Silvio P. Sabatini) - Academic years: 2021-2022
- "*Vision Psychometrics*" - (Official teacher: Silvio P. Sabatini) - Academic years: 2023-2024

2025 – CURRENT

Didactic activity

Integrative course - Exercises in Visual Psychophysics: Instruments and Experimental Techniques

Offered as part of the official course "**Perceptual Systems and Interaction**" (course code 80564, SSD ING-INF/06) for the Bioengineering degree program (LMG11159), 2nd semester.

12/2022

Co-supervision of BSc Final Project in Biomedical Engineering

- **Thesis title:** "Study of visual evoked potentials during motor interaction with conflicting visual stimuli".

Supervisors: Andrea Canessa, Gabriele Arnulfo

07/2025

Co-supervision of BSc Final Project in Biomedical Engineering

- **Thesis title:** "Studio di fattibilità di un sistema di eye-tracking in tempo reale mediante elettrooculografia".

Supervisors: Andrea Canessa

2025

Co-supervision of BSc thesis in Biomedical Engineering

- **Thesis title:** "Study of the integration of texture and binocular disparity in the processing of 3D surface orientation".

Supervisors: Silvio P. Sabatini, Andrea Canessa

2025

Co-supervision of BSc thesis in Physiotherapy

- **Thesis title:** "Assessment of gaze behavior during gait in people with Multiple Sclerosis: an experimental study using eye-tracking".

Supervisor: Dott. Andrea Tacchino (Dipartimento di Neuroscienze, riabilitazione, oftalmologia, genetica e scienze materno-infantili)

12/2023

Co-supervision of MSc thesis in Biomedical Engineering

- **Thesis title:** "Design and development of active 3D visual settings: an application for dynamic stereoacuity tests in natural conditions".

Supervisors: Silvio P. Sabatini

12/2024

Co-supervision of MSc thesis in Biomedical Engineering

- **Thesis title:** "Simulated maculopathy in Mixed Reality: effects on peripersonal space representation and PRL adaption".

Supervisors: Silvio P. Sabatini, Andrea Canessa

03/2025

Co-supervision of MSc thesis in Biomedical Engineering

- **Thesis title:** "A virtual reality-based assessment of human visual perceptual performance at different stimulus eccentricities".

Supervisors: Silvio P. Sabatini, Andrea Canessa

2025

Co-supervision of MSc thesis in Biomedical Engineering

- **Thesis title:** "An Eye-based user interface for controlling a sixth robotic finger".

Supervisors: Andrea Canessa, Silvio P. Sabatini, Gionata Salvietti (University of Siena)

● CONFERENCES AND SEMINARS

19/05/2022 – 22/05/2022 Rochester (NY)

32nd Biennial Center for Visual Science Symposium on "Active Vision"

Poster presentation - Title: "*Virtual Reality for dynamic manipulation of visuomotor contingencies: toward an interactive visual stimulation paradigm*".

Authors: Francesca Peveri, Andrea Canessa, Silvio P. Sabatini

21/06/2023 – 23/06/2023 Padova (IT)

VIII Congress of the Italian National Group of Bioengineering (GNB)

Poster presentation - Title: "*Time - frequency analysis of brain response to 3D slant texture and stereo cues*".

Authors: Francesca Peveri, Gabriele Arnulfo, Andrea Canessa, Silvio P. Sabatini

27/06/2023 – 30/06/2023 Bruxelles (BE)

21st International Multisensory Research Forum (IMRF)

Poster presentation - Title: "*Effects of dynamic alteration of depth cues during continuous dynamic interaction*".

Authors: Francesca Peveri, Andrea Canessa, Silvio P. Sabatini

27/08/2023 – 31/08/2023

European Conference on Visual Perception (ECVP)

Poster presentation - Title: "*Effects of dynamic alteration of depth cues during continuous dynamic interaction*".

Authors: Francesca Peveri, Andrea Canessa, Silvio P. Sabatini

25/08/2024 – 29/08/2024 Aberdeen, Scotland

European Conference on Visual Perception (ECVP)

Oral presentation - Title "*Can we reshape depth cue integration? Evidence of perceptual cue reweighting through dynamic interaction experience*".

Authors: Francesca Peveri, Andrea Canessa, Silvio P. Sabatini

19/06/2021 Virtual

3rd International Workshop on Event based Vision - Computer Vision and Pattern Recognition Workshops (CVPRW)

Oral presentation - Title: "*A Cortically-inspired Architecture for Event-based Visual Motion Processing: From Design Principles to Real-world Applications*"

Authors: Francesca Peveri, Simone Testa, Silvio P. Sabatini

Link [https://www.youtube.com/watch?v=KyS_h8i9HpM\\$](https://www.youtube.com/watch?v=KyS_h8i9HpM$)

25/09/2024 – 29/09/2024 Coimbra, Portugal

Seeing and Acting Workshop: Functional and Neural Perspectives (SAW)

Poster presentation - Title: "Reweighting of Visual Depth Cues through Dynamic Interaction with Conflicting Stimuli"

08/09/2025 – 12/09/2025 Firenze, Italy

The 15th International Conference on Low Vision Research and Rehabilitation (ISLRR)

Poster presentation - Title "*Enhancing visual rehabilitation: quantifying ocular and motor strategies with digital Ergoperimetry and eye-tracking*"

Authors: Francesca Peveri*, Antonella Panizzi**, Andrea Canessa*, Silvio P. Sabatini*

*University of Genoa, Department of Informatics, Bioengineering, Robotics and Systems Engineering, Genoa, Italy,

**Fondazione David Chiossone , Genoa, Italy

RESEARCH INTERESTS

Main interests

- Psychophysics of visual perception and multisensory integration
- Application of virtual reality and eye-tracking systems
- Development of technologies for assessment and rehabilitation in low vision
- Visuomotor/oculomotor coordination in multiple sclerosis
- Design of ecological and naturalistic visual tests for studying functional vision

PROJECTS

2024 – CURRENT

Participation to the NIH project "ARBi - Assessment and Rehabilitation of Binocular Sensorimotor Disorders"

2023 – 2024

Participation to the project "RAISE - Robotics and AI for Socio-economic Empowerment" supported by European Union - NextGenerationEU

Contribution to the organization of "Experiential workshop with end-users" (May 25th, 2023 c/o IIT, Genoa)

"PowerReps" - A wearable device for performance monitoring

"PowerReps" is a wearable device based on *Arduino UNO*, equipped with a wifi module, able to evaluate ROM (range of motion) of classic gym exercises (Squat, PullUp, PushUp) and quantify the power expressed. The device is coupled with a smartphone application design with *Android Studio* for exercise selection and real time evaluation of valid repetitions.

● **SCIENTIFIC TRAINING**

18/07/2022 – 22/07/2022

8th International Summer School of Neuroengineering Massimo Grattarola "Artificial and augmented sensing for humans and humanoids"

Genova (IT)

Poster presentation - Title: "Virtual Reality for dynamic manipulation of visuomotor contingencies: toward an interactive visual stimulation paradigm".

2021

PhD Course: "An introduction to Open Science & Research Data Management"

2021

PhD Course: "Computational model of visual perception"

2021

PhD Course: "Ethics and Bioethics in Bioengineering and Robotics "

2021

PhD Course: "Perceptual systems"

2021

PhD Course: "Theatrical technique for scientific presentation"

2021

PhD Course: "Microcontroller programming course"

2022

PhD Course: "Grant writing"

2022

PhD Course: "Paper writing"

2023

PhD Course: "Advance EEG course"

● **HONOURS AND AWARDS**

26/11/2022

Personal Trainer Certification - Project Invictus – ASI

Project Invictus is a Training School affiliated with ASI, Fitness & Wellness Sector. ASI is a National Sports Promotion Body (EPS) recognized by CONI and the Ministry of Labour and Social Policies.