

# Jonathan Ward

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## Summary

- Hardware engineer with over ten years of experience developing consumer and industrial hardware
- Deep experience in circuit design with breadth in software/firmware, FPGA, and other subdomains
  - Adept at system-level thinking as well as diving into implementation details
  - Delivered multiple products from concept through design, prototyping, and manufacturing
  - Provided mentorship for interns and junior engineers

## Skills

**Circuit design** - analog, RF, digital, circuit prototyping and rework, SPICE simulation, Keysight ADS RF simulation

**Schematic capture and circuit layout** - Altium, Mentor Graphics, others

**FPGA development** - Verilog, Altera Quartus, Xilinx ISE, Synplify, Modelsim

**Software development** - C, C++, Python, Swift, make, git

**Embedded development** - ARM Cortex M and Atmel platforms, JTAG/SWD debugging, Bluetooth LE, SPI, I2C, UART

**Mechanical** - Autodesk Inventor and other 3D CAD, machining and injection molding processes

## Education

**Columbia University** • New York, New York

Master of Science in Electrical Engineering, May 2010 • GPA: 3.43/4.0

**Case Western Reserve University** • Cleveland, Ohio

Bachelor of Science in Electrical Engineering, January 2007 • GPA: 3.83/4.0 • Magna Cum Laude

- Graduate and undergraduate coursework in analog/RF/digital circuits, IC design, digital signal processing, robotics, wireless communications

## Work Experience

**Co-Founder • Aeroscope Labs** • Boulder, Colorado • June 2015 – September 2017

- Produced wireless oscilloscope probe from initial concept to design, global sourcing, manufacturing, and product launch with paying customers
- Led industrial and mechanical design, beginning with form studies to design of injection molded parts and machined components
- Designed system architecture encompassing analog front-end, ADC, FPGA, microcontroller, radio interface, and iOS app
- Developed oscilloscope-on-a-chip FPGA solution in Verilog with high-speed ADC interface, signal analysis and trigger control, memory interface, and data output
- Implemented bare-metal C task scheduler for ARM Cortex M to interface between Bluetooth LE core and FPGA
- Built iOS app using Swift and designed complete user experience; guided app through acceptance on Apple App Store
- Designed and implemented custom Bluetooth LE protocol in C (embedded) and Swift (iOS) for wireless oscilloscope data transfer, optimized for low data rate
- Developed Bluetooth LE over-the-air FPGA firmware update solution using C (embedded) and Swift (iOS)
- Prototyped signal digital processing code in Python/Jupyter and created Swift implementation for final iOS application

**Lead Electrical Engineer • Nima** • San Francisco, California • April 2014 – July 2015

- Collaborated with mechanical and chemical engineers to create portable electronic food allergen detection devices utilizing sensitive optoelectronics (image sensors, photodiodes, and linear arrays) and ELISA test strips
- Designed a flexible embedded allergen detection platform with optical sensing, motor control, Bluetooth LE radio, and ARM microcontroller as well as performed PCB design and board bring-up
- Implemented low-level driver in C for CMOS linear image sensor using digital I/O for control and ADC for pixel data
- Built test system GUI in Python to visualize sensor test data and rapidly iterate sensor hardware and sensing algorithms
- Developed signal processing algorithms in C and Python to process optical sensor data and extract measurement results

**Electrical Engineer • Square Inc** • San Francisco, California • October 2012 – April 2014

- Member of core team responsible for ushering consumer credit card processing/point of sale products from initial concept through design, regulatory certification, manufacturing, and retail availability
- Performed PCB and flex circuit design and bring-up/prototyping while collaborating with product designers on form-factor
- Analyzed EMC (Electromagnetic Compatibility) failures due to spurious RF emissions and helped bring consumer products through FCC and CE regulatory compliance
- Participated onsite at several overseas manufacturing facilities to ensure successful manufacturing test setup and production

**Consulting and Contracting** • Boulder, Colorado and San Francisco, California • February 2011 – October 2012

**Backcountry Access** • **Atlantis Light Systems** • **Planet Labs** • **Fitbit**

- Prototyped a consumer-focused biometric sensing platform with analog signal processing, motor control, microcontroller
- Aided in design and implementation of X-band satellite radio prototype for remote sensing applications using high-speed board layout techniques coupled with FPGA-based digital signal processing
- Designed board-level RF/analog circuits for use in avalanche beacons
- Developed embedded software in C for the user interface and safety features of a high-intensity underwater light system

**Hardware R&D Engineer** • **Agilent Technologies** • Santa Rosa, California • May 2007 – May 2009

- Member of the signal analysis division developing RF and high-speed digital hardware for spectrum analysis equipment
- Performed simulation, board-level design, and verification of high-speed, multi-GHz digital systems such as PCI Express
- Developed CPLD/FPGA firmware for intermediate frequency (IF) processing systems using Verilog and the Synplify/Xilinx FPGA toolchain
- Collaborated on the design of advanced analog calibration hardware to ensure instrument accuracy over time, temperature, and humidity variations

**Part-time Consulting** • Cleveland, Ohio • August 2005 – May 2007

- Consulted for product design firm Nottingham-Spirk, prototyping circuits for consumer products including ultrasonic scent atomizer, hair straightening iron, automated cat litter box
- Acted as technical advisor for patent litigation case involving detailed technical analysis of embedded digital signal processing software written in Atmel assembly language

**Embedded Software Engineer Co-op** • **Rockwell Automation** • Cleveland, Ohio • May 2004 – December 2004

- Wrote C++ and ARM assembly firmware for Allen Bradley Logix PLCs

### **Interests and Activities**

- Avid interest in woodworking, metalworking, rock climbing, hiking
- FCC licensed general class amateur radio operator: KI6TFK
- Completed NCEES Fundamentals of Engineering/EIT exam in 2006 (precursor to PE licensing)