Benjamin Sanchez Terrones

CONTACT INFORMATION

Department of Electrical and Computer Engineering
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POSITIONS

Associate Professor 1/2025 - present
Department of Electrical and Computer Engineering
Richard and Loan Hill Department of Biomedical Engineering
University of Illinois Chicago

Assistant Professor 7/2020 - 12/2024
Department of Electrical and Computer Engineering
University of Utah

Instructor in Neurology 1/2014 - 7/2020
Beth Israel Deaconess Medical Center, Harvard Medical School
Mentor: Seward Rutkove, M.D.

Visiting Scientist 11/2013-12/2013
Automatic Control Lab and ACCESS Linnaeus Center
School of Electrical Engineering,
KTH-Royal Institute of Technology
Mentor: Cristian Rojas, Ph.D.

Visiting Scientist 4/2013 - 10/2013
Vrije Universiteit Brussel
Mentor: Rik Pintelon, Ph.D.

Postdoctoral Fellow 1/2012 - 12/2013
Universitat Politecnica Catalunya, Spain
Mentor: Ramon Bragos, Ph.D.

EDUCATION

Ph.D. in Electrical Engineering 2008 - 2012
Universitat Politecnica Catalunya, Spain

M.S. in Electrical Engineering 2007 - 2008
Universitat Politecnica Catalunya, Spain
graduated with honors (3rd top-ranked student)

B.S. in Electrical Engineering 2006 - 2007
Universitat Politecnica Catalunya, Spain

B.S. in Telecommunication Engineering 2001 - 2006
Universitat Politecnica Catalunya, Spain

RESEARCH INTERESTS

- Wearable and point of care medical devices for clinically-relevant applications
- Non-invasive physiological monitoring
- Digital health
- Measurement and monitoring of chronic disease
- Rural and austere conditions

HONORS AND AWARDS

- 2024 **Article front cover**, Head & Neck, Volume 46, Issue 3.
- 2023 **Article front cover**, Muscle & Nerve, Volume 68, Issue 5.
- 2023 **Rising Star Award**, Department of Electrical and Computer Engineering, University of Utah.
- 2023 **Highlighted Article**, Heart Rhythm.

- 2022 **Interviewed in IEEE Pulse**, 13 (4), 14-19.
- 2021 **Highlighted Article**, Clinical Neurophysiology.
- 2020 **Highlighted Articles**, Clinical Neurophysiology. (article #1, #2).
- 2020 IEEE Senior Member.
- 2018 **Highlights 2017**, Physiological Measurement (article #1, #2).
- 2017 **Highlighted Article**, Physiological Measurement.
- 2016 **President's Research Initiative Award**, American Association of Neuromuscular & Electrodiagnostic Medicine, New Orleans, LA.
- 2016 **Highlights 2015**, Physiological Measurement.
- 2015 **Highlighted Article**, Physiological Measurement.
- 2014 **President's Research Initiative Award**, American Association of Neuromuscular & Electrodiagnostic Medicine, Savannah, GA.
- 2014 **Extraordinary Ph.D. Thesis Award**, Universitat Politecnica de Catalunya.
- 2014 **Martin Black Prize** for the Best Paper Award published in Physiological Measurement journal in 2013, Institute of Physics and Engineering in Medicine.
- 2014 **Highlights 2013**, Physiological Measurement (article #1, #2) .
- 2013 **Highlighted Article**, Physiological Measurement.
- 2012 **Highlights Collection**, Measurement Science and Technology.
- 2012 **Highlighted Article**, Measurement Science and Technology.

Other

- 2018 Co-author of the only two articles (out of 15) included in the 2017 Highlights of Physiol. Meas. that are on bioimpedance.
- The paper *"Recording characteristics of electrical impedance myography needle electrodes"* was the most downloaded article of Physiol. Meas. in 2017.
- The paper *"Time-invariant measurement of time-varying bioimpedance using vector impedance analysis"* was the most downloaded article of Physiol. Meas. in 2015, also ranked in the shortlist of the 5 best articles published by the journal in 2015.
- First author having two Featured Articles in the same year by Physiol. Meas., also ranked in the shortlist of the 7 best articles published by the journal in 2013.
- The paper *"A new measuring and identification approach for time-varying bioimpedance using multisine electrical impedance spectroscopy"* was the most downloaded article of Physiol. Meas. in 2013.

SPONSORED RESEARCH

UI-UNAM Seed Funding Initiative 9/25 - 8/26 $40,000
Role: PI ($20,000)
Graphene-based Bioimpedance Sensor for Blood Pressure Monitoring

NSF CBET EBMS 2441185 1/25 - 12/30 $530,000
Role: PI ($530,000)
CAREER A deep explainable artificial intelligent framework for electrical impedance myography

NIH NCI 1R21CA289101-01A1 12/24 - 11/26 $412,430
Role: PI ($412,430)
Electrical impedance dermography as a biomarker for basal and squamous cell carcinoma

Innovation in Cancer Engineering Seed Grant 7/24 - 6/25 $40,000
Role: PI ($40,000)
A Pilot Study for the Use of Electrical Bioimpedance in Acute Myeloid Leukemia Patients

NIH NIMHD 1R21MD018488 7/24 - 6/26 $423,500
Role: Co-PI ($223,031)

PI: Lisa Diamond, University of Utah
Links between social safety and health among sexual and gender minorities

NIH NCI 1P01CA285249 7/24 - 6/29 $14,432,377
Role: Site PI, Project 2 ($557,016)
PIs: Katherine Hutcheson, David Fuller, Stephen Lay, MD Anderson Cancer Center
Optimizing OroPharyngeal Cancer SURVIVORship

NSF CBET EBMS 2319920 10/23 - 9/26 $450,000
Role: PI ($269,227)
Cuffless models to infer blood pressure from bioimpedance

NIH NCI 1R21CA273984 4/23 - 3/25 $425,000
Role: Co-PI ($160,084)
PI: Katherine Hutcheson, MD Anderson Cancer Center
Hypoglossal neuropathy in the pathogenesis of radiation associated dysphagia

American Cancer Society 1/23 - 1/24 $40,000
Role: PI ($40,000)
Electrical impedance dermography as a biomarker for non-melanoma skin cancer

Huntsman Cancer Institute 1/23 - 1/24 $17,500
Role: PI ($17,500)
Electrical impedance dermography in basal and squamous cell carcinoma.

Friends of FSH Research 6/21 - 5/22 $50,000
Role: PI ($50,000)
Tongue electro-impedance myography: a window into Facioscapulohumeral muscular dystrophy.

NIH NINDS 1R41NS112029-01A1 9/19 - 3/21 $225,000
Role: PI ($225,000)
Development of an needle impedance-electromyography technology for use in amyotrophic lateral sclerosis.

Massachusetts Technology Center 1/20 - 4/20 $15,000
Role: PI ($15,000)
Innovative diagnostic solution to assess nerve and muscle health.

Total $16,648,377
Share $2,559,288

INDUSTRY SPONSORED RESEARCH

Texas Instruments, Inc.
Role: PI
Unrestricted gift.

Tula Health, Inc.
Role: PI

B-Secur, Ltd.
Role: PI

Happy Health, Inc.
Role: PI

Impedimed, Inc.
Role: PI

Maxim Integrated, Inc.
Role: PI

Total	$693,731
Share	$693,731

REVIEWER

- 2026 NSF CBET EBMS CAREER Panel reviewer
- 2025 CDMRP ALS Adhoc Reviewer
- 2025 NIH CIDH Panel reviewer
- 2024 NSF, Directorate for Engineering, Emerging Frontiers and Multidisciplinary Activities
- 2023 NSF, Electrical, Communications, and Cyber Systems (ECCS)
- 2020 Estonian Research Council.
- 2020 European Research Council ERC European Commission.
- 2019 Prinses Beatrix Spierfonds (Netherlands).

JOURNAL PUBLICATIONS

[93] G.-B. Ha, L. T. Sanchez Shiromizu, J. Song, Z. Xie, H. Crandall, D. Assylbek, A. Boyadzhiev, H. Zhang, F. Guevara Vasquez, R. Mukkamala, M. Widlansky, S. Nemati, J. Capecelatro, C. A. Figueroa, and **B Sanchez**. *A wearable electrical hemodynamic imaging ring.* arXiv:2604.14494.

[92] H Crandall, T Schuessler, F Baelik, A Fabregas, B Stults, A Boyadzhiev, H Zhang, J Wu, A R. Rodan, S Juraschek, R Mukkamala, A Cheung, S Drakos, C Hohenegger, B Osting, and **B Sanchez**. *Cuffless hemodynamic monitoring with physics-informed machine learning models.* **Nature Communications**. In press.

[91] N Hansen, K Woodman, C Peterson, S Buoy, X Tang, S Mao, A C. Moreno, S Y. Lai, D Fuller, C E. A. Barbon, H McMillan, N C. Anderson, K Hutcheson, and **B Sanchez**. *A cross-sectional protocol for experimental tongue high-density surface electromyography to detect and classify radiation-associated hypoglossal neuropathy.* PLOS One. In press

[90] N Hansen, K A Hutcheson, H McMillan, S Mao, K Vidad, C E Barbon, K Woodman, N C Anderson, and **B Sanchez**. *Tongue Surface Electromyography Detects Reduced Motor Unit Recruitment in Oropharyngeal Cancer Survivors With Hypoglossal Neuropathy.* Head and Neck, 2026 Jan;48(1):195-205

[89] N Hansen, T Sheppard, J McCoy, R Freedman, A Bayes-Genis, B Steinberg, and **B Sanchez**. *Smartwatches and smart scales with body composition may interfere with cardiac implantable electronic devices.* Circulation: Arrythmia and Electrophysiology, 2025 Dec;18(12):e013881.

[88] EK Brunsgaard, **B Sanchez**, D Grossman. *Electrical Impedance Dermography: Background, Current State, and Emerging Clinical Opportunities.* Dermatology Research and Practice 2024 (1), 2085098

[87] Hansen N, Ha GB, Colvin P, Freedman R, Bayes-Genis A, Steinberg BA, and **B Sanchez**. *Samsung Galaxy Watch5 Pro and Withings Body+ generate electrical interference on CRT-Ds.* 10.1101/2023.10.05.23296573.

[86] Hansen N, Woodman K, Buoy S, Mao S, Lai SY, Fuller D, Hutcheson KA, and **B Sanchez**. *Tongue electrical impedance myography correlates with functional, neurophysiologic, and clinical outcome measures in long-term oropharyngeal cancer survivors with and without hypoglossal neuropathy: an exploratory study.* Head & Neck. 2024. 46 (3), 581-591.

[85] Pandeya S, **B Sanchez**, Nagy J, Rutkove S. *Combining electromyographic and electrical impedance data sets through machine learning: A study in D2-mdx and wild-type mice.* Muscle Nerve. 2023. 68 (5), 781–788.

[84] **B Sanchez**, Freedman R, Bayes-Luna A, Steinberg B. *Author's Reply to Safety of wearable bioimpedance monitors for CIED patients remains unknown.* Heart Rhythm. 2023, 20 (9), 1341-1342.

[83] Luo X, Shi J, Llobet, Rutkove S, **B Sanchez**. *Electrical impedance myography method of measuring anisotropic tongue tissue.* Physiological Measurement 44 (5), 055007, 2023.

[82] Mandeville R, Deshmukh S, Tsoon E, Kumar V, **B Sanchez**, et al. *A scoping review of current and emerging techniques for evaluation of peripheral nerve health, degeneration and regeneration: part 2, non-invasive imaging.* Journal of Neural Engineering. J Neural Eng. 2023, 24, 20 (4).

[81] Mandeville R, **B Sanchez**, et al. *A scoping review of current and emerging techniques for evaluation of peripheral nerve health, degeneration and regeneration: part 1, neurophysiology.* J Neural Eng. 2023, 24, 20 (4).

[80] Ha GB, Steinberg B, Freedman R, Bayes-Luna A, **B Sanchez**. *Safety evaluation of smart scales, smart watches, and smart rings with bioimpedance technology show evidence of potential interference in cardiac implantable electronic devices.* Heart Rhythm. 20 (4), 561-571, 2023.

[79] L Vela, H Crandall, T Lim, F Zhang, A Gibbs, A R. J. Mitchell, A Condon, L M. Diamond, H Zhang, **B Sanchez**. *IoMT-enabled stress monitoring in a virtual reality environment and at home.* IEEE Internet of Things Journal. 2023, 10 (12), 10649-10661.

[78] Wong E, Pandeya S, Crandall H, Smart T, Dixon M, Boucher K, Florell S, Grossman D, B Sanchez. *Electrical impedance dermography differentiates squamous cell carcinoma in situ from inflamed seborrheic keratoses.* Journal of Investigative Dermatology Innovations, 3 (3), 100194, 2023.

[77] Gibbs A, Fitzpatrick M, Lilburn M, Easlea H, Francey J, Funston R, Diven J, Murray S, Mitchell O, Condon A, Mitchell A, **B Sanchez**, Steinhaus D. *A universal, high-performance ECG signal processing engine to reduce clinical burden.* Annal of Noninvasive electrocardiography, 27 (5), e12993, 2022.

[76] Pandeya SR, Nagy JA, Riveros D, Semple C, Taylor RS, Hu A, **B Sanchez**, Rutkove S. *Using machine learning algorithms to enhance the diagnostic performance of electrical impedance myography.* Muscle Nerve. 2022, 66 (3), 354-361.

[75] Nagy JA, Riveros D, Semple C, **B Sanchez**, Rutkove S. *Altered electrical properties in skeletal muscle of mice with glycogen storage disease type II.* Scientific Reports, 2022, 12, 5327.

[74] Kwon H, Park HC, Barrera AC, Rutkove S, **B Sanchez**. *On the measurement of skeletal muscle anisotropic permittivity property with a single cross-shaped needle insertion.* Scientific Reports, 2022, 12 (1), 1-16.

[73] Rutkove S, Libman M L, Ruehr S, Nagy J, Semple C, **B Sanchez**. *Design and pilot testing of a 26-gauge impedance- electromyography (iEMG) needle in wild type and ALS mice.* Muscle Nerve, 2022, 65 (6), 702-708.

[72] Luo X, Wang S and **B Sanchez**. *Modeling and simulation of needle electrical impedance myography in nonhomogeneous isotropic skeletal muscle.* IEEE J Electromagnetics, RF Micro. Med. Biol, 2022, 6(1), 103-110.

[71] Pandeya S, Nagy JA, Riveros D, Semple C, Taylor RS, **B Sanchez**, Rutkove S. *Relationships between in vivo surface and ex vivo electrical impedance myography measurements in three different neuromuscular disorder mouse models.* PLoS ONE, 2021, 16(10): e0259071.

[70] Luo X, Zhou Y, Smart T, Grossman D, **B Sanchez**. *Electrical characterization of basal cell carcinoma using a novel handheld electrical impedance spectroscopy device*. Journal of Investigative Dermatology Innovations, 2022, 2 (1), 100075.

[69] Andreasen N, Crandall H, Brimhall O, Miller B, Perez-Tamayo J, Martinsen O, Kauwe SK, **B Sanchez**. *Machine learning-based diagnosis of breast cancer and evaluation of therapy effect measuring skin electrical resistance in lymphatic regions*. IEEE Access, 2021, 9: 152322–152332.

[68] Luo X, Gutierrez Pulido HV, Rutkove SB, **B Sanchez**. *A bioimpedance-based device to assess the volume conduction properties of the tongue in neurological disorders affecting bulbar function*. IEEE Open J Eng. Med. Biol., 2021, 2, 278-285.

[67] Luo X, Wang S, Rutkove SB, **B Sanchez**. *Nonhomogeneous volume conduction effects affecting needle electromyography: an analytical and simulation study*. Physiol. Meas. 2021, 42(11):10.

[66] Luo X, Wang S, **B Sanchez**. *A framework for modeling bioimpedance measurements of nonhomogeneous tissues: a theoretical and simulation study*. Physiol. Meas. 2021, 42 (5), 055007.

[65] **B Sanchez**. *Reply to Putting the patient first: The validity and value of surface-based electrical impedance myography techniques*. Clin. Neur., 2021, 132 (7), 1752-1753.

[64] Pandeya SR, Nagy JA, Riveros D, Semple C, Taylor RS, Mortreux M, **B Sanchez**, Kapur K, Rutkove SB. *Estimating myofiber cross-sectional area and connective tissue deposition with electrical impedance myography: A study in D2-mdx mice*. Muscle Nerve, 2021, 63 (6), 941-950.

[63] Luo X and **B Sanchez**. *In silico muscle conduction study validates in vivo measurement of tongue volume conduction properties using the UTA depressor*. Physiol. Meas. 2021, 42 (4), 045009.

[62] Martinez de Morentin Cardoner M, Kwon H, Gutierrez Pulido HV, Nagy JA, Rutkove SB and **B Sanchez**. *Modeling and reproducibility of twin concentric electrical impedance myography*. IEEE Trans. Biomed. Eng., 2021, 68 (10), 3068–3077.

[61] **B Sanchez**, Martinsen O, Freeborn TJ, Furse CM. *Electrical impedance myography: a critical review and outlook*. Clin. Neur., 2021, 132 (2), 338-344.

[60] Luo X, Gutierrez-Pulido HV, Rutkove SB, **B Sanchez**. *In vivo muscle conduction study of the tongue using a multi-electrode tongue depressor*. Clin. Neur., 2021, 132 (2), 683-687.

[59] Pandeya SR, Nagy JA, Riveros D, Semple C, Taylor RS, Mortreux M, **B Sanchez**, Kapur K, Rutkove SB. *Predicting myofiber cross-sectional area and triglyceride content with electrical impedance myography: a study in db/db mice*. Muscle Nerve, 2021, 63 (1), 127-140.

[58] Zhang F, Teng Z, Yang Y, Zhong H, Li J, Rutkove S, **B Sanchez**. *A novel method for estimating the fractional Cole impedance model using single-frequency dc-biased sinusoidal excitation*. Circuits, Systems, and Signal Processing, 2021, 40, 543-558.

[57] Zhang F, **B Sanchez**, et al. *Numerical estimation of Fricke-Morse impedance model parameters using single-frequency sinusoidal excitation*. Physiol. Meas., 2019, 40, 09NT01.

[56] Clark-Matott J, Nagy JA, **B Sanchez**, et al. *Altered muscle electrical tissue properties in a mouse model of premature aging.* Muscle Nerve, 2019, 60 (6), 801-810.

[55] Kwon H, Rojas C R, Rutkove S, **B Sanchez**. *Three-harmonic optimal multisine input power spectrum for bioimpedance identification.* Physiol. Meas., 2019, 40, 05NT02.

[54] Kwon H, M Martinez de Morentin, Nagy J A, Rutkove S and **B Sanchez**. *Approximate complex electrical potential distribution in the monodomain model with unequal conductivity and relative permittivity anisotropy ratios.* Physiol. Meas., 2019, 40, 085008.

[53] Vela L M, Kwon H, Rutkove S and **B Sanchez**. *Standalone IoT bioimpedance device supporting real-time online data access.* IEEE IoT, 2019, 6 (6), 9545-9554.

[52] Wang Y, Gutierrez H, Martucci M, Poussaint A, Qi K, **B Sanchez** and Rutkove SB. *Quantitative muscle ultrasound in upper extremity mononeuropathies.* Muscle Nerve, 2019, 60(1), 67–71.

[51] Nagy J A, DiDonato C J, Rutkove S B, **B Sanchez**. *Permittivity of ex vivo healthy and diseased murine skeletal muscle from 10 kHz to 1 MHz.* Sci. Data, 2019, 18, 6(1), 37.

[50] Kwon H, Guasch M, Nagy J A, Rutkove S, **B Sanchez**. *New electrical impedance methods for the in situ measurement of the complex permittivity of anisotropic skeletal muscle using multipolar needles.* Sci. Rep., 2019, 9(1), 3145.

[49] Kwon H, Malik W, Rutkove S, **B Sanchez**. *Separation of subcutaneous fat from muscle in surface electrical impedance myography measurements using model component analysis.* IEEE Trans. Biomed. Eng., 2019, 66(2), 354–364.

[48] Kapur K, **B Sanchez**, et al. *Functional mixed-effects modeling of longitudinal Duchenne muscular dystrophy electrical impedance myography data using state-space approach.* IEEE Trans. Biomed. Eng., 2019, 66(6), 1761–1768.

[47] Nagy J A, Kapur K, Taylor R, **B Sanchez**, Rutkove S. *Electrical impedance myography as a biomarker of myostatin inhibition with ActRIIB-mFc: a study in wild-type mice.* Future Science OA, 2018, FSO308.

[46] Widrick J J, Gibbs D E, **B Sanchez**, et al. *An open source microcontroller based flume for evaluating swimming performance of larval, juvenile, and adult zebrafish.* PloS one, 2018, 13(6), e0199712.

[45] Kwon H, Di Cristina J F, Rutkove S and **B Sanchez**. *Recording characteristics of electrical impedance-electromyography needle electrodes.* Physiol. Meas., 2018, 39, 055005.

[44] Rutkove S, Kwon H, Guasch-Morgades M, Wu J and **B Sanchez**. *Electrical impedance imaging of human muscle at the microscopic scale using a multi-electrode needle device: a simulation study.* Clin. Neur., 2018, 129(8), 1704–1708.

[43] Kapur K, Nagy J A, Taylor R, **B Sanchez** and Rutkove S. *Estimating myofiber size with electrical impedance myography: a study in ALS mice.* Muscle Nerve, 2018, 58(5), 713–717.

[42] Kapur K, Taylor R, Qi K, Nagy J A, Li J, **B Sanchez** and Rutkove S. *Predicting myofiber size with electrical impedance myography: a study in immature mice.* Muscle Nerve, 2018, 58, 106–113.

[41] Louarroudi E and **B Sanchez**. *Reply to Comment "On the correct use of stepped-sine excitations for the measurement of time-varying bioimpedance".* Physiol. Meas., 2018, 39, 028002.

[40] Kwon H, Rutkove S and **B Sanchez**. *Recording characteristics of electrical impedance myography needle electrodes.* Physiol. Meas., 2017, 38(9), 1748.

[39] Kwon H, Nagy J A, Taylor R, Rutkove S and **B Sanchez**. *New electrical impedance methods for the in situ measurement of the complex permittivity of anisotropic biological tissues.* Phys. Med. Biol., 2017, 62(22), 8616.

[38] Arnold W D, Taylor R, Li J, Nagy J A, **B Sanchez** and Rutkove S. *Electrical impedance myography detects age-related muscle change in mice.* Plos one, 2017, 12(10), e0185614.

[37] **B Sanchez** and Rutkove S. *Present Uses, Future Applications, and Technical Underpinnings of Electrical Impedance Myography.* Current Neurology and Neuroscience Reports, 2017, 17(86).

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[35] Rutkove S, Pacheck A and **B Sanchez**. *Sensitivity distribution simulations of surface electrode configurations for electrical impedance myography.* Muscle Nerve, 2017, 56(5), 887-895.

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[32] Lecina M, **B Sanchez**, et al. *Structural changes of Arthrospira sp. after low energy sonication treatment for microalgae harvesting: Elucidating key parameters to detect the rupture of gas vesicles.* Biores. tech., 2017, 223:98-104.

[31] Louarroudi E and **B Sanchez** *On the correct use of stepped-sine excitations for the measurement of time-varying bioimpedance.* Physiol. Meas., 2017, 38(2), N73.

[30] **B Sanchez** and Rutkove S. *Electrical impedance myography and its applications in neuromuscular disorders.* NeuroRx., 2017, 14(1), 107-118.

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[25] Arnold D, McGovern V, **B Sanchez**, et al. *The neuromuscular impact of symptomatic SMN restoration in a mouse model of spinal muscular atrophy.* Neurobiol. Dis., 2015, 87:116-123.

[24] **B Sanchez**, et al. *Evaluation of electrical impedance as a biomarker of myostatin inhibition in wild type and muscular dystrophy mice.* PLoS One, 2015, 10(10):e0140521.

[23] **B Sanchez**, et al. *Circular motion impedance analysis of time-varying bioimpedance.* Physiol. Meas., 2015. 36(11), 2353 - 2367.

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[21] Yang Y, Zhang F, Tao K, **B Sanchez**, et al. *An improved crest factor minimization algorithm to synthesize multisines with arbitrary power spectrum.* Physiol. Meas., 2015, 36(5), 895 - 910.

[20] **B Sanchez**, et al. *Time-invariant measurement of time-varying bioimpedance using vector impedance analysis.* Physiol. Meas., 2015, 36(3), 595 - 620.

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[12] **B Sanchez** and Rojas C R. *Robust excitation power spectrum design for broadband impedance spectroscopy.* Meas. Sci. Technol., 2014, 25 065501.

[11] **B Sanchez**, et al. *An FPGA-based frequency response analyzer for multisine and stepped sine measurements on stationary and time-varying impedance.* Meas. Sci. Technol., 2014, 25 015501.

[10] **B Sanchez**, et al. *Propagation of Measurement Errors Through Body Composition Equations for Body Impedance Analysis.* IEEE Trans. Instrum. Meas., 2013, 63(6), 1535 - 1544.

[9] **B Sanchez**, et al. *Harmonic impedance spectra identification from time-varying bioimpedance: theory and validation.* Physiol. Meas., 2013, 34(10), 1217 - 1238.

[8] **B Sanchez**, et al. *A new measuring and identification approach for time-varying bioimpedance using multisine electrical impedance spectroscopy.* Physiol. Meas., 2013, 34(3), 339 - 357.

[7] **B Sanchez**, et al. *Novel approach of processing electrical bioimpedance data using differential impedance analysis.* Med. Eng. Phys., 2013, 35(9), 1349 - 1357.

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[5] **B Sanchez**, et al. *In vivo electrical bioimpedance characterization of human lung tissue during the bronchoscopy procedure. A feasibility study.* Med. Eng. Phys., 2013, 35(7), 949 - 957.

[4] **B Sanchez**, et al. *Basics of broadband impedance spectroscopy using periodic excitations.* Meas. Sci. Technol., 2012, 23 105501.

[3] **B Sanchez**, et al. *On the calculation of the D-optimal multisine excitation power spectrum for broadband impedance spectroscopy measurements.* Meas. Sci. Technol., 2012, 23 085702.

[2] **B Sanchez**, et al. *Novel estimation of the electrical bioimpedance using the local polynomial method. Application to in vivo real-time myocardium tissue impedance characterization during the cardiac cycle.* IEEE Trans. Biomed. Eng., 2011, 58(12), 3376 - 3385.

[1] **B Sanchez**, et al. *Optimal multisine excitation design for broadband electrical impedance spectroscopy.* Meas. Sci. Technol., 2011, 22(11), 115601.

BOOK CHAPTERS

[1] Rutkove S and **B Sanchez**. *Electrical impedance methods in neuromuscular assessment: an overview*, Bioelectric medicine, Cold Spring Harbor perspectives in medicine 9 (10), a034405.

PATENTS

[8] 2024. Provisional disclosure. Tabib-Azar M and **B Sanchez** "*Wearable nuclear magnetic resonance device and methods for substance use detection*".

[7] 2023 Patent Application. Docket No. 6300.608. **B Sanchez**. "*Bioimpedance devices and methods for cuffless measurement of blood pressure*".

[6] 2020 Patent Application. 6300.528. "*Multi-electrode depressor for evaluating tongue health*".

[5] 2018 62/737721. Gaw R L and **B Sanchez**. *Evaluating impedance measurements.*

[4] 2018 US20200297235A1. **B Sanchez**, Rutkove S and Kwon H. *Needle impedance electromyography and electrical impedance imaging for enhanced muscle diagnostics.*

[3] 2016 PCT/EP2016/056933. Rosell F J, Cinca J, Bragos R, Amoros G, Vizuete E, Sanchez J and **B Sanchez**. *Systems and methods to assess infarcted myocardial tissue by measuring electrical impedance during the cardiac cycle.*

[2] 2015 PCT/US2015/15961. Rutkove S and **B Sanchez**. *Electrical impedance myography.*

[1] 2012 PCT/EP2012/061224. Rosell J, Bragos R, **B Sanchez**, Bayes A, Llucia A. *Methods and devices for mechanical and electrical stimulation of cell monolayer and 3D cultures for tissue engineering applications.*

INDUSTRY

- 2026 - present Chief Scientific Officer, Promptus.
- 2026 - present Head of Biosensing and Product Development, NeuralPoint AI.
- 2024 - present Chief Scientific Advisor, SOBR Safe, Inc.
- 2024 - present Chief Scientific Officer, HemodynamiQ.
- 2023 - 2025 Scientific Advisor, Physio AI.
- 2023 - present Consultant, Tula Health, Inc.
- 2020 - present Scientific Advisor, B-Secur, Ltd.
- 2018 - present Co-Founder, Haystack Diagnostics, Inc.
- 2018 - present Consultant, Happy Health, Inc.
- 2016 - present Consultant, Maxim Integrated, Inc.
- 2016 - present Consultant, Myolex, Inc.
- 2015 - present Consultant, Impedimed, Inc.
- 2014 - present Consultant, Texas Instruments, Inc.

INVITED TALKS AT SEMINARS AND CONFERENCES

[8] 2026/3 Seminar Department of Physical Therapy and Human Movement Sciences (PTHMS) Grand Rounds, University of Northwestern.

[7] 2026/2 Seminar VA-Madison Geriatric Research Education and Clinical Center (GRECC).

[6] 2024/10 Invited Speaker, Nephrology Research Conference, University of Utah.

[5] 2024/10 Invited Speaker, Cardiology Grand Rounds, University of Chicago.

[4] 2019 Invited Speaker, Brainstorm Event, annual meeting of the American Academy of Neurology, Philadelphia, PA.

[3] 2018 Department of Electrical and Computer Engineering, University of Alabama, AL.

[2] 2015 Thayer School of Engineering, Dartmouth, NH.

[1] 2014 Honorary Speaker, Plenary talk at the Institute of Physics and Engineering in Medicine Medical Physics and Engineering Conference, Glasgow.

SERVICE

2022 – 12/2024 ECE Grant Round meetings, Chair, University of Utah
2022 – 12/2024 Seminars and Distinguished Lecturer Committee, Member, University of Utah
2021 – 12/2024 Grad Committee, Member, University of Utah
2021 University of Utah College of Engineering Orientation Faculty Panel, Member
2021 University of Utah TA and grad Research Fellowship awards, Reviewer

TEACHING

ECE 491/BME 494 *Introduction to Bioelectricity*, University of Illinois Chicago
Spring 2026
ECE 342 *Electronics II*, University of Illinois Chicago
Fall 2025, 2026
ECE 1240 *Introduction to Circuit Design*, University of Utah
Spring 2022, Spring 2023
ECE 1050 *Matlab for ECE Design*, University of Utah
Spring 2022, Spring 2023
ECE 1245 *Circuits and Systems I Lab*, University of Utah
Spring 2022, Spring 2023
ECE 5360/6360 *Bioelectricity*, University of Utah
Fall 2021, Fall 2022
ECE 5330/6330 *Bioinstrumentation*, University of Utah
Fall 2021

LAB MEMBERS

Albert Fabregas (Grad student).
Zhuyun Xie (Grad student).
Jake McCoy (Grad student, NSF Graduate Research Fellow 2026–2029, $167K over 3 years).
Lucas Takanori (Grad student).
Gia-Bao Ha (Grad student student)
Elaine Wong (Grad student, NSF Graduate Research Fellow 2023–2026, $167K over 3 years)
Nathan Hansen (Grad student, NSF Graduate Research Fellow 2024–2027, $167K over 3 years)

First time 2 students from the ECE department at the University of Utah receive an NSF Graduate Research Fellowship in the same year. Prior to 2023 award year, the ECE department had 1 NSF GRFP award year 2015, 1 in award year 2011, 1 in award year 2010, 1 in award year 2003, and 1 in award year 2002.

First time an ECE student at University of Illinois Chicago receives

ALUMNI

2023–2026 Henry Crandall (PhD student, NSF Graduate Research Fellow, $167K over 3 years)
2023-2025 Dinali Assylbek (undergrad student). Engineer, Suntra Medical.
2023 Albert Fabregas (Visiting undergrad). MS student, UPC.
2019–2021 Xuesong Luo (Visiting PhD). Postdoc, Tsinghua University.
2021 Arnau Marin Llobet (Visiting undergrad). Grad student, Harvard University.
2021 Tara Zamani (Undergrad). Research assistant, Duke University.
2020 Ye Zhou (Undergrad). MS student, Rice University.
2019 Albert Cheto Barrera (Undergrad). Industry.
2017–2019 Fu Zhang (Visiting PhD). Postdoc, Hunan Normal University.
2018 Marti Martinez Cardoner (Visiting undergrad). MS student, ETH University.
2017 Maria Guasch Morgades (Visiting undergrad). MS student, Universita di Pisa.

ORGANIZATION OF CONFERENCES

- 2024-present Associate Editor, IEEE EMBC Theme: Biomedical Sensors and Wearable Systems.
- 2022 Chairman, ICBEM-ICEBI-EIT conference, Seoul, South Korea.
- 2022 Chairman, Symposium "*Bioengineering advances in the neuromuscular clinic*", 44th International conference IEEE EMBS, Glasgow, UK.
- 2021 Course/Session Director for the 2021 American Clinical Neurophysiology Society Annual Meeting
- 2018 Chairman, Symposium "*Recent innovations and new health-related applications of electrical bioimpedance*", 40th International conference IEEE EMBS, Honolulu, HI.
- 2018 Scientific Program Committee member, 11th International Conference on Bioelectromagnetism, Aachen, Germany.
- 2016 Chairman, 16th International Conference on Electrical Bioimpedance, Stockholm, Sweden.

SCIENTIFIC AND ADMINISTRATIVE RESPONSIBILITIES

- 2021 - present Editorial Board Member, IEEE Open Journal of Engineering in Medicine and Biology (OJEMB).
- 2021 - present Associate Editor, IEEE J. Electromagnetics, RF and Microwaves in Medicine and Biology (J-ERM).

- 2020 - 2021 Associate Editor, Int. J. Circuit Theory & Applications, John Wiley & Sons.
- 2016 - present Associate Editor, Physiological Measurement, Institute of Physics.
- 2018 - present Members-at-Large of the IEEE Technical Committee on Biomedical Signal Processing.
- Member of the American Academy of Neurology, American Association of Neuromuscular & Electrodiagnostic Medicine, Institute of Electrical & Electronic Engineers (IEEE), IEEE Engineering in Medicine and Biology Society, and International Society for Electrical Bio-Impedance.
- Reviewer of Nature Scientific Reports, Plose One, Muscle and Nerve, Physiological Measurement, Measurement Science and Technology, Measurement, IEEE Transactions on Instrumentation and Measurement, Medical Engineering and Physics, IEEE Transactions on Biomedical Circuits and Systems, IEEE Transactions on Biomedical Engineering, IEEE Journal of Biomedical and Health Informatics, Physics in Medicine and Biology, Bioelectrochemistry, Biomedical Signal Processing and Control.

SCIENCE OUTREACH & MEDIA

- 2023 NIH NHLBI Article News
- 2023 British Heart Foundation
- 2023 Fox News
- 2023 CBS News
- 2023 Forbes
- 2023 US News
- 2023 Yahoo News
- 2023 The Guardian
- 2023 Sky News
- 2023 The Independent
- 2023 The Telegraph
- 2023 The University of Utah
- 2022 WBZ News Radio Interview, Tomorrow's Technology Today
- 2022 KSL
- 2022 KSL News Radio, 102.7 FM
- 2022 Fox 13 News
- 2022 Health IT Analytics
- 2022 Diagnostics World
- 2022 Health News Digest
- 2022 Salt Lake Tribune (print & online)
- 2022 Healthcare-in-Europe.com
- 2022 College of Engineering Press note
- 2017 Medical Physics Web Review Magazine Article, Issue 3, page 25.
- 2017 Editor's choice Article of the Month, Institute of Physics and Engineering in Medicine.
- 2017 Medical Physics Web, online Newsmaker Article.
- 2014 Press note, Universitat Politecnica de Catalunya.
- 2014 Press note, Medical Physics Web.