Reza Ranjandish

Postdoctoral Researcher, EPFL

Nationality: Iranian

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Professional and Research Interests

- Low power analog/digital/mixed-mode circuit design for wireless, biomedical, sensor, and RF applications.
- Low power wireless data telemetry, wireless power transfer and battery charger for biomedical applications.
- Brain inspired computing and Machine Learning (ML) for biomedical applications.
- Low-power data compression architectures for biomedical applications.
- Smart wireless wearable electronics for health monitoring.

Education

- Ph.D. in Electrical Engineering, Ecole Polytechnique Federal de Lausanne (EPFL) (March 2015 – March 2019) Supervisor: Dr. MER Alexandre Schmid
  Thesis: Implantable Autonomous Wireless Closed-loop Bio-electronics for Epilepsy Control.
- M.Sc. in Electrical Engineering, Circuits and Systems, University of Tehran, Tehran, Iran. (2011 - August 2014) Overall GPA: 18.82/20 (in WES format: 3.91/4) Supervisor: Dr. Omid Shoaei
  Thesis: Study and design of voltage-mode electrical stimulator for Deep Brain Stimulation (DBS).
- Master of Business Administration (MBA), University of Tehran, Tehran, Iran. (2012-2013) Supervisor: Dr. Vahid Shaghaghi
  Thesis: Estimating share price using Fuzzy regression
- B.Sc. in Electrical Engineering, Electronics, Shahid Beheshti Univerity, Tehran, Iran. (2006-2011) Supervisor: Dr. Babak Mazloom-Nezhad Maybodi
  Thesis: Electronics design for smart homes using IoT.

Academic and Industrial Experiences

- Postdoctoral researcher, Ecole Polytechnique Federal de Lausanne (EPFL) (March 2019 - Present)
- Research assistant, Ecole Polytechnique Federal de Lausanne (EPFL) (March 2015 – March 2019)
- CEO and Cofounder, Arka Fannavari Raya Co. LTD, Tehran, Iran. (February 2014 - February 2015)
- Research assistant at Integrated Circuits Lab., School of Electrical and Computer Engineering, University of Tehran. (June 2014 - February 2015)

Honors and Awards

- Student travel grant award, ISSCC 2019, San Francisco, United States.
- Student travel grant award, ASSCC 2018, Tainan, Taiwan.
- Silver leaf award for the presented paper at PRIME 2016, Lisbon, Portugal.
- Ranked 2nd among 20 top master students in Circuits and Systems, University of Tehran, Iran.

Skills

- Having experience of IC design with more than 5 independent tape-outs and 2 shared tape-outs.
- Analog and Mixed-mode design (AFE, signal conditioning, ADC, …).
- Digital design including lightweight machine learning core.
- Wireless data telemetry, wireless power transfer and battery charger circuits.
- Power management and conditioning circuits.

- High-voltage electrical stimulator design.
- Experienced in PCB design for low-frequency systems using Altium Design.
- Skilled in project management.

Publications

Journal Papers:

[J2] Ranjandish, R., & Schmid, A. (2019) A design methodology for charge-balanced stimulators based on anodic current variation monitoring. Analog Integrated Circuits and Signal Processing, pp.1-10.

[J1] Ranjandish, R., & Schmid, A. (2018). A Sub-µW/channel, 16-channel Seizure Detection and Signal Acquisition SoC Based on Multichannel Compressive Sensing. IEEE Transactions on Circuits and Systems II: Express Briefs.

Submitted Journals:

- **Ranjandish, R.**, & Schmid, A. "An Active Charge Balancing Method suitable for Integration in the Output-Stage of Electrical Neural Stimulators". Submitted to IEEE Sensors Journal
- **Ranjandish, R.**, & Schmid, A. "Walsh-Hadamard based Orthogonal Sampling Technique for Parallel Neural Recording Systems". Submitted to Transaction to Biomedical Circuits and Systems.

Conference Papers:a

[C15] Ranjandish, R., & Schmid, A. (2018, Nov). A 4-Channel, 5.04 uW, 0.325 mm2, Parallel Neural Recording System Based on Orthogonal Sampling. In 2018 IEEE Asian Solid-State Circuits Conference (ASSCC 2018).

[C14] Ranjandish, R., & Schmid, A. (2018, Oct). Implantable IoT System for Closed- Loop Epilepsy Control based in Electrical Neuromodulation. In 26th IFIP/IEEE International Conference on Very Large Scale Integration (VLSI-SoC 2018).

[C13] Ranjandish, R., & Schmid, A. (2018, Sep). An All Wireless, 16-Channel Epilepsy Control System with Sub-uW/Channel and Closed-Loop Stimulation Using a Switched-Capacitor-Based Active Charge Balancing Method. In 48th IEEE European Solid-State Circuits conference (ESSCIRC).

[C12] Ranjandish, R., & Schmid, A. (2018, July). An Active Charge Balancing Method Based on Chopped Anodic Phase. In 2018 14th Conference on Ph. D. Research in Microelectronics and Electronics (PRIME) (pp. 261-264). IEEE.

[C11] Ranjandish, R., Shoaei, O., & Schmid, A. (2018, July). A Fully Fail-Safe Capacitive-Based Charge Metering Method for Active Charge Balancing in Deep Brain Stimulation. In 2018 14th Conference on Ph. D. Research in Microelectronics and Electronics (PRIME) (pp. 249-252). IEEE.

[C10] Ranjandish, R., & Schmid, A. (2018, May). Current Overshoots and Undershoots in Electrical Stimulation: A Circuit-level Perspective of the Origin and Solutions. In Circuits and Systems (ISCAS), 2018 IEEE International Symposium on (pp. 1-4). IEEE.

[C9] Ranjandish, R., & Schmid, A. (2017, October). A compact size charge-mode stimulator using a low-power active charge balancing method for deep brain stimulation (DBS). In Biomedical Circuits and Systems Conference (BioCAS), 2017 IEEE (pp. 1-4). IEEE.

[C8] Ture, K., **Ranjandish, R.**, Yilmaz, G., Seiler, S., Widmer, H. R., Schmid, A.,... & Dehollain, C. (2017, October). Power/data platform for high data rate in implanted neural monitoring system. In Biomedical Circuits and Systems Conference (BioCAS), 2017 IEEE (pp. 1-4). IEEE.

[C7] Ranjandish, R., & Schmid, A. (2017, October). An active charge balancing method based on anodic current variation monitoring. In Biomedical Circuits and Systems Conference (BioCAS), 2017 IEEE (pp. 1-4). IEEE.

[C6] Ranjandish, R., & Schmid, A. (2016, October). An active charge balancing method based on self-oscillation of the anodic current. In Biomedical Circuits and Systems Conference (BioCAS), 2016 IEEE (pp. 496-499). IEEE.

[C5] Ranjandish, R., & Schmid, A. (2016, June). "High frequency self-oscillating current switching for a fully integrated fail-safe stimulator output stage". In 2016 12th Conference on Ph. D. Research in Microelectronics and Electronics (PRIME) (pp. 1-4). IEEE

[C4] Ranjandish, R., & Shoaei, O. (2015, May). A low-power digitally closed-loop electrical stimulator suited for low-pulse-width-stimulation. In Electrical Engineering (ICEE), 2015 23rd Iranian Conference on (pp. 1393-1397).

IEEE.

[C3] Ranjandish, R., & Shoaei, O. (2014, December). "Polarity detection base pulse insertion for active charge balancing in electrical stimulation." In Biomedical Engineering and Sciences (IECBES), 2014 IEEE Conference on (pp. 38-41). IEEE.

[C2] Ranjandish, R., & Shoaei, O. (2014, October). "A simple and precise charge balancing method for voltage mode stimulation." In 2014 IEEE Biomedical Circuits and Systems Conference (BioCAS) Proceedings (pp. 376-379). IEEE.

[C1] Ranjandish, R., A. Agharasooli, M. Tayarani, and O. Shoaei. "A Passive Implantable Biopotential Measurement Sensor with an Inductive Coupled Readout Circuit." Electrical Engineering (ICEE), 2014 22st Iranian Conference on. IEEE, 2014.

Submitted Conferences:

- **Ranjandish, R.**, & Schmid, A. "Chopped-Anodic-Phase Charge Balancing Method for Electrical Stimulation". <u>Submitted</u> to The 26th IEEE International Conference on Electronics Circuits and Systems (ICECS).

Supervisions and Mentorships

Master Thesis Supervised

- **Sebastien Debenest**, 2019, EPFL, Lightweight machine learning hardware implementation of seizure detection algorithms.
- **Niederhauser Loïc**, 2018, EPFL, Epilepsy Feature Extraction Using Support Vector Machine (SVM).

Master Semester Project Supervised

- **Emrick Sinitambirivoutin**, 2019, EPFL, Lightweight machine learning hardware implementation of seizure detection algorithms.

Bachelor Thesis Supervised

- **Lucas Biotto**, 2018, EPFL, Implantable multi-channel bio-electronics for epilepsy detection.

Internship Supervisions

- **Ali Amidi**, 2014, Universyty of Tehran, Iran.

References

Available upon request.

Publications