Lefteris Kampianakis, Ph.D.

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Profile

An RnD Electrical Engineer with 10+ years of experience in architecture and design of innovative devices. A tech leader with numerous academic achievements, a multilingual, multicultural and interdisciplinary background, and with extensive experience in backscatter communication, medical devices, sensing systems, as well as architecture, new business development and management. Dedicated to growth and success, thriving in fast-paced and demanding environments, providing direction and structure with a proven track record of mentoring and supporting various steams. Avid relationship builder within organizations to lead strategies. Confident public speaker and acknowledged author of 9 journal publications and 10 conference papers, 2 patents and 3 theses.

Expertise

- Backscatter communications
- Ultra low-power, low-cost wireless sensor networks
- Interdisciplinary academic and industrial research and development
- Medical devices for biomedical sensing and neuromodulation

Work Experience

More information and multimedia available at http://ekampianakis.github.io/projects.html

Senior Electrical Engineer — **Cirtec Medical**
Neuromodulation & Neural sensing RnD team — *Sept 2018 - Today (+internship)*

- Tech-lead for novel neural sensing platform for amputee rehabilitation incorporating wireless streaming communication with Microsemi MICS radio and Intan RHD neural amplifiers.
- Tech-lead for novel light-sensing & stimulation spinal cord stimulation platform. Developed low-noise light-backscatter-based electronics and coordinated closely with customer and mech. engineering team for integration.
- Tech-lead for the "ACCEL" implantable pulse generator platform. Assembled and coordinated 5-person engineering team and lead the project migration and sustaining efforts. Developed custom backscatter telemetry system from first principles.
- Designed and fabricated custom embedded automated verification testing systems for ISO 14708- and 60601-testing for leads and neuromodulation ICs, saving hundreds of hours in manual testing.
- Founding member of internal group for improving work environment, culture and reducing employee attricion rate.
- Responsible for managing interactions with engineering resources, customers and management for 10+ projects with a cumulative cost of over $10M.

RnD Electrical Engineer — **University of Washington**
NSF: Center for Sensorimotor Neural Engineering project "Wireless Bidirectional BCI" — *Sept. 2014–March 2019*

- Developed a 24 Mbps backscatter-based implantable systems using software defined radios, custom RF physical layer communication, and real-time signal processing; demonstrated 5x data-rate improvement compared to prior art. [J1,J2,J3,C2,P2]
- Developed and implemented wireless, μPower interface for translating the input spectrum of existing neural recording ICs using analog circuit design simulation and fabrication; demonstrated spectral improvement of 19 dB and allowed the reuse of expensive custom ICs. [C1]

Medical device startup founder — **University of Washington**
Amazon Inc.-funded project "Automated Continuous Bladder Irrigation (ACBI)" — *June 2017–May 2019*

- Founding member and EE tech leader for team of 5 engineers developing real-time hardware and firmware for embedded sensor/actuation system to monitor and control the medical procedure of continuous bladder irrigation. The developed device could save $285 million per year on healthcare in the United States alone. [P1]

RnD Electrical Engineer — **Technical University of Crete**
ERC-04-BLASE research project "Backscatter Networks for Large-Scale Environmental Sensing" — *Dec. 2011–Aug. 2014*

- Tech lead for a team of 4 Engineers designing and implementing low-power agricultural/environmental sensor network hardware, firmware, and custom physical layer communication, and signal processing; first demonstration of wireless backscatter sensor network in real-world application. [J4,J5,C4,C5,C6]

Education

University of Washington, Electrical Engineering — **Seattle, WA, USA**
Ph.D., Thesis: "High data-rate low-power wireless communication systems for brain computer interfaces" — *March 2019*
Advisor: Prof. Matthew Reynolds

Technical University of Crete, Electronic & Computer Engineering — **Chania, Greece**
M.Sc., Thesis: "Scatter radio sensor network with analog frequency modulation principles" — *July 2014*
Advisor: Prof. Aggelos Bletsas
Diploma of Eng. (5 year program), Thesis: "Custom over the air programmable embedded radios" — *December 2011*
Advisor: Prof. Aggelos Bletsas

Leadership/Mentorship Summary

Technical: Tech-Lead of numerous multi-disciplinary projects, teaching assistant (TA), lab manager

Non-technical: Primary mentor for 5 individuals in self-help programs. Primary organizer of meditation workshops and cultural groups.

Skills

Management: Agile methodology, Waterfall, Scrum, Interdisciplinarity
Social/Mental Non-violent communication, Active Listening, Mindfulness
Embedded Systems: 8051, ATMega128, Cortex M0+, Silabs/TI Radios, Arduino, Xilinx FPGA/CPLD, VHDL
Circuit Prototyping/Testing: PCB Milling, RF & SMD Board Fabrication, Testing using VNA, SA, SG, Oscilloscope
Software Tools: Matlab, C/C++, Labview, Gnuradio, Python, Cuda, UNIX Shell scripting,

Awards/Achievements

Publications: 8 Peer-reviewed Journal publications, 10 Conference publications (IEEE & other), 2 Patents (filed), 3 Theses

Best Paper/Poster: Best Poster, IEEE RFID 2017, Best paper (finalist), IEEE RFID 2017, Top 10% Qualification, IEEE Sensors 2017

Grants: Amazon Catalyst Grant for Project "ACBI", NCESD Grant for Solar Car Project "Hephaestus"

Academic: 3rd Place in health innovation challenge (HIC) in 2017, 1st Prize at the Pan-Hellenic IEEE Final/Diploma Thesis Competition for the years 2009-2011, Graduate Fellowship Award from Technical University of Crete 2011–2013

Athletic/Arts: 2nd Place in the Pan-Cretan Prelim Olympic Weightlifting Championship 2014, Professional Greek Folk Dancing 2009-today

Patent Applications

[P1]: PCT/US2017/637,311. System and Method for Automated Urine Assessment and Monitoring. Filed 3/1/2018

[P2]: PCT/US2017/016,573. Antenna Elements, Implanted Devices, and Systems for Communication With Implanted Devices. Filed 2/3/2017

Selected Peer-reviewed Journal Publications

[J1]: A. Sharma, **E. Kampianakis**, J. Rosenthal, A. Pike, A. Dadkhah and M. S. Reynolds, "Wideband UHF DQPSK Backscatter Communication in Reverberant Cavity Animal Cage Environments," in IEEE Transactions on Antennas and Propagation, vol. 67, no. 8, pp. 5002-5011, Aug. 2019. Note: A. Sharma and E. Kampianakis are first co-authors

[J2]: **E. Kampianakis**, A. Sharma, J. T. Arenas and M. S. Reynolds "A Dual-Band Wireless Power Transfer and Backscatter Communication Approach for Real-Time Neural/EMG Data Acquisition", IEEE Journal of Radio Frequency Identification (JRFID), vol. 1, no. 1, pp. 100-107, March 2017.

[J3]: A. Sharma, **E. Kampianakis** and M. Reynolds. "A dual-band HF and UHF antenna system for implanted neural recording and stimulation devices", in IEEE Antennas and Wireless Propagation Letters, vol. 16, pp. 493-496, 2017.

[J5]: **E. Kampianakis**, J. Kimionis, K. Tountas, C. Konstantopoulos, E. Koutroulis and A. Bletsas "Wireless Environmental Sensor Networking with Analog Scatter Radio and Timer Principles", in IEEE Sensors Journal, vol. 14, no. 10, pp. 3365-3376, Oct. 2014.

[J4]: S. N. Daskalakis, S. D. Assimonis, **E. Kampianakis** and A. Bletsas. "Soil moisture Scatter Radio Networking with Low Power", IEEE Trans. on Microwave Theory and Techniques (TMTT), vol. 64, no. 7, pp. 2338-2346, July 2016.

[J6]: A. Bletsas, A. Vlachaki, **E. Kampianakis**, G. Sklivanitis, J. Kimionis, K. Tountas, M. Asteris, and P. Markopoulos, "Building the low-cost digital garden as a telecom lab exercise", in IEEE Pervasive Computing, vol. 12, no. 1, pp. 48-57, Jan.-Mar. 2013.

[J7]: C. P. Providakis, S. Tsistrakis, M. Voutetaki, Y. Tsompanakis, M. Stavroulaki, J. Agadakos, **E. Kampianakis** and G. Pentes, "A new damage identification approach based on impedance-type measurements and 2D error statistics", Structural Monitoring and Maintenance, vol. 2, no. 4, pp. 319-338, June 2015.

[J8]: C. P. Providakis, E. V. Liarakos, and **E. Kampianakis**, "Nondestructive Wireless Monitoring of Early-Age Concrete Strength Gain Using an Innovative Electromechanical Impedance Sensing System", Smart Materials Research, 2013.

Selected Peer-reviewed Conference Publications

[C1]: **E. Kampianakis** and M. S. Reynolds. "A Biosignal Analog Front-End Leveraging Frequency Translation", in proc. IEEE Sensors 2017.

[C2]: **E. Kampianakis**, A. Sharma and M. S. Reynolds. "A Dual-Band Wireless Power Transfer and Backscatter Communication Approach for Implantable Neuroprosthetic Devices", in proc. IEEE RFID 2017 pp. 67-72. **Best poster award and best paper nomination.**

[C3]: X. Fu, A. Sharma, **E. Kampianakis**, A.P. Engel, D. Arnitz and M. S. Reynolds. "A Low Cost 10.0-11.1 GHz X-Band Microwave Backscatter Communication Testbed with Integrated Planar Wideband Antennas", in proc. IEEE RFID 2016.

[C4]: S. Assimonis, **E. Kampianakis** and A. Bletsas. "Microwave Analysis and Experimentation for Improved Backscatter Radio", in proc. European Conference on Antennas and Propagation (EuCAP), 2014

[C5]: **E. Kampianakis**, S. Assimonis and A. Bletsas. "Network Demonstration of Low-cost and Ultra-low-power Environmental Sensing with Analog Backscatter", in proc. Radio Wireless Week (RWW), Wireless Sensors and Sensor Networks (WiSNet) Topical Conference 2014

[C6]: **E. Kampianakis**, J. Kimionis, K. Tountas, C. Konstantopoulos, E. Koutroulis and A. Bletsas. "Backscatter Sensor Network for Extended Ranges and Low Cost with Frequency Modulators: Application on Wireless Humidity Sensing", in proc. IEEE SENSORS 2013 **Nominated as top %10 among presented papers.**