# Kelvin Ly

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University of Central Florida — MS, Computer Engineering
Cummulative GPA: 3.944 — 2016-2018

University of Central Florida — BS, Electrical Engineering
Cummulative GPA: 3.905, Magna Cum Laude — 2011-2015

## Objectives

To begin and pursue a career in electrical engineering or firmware engineering

## Skills

- Professional experience in electronics design (mostly **mixed signal/digital**, a little RF), **PCB layout** (KiCad, Altium Designer)
- Some experience with **low-noise analog/mixed-signal design**, **analog filter design**, **digital signal processing**, **image processing** (**CUDA** interoperating with **OpenCV**)
- Hobbyist level **PCB assembly, reflow, and rework**, **SPICE circuit modeling**, and reverse engineering (hardware and firmware)
- Some familiarity with **I2C**, **SPI**, **UART**, **CAN**, **SDIO**, **Ethernet**(10BASE-T), **on-off keying**, **PCM**, **802.11a/b**, **MIPI CSI**, **parallel camera interface**, **JESD204**, **SerDes**, **AMBA/AXI**, **DDR1**, **SPI Flash**, **Bluetooth Low Energy**, **I2C-based gyroscopes, accelerometers, magnetometers**, **USB 1.0**
- Familiarity with **nRF52**, **MSP430**, **PIC12**, **ATTiny/ATMega**, **SAM D09** microcontrollers
- Implemented **I2C**, **SPI**, **UART**, **PWM**, **VGA**, **Ethernet RMII**, **Wishbone** interfaces on FPGA logic
- Fluent in **C99**, **C++14**, **Python 2/3**, **Go**, **Verilog**
- Working knowledge of **x86/x64/MIPS/MSP430** assembly, **Java**, **LaTeX**, **MATLAB**, **Multisim**, **Xilinx ISE/Vivado**, **VHDL**, **Linux** (scripting and low-level userland programming, some kernel module programming), **JTAG/SWD**, **TCL**

## Professional Experience

**STERIS IMS** Electrical Engineer, Cooper City FL — May 2018 - present

- Created **PCB designs**, **layouts**, sourced parts, and **assembled and tested** PCBs to create reproducible and manufacturable designs, including some **flexible PCBs**
- Developed **firmware** and **support software** for devices and prototype designs as needed, including work in **image processing** using **OpenCV**, and **IMU sensor fusion** using industry-standard **Madgwick filter**
- Tested devices to ensure compliance with **IEC60601** and other standards

**Cassina Technologies** Software Engineer, Cooper City FL — October 2018 - present

- Developed **firmware** for Bluetooth LE-based device and designed **Bluetooth LE application level communication protocols** to use in device
- Developed **Android app** to interface with and to control Bluetooth LE-based device

**Fluorometric Instruments** Design Engineer, Orlando FL — September 2017 - present

- **Designed PCBs** part time for oxygen sensors, allowing client to test manufacturable products
- Created **designs**, **layouts**, sourced parts, and **assembled and tested** PCBs to create reproducible and manufacturable designs
- Developed **firmware** and **support software** for devices as needed

**University of Central Florida** Undergraduate/Graduate Researcher, Orlando Fl — November 2015 - May 2018

- Researched defenses and attack mitigations for the **Internet of Things**, producing four publications and one book chapter
- **Designed and assembled PCBs** for the lab, producing tools and prototypes for a wide variety of projects
  - Built mixed-signal or digital designs incorporating **Texas Instruments**, **Expressif**, and **Atmel** microcontrollers
  - Designed **architecture and IP cores** for **Nexys 4 Artix-7 FPGA** to **transceive Ethernet packets** and **crack homomorphic encryption** as part of our second place entry in **NYU CSAW ESC '15**
  - Designed IP cores in **Verilog** to patch **OpenRISC processor core** as part of our winning entry in **NYU CSAW ESC '16**

**University of Central Florida** Undergraduate Researcher, Orlando FL — December 2014 - March 2015

- Studied **feature extraction** from EEG data, implementing **SSVEP frequency detection** that was later used in senior design project
- Maintained and repaired **RAVEN II** medical robot running on **ROS robotics framework**, restoring it to operation and allowing its use under a new team in current research projects

## Internships

**IBM** Extreme Blue Intern, RTP NC — May 2015 - August 2015

- Developed **on-disk encryption** for **IBM Connections**, creating a roadmap of design pitfalls for IBM's teams to work off of
- Implemented project in **JavaScript and Node.js**, with patches to existing **Java** and **Python** code and libraries, successfully providing encrypted context access and search indexing

**Google** Software Engineer Intern, Chapel Hill NC — May 2014 - August 2014

- Patched existing benchmarking code for Skia rendering engine, allowing collection of gigabytes of data per day into a single database
- Contributed code in **C++**, **Python** and **Go** to create actionable visualizations of benchmarking data, fulfilling Skia team's recommendations

## Notable Projects

| Project | Software/FPGA | Analog/RF | DSP/Control | Power/Misc |
|---|---|---|---|---|
| Reflow oven from toaster (WIP) | PID controller using MSP430 MCU | Temperature reading using thermocouple | - | Mains isolation from controller, zero-crossing gate driver, housing design with emphasis on thermal insulation and even heating |
| Guitar looper effects pedal (WIP) | FPGA logic for communicating with DDR DRAM, ADC and DAC | Simple passive filtering, discrete ADC design | Second order $\Sigma - \Delta$ ADC design, simple FIR filtering, DAC implemented on FPGA using PDM (pulse density modulation) | - |
| 915 MHz 1 Mbps discrete RF transceiver (WIP) | Signal processing on FPGA | Half duplex IQ modulation/demodulation using discrete diode ring mixer, multiple VGA stages, discrete power amplifier design | Error correction, AGC, packet decoding implemented on FPGA | Multi-board design |
| Capacitive linear encoder (rev. 3, WIP) | Bare metal ARM coded in C for Microchip SAM D09 | Common mode noise reduction using differential signal along with 5th order Butterworth active filter | Same as before | Use of cheaper op amps based on better noise analysis |
| Sensorless brushless DC motor driver for RC plane (WIP) | FOC using Lattice iCE40 FPGA driving TI DRV8353 gate driver | - | State observer and FOC implemented on FPGA | Layout designed for high current, space for heatsinking for MOSFETs |
| Visible light transmitter and receiver | Bare metal ARM coded in C, using USB peripheral for data transfer, MSP430-based transmitter, signal processing code written in Python | Transimpedance photodiode front end with several stages of variable gain amplifiers and bandpass filtering | Cortas phase locking loop, software-controlled AGC, BPSK demodulation with CRC checksum, PID-based automatic gain control | Space-constrained, low power transmitter design with capacitive-touch buttons, IMU for position sensing |
| RF broadband attenuator blocks | - | RF layout, routing taper design to transition from SMA connector to coplanar waveguide on two-layer FR4 | - | (WIP) Aluminum housing to reduce RF emissions |
| 144 MHz Yagi-Uda antenna with discrete LNA | LNA designed using Jupyter Notebook, implemented noise calculation code for scikit-rf | Infineon BFU520 based LNA, L-matching networks designed using VNA measurements, antenna tuning and characterization using modified TinyVNA | - | Modified TinyVNA to have lower output power to avoid saturating BFU520 during measurements |
| Universal motor controller board | - | - | - | Four H-bridges using DI DGD0506A MOSFET gate drivers |
| Capacitive linear encoder (rev. 1/2) | Bare metal ARM coded in C | High impedance front end followed by cascaded active low pass filters into ADC driver | Computationally efficient digital filtering to remove harmonics and calculate phase using CORDIC | - |
| Lunar Knights robotics team software lead (UCF) for NASA Mars Rover Competition | Software written in C++ using ROS framework using Jetson TX2, autonomous navigation and teleoperation | - | PID tuning for wheels and digging arm | Mitigated noise on digging arm position potentiometers, wrote code to interface with CAN-based motor controller |
| Mind-controlled wheelchair (UCF) | Wheelchair controls implemented on Raspberry Pi 3 | - | Feature extraction from electrodes on scalp, based on steady state visually evoked potential (SSVEP) | Designed laser cut joystick gimbal |