May 2020

Curriculum Vitae

Name: Victor Hugo de Oliveira e Souza (Victor Hugo Souza)
Website: https://vhosouza.github.io/
ORCID: 0000-0002-0254-4322; **ResearcherID:** D-1611-2012; **Scopus ID:** 36476674200

Current Position

Postdoctoral researcher 03/2018 – present
Aalto University, Department of Neuroscience and Biomedical Engineering, Espoo, Finland
Superior: Risto Ilmoniemi
Funding Agency: Jane & Aatos Erkko Foundation

Project manager 05/2019 – present
Aalto University, Department of Neuroscience and Biomedical Engineering, Espoo, Finland
Principal investigator: Risto Ilmoniemi
Project: Electronic–Robotic Perturb-and-Measure Brain Scanner
Funding Agency: Academy of Finland

Education

Bachelor of Science in Medical Physics 2007 – 2011
University of São Paulo, Ribeirão Preto, Brazil

Master of Science in Physics Applied to Medicine and Biology 2012 – 2014
University of São Paulo, Ribeirão Preto, Brazil
Thesis: Evaluation of Muscle Recruitment by High-Density Electromyography with Navigated Transcranial Magnetic Stimulation
Supervisor: Oswaldo Baffa Filho
Funding Agency: São Paulo Research Foundation (FAPESP)

Doctor of Science in Physics Applied to Medicine and Biology 2014 – 2018
University of São Paulo, Ribeirão Preto, Brazil
Thesis: Development of Instrumentation for Neuronavigation and Transcranial Magnetic Stimulation
Supervisor: Oswaldo Baffa Filho
Funding Agency: Brazilian Council for Scientific and Technological Development (CNPq)

Complementary Education

Spike sorting: What is it? Why do we need it? Where does it come from? How is it done? How to interpret it? 2013
University of São Paulo, Institute of Mathematics and Statistics, São Paulo, Brazil
Course Load: 6 hours

Coupling to the Dynamics of the Human Brain with TMS–EEG 2013
Aalto University, School of Science, Espoo, Finland
Course Load: 60 hours

4th Science Factory: TMS–EEG Summer School 2016
Aalto University, School of Science, Espoo, Finland
Course Load: 60 hours

AI in Health Technologies 2018
Aalto University, School of Science, Espoo, Finland
Course Load: 135 hours

Research and Professional Experience

Scientific Initiation 07/2008–12/2011
Laboratory of Biomagnetism, University of São Paulo, Ribeirão Preto, Brazil
Funding Agency: São Paulo Research Foundation (FAPESP) and Brazilian Council for Scientific and Technological Development (CNPq).

Training in Nuclear Medicine, Radiodiagnosis, Radioprotection, Radiotherapy, Magnetic Resonance Imaging and Ultrasonography 05/2011–08/2011
Clinics Hospital of Ribeirão Preto Medical School, University of São Paulo. Duration: 300 Hours

Doctoral student 03/2014–02/2018
Department of Physics, University of São Paulo, Ribeirão Preto, Brazil
Funding Agency: Brazilian Council for Scientific and Technological Development

Visiting graduate student 11/2016–08/2017
Department of Neuroscience and Biomedical Engineering, Aalto University, Espoo, Finland,
Funding Agency: Erasmus Mundus

Teaching Experience

Class Tutoring in Biophysics I 2011
University of São Paulo, Department of Biology. Duration: 140 Hours

Class Tutoring in Experimental Physics – Electricity and Magnetism 2012
University of São Paulo, Department of Physics. Duration: 140 Hours

Class Tutoring in Introduction to Biomedical Instrumentation 2013
University of São Paulo, Department of Physics. Duration: 140 Hours

Class Tutoring in Physics 3 – Electricity and Magnetism 2014
University of São Paulo, Department of Physics. Duration: 140 Hours

Workshop in Neuronavigation and Transcranial Magnetic Stimulation 2014
Federal University of Bahia, Salvador, Brazil. Duration: 40 hours

Workshop in Development and Applications with InVesalius Navigator 2014
Center for Information Technology Renato Archer, Campinas, Brazil. Duration: 16 hours

Class Tutoring in Nuclear Magnetic Resonance Applied to Biomedicine 2015
University of São Paulo, Department of Physics. Duration: 140 Hours

NBE-E4540 - Introduction to Scientific Visualization 09/2019 – 12/2019
Aalto University, Department of Neuroscience and Biomedical Engineering. 5 ECTS credits.

JOIN-E300 - Life Science Technologies Project Course 01/2020 – 05/2020
Aalto University, Department of Electrical Engineering and Automation. 10 ECTS credits.

Personal Research Funding and Grants

Brazilian Council for Scientific and Technological Development – R$ 3,900 (124463/2008-8; Personal grant) 08/2008–09/2009

São Paulo Research Foundation – R$ 12,294 (2009/09064-6; Personal grant) 10/2009–12/2011

São Paulo Research Foundation – R$ 31,852 (2012/11937-0; Personal grant) 09/2012–02/2014

Brazilian Council for Scientific and Technological Development – R$ 110,328 (140787/2014-3; Personal grant) 03/2014–02/2018

Erasmus Mundus, SMART^2 Project – € 15,000 (SS16DM0736; Doctorate mobility) 11/2016–08/2017

Scientific Publications

List date: May 30, 2020. 12 scientific journal publications, 6 articles in conference proceeding, 2 book chapters, 1 patent application, 3 other writings. Google Scholar: 50 citations, h-index 5; Scopus: 22 citations, h-index 3.

Research Papers

1. GARCIA MAC; **SOUZA VH**; VARGAS CD. *Can the Recording of Motor Potentials Evoked by Transcranial Magnetic Stimulation be Optimized?* Frontiers in Human Neuroscience, v. 11, p. 413, 2017. DOI: 10.3389/fnhum.2017.00413

2. PERES ASC; **SOUZA VH**; CATUNDA JMY; MAZZETO-BETTI KC; SANTOS-PONTELLI TEG; VARGAS CD; BAFFA O; DE ARAÚJO DB; PONTES-NETO OM; LEITE JP; GARCIA MAC. *Can somatosensory electrical stimulation relieve spasticity in post-stroke patients? A TMS pilot study*. Biomedizinische Technik/Biomedical Engineering, v. 63, p. 501-506, 2018. DOI: 10.1515/bmt-2016-0162

3. **SOUZA VH**; VIEIRA TM; PERES ASC; GARCIA MAC; VARGAS CD; BAFFA O. *Effect of TMS coil orientation on the spatial distribution of motor evoked potentials in an intrinsic hand muscle.* Biomedizinische Technik/Biomedical Engineering, v. 63, p. 1-11, 2018. DOI: 10.1515/bmt-2016-0240

4. GRILLO FW; **SOUZA VH**; MATSUDA RH; RONDINONI C; PAVAN TZ; BAFFA O; MACHADO HR; CARNEIRO AAO. *Patient-specific neurosurgical phantom: assessment of visual quality, accuracy, and scaling effects.* 3D Printing in Medicine, v. 8, 3, 2018. DOI: 10.1186/s41205-018-0025-8

5. **SOUZA VH**; BAFFA O; GARCIA MAC. *Lateralized asymmetries in distribution of muscular evoked responses: An evidence of specialized motor control over an intrinsic hand muscle.* Brain Research, v. 1684, p. 60, 2018. DOI: 10.1016/j.brainres.2018.01.031

6. **SOUZA VH**; MATSUDA R; PERES A; AMORIM P; MORAES T; SILVA J; BAFFA O. *Development and characterization of the InVesalius Navigator software for navigated transcranial magnetic stimulation* Journal of Neuroscience Methods, v. 309, p. 109-120, 2018. DOI: 10.1016/j.jneumeth.2018.08.023

7. ZUGAIB J; **SOUZA VH**. *Transcranial magnetic stimulation for neuromodulation of the operculo-insular cortex in humans.* The Journal of Physiology, v. 597, p. 677-678, 2019. DOI: 10.1113/JP277415

8. ZACHARIAS LR; PERES ASC; **SOUZA VH**; CONFORTO AB; BAFFA O. Method to assess the mismatch between the measured and nominal parameters of transcranial magnetic stimulation devices. Journal of Neuroscience Methods, v. 322, p. 83-87, 2019. DOI: 10.1016/j.jneumeth.2019.03.021

9. NIEMINEN JO; KOPONEN LM; MÄKELÄ N; **SOUZA VH**; STENROOS M; ILMONIEMI RJ. Short-interval intracortical inhibition in human primary motor cortex: A multi-locus transcranial magnetic stimulation study. NeuroImage, v. 203, p. 116194, 2019. DOI: 10.1016/j.neuroimage.2019.116194

10. MATSUDA RH; TARDELLI GP; GUIMARÃES CO; **SOUZA VH**; BAFFA FILHO O. Estimulação magnética transcraniana: uma breve revisão dos princípios e aplicações. Revista Brasileira de Física Médica, v. 13, p. 49-56, 2019. DOI: 10.29384/rbfm.2019.v13.n1.p49-56

11. GARCIA MAC; **SOUZA VH**. *The (un)standardized use of handheld dynamometers on the evaluation of muscle force output*. Brazilian Journal of Physical Therapy, v. 24, p. 88-89, 2020. DOI: 10.1016/j.bjpt.2019.10.004

12. GARCIA MAC; **SOUZA VH**; LINDOLFO-ALMAS J; MATSUDA RH; NOGUEIRA-CAMPOS A. *Motor potential evoked by transcranial magnetic stimulation depends on the placement protocol of recording electrodes: A pilot study*. Biomedical Physics & Engineering Express, In Press, 2020. DOI: 10.1088/2057-1976/ab950a

Articles in Conference Proceedings

1. PERES ASC; **SOUZA VHO**; RODRIGUES EM; MAZIERO D; ARAUJO DB; SALMON CEG; BAFFA O. *Vector Magnetic Field Mapping of a Transcranial Magnetic Stimulation Coil Using Magnetic Resonance Imaging: in-vitro and in-vivo Experiments*. World Congress on Medical Physics and Biomedical Engineering – 2009 (Munich – Germany). IFMBE Proceedings (Springer, Volume 25/VII, pages. 571-574). DOI: 10.1007/978-3-642-03885-3_159

2. PERES ASC; **SOUZA VHO**; RODRIGUES EM; SALMON CEG; ARAUJO DB; BAFFA O. *Real-Time Spatial Localization*

System of Brains Regions for TMS Application by Co-registration with fMRI. 17th International Conference on Biomagnetism Advances in Biomagnetism – Biomag 2010 (Dubrovnik – Croatia). IFMBE Proceedings (Springer, Volume 28, pages. 92-96). DOI: 10.1007/978-3-642-12197-5_17

3. BAFFA O; **SOUZA VHO**. Biomagnetismo: uma alternativa para o estudo de sistemas biológicos. Encuentro de Fisica: Las fronteras de la Fisica en Latinoamérica 2013 (Quito – Ecuador). Memorias.

4. RONDINONI C; **SOUZA VHO**; HIROSHI RM; PERES ASC; SANTOS MV; BAFFA O; DOS-SANTOS AC; MACHADO HR; NORITOMI PY; SILVA JVL. Inter-institutional protocol describing the use of three-dimensional printing for surgical planning in a patient with childhood epilepsy: From 3D modeling to neuronavigation. 2014 IEEE 16th International Conference on e-Health Networking, Applications and Services (Healthcom) (Springer, Volume 1, pg. 347-349) (Natal – Brazil). DOI: 10.1109/HealthCom.2014.7001866

5. PERES ASC; **SOUZA VH**; CATUNDA JMY; MAZZETTO-BETTI KC; SANTOS-PONTELLI TEG; VARGAS CD; PONTES-NETO OM; LEITE JP; GARCIA MAC. *Efeito da estimulação elétrica somatosensorial na excitabilidade corticoespinhal de pacientes espásticos*. In: XXV Congresso Brasileiro de Engenharia Biomédica, 2016, Foz do Iguaçú. Anais do XXV Congresso Brasileiro de Engenharia Biomédica, 2016. v. 1. p. 1482-1485.

6. **SOUZA VH**; MATSUDA RH; GRILLO FW; RONDINONI C; MACHADO HR; CARNEIRO AAO; BAFFA O. Neuronavegação *com biomodelos multi-escala impressos em 3d para simulação cirúrgica*. In: XXV Congresso Brasileiro de Engenharia Biomédica, 2016, Foz do Iguaçú. Anais do XXV Congresso Brasileiro de Engenharia Biomédica, 2016. v. 1. p. 619-622.

Abstract in Conference Proceedings

1. **SOUZA VHO**; RODRIGUES EM; PERES ASC; AMORIM PHJ; MORAES TF; MARTINS TACP; SILVA JVL; BAFFA O. *Neuronavigation software for transcranial magnetic stimulation*. 18th International Conference on Medical Physics, Porto Alegre, Brazil. Brazilian Journal of Medical Physics – Proceedings of the 18th International Conference on Medical Physics, XVI Brazilian Congress of Medical Physics e V Instrumentation and Medical Imaging Symposium (ABFM, Volume 5, page 83).

2. **SOUZA V;** NIEMINEN J; TUGIN S; KOPONEN L; BAFFA O; ILMONIEMI R. *Multi-locus TMS transducer for probing orientation dependency of mechanisms in the primary motor cortex.* Brain Stimulation, v. 12, p. 467, 2019. DOI: 10.1016/j.brs.2018.12.522

3. **SOUZA V**; MATSUDA R; PERES A; AMORIM P; MORAES T; SILVA J; BAFFA O. *InVesalius Navigator, a free and open-source software for navigated transcranial magnetic stimulation.* Brain Stimulation, v. 12, p. 571, 2019. DOI: 10.1016/j.brs.2018.12.894

4. **SOUZA V**; BAFFA O; GARCIA M. *Evidence of asymmetrical spatial distributions of motor evoked potentials between dominant and non-dominant hands*. Brain Stimulation, v. 12, p. 423-424, 2019. DOI: 10.1016/j.brs.2018.12.373

5. **SOUZA VH**; KORHONEN J; PAASONEN J; NIEMINEN J; LAAKSO H; PITKÄNEN M; GRÖHN O; ILMONIEMI R. *Towards concurrent multi-locus TMS and functional MRI in rats*. Clinical Neurophysiology, v. 131, p. e36, 2020. DOI: 10.1016/j.clinph.2019.12.153

6. TUGIN S; **SOUZA VH**; NAZAROVA M; NIEMINEN J; NOVIKOV P; TERVO A; LIOUMIS P; NIKULIN V; ILMONIEMI R. *Effect of stimulus orientation and intensity on short-interval intracortical inhibition (SICI) and facilitation (SICF)*. Clinical Neurophysiology, v. 131, p. e41, 2020. DOI: 10.1016/j.clinph.2019.12.162

7. NIEMINEN J; MALMI M; MILARDOVICH D; SINISALO H; **SOUZA VH**; TERVO A; YURIEV M; ILMONIEMI R. *Multi-locus TMS system for electronically controlled stimulation within a cortical region*. Clinical Neurophysiology, v. 131, p. e54-e55, 2020. DOI: 10.1016/j.clinph.2019.12.189

8. MATSUDA R; **SOUZA VH**; ARAKI VD; CAURIN GA; BAFFA O. *An open-source platform for collaborative robots' for navigated TMS.* Clinical Neurophysiology, v. 131, p. e108, 2020. DOI: 10.1016/j.clinph.2019.12.278

Book Chapters

1. **SOUZA VHO**; RODRIGUES EM; PERES ASC; SALMON CEG; BAFFA O. *Estimulação Magnética Transcraniana Assistida por um Neuronavegador com Co-registro de Campo Magnético da Bobina de Estimulação e Imagens de Ressonância Magnética*. Neurociências e Epilepsia (Editora Plêiade, Volume 2, pág. 153-159).

2. PERES ASC; **SOUZA VHO**; RODRIGUES EM; MAZIERO D; SALMON CEG; BAFFA O. *Ressonância Magnética para o*

Mapeamento Vetorial de Campos Produzidos em Estimulação Magnética Transcraniana Utilizando Experimentos in-vitro e in-vivo. Neurociências e Epilepsia (Editora Plêiade, Volume 2, pág. 161-166).

Other Materials

1. Educational material. Biomagnetismo: Aspectos instrumentais e Aplicações (2011). University of São Paulo, Ribeirão Preto, Brazil.

2. Educational material. Estimulação Magnética Transcraniana (2011). University of São Paulo, Ribeirão Preto, Brazil.

3. Disputes & Debates: Editors' Choice: ZUGAIB J; CAMATI JR; **SOUZA VH**. *Reader response: Insular and anterior cingulate cortex deep stimulation for central neuropathic pain: Disassembling the percept of pain*. Neurology, v. 94 (16), p. 720-721, 2020. DOI: 10.1212/WNL.0000000000009303

Technical Productions

Patents

1. PERES ASC; **SOUZA VHO**; BAFFA O; RODRIGUES EM; ARAUJO DB; MARTINS TACP; AMORIM PHJ; MORAES TF; SILVA JVL. Sistema para Navegação Virtual e Co-registro de Corpos Rígidos e seus Modelos Virtuais e Método para a Determinação das Coordenadas Comuns aos Componentes do Sistema. Deposit Date: 04/10/2013. Registry: BR1020130256510. Depositor**:** University of São Paulo

Open-source Software

1. **SOUZA VH**; RODRIGUES EM; PERES ASC; AMORIM PHJ; MORAES TF; MARTINS TACP; ARAUJO DB; SILVA JVL; BAFFA O. InVesalius Navigator (2011). Language: Python. DOI: 10.5281/zenodo.1326396

2. **SOUZA VH**; PERES ASC; RAKAUSKAS LZ; BAFFA O. MEP Hunter (2013). Language: MATLAB. Distribution: https://github.com/biomaglab/mephunter

3. **SOUZA VH**; PERES ASC; RAKAUSKAS LZ; BAFFA O. Signal Hunter (2014). Language: MATLAB. DOI: 10.5281/zenodo.1326308

Other Scientific Merits

Supervision experience

1. Doctoral candidate: Matsuda, Renan Hiroshi; Supervisor: Prof. Oswaldo Baffa; University of São Paulo, Brazil (06/2018–Present).

2. Student: Cuziol, Vitor; Bachelor's thesis; Supervisor: Prof. Oswaldo Baffa; University of São Paulo, Brazil (05/2015–10/2016).

3. Student: Malmi, Mikko; Bachelor's thesis; Supervisor: Jani-Petri Martikainen; Aalto University, Finland (05/2019 – present).

Reviewer experience

1. Journal of Neural Engineering (2019 – present)

2. Plos One (2019 – present)

3. Journal of Neuroscience Methods (2019 – present)

4. Sensors (2019 – present)

Member in examination board for master's degree

1. Candidate: Rossi, Bárbara Palmeira; Supervisor: Prof. Diogo C. Felício; Federal University of Juiz de Fora, Juiz de Fora, Brazil (05/2018).

2. Candidate: Fernandes, Ana Cecília Sá; Supervisor: Prof. André S. C. Peres, International; International Institute for Neurosciences of Natal - Edmond and Lily Safra, Natal, Brazil (07/2019).

3. Candidate: Cuziol, Vitor Valsichi; Supervisor: Prof. Luiz Otávio Murta Junior; University of São Paulo, Ribeirão Preto, Brazil (04/2020).

Memberships in scientific societies

1. Brazilian Physical Society: regular member no. 34313 (2016-2017)

Awards

1. Honorable mention for the study by **SOUZA VH** et al. "*Avaliação do Potencial Evocado Motor por Eletromiografia de Alta Densidade em Aplicações de Estimulação Magnética Transcraniana em Diferentes Orientações*" in the VI Workshop CInAPCe, Campinas, Brazil, Aug 14-17, 2012.

2. 500 € prize for best voted abstract by AYDOGAN DB; **SOUZA VH**; ILMONIEMI R, "*Diffusion MRI processing pipeline for real-time tractography-based nTMS*" in the 11th International Symposium on nTMS in Neurosurgery and Neuromodulation, Berlin, Germany, Nov 8-9, 2019.

3. 300 € Travel award for presenting the study by **SOUZA VH** et al. "*Towards concurrent multi-locus TMS and functional MRI in rats*" in the 7th International Conference on Non-Invasive Brain Stimulation (NIBS), Baden-Baden, Germany, March 24-26, 2020.

Experience in organizing scientific meetings

XIV Week on Medical Physics (Main coordinator) 2015
University of São Paulo, Ribeirão Preto, Brazil. Participants: 135

II Winter school on Physics Applied to Medicine and Biology (Main coordinator) 2016
University of São Paulo, Ribeirão Preto, Brazil. Participants: 68

5th TMS–EEG Summer School and Workshop (Member of organizing team) 2017
Aalto University, Espoo, Finland. Participants: 40

6th TMS–EEG Summer School and Workshop (Member of organizing team) 2018
Aalto University, Espoo, Finland. Participants: 40

7th TMS–EEG Summer School and Workshop (Member of organizing team) 2019
Aalto University, Espoo, Finland. Participants: 40

Languages

Mother tongue: Portuguese

Other languages: English (C2), Spanish (B2), Finnish (A2)