Eric Ponce

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Education

Massachusetts Institute of Technology *Cambridge, MA*
PhD in Electrical Engineering and Computer Science GPA: 5.0/5.0 *Jun 2019 – Sep 2023*
MEng in Electrical Engineering and Computer Science GPA: 4.8/5.0 *Jun 2017 – Jun 2019*
BS in Electrical Science and Engineering GPA: 4.9/5.0 *Aug 2013 – Jun 2017*

Skills

Hardware Analog, digital, embedded, low-power, and power electronic circuit design, KiCad, Altium, Cadence, SPICE, SolidWorks
Firmware Communications (SPI, I2C, CAN, Wi-Fi, BT, NB-IoT, etc.), signal processing, multiple MCU architectures (8051, AVR, ARM Cortex-M), RTOS
Software C, C++, Python (NumPy, SciPy, Matplotlib), shell scripting (bash), Git, build system (GNU), HTML, CSS, JavaScript
Other Numerical & analytical modeling, optimization, 3D printing, laser cutting, solder rework, Spanish

Experience

MIT – Electromechanical Systems Group (Prof. Steven Leeb), *Graduate Researcher* **Jun 2017 – Sep 2023 | Cambridge, MA**
- Developed physical models and low-power mixed-signal embedded circuitry (Infineon PSoC), firmware, and software for non-intrusively measuring the state and operation of mechanical systems, such as water meters, to cheaply retrofit for smart resource tracking and diagnostic capability
- Developed electrical models, low-power embedded circuitry (Infineon PSoC, Microchip SAML10), and firmware for harvesting ambient energy from magnetic fields to enable low-maintenance sensing of systems
- Developed methods for analyzing the stability of grid-connected constant-power-loads which may cause serious instabilities
- Redesigned firmware and developed a new web software UI to drastically reduce power consumption and demonstrate new sensing capabilities for research group's wireless sensing platform centered around a TI Tiva C Series microcontroller and CC3100 Wi-Fi network processor
- Mentored/managed several undergraduate- and graduate-level researchers on development for research group topics and electrical engineering courses for students across a range of levels (middle-school through university)

Caribbean Science Foundation – SPISE, *Electronics Instructor* **Jul 2023 – Aug 2023 | Bridgetown, Barbados**
- Developed and taught a five-week hands-on introduction to electronic circuit design for Caribbean high-school students who are gifted in STEM

WaterBit, *Electrical Engineering Intern* **Jun 2020 – Aug 2020 | San Jose, CA**
- Developed real-time embedded signal processing methods to non-intrusively detect disastrous valve failure in harsh agricultural environments
- Restructured and rewrote ultra-low power firmware to enable development of new features and reduce technical debt
- Customized the firmware build system for our Infineon PSoC target to improve version control and continuous integration efforts
- Reviewed designs of high-efficiency ultra-low-power switching converters for sensors and suggested improvements

MIT – 6.131 Power Electronics Lab & 6.115 Microcomputer Lab, *Teaching Assistant* **Jan 2017 – Jun 2019 | Cambridge, MA**
- Managed staff hours, laboratory resources, and safety, maintained lab equipment, and helped students learn the material and debug their work
- Acheived a TA rating of 6.96/7.0 and received the 2022 Grainger Foundation Teaching Award for transitioning labs to a remote learning format

ORI, *Electrical Engineering Consultant* **Sep 2016 – Feb 2017 | Cambridge, MA**
- Developed highly configurable and easily expandable embedded circuitry for control of movable furniture centered around an Infineon PSoC

Apple – iPad Systems, *Electrical Engineering Intern* **Jun 2016 – Aug 2016 | Cupertino, CA**
- Developed software and tooling and interfaced with vendor to validate, debug, and improve early-stage USB power-delivery
- Validated power distribution and high-speed communication networks and interfaces using a network analyzer
- Owned design and production of mixed-signal high-speed multi-layer PCB to enabled the testing of high pixel density LED displays
- Provided engineering support in Shenzhen during bring up of large-scale design verification build

Electric Vehicle Student Team, *Team Member, Lead* **Sept 2013 - June 2018 | Cambridge, MA**
- Managed design and implementation of all electrical systems in electric Opel GT conversion project
- Set up a bare-metal ARM development environment and unit-testing/static-analysis systems to streamline team-wide embedded development
- Developed customizable battery control modules for traction applications with safety monitoring, power distribution, and charging functionality

Publications

- Monagle, D., **Ponce, E.**, & Leeb, S., "Resonant Circuits for Split-Core Magnetic Energy Harvesters," *IEEE TIE*, 2023
- **Ponce, E.**, "Measurement and Modeling for Resource Monitoring," PhD Thesis, *DSpace@MIT*, 2023
- Monagle, D., **Ponce, E.**, & Leeb, S., "Generalized Analysis Method for Magnetic Energy Harvesters," *IEEE TPEL*, 2022
- Gutierrez, M., Saathoff, E., **Ponce, E.**, & Leeb, S., "Sub Line-Freq. Stability Analysis of Single-Phase CPLs Using Envelope Impedance," *IEEE TPEL*, 2022
- **Ponce, E.** & Leeb, S., "Passive Probe: Mechanically-Modulated Field Sensing for Motion Tracking and Flow Estimation," *IEEE Sensors Journal*, 2022
- **Ponce, E.**, Leeb, S., & Lindahl, P., "Know the Flow: Non-Contact Magnetic Flow Rate Sensing for Water Meters," *IEEE Sensors Journal*, 2021
- **Ponce, E.** & Leeb, S., "A 3-D Field Solution for Axially Polarized Multi-Pole Ring PMs and its Appl. in Position Meas," *IEEE Trans. Magn.*, 2020
- **Ponce, E.**, "Non-intrusive load monitoring for existing water and natural gas metering infrastructure," MEng Thesis, *DSpace@MIT*, 2019