Lefteris Kampianakis

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Objective

I have 9+ years of experience in designing, integrating, fabricating, and testing hardware for wireless sensing devices and networks. Specifically, I have focused on ultra low-power, ultra high data-rate Brain Computer Interfaces.

I'm starting an internship as an Integrated Circuits Architect & Systems Engineer with Cactus Semiconductor in the Fall of 2018. I am seeking challenging system-level design jobs starting Spring 2018.

Technical Interests and Expertise

- System-level design and integration of industrial products
- μPower consumption & high data-rate embedded systems
- Integrated high bandwidth brain-computer interfaces (BCI)
- High data-rate software-defined radio receivers
- Multilayer circuit/board design for RF and sensing applications

Education

University of Washington, Electrical Engineering — **Seattle, WA, USA**
Ph.D., Thesis: "High data-rate low-power wireless communication systems for brain computer interfaces" — *(Expected December 2018)*
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

Selected Work Experience

More information and multimedia available at http://staff.washington.edu/ekampian/projects.html

Graduate Researcher, Advisor: Prof. Matthew Reynolds — **University of Washington**
NSF: Center for Sensorimotor Neural Engineering project "Wireless Bidirectional BCI" — *Sept. 2014–present*

- 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]
- Designed 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]

Amazon Catalyst Fellow — **University of Washington**
Amazon Inc.-funded project "Automated Continuous Bladder Irrigation (ACBI)" — *June 2017–Present*

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

- 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,C7]

Independent Contractor, Supervisor: Prof. Konstantinos Providakis — **Technical University of Crete**
THALES Programme: "Wireless Admittance Monitoring System (WiAMS)" — *Jan. 2011–Jan. 2013*

- 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]
- 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.

Graduate Researcher, Telecom Lab, Advisor: Prof. Aggelos Bletsas — **Technical University of Crete**
The i-Cubes project: "Remotely Programmable, Low-power, Low-cost WSN from Scratch" — *Dec. 2010–Aug. 2011*

- Designed, integrated and fabricated wireless sensor network (WSN) hardware and firmware using 8051 microcontrollers and CC2500 radio ICs; the technology was utilized to build a reliable network for the municipal water company of Chania [J6,C10].
- Developed firmware with C and 8051 assembly for a custom bootloader that allows over-the-air programming (OTAP) of the WSN; demonstrated OTAP for a network of 5 custom nodes in under 10 seconds. [C8]

Technical skills

CAD & Simulation: HFSS, ADS, Eagle Board Design, AutoCAD, TiNA, LTSpice, Cadence

Embedded Systems: 8051, ATMega128, Cortex M0+, Chipcon Radios, Xilinx FPGA/CPLD, VHDL

Circuit Prototyping/Testing: PCB Milling, RF & SMD Board Fabrication, RF and mixed signal testing

Software Tools: Matlab, C/C++, Java, Gnuradio, Python, Cuda, UNIX Shell scripting, MySQL, CORBA, Java RMI, IDL, Fortran

Leadership

Mentoring: Electronics systems mentor for Amazon Catalyst project (2017–present), IEEE RFID 2017 organizing committee member

Teaching: Teaching and lab assistant for 4 classes (2011-2012), Paid tutor for Matlab, C, Java, Fortran (2010–2014)

Awards/Achievements

Publications: 7 Peer-reviewed Journal publications, 10 Conference publications (IEEE & other), 2 Patents (filed), 2 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: 2nd Place in the Pan-Cretan Olympic Weightlifting Championship - Preliminary Category 2014.

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

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. 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.

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. N. Daskalakis, S. D. Assimonis, **E. Kampianakis** and A. Bletsas. "Soil Moisture Wireless Sensing with Analog Scatter Radio, Low Power, Ultra-Low Cost and Extended Communication Ranges", in proc. IEEE Sensors, 2014.

[C5]: 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

[C6]: **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

[C7]: **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.**

[C8]: **E. Kampianakis**, J. Kimionis, K. Tountas and A. Bletsas. "A Remotely Programmable Modular Testbed for Backscatter Sensor Network Research", Workshop on Real-World Wireless Sensor Networks (REALWSN) 2013

[C9]: C. Konstantopoulos, **E. Kampianakis**, E. Koutroulis and A. Bletsas."Wireless Sensor Node for Backscattering Electrical Signals Generated by Plants", in proc. IEEE Sensors 2013

[C10]: A. Bletsas, A. Vlachaki, **E. Kampianakis**, G. Sklivanitis, J. Kimionis, K. Tountas, M. Asteris, and P. Markopoulos, "Towards precision agriculture: Building a soil wetness multi-hop WSN from first principles", in proc. 2nd International Workshop in Sensing Technologies in Architecture, Forestry and Environment (ECOSENSE) 2011.