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 **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, firmware, protocols)
- Some familiarity with **I2C**, **SPI**, **UART**, **CAN**, **SDIO**, **Ethernet**(10BASE-T), **QAM**, **on-off keying**, **PCM**, **PPM**, **802.11a/b**, **MIPI CSI**, **parallel camera interface**, **JESD204**, **SerDes**, **AMBA/AXI**, **DDR1**, **SPI Flash**, **LVDS**, **Bluetooth Low Energy**, **USB 1.0**, **one wire**
- Familiarity with **nRF52**, **MSP430**, **PIC12**, **ATTiny/ATMega**, **Atmel SAM**, **STM32**, **Silicon Labs C8051** microcontrollers
- Implemented **I2C**, **SPI**, **UART**, **PWM**, **VGA**, **Ethernet RMII**, **parallel camera**, **Wishbone**, **HyperBus** interfaces on FPGA logic (**Lattice**, **AMD/Xilinx**, **Intel/Altera**)
- 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 Senior Electrical Engineer, Cooper City FL (full time) — May 2018 - present

- Created **PCB designs**, **layouts**, sourced parts, and **assembled and tested** various 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 **FPGAs**, and **IMU-based sensor fusion**
- Developed **custom kernel driver** to support custom camera sensor on **Jetson TX2**
- **Reverse engineered** various PCBs, serial protocols, etc
- Tested devices to ensure compliance with **IEC60601** and other standards

Cassina Technologies Software Engineer, Cooper City FL (part time) — 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, Tarpon Springs FL (part time) — 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**, along with matching patches to **GCC** 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
3D printer pick and place attachment (WIP)	**Computer vision**-based PCB and component semiautomatic registration, interfacing with 3D printer controls for bulk of motion		**Stepper**-driven theta axis, open loop second Z axis	Multiboard design, lots of mechanical design using **FreeCAD**, Maxwell kinematic coupling
CNC controller	**grbl** based CNC driver using **TMC2590** stepper motor controllers, **ATtiny404** for stepper motor initialization			Four layer PCB layout, careful routing around current sense and MOSFET gate traces, control signal isolation to reduce EMI issues
915 MHz 1 Mbps discrete RF transceiver (WIP)	Signal processing **implemented on FPGA**	Half duplex **direct conversion IQ modulation/demodulation** using **discrete diode ring mixer**, multiple **VGA stages**, discrete **power amplifier design**	**Error correction**, **AGC**, and packet decoding **implemented on FPGA**	Multi-board design
Capacitive linear encoder (rev. 3, WIP)	Bare metal dsPIC coded in C for **Microchip dspPIC33**	Variable gain amplifier stages, design for maximizing dynamic range while reducing potential EMI performance degradation	Same as before	Use of cheaper op amps based on better **noise analysis**
FPGA-based logic analyzer based on iCE40 devkit	Logic signal encoding using **hardware ring buffer**, efficient signal encoding, hand written **soft UART core**			Hand written **I2C decoder** in Python
Sensorless brushless DC motor driver for RC plane (WIP)	**FOC** using **STM32F301** driving **TI DRV8353** gate driver	-	**State observer** and **FOC implemented in bare metal ARM**	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 **active bandpass filtering**	**Cortas phase lock 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
Capacitive linear encoder (rev. 1/2)	**Bare metal** ARM coded in C for **STM32F070C5T6**	High impedance, low noise front end followed by cascaded **active low pass filters** into ADC driver	Computationally efficient digital filtering to remove harmonics and **phase shift calculation** using **CORDIC**	-
Lunar Knights robotics team software lead (UCF) for NASA Mars Rover Competition	Software written in C++ using **ROS framework** using NVIDIA 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, senior design project (UCF)	Wheelchair controls implemented on **Raspberry Pi 3** in **Python 3**	-	**Feature extraction** from electrodes on scalp, based on steady state visually evoked potential (SSVEP)	Designed **laser cut** joystick gimbal