STELLA BANOU
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Education

Northeastern University (NEU); Boston, MA
Master of Science in Electrical and Computer Engineering, December 2018 **GPA: 3.50**
PhD Candidate in Electrical and Computer Engineering, *expected graduation* August 2022

Worcester Polytechnic Institute (WPI); Worcester, MA
Bachelor of Science in Electrical and Computer Engineering, May 2016 **GPA: 3.53**
Minor in Spanish

Research Focus: Intra-Body Communication, Communication Systems Design, Wearable Safety, Capacitive sensing, Body Area Networks, Wireless Sensor Networks, Coupling communication methods, Health IoT

Academic Honors/Awards

NSF I-corps Award	February 2021
N2Women Fellowship INFOCOM 2019	May 2019
NSF Student Travel Grant NANOCOM 2018	September 2018
NEU Research Assistantship	August 2016 – Present
WPI Deans List	January – May 2013
WPI International Scholar	August 2012 – May 2016

Selected Publications

S. Banou, K. Li and K. R. Chowdhury, "MAGIC: Magnetic Resonance Coupling for Intra-body Communications," IEEE INFOCOM 2020, Toronto, Canada, July 2020.

W. J. Tomlinson, S. Banou, C. Yu, M. Nogueira, and K. R. Chowdhury, "Secure On-skin Biometric Signal Transmission using Galvanic Coupling," IEEE INFOCOM 2019, Paris, France, May. 2019.

W. J. Tomlinson, S. Banou, C. Yu, M. Stojanovic and K. Chowdhury, "Comprehensive Survey of Galvanic Coupling and Alternative Intra-body Communication Technologies", IEEE Communications Surveys and Tutorials, 2018

S. Banou, M. Swaminathan, G. Reus Muns, D. Duong, F. Kulsoom, P. Savazzi, A.Vizziello and K. Chowdhury, "Beamforming Galvanic Coupling Signals for IoMT Implant-to-Relay Communication", IEEE Sensors Journal, 2018

W. J. Tomlinson, S. Banou, C. Yu, M. Stojanovic and K. Chowdhury, "Body-Guided Galvanic Coupling Communication for Secure Biometric Data", IEEE Transactions of Wireless Communications, 2018

Selected Research Projects

Current
"**Human Body Antenna - Safe and Efficient Health Data Communication utilizing Human Tissue Conductivity"**
I design a system that induces a human antenna field to sense and communicate with other IoT devices in the near field- within 2.5 meters. This is the final piece for truly connected health monitoring that completes the full cycle of data flow, from implanted to wearable devices and finally from the body network to the computational cloud for the next generation of IoT-enabled healthcare.

"Smart Mask – proximity, safe behavior and health data monitoring"
I led a team that successfully applied to the NSF I-corps program for commercializing research products. We received $50,000+ to fund customer discovery on a Smart Mask sensor network system, which measures proximity, hand gestures, correct mask placement and vitals and identifies patterns of safe behavior with regards to airborne disease spread. I designed a proximity sensing and alert communication system that can be inserted on a cloth mask to ensure safe social behavior.

June 2018 – August 2019
***"Design and Implementation of a Magnetic Resonance Communication system for Implanted Intra-Body Networks"* :** I led the design of a Magnetic Resonance communication system between a wearable transceiver and a network of implants in the body. Presented the work in INFOCOM 2020.

April 2018 – June 2018
"Implementation of Beamforming-in-the-body": Worked on the design of a hardware implementation of a MISO beamforming system utilizing intra-body galvanic coupling signals to transmit and receive sensor data. I implemented the system using N210 USRPs with

MATLAB. The use of beamforming weights increased the received power by 3 dB while ensuring low BER of ~10^{-3} for a muscle to skin communication link. The purpose is to provide an efficient implant to relay communication system for intra-body networks.

May 2017 – March 2018

"Body-Generated Password Authentication System": Worked on the development of an authentication system to unlock mobile devices using electrocardiogram (ECG) signals, alternative to today's fingerprint and facial recognition systems. The signal is acquired on the wrist and is transmitted to the palm by Galvanic Coupling (GC) Intra-Body Communication. We developed an ECG-signal classification algorithm identify a subject based on their unique ECG signal. Led the arm-wrist-palm channel model. I contributed to the final prototype design that acquire the signal, create a password and transmit it via GC to unlock a device upon contact.

August 2015 – March 2016

Automotive Cyber Physical Systems, WPI: Our team of four worked with Prof. Wyglinski to design a wireless transmitter-receiver pair using USRPs and MATLAB that mimics the transmission of a Tire Pressure Monitoring System (TPMS) sensor signal. The purpose of the project was to investigate the TPMS wireless signal as a possible point of entry for malicious attacks on automotive vehicles.

Work Experience

Sept. 2019 – March 2020	**Interim Engineering Intern at Qualcomm Inc., Cambridge UK:** As part of the Innovation and Advanced Algorithm team, I worked on a novel ear-to-ear communication system for wireless earphones. I led the proof-of-concept implementation of a magnetic coupling communication system and presented to senior leadership of the company (head of EMEA, Senior VP of Engineering)
May – August 2014	**Communications Intern at National Grid, Worcester MA:** Worked on the company's Smart Grid pilot in Worcester. Worked with and presented to the Engineering Testing Department, Communications and Marketing, Customers Service. Responsibilities included public awareness about the pilot, educating the public and the overseas colleagues from the UK.
August 2014 – May 2016	**Campus Center Building Manager, WPI:** Managing the three stories Rubin Campus Center, checking out items (laptops, chargers, cables), directing visitors around the building and campus.
August 2014 – May 2016	**Office of Multicultural Affairs Student Worker, WPI:** Organizing events that promote the different cultures that are represented in the student body of WPI as well as overseeing the office in the evenings.

Skills

Electronic Systems Design: Microwave Circuit Design, Continuous and Digital signal processing, Biomedical Signal Processing, Software Defined Radios (USRPs) programming, Embedded programming C/C++, System design and implementation: Galvanic, Magnetic and Capacitive coupling for body-worn devices and implants
Simulation/Modeling Software: COMSOL, ANSYSS, CST
Programming Languages: MATLAB, C, C++, Python, basic VHDL, basic HTML, LateX
Languages: English and Greek (fluent), Spanish (Advanced)

Class Work

MSc, Northeastern University 2016-2018

Applied Probability and Stochastic Processes
Biomedical Signal Processing
Machine Learning and Pattern Recognition
Fundamentals of Computer Networks
Mobile and Wireless Networking
Advanced Network Management
Parallel Processing Data Analysis
Information Theory
Microwave Circuit Design
Wireless IoT Systems

Leadership and Outreach

Feb 2013 – May 2016	**National Grid Engineering Ambassador, WPI:** Performed regular presentations and activities in local middle schools and high schools to promote engineering as a field of study for future college students. Particularly interested in promoting STEM to minorities and young girls as a possible career. Formed an engineering ambassadors network with other universities in New England. Sponsored by National Grid.
Aug 2013 – May 2016	**Community Advisor, WPI:** Served as an orientation leader for a group of 27 freshmen. Organized events and programs to make their transition to college easier. Received special training to act as an advisor for academic, personal and social issues.