Silvia Buscaglione

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Research Interest

I am a Postdoctoral Research Associate working at the intersection of **human motor control, biomechanics**, and **human-robot interaction**. Through my PhD, I applied **robotics** and **wearable sensors** to the experimental study of human motor control, focusing on tele-impedance control, human-human physical interaction through robots, and motor learning. I gained high expertise in designing experimental protocols and developing multi-modal platforms integrating wearable sensors, robots, optoelectronic systems, and virtual reality technologies. In my postdoc, I investigate **human motor control in interaction with complex objects and in human-human physical collaboration** during postural balance tasks, with implications for **rehabilitation** and **assistive technology**.

Education

Postdoctoral Research Associate 2024 - now

Northeastern University, USA, Departments of Biology, and Electrical and Computer Engineering
Action Lab, Prof. Dagmar Sternad
Research focus: *Postural balance, human motor control, fine motor control in stroke patients*

Ph.D. Biomedical Engineering 2020 - 2024

Università Campus Bio-medico di Roma, Italy, Department of Engineering, Neurophysiology and Neuroengineering of the Human-Technology Interaction

Newcastle University, UK, School of Engineering, 2022 - 2024
Neurorobotics Lab

Thesis: *Investigation of physical interactions in humans mediated by robots*
Supervisor: Prof. Domenico Formica

M.S. Biomedical Engineering, 110/110 magna cum laude 2016 - 2019

Università Campus Bio-medico di Roma, Rome, Italy Department of Engineering, Neurophysiology and Neuroengineering of the Human-Technology Interaction

Thesis: *Tele-impedance control of a virtual avatar using EMG and IMU sensors*
Supervisor: Prof. Domenico Formica

B.S. Industrial Engineering, 110/110 magna cum laude 2013 - 2016

Università Campus Bio-medico di Roma, Rome, Italy, Department of Engineering, Non-linear Physics and Mathematical Modeling Laboratory

Thesis: *Computational model of the brachioplasty surgery: stress analysis and validation of the surgical incision*
Supervisor: Prof. Alessio Gizzi

Participation in Summer Schools

1st Doctoral Summer School on Robotics and Intelligent Machines, Volterra, Italy
Volterra International School of Higher Education 08/2023

- Robot design, sensing and perception, control and human-robot interaction

Advanced School in Artificial Intelligence (AS-AI) Rome, Italy
ISTC-CNR, Rome, Italy Interdisciplinary course work, research, and applications in machine learning, brain, mind and society 10/2018 - 03/2019

- Project: *The role of serotonin in Parkinsonian tremor: a mean-field neuro-robotics model*
- Supervisor: Prof. Daniele Caligiore

Professional Experience

Teaching Assistant, Northeastern University, Boston, MA, USA 2026 - now
Multidisciplinary Approach in Motor Control, Department of Biology

Teaching Assistant, Newcastle University, Newcastle, United Kingdom 2023 - 2024
Introduction to Biomedical Engineering, School of Mechanical Engineering

Teaching Assistant, Newcastle University, Newcastle, United Kingdom 2022 - 2023
Matlab Course, School of Mechanical Engineering

Teaching Assistant, Università Campus Bio-medico di Roma, Rome, Italy 2020 - 2022
Mechatronics for Biomedical Systems, School of Biomedical Engineering

Research Assistant, Università Campus Bio-medico di Roma, Rome, Italy 2020
Neurophysiology and Neuroengineering of the Human-Technology Interaction Research Unit, Department of Engineering

Back-End Developer, Integris S.p.A., Rome, Italy 2019 - 2020
Back-End developer for a mobile app to provide subject-specific and real-time-tuned marathon trainings

Supervision of Graduate Students

Ph.D. Students

- K. S. Desabhotla, *Interactive control of complex object in neuro-typical and post-stroke individuals* now
  Northeastern University, Boston, USA
- N. Norouzi Behjat, *Human arm impedance modulation in dynamic tasks* now
  Northeastern University, Boston, USA

Master students:

- G. Ticchiarelli, *Tele-impedance control of a virtual avatar combining M-IMU and EMG sensors* 2021
  Università La Sapienza, Rome, Italy
- E. Portuese, *Assessment of running training sessions using IMU sensors: evaluation of existing parameters and choice of new indicators* 2020
  Università Campus Bio-medico di Roma, Rome, Italy
- V. Lapadula, *A body hydration analysis system to improve running performance* 2020
  Università Campus Bio-medico di Roma, Rome, Italy

Grant Experience

NIH K99/R00 Pathway to Independence Award, Northeastern University
PI: Silvia Buscaglione. Submitted 10/2026, Under Review
Role: Principal Investigator; conceived the project and led proposal writing

NIH R37 MERIT Award, Northeastern University
PI: Prof. Dagmar Sternad. Submitted 06/2026
Role: Collaborated on scientific rationale and proposal writing.

Publications

Peer-Reviewed Journal Papers

1. **Buscaglione S.**, Sisler S., Russo M., Sternad D. (Submitted). Using Canes for Balance Control - Learning, Adaptation, After-Effects? *Journal of Neurophysiology*.
2. Desabhotla K. S.†, **Buscaglione S.**†, Annapragada S., Lokesh R., Lambert C., DiCarlo J., Goedeken S., Rishe K., Lin D., Sternad D. (Submitted). Force modulation and tuning during object interaction in post-stroke individuals. *Journal of NeuroEngineering and Rehabilitation*.
   † Equally contributed
3. **Buscaglione S.**, Provenzale C., Bonsignori C., Ivanova E., Noccaro A., Sparaci L., Taffoni F., Burdet E., Formica D. (2026). Write together: using haptic coupling to enhance children's handwriting. *IEEE Transactions on Haptics*. link
4. Noccaro A.†, **Buscaglione S.**†, Eden J., Cheng X., Di Stefano N., Di Pino G., Burdet E., Formica D. (2025). Robot-mediated asymmetric connection between humans can improve performance without increasing effort. *IEEE Transaction on Biomedical Engineering*, 1-9. link
   † Equally contributed
5. Way J., **Buscaglione S.**, Giovannetti G., Formica D. (2024). Design and testing of a planar device for haptic interactions during handwriting teaching and learning. *IEEE Transaction on Medical Robotics and Bionics,* 108-113. link
6. **Buscaglione S.**, Noccaro, A., Tagliamonte, N., Ticchiarelli, G., Di Pino, G., Formica, D. (2024). Tele-impedance control of a virtual avatar based on EMG and M-IMU sensors: a proof-of-concept. *Scientific Reports*, 14(1), 18543. link
7. Caligiore, D., Montedori, F., **Buscaglione, S.**, Capirchio, A. (2021). Increasing serotonin to reduce Parkinsonian tremor. *Frontiers in Systems Neuroscience*, 15, 682990. link
8. Simone, P., Carusi, C., Segreto, F., Iannuzzi, R., **Buscaglione, S.**, Gizzi, A., ..., Persichetti, P. (2018). Post-bariatric brachioplasty with posteromedial scar: physical model, technical refinements, and clinical outcomes. *Plastic and Reconstructive Surgery*, 141(2), 344-353. link

Peer-Reviewed Journal Papers - In Preparation

1. **Buscaglione S.**, Russo M., Sternad D. (in preparation). The effect of human–human physical interaction on postural balance in trained and untrained individuals standing on a narrow beam.
2. Krotov A., Edraki M., **Buscaglione S.**, Serre H., Ramezani A., Sternad D. (in preparation). Preparatory Actions in Human Manipulation of a Flexible Object - Hitting a Target with a Whip.
3. **Buscaglione S.**, Russo M., Sternad D. (in preparation). Ballet dancers and novices' strategies in postural balance task.
4. Norouzi Behjat N., Lokesh R., **Buscaglione S.**, Sternad D. (in preparation). Grip force as an evaluation of human arm impedance during dynamic task.

Peer-Reviewed Conference Papers

1. Desabhotla K. S., **Buscaglione S.**, Annapragada S., Lokesh R., DiCarlo J., Lin D., Sternad D. Model-based estimation of interaction forces in an object manipulation task. In *Annual International Conference of the IEEE Engineering in Medicine & Biology Society* (EMBC, 2026).
2. **Buscaglione S.**, Noccaro A., Provenzale C., Bonsignori C., Ivanova E., Sparaci L., Taffoni F., Burdet E., Formica D. (2024, September). A human-human physical interaction system for training handwriting. In *IEEE International Conference on Biomedical Robotics and Biomechatronics*, 1415-1420. (BIOROB, Heidelberg, Germany, 1-4 September). link
3. Giovannetti G., Noccaro A., **Buscaglione S.**, Formica D. (2024). Estimation of passive wrist stiffness across two coupled degrees of freedom using a kinematic model of the human wrist. In *IEEE International Conference on Biomedical Robotics and Biomechatronics*, 1358-1363. (BIOROB, Heidelberg, Germany, 1-4 September). link
4. Mulian, H., Shlomov, S., Limonad, L., Noccaro, A., **Buscaglione, S.** (2024). Mimicking the Maestro: Exploring the Efficacy of a Virtual AI Teacher in Fine Motor Skill Acquisition. In *Proceedings of the AAAI Conference on Artificial Intelligence*, 23224-23231. (Vancouver, Canada, 20–27 February). link
5. Noccaro, A., **Buscaglione, S.**, Pinardi, M., Di Pino, G., Formica, D. (2023). Evaluation of a 7-DoFs Robotic Manipulator as haptic interface during planar reaching tasks. In *IEEE/RSJ International Conference on Intelligent Robots and Systems*, 5095-5100, (IROS, Detroit, USA, 1–5 October). link
6. **Buscaglione, S.**, Noccaro, A., Di Pino, G., Formica, D. (2023). Assessment of the visual noise influence on muscle activation during a tracking task. In *IEEE International Symposium on Medical Measurements and Applications*, 1-5. (MeMeA, Jeju, South Korea, 14-16 June) link
7. Giovannetti, G., **Buscaglione, S.**, Noccaro, A., Formica, D. (2023, June). Design and validation of 3D printed hand interfaces for wrist stiffness assessment. In *IEEE International Symposium on Medical Measurements and Applications*, 1-6. (MeMeA, Jeju, South Korea, 14-16 June) link
8. **Buscaglione, S.**, Tagliamonte, N. L., Ticchiarelli, G., Di Pino, G., Formica, D., Noccaro, A. (2022). Tele-impedance control approach using wearable sensors. In *Annual International Conference of the IEEE Engineering in Medicine & Biology Society*, 2870-2873. (EMBC, Glasgow, UK, 11-15 July) link
9. Noccaro, A.[†], **Buscaglione, S.**[†], Di Pino, G., Formica, D. (2022). Visual noise linearly influences tracking performance. In *Annual International Conference of the IEEE Engineering in Medicine & Biology Society*, 794-797. (EMBC, Glasgow, UK, 11-15 July) link
   [†] Equally contributed
10. Portuese, E., **Buscaglione, S.**, Formica, D., Lanaro, D. (2020). Assessment of running training sessions using IMU sensors: Evaluation of existing parameters and choice of new indicators. In *IEEE International Workshop on Metrology for Industry 4.0 & IoT*, 121-124. (Rome, Italy, 3-5 June) link
11. Lapadula, V., Sabatini, A., Zompanti, A., **Buscaglione, S.**, Lanaro, D., Merone, M. (2020). A body hydration analysis system to improve running performance. In *IEEE International Workshop on Metrology for Industry 4.0 & IoT*, 507-510. (Rome, Italy, 3-5 June) link

Invited Talks

1. **Movella | XSens and Delsys Europe User Group Meeting**, Modena, Italy — 2025
   Tele-impedance control of a virtual avatar using EMG and M-IMU sensors
   Buscaglione S.
2. **Shirley Ryan AbilityLab**, Chicago, IL, USA — 2026
   Physical Human-Human Interaction: Insights For Assistive and Rehabilitation Devices
   Buscaglione S.

Awards

1. **Travel Award @ NSF M3X PI Meeting**, Alexandria, VA, USA 2026
   Physical Human-Human Interaction in Postural Balance: Insights for Intelligent Assistive Devices
   Buscaglione S., Russo M., Sternad

Journal Review Experience

1. Guest editor for PLOS Computational Biology 2026
2. Reviewer for several scientific international journals: IEEE Transactions on Haptics, PLOS Computational Biology, Scientific Reports, IEEE Robotics and Automation Letters, Cognitive Neurodynamics 2020 - Now
3. Reviewer for several prestigious international conferences: IEEE-ICRA, IEEE/RSJ-IROS, IEEE-EMBC, IEEE-BIOROB 2020 - Now

Participation at Conferences

Oral Presentation

1. NSF M3X PI Meeting, Alexandria, VA, USA 2026
   - Physical human-human interaction in postural balance: insights for intelligent assistive devices
     Buscaglione S., Russo M., Sternad D.

2. NEST 2025, University of Connecticut, USA 2025
   New England Sequencing and Timing Workshop.
   - Maintaining balance by holding hands in ballet dancers and untrained individuals
     Buscaglione S., Russo M., Sternad D.

3. BIOROB 2024, Heidelberg, Germany 2024
   The 2024 IEEE International Conference on Biomedical Robotics and Biomechatronics
   - Design and testing of a planar device for haptic interactions during handwriting teaching and learning
     Way J., **Buscaglione S.**, Giovannetti G., Formica D.

4. IROS 2023, Detroit, USA 2023
   The 2023 IEEE/RSJ International Conference on Intelligent Robots and Systems
   - Assessment of a tele-impedance control based on wearable sensors
     Buscaglione S., Noccaro A., Di Pino G., Formica D.

5. MEMEA 2023, Jeju, Korea 2023
   The 2023 IEEE International Symposium on Medical Measurements and Applications
   - Assessment of the visual noise influence on muscle activation during a tracking task
     Buscaglione S., Noccaro A., Di Pino G., Formica D.

6. EMBC 2022, Glasgow, UK 2023
   The 2022 International Engineering in Medicine and Biology Conference
   - Tele-impedance control approach using wearable sensors
     Buscaglione S., Noccaro A., Ticchiarelli G., Tagliamonte N., Di Pino G., Formica D.

Poster Presentation

1. M3X 2025, Alexandria, VI, USA 2026
   First M3X PI Meeting
   - Physical Human-Human Interaction in Postural Balance: Insights for Intelligent Assistive Devices
     Buscaglione S., Sternad D.

2. PMC 2025, Kingston, RI, USA 2025
   Progress in Motor Control
   - Holding Hands in a Challenging Postural Balance Task.
     Buscaglione S., Russo M., Sternad D.

3. NCM 2025, Panama City, Panama 2025
   Society for the Neural Control of Movement Meeting
   - Human-human physical interaction in a challenging postural balance task.
     Buscaglione S., Russo M., Sternad D.

4. BIOROB 2024, Heidelberg, Germany 2024
   The 2024 IEEE International Conference on Biomedical Robotics and Biomechatronics
   - A human-human physical interaction system for training handwriting.
     Buscaglione S., Noccaro A., Provenzale C., Bonsignori C., Ivanova E., Sparaci L., Taffoni F., Burdet E., Formica D.

Skills

Languages	Italian - native language English - fluent
Software Languages	Matlab, C++, C#, C, Python, LaTex, Office, HTML
Software	Matlab/Simulink/SimMechanics Unity 3D, Qt, Visual Studio, ROS OnShape, Fusion360, SolidWorks, Eagle PIC Microcontroller environments (PICC by CCS Inc., STM32CubeIDE)
Technologies	Use of EMG sensors (Delsys Trigno) and EMG data processing, Use of M-IMU sensors (Xsens MTw, Delsys Trigno IM) and M-IMU data processing, Robotic Control - 7 DoFs robotic arm (Panda by Franka Emika) Robotic Control - Haptic Master Robotic System