TALLES BATISTA RATTIS SANTOS

Confluence Hall 323, Colorado Mesa University
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EDUCATION

- **Colorado State University (CSU)** **Mar 2020 - Jul 2022**
  Postdoctoral Research Fellow
  Department of Mathematics, CSU
  Advisor: Jennifer L. Mueller

- **Polytechnic School of the Univ. of São Paulo, Poli-USP, Brazil** **Feb 2015 - Dec 2019**
  Ph.D. in control engineering and mechanical automation
  Department of Mechanical Engineering, Poli-USP
  -Title in English: ***Development and use of anatomical and physiological prior information to estimate electrical impedance tomography images***
  Advisor: Raul Gonzalez Lima

- **Polytechnic School of the Univ. of São Paulo, Poli-USP, Brazil** **Feb 2012 - Feb 2015**
  M.S. degree in control engineering and mechanical automation
  Department of Mechanical Engineering, Poli-USP
  -Title in English: ***Control test of bovine pericardium with electrical impedance tomography***
  Advisor: Raul Gonzalez Lima

- **Federal University of Minas Gerais, UFMG, Brazil** **Jul 2006 - Dec 2011**
  Bachelor in Electrical Engineering
  Department of Electrical Engineering, UFMG

RELEVANT SKILLS AND INTERESTS

- **Advanced programming experience in C/C++, Matlab/Octave, Shell Script and Python.**
- **Advanced experience designing and prototyping electronics in medical devices.**
- **Developed new signal processing techniques using statistical methods.**
- **Open Source Enthusiast**
  -Linux user
- **Fluent in Portuguese.**
- **Advanced (speaking, reading, writing) in English.**

TEACHING EXPERIENCE

LECTURES (FULL COURSE)

- **Fall 2023/ Fall 2024 / Fall 2025**
  - **Introduction to Probability Theory (ECEN-3810). Offered at Colorado Mesa University.**
  - **Control Systems Analysis (ECEN-4138). Offered at Colorado Mesa University.**
  - **Intro to Digital Filtering (ECEN-4632). Offered at Colorado Mesa University.**
- **Spring 2024**

- **Linear Systems (ECEN-3300). Offered at Colorado Mesa University.**
- **Control Systems Lab. (ECEN-4638). Offered at Colorado Mesa University.**
- **DSP Laboratory. (ECEN-4532). Offered at Colorado Mesa University.**

• **Spring 2023**

- **Introduction to Probability Theory (ECEN-3810). Offered at Colorado Mesa University.**
- **Introduction to Digital Filtering (ECEN-4632). Offered at Colorado Mesa University.**
- **Control Systems Lab. (ECEN-4638). Offered at Colorado Mesa University.**

• **Fall 2022**

- **Linear Systems (ECEN-3300). Offered at Colorado Mesa University.**
- **Control Systems Analysis (ECEN-4138). Offered at Colorado Mesa University.**

WORKING EXPERIENCE

• **Colorado Mesa University (CMU)** **2022 - Present**

Instructor, CMU/CU Boulder Engineering Partnership Program

- CU Boulder faculty teaching at Electrical and Computer Engineering Program at Colorado Mesa University.

Reference: Nathan McNeill, Director of CMU-CU Boulder Eng. Partnership Programs.

• **Timpel Medical** **2016 - 2022**

Research and Development Engineer

- Improvement of the Timpel EIT system (Enlight 1800™).

- Development and improvement of reconstructions algorithms used to EIT difference images.

- FDA application process of the EIT system (Enlight 1800™) and its features.

Timpel Medical, Rua Simão Álvares, 356, Pinheiros, São Paulo-SP, Brazil, 05.417-020.

Reference: Rafael Holzhacker, chief executive.

RESEARCH EXPERIENCE

• **Colorado State University (CSU), Department of Mathematics** **2020 - 2022**

Postdoctoral Research Fellow

- Development and use of prior information to improve the spatial resolution of EIT images.

- Development of new clinical applications using EIT.

- Provide on-site support for the EIT hardware system, including making upgrades and repairs.

Electrical Impedance Tomograpphy laboratory (EIT lab), Department of Mathematics at CSU.

Advisor: Prof. Jennifer L. Mueller.

• **Laboratório de Engenharia Ambiental e Biomédica (LAB)** **2012 - 2019**

Graduate student researcher

-Development of image reconstruction algorithms and instrumentation relating to EIT.

***Laboratório de Engenharia Ambiental e Biomédica*, Polytechnic School of the University of São Paulo.**

Advisor: Prof. Raul G. Lima.

• **Electrical Impedance Tomograpphy laboratory (EIT lab)** **Sep 2013 - Mar 2014**

Visiting research associate

-Development of the *active complex electrode (ACE1) EIT system* for thoracic images.

Electrical Impedance Tomograpphy laboratory (EIT lab), Department of Mathematics at CSU.

Advisor: Prof. Jennifer L. Mueller.

• **Bioengineering Laboratory (LABBIO)** **2008 - 2010**

Undergraduate student researcher

-Development of a test bench to simulate the formation of an occlusive thrombus in a vein.

-Development of a test bench to sort biological tissues used in artificial heart valves.

Bioengineering Laboratory at Dep. of Mechanical Engineering, Federal University of Minas Gerais.

Advisor: Prof. Marcos Pinotti Barbosa.

PUBLICATIONS

Selected Publications

• **SANTOS, T. B. R. ; NAKANISHI, R. M. ; KAIPIO, J. P. ; MUELLER, J. L. ; LIMA, R. G. . Introduction of Sample Based Prior into the D-Bar Method Through a Schur Complement Property. IEEE TRANSACTIONS ON MEDICAL IMAGING, v. 39, p. 4085-4093, 2020.**

• **MARTINS, T. de C. ; SATO, A. K. ; MOURA, F. S. de ; CAMARGO, E. D. L. B. de ; SILVA, O. L. ; SANTOS, T. B. R. ; ZHAO, Z. ; MÖELLER, K. ; AMATO, M. B. P. ; MUELLER, J. L. ; LIMA, R. G. ; TSUZUKI, M. de S. G. . A review of electrical impedance tomography in lung applications: Theory and algorithms for absolute images. ANNUAL REVIEWS IN CONTROL, v. 48, p. 442-471, 2019.**

• **MELLENTHIN, M. M. ; MUELLER, J. L. ; CAMARGO, E. D. L. B de ; MOURA, F. S. de ; SANTOS, T. B. R. ; LIMA, R. G. ; HAMILTON, S. J. ; MULLER, P. A. ; ALSAKER, M. . The ACE1 Electrical Impedance Tomography System for Thoracic Imaging. IEEE TRANSACTIONS ON INSTRUMENTATION AND MEASUREMENT, v. 68, p. 3137-3150, 2019.**

• **NAKANISHI, R. M. ; SANTOS, T. B. R. ; AMATO, M. B. P. ; LIMA, R. G. . A Measure of Prior Information of a Pathology in an EIT Anatomical Atlas. 17th International Conference on Electrical Bioimpedance (pp.173-180), 2019.**

• **HAMILTON, S J ; MUELLER, J L ; SANTOS, T R . Robust computation in 2D absolute EIT (a-EIT) using D-bar methods with the exp approximation. Physiological Measurement, v. 39, p. 064005, 2018.**

• **SANTOS, T. B. R. ; CAMARGO, E. D. L. B. de ; MUELLER, J. L. ; LIMA, R. G. . Introduction of statistical priors into the D-bar method for electrical impedance tomography. In: 2018 International Applied Computational Electromagnetics Society Symposium (ACES), 2018, Denver. p. 1.**

• **SANTOS, T. B. R. ; SILVA, O. L. ; CAMARGO, E. D. L. B. DE ; MOURA, F. S. de ; BARBOSA, M. P. ; LIMA, R. G. . "Development of a test bench for quality control test of bovine pericardium with electrical impedance tomography", in 7th International Conference and Medical Sciences, Belo Horizonte. Proceedings of the 7th International Conference and Medical Sciences, 2012.**

PATENTS

• **Systems and methods for determining a fluid and tissue volume estimations using electrical property tomography. Patent Number 11605162. 2023**

CONFERENCE PRESENTATIONS

Mini-symposium speaker

• **"D-bar reconstructions of human ventilation EIT data with a statistical prior applied through a Schur complement property", Online Oral presentation at 21st International Conference on Biomedical Applications of Electrical Impedance Tomography (EIT 2021), NUI, Galway-Ireland, 2021.**

• **"The use of the approximation error method and Bayesian inference to introduce anatomical and physiological prior information into D-bar algorithms", Oral presentation at SIAM Conference on Imaging Science, Bologna-Italy, 2018.**

• **"Introduction of statistical priors into the D-bar method for electrical impedance tomography", Oral presentation at International Applied Computational Electromagnetics Society Symposium (ACES), Denver-USA, 2018.**

• **"The Use of the Approximation Error Method and Bayesian Inference to Introduce Anatomical and Physiological Prior Information into EIT Reconstruction Algorithms", Oral presentation at SIAM Conference on Imaging Science, Albuquerque-USA, 2016.**