

Lefteris Kampianakis, Ph.D.

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Profile

An Electrical Engineer with 10+ years of experience in designing, integrating, fabricating, and testing electronics for wireless communication systems, sensors, and medical devices. A leader with solid academic achievements, multilingual and multicultural and interdisciplinary background with extensive experience in medical system design, new business development and management. Dedicated to growth, thriving in fast-paced and demanding environments, and providing direction and mentoring.

Technical Interests and Expertise

- o Design of neuromodulation & neural-sensing medical devices
- o Integration of cross functional systems and disciplines
- o Research, development and integration of novel technologies
- o Wireless power transfer and communication for medical devices

Education

University of Washington, Electrical Engineering

Ph.D., Thesis: "High data-rate low-power wireless communication systems for brain computer interfaces"

Advisor: Prof. Matthew Reynolds

Seattle, WA, USA

March 2019

Technical University of Crete, Electronic & Computer Engineering

M.Sc., Thesis: "Scatter radio sensor network with analog frequency modulation principles"

Advisor: Prof. Aggelos Bletsas

Chania, Greece

July 2014

Diploma of Eng. (5 year program), Thesis: "Custom over the air programmable embedded radios"

Advisor: Prof. Aggelos Bletsas

December 2011

Selected Work Experience

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

Senior Electrical Engineer, Manager: Steve Zielinski

Spinal cord stimulation platforms

Cirtec Medical

Sept 2018 - Today (+internship)

- o Electronics-lead for novel neural sensing platform for amputee rehabilitation incorporating wireless streaming communication with Microsemi MICS radio and Intan RHD neural amplifiers.
- o Electronics-lead for novel light-sensing & stimulation spinal cord stimulation platform. Developed low-noise reflectometer electronics and worked closely with customer and mech. engineering team for integration.
- o Electronics-lead for the "ACCEL" implantable pulse generator platform. Assembled and coordinated 4-person engineering team and lead the project migration and sustaining efforts. Developed verification fixtures, methods and systems, and upgraded firmware and hardware components.
- o 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.
- o Participated in 30+ business development opportunities and facilitated in developing 10+ million dollars contracts.
- o Founding member of internal group for improving work environment, culture and employee retention rate.

Graduate Researcher, Advisor: Prof. Matthew Reynolds

NSF: Center for Sensorimotor Neural Engineering project "Wireless Bidirectional BCI"

University of Washington

Sept. 2014–March 2019

- o Developed 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]
- o Designed and implemented wireless, μ Power 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]

Amazon Catalyst Fellow

Amazon Inc.-funded project "Automated Continuous Bladder Irrigation (ACBI)"

University of Washington

June 2017–May 2019

- o Developed 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]

Graduate Researcher, Telecom Lab, Advisor: Prof. Aggelos Bletsas

ERC-04-BLASE research project "Backscatter Networks for Large-Scale Environmental Sensing"

Technical University of Crete

Dec. 2011–Aug. 2014

- o Designed and implemented 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]

Independent Contractor, Supervisor: Prof. Konstantinos Providakis

THALES Programme: "Wireless Admittance Monitoring System (WiAMS)"

Technical University of Crete

Jan. 2011–Jan. 2013

- o Developed a novel wireless real-time monitoring system for structural integrity assessment of concrete structures using piezoelectric sensors; successfully detected cracks in concrete structures in real-time. [J7,J8]
- o Designed and fabricated driving circuit for an admittance measuring system using precision DACs and ADCs. Designed MySQL database with query optimization, UNIX shell scripting and custom driver development for the Raspberry Pi to interface the driving circuit.

Skills

Embedded Systems: 8051, ATmega128, Cortex M0+, Silabs/TI Radios, Arduino, Xilinx FPGA/CPLD, VHDL
CAD & Simulation: Eagle Board Design, Altium, LTSpice, Cadence
Social/Mental NVC, Active Listening, Mindfulness

Software Tools: Matlab, C/C++, Labview, Gnuradio, Python, Cuda, UNIX Shell scripting,
Circuit Prototyping/Testing: PCB Milling, RF & SMD Board Fabrication, Testing using VNA, SA, SG, Oscilloscope

Leadership/Mentorship

Technical: Tech-Lead of 3 EE multi-disciplinary medical device projects, teacher, lab instructor and tutor for 5 college classes (2011-2014)
Non-technical: Primary mentor for 5 individuals in self-help programs. Primary organizer of meditation workshops and cultural groups.

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]: **E. Kampianakis**, A. Sharma, James Rosenthal and M. S. Reynolds "Wideband UHF DQPSK Backscatter Communication in Reverberant Cavity Animal Cage Environments ", in IEEE Trans. on Antennas and Propagation (TAP), June 2018. (Submitted)
[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. Pentis, "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.**