

PERSONAL INFORMATION

Alberto Botter



[REDACTED]

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Sex Male | Date of birth 5 Oct 1980 | Nationality Italian

POSITION

Assistant Professor (RTDa) – Department of Electronics and Telecommunications, Politecnico di Torino, Torino, Italy;

WORK EXPERIENCE

2006–2007

Research Fellow

Department of Biomedical Sciences and Human Oncology, Università di Torino, Torino, Italy

Title of the research: "Development of multidisciplinary rehabilitation protocols in patients with traumatic and oncologic diseases of the cervico-cranio-mandibular district "

2006–2010

Contract Researcher

COREP – Consorzio per la Ricerca e l'Educazione Permanente, Torino, Italy

Research activity within the projects: "Microgravity Effects on Skeletal Muscles" funded by the European Space Agency (ESA), the project "Osteoporosis and Muscle Atrophy" funded by the Italian Space Agency (ASI), and the project " Neuromuscular Investigation and Conditioning in Endocrine Myopathies" funded by the Bank Foundation "Compagnia di San Paolo".

2009–2009

Research Fellow

Department of Internal Medicine, Università di Torino, Torino, Italy

Title of the research: "Study of peripheral muscle fatigue: efficacy of a test for the evaluation of healthy and pathological subjects"

2012–2015

Contract Researcher

COREP – Consorzio per la Ricerca e l'Educazione Permanente, Torino, Italy

Research activity within the projects: "Biomarkers for objective assessment and early detection of work-related upper extremity musculoskeletal disorders" funded by the Italian Ministry of Health the project " Amyotrophic lateral sclerosis (ALS) swine models: production and characterization" funded by the Italian Ministry of Education, University and Research, and the project "Design, Development and Validation of a Portable Cocontractometer Prototype" funded by IPSEN Inovation s.a.s.

2011–2016

Research Assistant

Laboratory for Engineering of the Neuromuscular System, Politecnico di Torino, Torino, Italy

Title of the research: "Non-invasive investigation of the neuromuscular system: methods and applications in ergonomics and occupational medicine"

EDUCATION AND TRAINING

2004

BSc in Electronic Engineering

Politecnico di Torino, Torino, Italy

Title of the thesis: "Effect of noise in logic circuits with aliasing"

Grade: 110/110

2005 MSc in Electronic Engineering

Politecnico di Torino, Torino, Italy

Title of the thesis: "Time-frequency analysis of the cerebral hemodynamics and autoregulation"

Grade: 110/110

2011 PhD in Biomedical Engineering

Politecnico di Torino, Torino, Italy

Title of the thesis: "Investigation of the neuromuscular system during involuntary muscle contractions"

ADDITIONAL INFORMATION

Bibliometric Indicators

39 publications in peer-reviewed International journals

10 Contributions in Conference Proceedings

3 book chapters

h-index: H = 14

Citations: C = 704

Metrics provided by Scopus on 05/07/2018

Patents

Botter A, Merletti R. "Device for the joint acquisition of at least one surface electromyographic signal and one echographic image of a same portion of a muscle of living being and manufacturing method", -WO2014/009869

Awards

Botter A. Excellence in Reviewing Award. Journal of Electromyography and Kinesiology, Elsevier, 2014 and 2017

Editorial Activity

Member of the Editorial Board of Frontiers in Bioengineering and Biotechnology – Computational physiology and Medicine

Member of the Editorial Board of Frontiers in Exercise Physiology

Reviewer for the following international Journals: Journal of NeuroEngineering and Rehabilitation, Biomedical Signal Processing and Control, Journal of Electrophysiology and Kinesiology, Medical & Biological Engineering & Computing, Muscle and Nerve, Experimental Brain Research, Journal of Sport Sciences, Journal of Mechanics in Medicine and Biology, European Journal of Applied Physiology, Physiological Measurements, Journal of Neurophysiology, Transactions on Neural Systems and Rehabilitation Engineering.

Conferences and Courses Organization

- October 2018. Organizer of the Workshop "State of the art and recent advances in HD-sEMG: prospects in neurorehabilitatio", International Conference on Neurorehabilitation (ICNR 2018), Pisa 16-19 October 2018
- October 2017. XVIII Member of the Organising Committee and of the Scientific Committee of the "Conference of the Italian Society of Clinical Movement Analysis (SIAMOC)". Torino 4-7 October, 2017
- October 2017. XVIII SIAMOC. Organizer of the Conference Course: "New evidences on the interpretation of surface EMG: from bipolar to multichannel and back", SIAMOC Torino 4-7 October 2017.
- July 2014. Organizer of the Special Session "Is it time to update existing recommendations for the use of surface electromyography?" XX Conference of the International Society of Electrophysiology and Kinesiology.Rome, July 15-18, 2014
- May 2014. Organizer or Workshop "Neural control of muscle function in young and elderly adults" within the Project "Glucocorticoid Actions on Motor control in the Elderly - GAME". SCDU Medicina Fisica e Riabilitativa,AOU Città della Salute e della Scienza di Torino, Torino, Italy. 8 May 2014

Projects

Submitted. **Funding Agency:** The National Institute for Occupational Safety and Health (NIOSH) - USA. (Research program PA-13-129); **Project title:** "Prevention of muscle fatigue and musculoskeletal disorders in standing work". **Role:** CoPI

2016-2017. **Funding Agency:** Swiss National Fundation - Switzerland. **Project Title:** "Trapezius fatigue and myalgia: a likely neuromuscular control issue. the role of 24 hours trapezius muscle activity and work-life balance is investigated in this study" (N. contract/ project: 32003B_160207/1). **Role:** responsible for the scientific activities of the partner "LISiN-COREP".

2014 - 2018. **Funding Agency:** National Institute of Health (NIH) - USA. **Project Title:** "sEMG assessment of spinal motoneuron degeneration after stroke" (N. contract/ project: 1RO1 NS080839-01A1). **Role:** responsible for the scientific activities of the subcontractor "LISiN-Politecnico di Torino".

2014 - 2014. **Funding Agency:** Ipsen Innovation s.a.s., Les Ulis - France. **Project Title:** "Design, Development and Validation of a Portable Co-contractometer Prototype". **Role:** member of the research unit "LISiN-COREP".

2013 - 2015. **Funding Agency:** Ministero dell'Istruzione Università e della Ricerca - Italia. **Project Title:** "Fall risk estimation and prevention in the elderly using a multifactorial approach" (N. contract/ project: 2010R277FT_006). **Role:** member of the research unit "LISiN-Politecnico di Torino".

2012 - 2015. **Funding Agency:** Ministero della Salute - Italia. **Project Title:** "Biomarkers for objective assessment and early detection of work-related upper extremity musculoskeletal disorders - WRUEMSDs" (N. contract/ project: RF-2009-1551299). **Role:** responsible for the scientific activities of the partner "LISiN-COREP".

2011 - 2014. **Funding Agency:** Fondazione Compagnia di San Paolo - Italia. **Project Title:** "Glucocorticoid Actions on Motor control in the Elderly - GAME" (N. contract/ project: 2011.0159). **Role:** responsible for the scientific activities of "LISiN-COREP" (coordinator).

2009 - 2012. **Funding Agency:** Fondazione Compagnia di San Paolo - Italia. **Project Title:** "Neuromuscular Investigation and Conditioning in Endocrine Myopathies - NICEM" (N. contract/ project: 2009.0914). **Role:** responsible for the scientific activities of "LISiN-COREP" (coordinator).

2006 - 2008. **Funding Agency:** European Space Agency (ESA). **Project Title:** "Microgravity Effects on Skeletal Muscles – MESM" (N. contract/ project: 028 15097/01/NL/SH). **Role:** responsible for the scientific activities of "LISiN-COREP" (coordinator).

2006 - 2008. **Funding Agency:** Italian Space Agency (ASI). **Project Title:** "Osteoporosis and Muscle Atrophy – OSMA" (N. contract/ project: I/007/060/0). **Role:** responsible for the scientific activities of "LISiN-COREP" (coordinator).

Full papers on peer-reviewed journals

1. Minetto MA, Botter A, Gamerro G, Varvello I, Massazza G, Bellomo RG, Maffiuletti NA, Saggini R. Contralateral effect of short-duration unilateral neuromuscular electrical stimulation and focal vibration in healthy subjects. Eur J Phys Rehabil Med. 2018 Mar 12.
2. Almuklass AM, Davis L, Hamilton LD, Vieira TM, Botter A, Enoka RM. Motor unit discharge characteristics and walking performance of individuals with multiple sclerosis. J Neurophysiol. 2018 Apr 1;119(4):1273-1282.
3. Vieira TM, Botter A, Muceli S, Farina D. Specificity of surface EMG recordings for gastrocnemius during upright standing. Sci Rep. 2017 Oct 16;7(1):13300.
4. Baudry S, Motta G, Botter A, Duchateau J, Minetto MA. Neural Correlates to the Increase in Maximal Force after Dexamethasone Administration. Med Sci Sports Exerc. 2018 Feb;50(2):218-224.
5. Vieira TM, Bisi MC, Stagni R, Botter A. Changes in tibialis anterior architecture affect the amplitude of surface electromyograms. J Neuroeng Rehabil. 2017 Aug 14;14(1):81.
6. Vieira T, Botter A, Gastaldi L, Sacco ICN, Martelli F, Giacomozi C. Textured insoles affect the plantar pressure distribution while elite rowers perform on an indoor rowing machine. PLoS One. 2017 Nov 2;12(11):e0187202.
7. Botter A, Vieira TM. Optimization of surface electrodes location for H-reflex recordings in soleus muscle. J Electromyogr Kinesiol. 2017 Mar 16;34:14-23.
8. Gazzoni M, Botter A, Vieira T. Surface EMG and muscle fatigue: multi-channel approaches to the study of myoelectric manifestations of muscle fatigue. Physiol Meas. 2017 Feb 15
9. Dieterich AV, Botter A, Vieira TM, Peolsson A, Petzke F, Davey P, Falla D. Spatial variation and inconsistency between estimates of onset of muscle activation from EMG and ultrasound. Sci Rep. 2017 Feb 8;7:42011.
10. Vieira TM, Baudry S, Botter A. Young, Healthy Subjects Can Reduce the Activity of Calf Muscles

- When Provided with EMG Biofeedback in Upright Stance. *Front Physiol.* 2016 Apr 29;7:158.
11. Vieira TM, Potenza P, Gastaldi L, Botter A. Electrode position markedly affects knee torque in tetanic, stimulated contractions. *Eur J Appl Physiol.* 2016 Feb;116(2):335-42.
 12. Botter A, Vieira TMM. Filtered Virtual Reference: a New Method for the Reduction of Power Line Interference with Minimal Distortion of Monopolar Surface EMG. *IEEE Trans Biomed Eng.* 2015 Nov;62(11):2638-47
 13. Piitulainen H, Botter A, Bourguignon M, Jousmäki V, Hari R. Spatial variability in cortex-muscle coherence investigated with magnetoencephalography and high-density surface electromyography. *J Neurophysiol.* 2015 Nov 15;114(5):2843-53.
 14. Vieira TMM, Botter A, Minetto MA, Hodson-Tole E. Spatial Variation of Compound Muscle Action Potentials across Human Gastrocnemius medialis. *J Neurophysiol.* 2015 Sep;114(3):1617-27.
 15. Bisi MC, Botter A, Stagni R, Vieira T. New frontiers for muscle function investigation: Integration of surface EMG and 3D ecographic images. *Journal of Mechanics in Medicine and Biology.* 2015, 15 (2).
 16. Gallina A, Botter A. Spatial localization of electromyographic amplitude distributions associated to the activation of dorsal forearm muscles. *Front Physiol.* 2013 Dec 13;4:367.
 17. Vieira TM, Minetto MA, Hodson-Tole EF, Botter A. How much does the human medial gastrocnemius muscle contribute to ankle torques outside the sagittal plane? *Hum Mov Sci.* 2013 Aug;32(4):753-67.
 18. Botter A, Vieira TM, Loram ID, Merletti R, Hodson-Tole EF. A novel system of electrodes transparent to ultrasound for simultaneous detection of myoelectric activity and B-mode ultrasound images of skeletal muscles. *J Appl Physiol* (1985). 2013 Oct 15;115:1203-14.
 19. Minetto MA, Botter A, Bottinelli O, Miotti D, Bottinelli R, D'Antona G. Variability in muscle adaptation to electrical stimulation. *Int J Sports Med.* 2013 Jun;34(6):544-53.
 20. Piitulainen H, Botter A, Merletti R, Avela J. Multi-channel electromyography during maximal isometric and dynamic contractions. *J Electromyogr Kinesiol.* 2013 Apr;23(2):302-10.
 21. Minetto MA, Botter A, Sprager S, Agosti F, Patrizi A, Lanfranco F, Sartorio A. Feasibility study of detecting surface electromyograms in severely obese patients. *J Electromyogr Kinesiol.* 2013 Apr; 23: 285-95
 22. Minetto MA, Holobar A, Botter A, Farina D. Origin and Development of Muscle Cramps. *Exerc Sport Sci Rev.* 2013 Jan;41(1):3-10.
 23. Bonfiglioli R, Botter A, Calabrese M, Mussoni P, Violante FS, Merletti R. Surface electromyography features in manual workers affected by carpal tunnel syndrome. *Muscle Nerve.* 2012 Jun;45(6):873-82.
 24. Minetto MA, Holobar A, Botter A, Ravenni R, Farina D. Mechanisms of cramp contractions: peripheral or central generation? *J Physiol.* 2011 Dec 1;589 :5759-73.
 25. Botter A, Oprandi G, Lanfranco F, Allasia S, Maffioletti NA, Minetto MA. Atlas of the muscle motor points for the lower limb: implications for electrical stimulation procedures and electrode positioning. *Eur J Appl Physiol.* 2011 Oct;111(10):2461-71.
 26. Minetto MA, Lanfranco F, Botter A, Motta G, Mengozzi G, Giordano R, Picu A, Ghigo E, Arvat E. Do muscle fiber conduction slowing and decreased levels of circulating muscle proteins represent sensitive markers of steroid myopathy? A pilot study in Cushing's disease. *Eur J Endocrinol.* 2011; 164(6):985-93.
 27. Merletti R, Botter A, Lanfranco F, Minetto MA. Spinal involvement and muscle cramps in electrically elicited muscle contractions. *Artif Organs.* 2011 Mar;35(3):221-5.
 28. Merletti R, Botter A, Cescon C, Minetto MA, Vieira TMM. Advances in surface EMG: Recent progress in clinical research applications. *Crit. Rev. in Biomed. Eng.* 2010; 38(4):347-79.
 29. Merletti R, Aventaggiato M, Botter A, Holobar A, Marateb H, Vieira TMM. Advances in surface EMG: Recent progress in detection and processing techniques. *Crit. Rev. in Biomed. Eng.* 2010; 38(4):305-45.
 30. Piitulainen H, Botter A, Merletti R, Avela J. Muscle fiber conduction velocity is more affected after eccentric than concentric exercise. *Eur J Appl Physiol.* 2010 Sep 24.
 31. Holobar A, Minetto MA, Botter A, Negro F, Farina D. Experimental analysis of accuracy in the identification of motor unit spike trains from high-density surface EMG. *IEEE Trans Neural Syst Rehabil Eng.* 2010 Jun;18(3):221-9.
 32. Minetto MA, Botter A, Lanfranco F, Baldi M, Ghigo E, Arvat E. Muscle fiber conduction slowing and decreased levels of circulating muscle proteins after short-term dexamethasone administration in

- healthy subjects. *J Clin Endocrinol Metab.* 2010 Apr;95(4):1663-71.
33. Minetto MA, Botter A. Elicitability of muscle cramps in different leg and foot muscles. *Muscle Nerve.* 2009 Oct;40(4):535-44.
34. Minetto MA, Holobar A, Botter A, Farina D. Discharge properties of motor units of the abductor hallucis muscle during cramp contractions. *J Neurophysiol.* 2009 Sep;102(3):1890-901.
35. Botter A, Lanfranco F, Merletti R, Minetto MA. Myoelectric fatigue profiles of three knee extensor muscles. *Int J Sports Med.* 2009 Jun;30(6):408-17.
36. Minetto MA, Botter A, De Grandis D, Merletti R. Time and frequency domain analysis of surface myoelectric signals during electrically-elicited cramps. *Neurophysiol Clin.* 2009 Feb;39(1):15-25.
37. Merletti R, Botter A, Troiano A, Merlo E, Minetto MA. Technology and instrumentation for detection and conditioning of the surface electromyographic signal: state of the art. *Clin Biomech (Bristol, Avon).* 2009 Feb;24(2):122-34. Review.
38. Botter A, Merletti R, Minetto MA. Pulse charge and not waveform affects M-wave properties during progressive motor unit activation. *J Electromyogr Kinesiol.* 2009 Aug;19(4):564-73.
39. Minetto MA, Botter A, Ravenni R, Merletti R, De Grandis D. Reliability of a novel neurostimulation method to study involuntary muscle phenomena. *Muscle Nerve.* 2008 Jan;37(1):90-100.

Refereed Conference Papers

- 1.Borzelli D, Gastaldi L, Pastorelli S, Botter A, Vieira TM, Takagi J, Takeda R, Tadano S. Estimation of the CoM and CoP using a 3D body scanning system. *Conf. Proc. IEEE Internationa Symposium on Medical Measurements and Applications MeMeA.*
- 2.Botter A, Vazzoler I, Vieira TM. High Density EMG investigation of H-reflex distribution over the soleus muscle. *Conf Proc IEEE Eng Med Biol Soc.* 2015 Aug;2015:3460-3.
- 3.Vieira TM, Readi NG, Schwarcke L, Botter A. The effect of lymph drainage on the myoelectric manifestation of vastus lateralis fatigue: Preliminary results. *Conf Proc IEEE Eng Med Biol Soc.* 2015 Aug;2015:6671-4.
- 4.Botter A, Marateb HR, Afsharipour B, Merletti R. Solving EMG-force relationship using Particle Swarm Optimization. *Conf Proc IEEE Eng Med Biol Soc.* 2011;2011:3861-4.
- 5.Bisi MC, Botter A, Stagni R, Vieira T. Integration of Surface EMG, US Imaging and 3D Kinematic: New Frontiers for Muscle Function Investigation. *IFMBE Proceedings.* Volume 45, 2014, Pages 356-359
- 6.Hodson-Tole EF; Loram ID; Minetto MA; Botter A; Vieira TMM. Are motor units with different activation thresholds spatially distributed in human gastrocnemius medialis? In *Proceedings of the 37th Congress of IUPS - The Physiological Society.* 2013
- 7.Holobar H, Minetto MA, Botter A, Farina D. Identification of motor unit discharge patterns from high-density surface EMG during high contraction levels. *IFMBE Proceedings.* Volume 37, 2011, Pages 1165-1168

Book Chapters

- 1.Botter A., Merletti R. (2015). EMG of electrically stimulated muscles. In: Roberto Merletti, Dario Farina. *Surface Electromyography.* Wiley - IEEE press. ISBN: 978-1-118-98702-5
- 2.Barone U., Botter A., Merletti R. (2015). Detection And Conditioning Of Surface EMG Signals. In: Roberto Merletti, Dario Farina. *Surface Electromyography.* Wiley - IEEE press. ISBN: 978-1-118-98702-5
- 3.Botter A., Gazzoni M., Merletti R. (2013). Surface Electromyogram detection. In: Dario Farina, Winnie Jensen, Metin Akay. *Introduction to Neural Engineering for Motor Rehabilitation.* p. 113-135, Wiley - IEEE press, ISBN: 9780470916735, doi: 10.1002/9781118628522.ch

Invited Lectures

1. Botter A, Holobar A, Merletti R, Minetto MA. Surface EMG detection, decomposition and interpretation using 2D electrode arrays. "XVI International Single Fibre and Quantitative EMG Course", Ljubljana, Slovenia, June 2-3, 2007.
2. Botter A. Hands-on lecture on sEMG detection. ISB Workshop on Surface Electromyography within "2013 ISB Conference", Natal, Brazil, August 4-9, 2013.
3. Botter A. EMG di superficie con matrici di elettrodi. "XXVII Corso teorico-pratico in elettromiografia e neurofisiologia clinica", Lido degli Estensi, Ferrara, Italy, August 31- September 10, 2007.

Teaching Activity

Teaching as Assistant Professor:

2017-2018. Politecnico di Torino, Degree Program: Biomedical Engineering. Teaching: "Engineering of

the Neuromuscular System"

2017-2018. Politecnico di Torino, Degree Program: Biomedical Engineering. Teaching: "Rehabilitation Engineering"

2016-2018. Politecnico di Torino, Degree Program: Biomedical Engineering. Teaching: "Biomedical Instrumentation"

2016-2018. Politecnico di Torino, Degree Program: Biomedical Engineering. Teaching: "Biomedical Signal Processing"

2016-2017. Politecnico di Torino, Degree Program: Biomedical Engineering. Teaching: "Design of biomedical programmable systems"

Teaching as External Collaborator:

2011-2014. Politecnico di Torino, Degree Program: Biomedical Engineering. Teaching: "Rehabilitation engineering"

2012-2013. Politecnico di Torino, Degree Program: Biomedical Engineering. Teaching: "Biomedical engineering in exercise and sports"

2011-2012. Politecnico di Torino, Degree Program: Biomedical Engineering. Teaching: "Neuromuscular system engineering"

2010-2011. Politecnico di Torino, Degree Program: Biomedical Engineering. Teaching: "Neuromuscular system engineering"

2007-2008. Politecnico di Torino, Degree Program: Biomedical Engineering. Teaching: "Biomedical Instrumentation"

Master Thesis Supervised:

2016. Politecnico di Torino. Master Degree in Biomedical Engineering. Title: "EMG-US study of muscle function"

2016. Politecnico di Torino. Master Degree in Biomedical Engineering. Title: "Electromyographic and kinematic analysis of the athletic gesture during handcycling handcycling is an alternative to classic cycling for individuals with disabilities compromising the trunk and lower body"

2015. Politecnico di Torino. Master Degree in Biomedical Engineering. Title: "Evaluation of the optimal electrode configuration for the functional electrical stimulation of quadriceps femoris"

2014. Politecnico di Torino. Master Degree in Biomedical Engineering. Title "Non-invasive investigation of muscle movement and activation: discrimination between active and non-active movement"

2012. Università degli Studi Roma Tre. Master Degree in Biomedical Engineering. Title "Contribution of myoelectric fatigue to the evaluation of biomechanical risk in working activities"