

Melissa Monti

Biomedical Engineer, PhD student in Biomedical Engineering

Education

- Nov 2022 – ongoing* **PhD student in Biomedical, Electrical and System Engineering – curriculum: Biomedical Engineering**
University of Bologna, Italy
Project: Multimodal brain network models for charting the development of brain diseases.
Responsibilities: EEG and behavioral tasks programming and data acquisition; preprocessing and processing of non-invasive and invasive electrophysiological data, and MRI data; biophysical neuro-computational modeling, graph theoretical analysis of electrophysiological, EEG and MRI-based data.
- 2023* **Professional Engineer License**
- 2022* **Master Degree in Biomedical Engineering for Neuroscience**
University of Bologna, Italy
- Final grade: 110/110 cum Laude
 - Score weighted average: 30/30
 - Master Thesis: Investigating perceptual multisensory impairments in autism through a neural network: a possible neural implementation for the shift from cross-modal competition to facilitation.
- Feb 2022 – May 2022* **Research Internship**
University of Bologna, Italy
Project: Neurocomputational modeling of multisensory integration.
- 2020* **Bachelor Degree in Biomedical Engineering**
University of Bologna, Italy
- Final grade: 110/110 cum Laude
 - Score weighted average: 29.68/30

Additional courses

- 18 Aug – 29 Aug 2025* **Micro- and Nano Sensors Summer school 2025**
Organizer: DTU Health Tech
Copenhagen, Denmark
- 12 Jul – 11 Sept 2024* **Advanced machine learning and deep learning techniques for Medicine**
Organizer: University of Bologna
Cesena, Italy
- 12, 13 Jun 2024* **Artificial intelligence for multi-variate brain signals**
Organizer: University of Bologna
Cesena, Italy

4, 5 Jun 2024	Scientific programming in Python: an introduction for bioengineers <i>Organizer: University of Bologna</i> <i>Cesena, Italy</i>
7 Mar – 22 Mar 2024	Special Topics in Applied Neuro-Engineering <i>Organizer: University of Bologna</i> <i>Cesena, Italy</i>
11 Jun – 16 Jun 2023	Summer School on Neurorehabilitation (SNNR) 2023 <i>Organizer: Shirley Ryan AbilityLab, Imperial College of London, Hospital los Madroños</i> <i>Baiona, Spain</i>
8 Jun – 9 Jun 2023	Brain Inspired Computing Workshop (BICW) <i>Organizer: Università degli studi di Modena e Reggio Emilia</i> <i>Modena, Italy</i>
18 Jan – 24 Feb 2023	Methods and applications - Introduction to AI for Health and well-being <i>Organizer: University of Bologna</i> <i>Online</i>
Oct – Dec 2020	Behavioural and cognitive neuroscience <i>Organizer: IMT School for Advanced Studies Lucca</i> <i>Pisa, Italy</i>

Research Experience

Oct 2023 – ongoing	Visiting PhD Student <i>Sapienza University of Rome, Italy</i> Responsibilities: project management, task programming, EEG data acquisition and processing, brain mapping, ERPs, spectral analysis, brain and inter-brain connectivity, graph theoretical analyses of EEG, stereo-EEG, and MRI data.
Jan 2025 – Apr 2025	Visiting Professional <i>Atrium Health Wake Forest Baptist, Radiology Department, NC, USA</i> Project: Charting brain tumor network with graph theory to improve prognosis and clinical outcomes. Responsibilities: MRI data processing, DTI tractography, graph theoretical analyses of MRI data from.
Aug 2022 – Sept 2022	Master Thesis Student <i>Albert Einstein College of Medicine, The Cognitive Neurophysiology Laboratory (CNL), New York, USA</i> Project: Investigating perceptual multisensory impairments in autism through a neural network. Responsibilities: biologically plausible computational modeling.

Participation in research projects

- Investigator for the project “ACT2: Acting together: how motor styles shape action prediction and brain-to-brain connectivity in typical and autistic populations”, PRIN 2020, prot. 20207S3NB8, Italian Ministry of University and Research, 2022-2025.
- Investigator for the project “KEATS - Playing in the same Key: Emotions sharing in Autism by mulTi-Subject models”, Bando SEED - PNR Università Sapienza, 2021-2024.
- Investigator for the project “VR-BCI4PM: A virtual reality system controlled by a hybrid brain-computer interface to improve powered mobility in individuals with neuromotor disorders”, PRIN 2022, Italian Ministry of University and Research.
- Investigator for the project “Visuospatial modulation of bimanual touch perception in real and virtual environments”. National Science Foundation (NSF) NSF 2019959.

Collaborations

Istituto Italiano di Tecnologia (IIT)

Prof. Monica Gori

Country: Italy

IRCCS Istituto delle Scienze Neurologiche di Bologna - Ospedale Bellaria

Dr. Elena Pasini

Country: Italy

Wake Forest University School of Medicine, Comprehensive Cancer Center

Prof. Roy E. Strowd and Prof. Christopher T. Withlow

Country: USA

Albert Einstein College of Medicine

Prof. Sophie Molholm

Country: USA

Wake Forest University

Prof. Barry E. Stein and Prof. Benjamin A. Rowland

Country: USA

Baylor College of Medicine

Prof. Jeffrey M. Yau

Country: USA

UCLA

Prof. Ladan Shams

Country: USA

Publications

Papers in International Journals

- Zanchi, S., Montagnani, E., Marchetti, V., Esposito, D., **Monti, M.**, Guarischi, M., Cuppini, C., Gori, M. Disentangling Sensory Contributions to Postural Control Regulation Through Sample Entropy and Neural Modeling. *PNAS. Submitted*

- **Monti, M.**, Molholm, S., Foxe, J. J., Cuppini, C. The evolution of cross-modal brain organization during development: a neurocomputational-based investigation on typically developing and autistic children. *Submitted*.
- **Monti, M.**, Molholm, S., Foxe, J. J., Cuppini, C. Is competition the default configuration of cross-sensory interactions? *In publication*.
- Cuppini, C., Di Rosa, E.F., Astolfi, L., **Monti, M.** Unraveling Audiovisual Perception Across Space and Time: A Neuroinspired Computational Architecture. *European Journal of Neuroscience* 62, no. 3: e70217.
- **Monti, M.**, Molholm, S., Cuppini, C. (2023). Atypical development of causal inference in autism inferred through a neurocomputational model. *Frontiers in Computational Neuroscience*. 17.
- Cuppini, C., Magosso, E., **Monti, M.**, Ursino, M., & Yau, J. M. (2022). A neurocomputational analysis of visual bias on bimanual tactile spatial perception during a crossmodal exposure. *Frontiers in neural circuits*, 16, 933455.

Indexed Long Abstracts in National and International Conferences

- Patarini, F., Maronati, C., Manuello, J., Cuturi, L.F., **Monti, M.**, Savina, G., Iarrobino, I., Iani, C., Rubichi, S., Ciaramidaro, A., Astolfi, L., Cavallo, A., Toppi, J. (2025). Handling Kinematic Features in an Action Observation Task to Optimize a Brain Computer Interface-Based Rehabilitation Training. *International Conference On Rehabilitation Robotics (ICORR)*, Chicago, IL, USA, 2025, pp. 1078-1082, doi: 10.1109/ICORR66766.2025.11062958.
- **Monti, M.**, Bisi, M.C., Stagni, R., Cuppini, C. (2023). The neural bases of sensory reweighting for postural control: a neuro-computational model. *In Proceedings XXIII Congresso SIAMOC 2023*. Page 98. Roma.
- **Monti, M.**, Molholm, S., Cuppini, C. A neural model of sensory interactions in young neurotypical and ASD children. *VIII National Congress on Bioengineering 2023*, Padua (Italy), 21 Jun - 23 Jun. (Abstract ID: 1643).

Abstract in National and International Conferences

- Maronati, C., Patarini, F., Manuello, J., Cuturi, L.F., **Monti, M.**, Ferrari, E., Iarrobino, I., Iani, C., Rubichi, S., Ciaramidaro, A., Astolfi, L., Toppi, J., Cavallo, A. Kinematic similarities as a core element for the efficiency of the Internal Forward Model. *XXXIII Congresso Nazionale SIPF*, Verona (Italy), 17 Sept – 19 Sept 2025.
- Maronati, C., Patarini, F., Manuello, J., Cuturi, L.F., **Monti, M.**, Ferrari, E., Iarrobino, I., Iani, C., Rubichi, S., Ciaramidaro, A., Astolfi, L., Toppi, J., Cavallo, A. Neural and behavioral signatures of kinematic similarities in action perception. *10th Joint Action Meeting (JAM X)*, Turin (Italy), 9 Jul – 12 Jul 2025.
- Ferrari, E., Maronati, **Monti, M.**, Ferrazzi, G., Iarrobino, I., Manuello, J., Patarini, F., Passeri, A., Giuberti, V., Iani, C., Rubichi, S., Toppi, J., Astolfi, L., Ciaramidaro, A., Cavallo, A. ACT²: Exploring kinematic profiles in autism. *10th Joint Action Meeting (JAM X)*, Turin (Italy), 9 Jul – 12 Jul 2025.
- Manuello, J., Maronati, Cuturi, L.F., Costa, T., Patarini, F., **Monti, M.**, Toppi, J., Ciaramidaro, A., Astolfi, L., Cavallo, A. ACT²: a kinematics framework to explore dyadic motor similarity. *10th Joint Action Meeting (JAM X)*, Turin (Italy), 9 Jul – 12 Jul 2025.
- **Monti, M.** and Cuppini, C. Atypical development of causal inference in autism. *FENS Forum 2024*, Vienna (Austria), 25 Jun – 29 Jun 2024 (Abstract number 2062).
- **Monti, M.**, Bisi, M. C., Stagni, R., Cuppini, C. The neural bases of sensory reweighting for postural control: a neuro-computational model. *XXIII Neuroscience 2023*, Washington (USA), 11 Nov - 15 Nov 2023 (Session PST281, Presentation number PST281, Abstract Control Number 7166).

- Cuppini, C., **Monti, M.**, Magosso, E., Yau, J. Visual bias on bimanual tactile perception: investigation of the neural mechanisms using neurocomputational modelling. *International Multisensory Research Forum 2023*, Brussels (Belgium), 27 Jun - 30 Jun 2023 (Poster 81).
- **Monti, M.**, Molholm, S., Cuppini, C. A model of the maturation of sensory interactions: from cross-modal competition to facilitation in Autism. *2023 11th International IEEE/EMBS Conference on Neural Engineering*, Baltimore (USA), 25 Apr-27 Apr 2023 (Abstract 406, Paper ID: 1570881557).
- Stein, B. E., Rowland, B. A., **Monti, M.**, Magosso, E., Cuppini, C. Neural Mechanisms Underlying the Reversal of Hemianopia with Multisensory Training. *International Multisensory Research Forum 2022*, Ulm (Germany), 3 Jul - 7 Jul 2022 (Poster 4:30, Abstract 291).
- Cuppini, C., **Monti, M.**, Ursino, M., Shams, L. A Hebbian model of the lexical-semantic memory helps explain the multisensory benefit in learning name-face association. *CNS Annual Meeting 2022*, San Francisco (USA), 23 Apr - 26 Apr 2022 (Poster Session A, Abstract 53).

Talks

- Invited speech: Charting brain tumor network with graph theory to improve prognosis and clinical outcomes, Brain Tumor Center of Excellence (BTCOE), Atrium Health Wake Forest Baptist, 11 Mar 2025.
- Invited speech: Investigating perceptual multisensory impairments in Autism through a neural network: a possible neural implementation for the shift from cross-modal competition to facilitation, Albert Einstein College of Medicine, 14 Sept 2022.

Academic and didactic experience

- Teaching assistant:
 - A.A. 2024/2025 Fundamentals of Biomedical Instrumentation
Bachelor's Degree in Biomedical Engineering, University of Bologna
 - A.A. 2022/2023, 2023/2024 Physiology
Bachelor's Degree in Biomedical Engineering, University of Bologna
- Co-supervisor to 4 Master Theses in Biomedical Engineering
- Co-supervisor to 7 Bachelor Theses in Biomedical Engineering

Honours and Awards

16 Jan 2025	Marco Polo mobility grant <i>University of Bologna</i>
10 May 2024	Merit-based scholarship for academic courses A.Y. 2021/2022 <i>INPS</i>
13 Sept 2023	Best Master Thesis "Nearlab 2023 - Politecnico di Milano" <i>Italian National Group of Bioengineering (GNB)</i>
7 Jun 2020	Merit-based scholarship for laudable students enrolled in the A.Y. 2019/2020

University of Bologna

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| 22 May 2020 | Merit-based scholarship for academic courses A.Y. 2017/2018
<i>INPS</i> |
| 29 Jun 2019 | Merit-based scholarship “Antonio Fiorini” for university students
<i>Municipality of Molinella</i> |
| 18 Jun 2019 | Merit-based scholarship for laudable students enrolled in the A.Y. 2018/19
<i>University of Bologna</i> |
| 9 Jan 2019 | Merit-based scholarship for enrollment in courses relating to disciplinary areas of particular national interest
<i>University of Bologna</i> |

Personal skills

Job-related skills:

- Management, planning and setup preparation of experiments involving behavioral and electrophysiological data acquisition;
- Task implementation;
- EEG and EEG-hyperscanning data acquisition;
- Biophysical neurocomputational modelling;
- Invasive and non-invasive EEG pre-processing and analysis;
- EEG brain connectivity and multi-brain connectivity;
- Diffusion MRI data processing;
- DTI tractography;
- Application of graph theory analysis to electrophysiological, EEG, and MRI data.

Technical skills:

- Proficient user of Matlab;
- Confident with Python;
- Advanced user of bash shell scripting;
- Proficient user of Psychtoolbox;
- Proficient user of Brain Products® EEG amplifiers and caps;
- Proficient user of EEGLAB, Fieldtrip, Brain Vision Analyzer;
- Advanced user of Vicon motion capture system and Vicon Nexus® software;
- Advanced user of MRtrix3 and FSL;
- Confident with Tobii Pro Glasses 3 eye tracking system;
- Confident with inertial sensors.

Soft skills:

- Leadership
- Teamwork
- Independent work
- Multitasking and time management
- Problem solving and critical thinking
- Adaptability
- Creativity and innovation
- Public speaking and pitching

- Theses supervision
- Grant writing

Languages

Italian: mother tongue

English: advanced user (C1)

Certificates: CAE Cambridge Certificate in Advanced English (June, 2020)