

# Kelvin Ly

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UNIVERSITY OF CENTRAL FLORIDA

Cummulative GPA: 3.944

MS, COMPUTER ENGINEERING

2016-2018

UNIVERSITY OF CENTRAL FLORIDA

Cummulative GPA: 3.905, Magna Cum Laude

BS, ELECTRICAL ENGINEERING

2011-2015

## OBJECTIVES

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

## SKILLS

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- 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 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**, **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 (**Lattice**, **Xilinx**, **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

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**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

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**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

- 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
Closed loop galvanometer (WIP)	-	Analog feedback loop using <b>capacitively sensed position</b>	Tunable PID loop for feedback	-
Reflow oven from toaster (WIP)	<b>PID controller</b> using <b>MSP430 MCU</b>	Temperature reading using thermocouple	-	Mains isolation from controller, <b>zero-crossing gate driver</b> , housing design with emphasis on thermal insulation and even heating
Guitar looper effects pedal (WIP)	FPGA logic for communicating with <b>DDR1 DRAM</b> , custom ADC and DAC	Simple passive filtering, discrete ADC design	<b>Second order <math>\Sigma - \Delta</math> ADC design</b> , simple <b>FIR filtering</b> , DAC implemented on FPGA using <b>PDM</b> (pulse density modulation)	-
915 MHz 1 Mbps discrete RF transceiver (WIP)	Signal processing <b>implemented on FPGA</b>	Half duplex <b>direct conversion IQ modulation/demodulation</b> using <b>discrete diode ring mixer</b> , multiple <b>VGA stages</b> , discrete <b>power amplifier design</b>	<b>Error correction</b> , <b>AGC</b> , and packet decoding <b>implemented on FPGA</b>	Multi-board design
Capacitive linear encoder (rev. 3, WIP)	Bare metal ARM coded in C for <b>Microchip SAM D09</b>	Common mode noise reduction using differential signal along with <b>5th order Butterworth active filter</b>	Same as before	Use of cheaper op amps based on better <b>noise analysis</b>
Sensorless brushless DC motor driver for RC plane (WIP)	<b>FOC</b> using <b>Lattice iCE40 FPGA</b> driving <b>TI DRV8353</b> gate driver	-	<b>State observer</b> and <b>FOC implemented on FPGA</b>	Layout designed for high current, space for heatsinking for MOS-FETs
Visible light transmitter and receiver	Bare metal ARM coded in C, using USB peripheral for data transfer, <b>MSP430</b> -based transmitter, signal processing code written in Python	<b>Transimpedance photodiode front end</b> with several stages of <b>variable gain amplifiers</b> and <b>active bandpass filtering</b>	<b>Cortas phase lock loop</b> , software-controlled <b>AGC</b> , <b>BPSK demodulation</b> with CRC checksum, <b>PID</b> -based automatic gain control	<b>Space-constrained</b> , <b>low power</b> transmitter design with <b>capacitive-touch</b> buttons, <b>IMU</b> for position sensing
RF broadband attenuator blocks	-	<b>RF layout</b> , 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 <b>discrete LNA</b>	LNA designed using <b>Jupyter Notebook</b> , implemented noise calculation code for <b>scikit-rf</b>	Infineon BFU520 based LNA, <b>L-matching networks</b> designed using <b>VNA measurements</b> , <b>antenna tuning</b> and <b>characterization</b> using modified TinyVNA	-	Modified TinyVNA to have lower output power to avoid saturating BFU520 during measurements
Universal motor controller board	-	-	-	Four <b>half H-bridges</b> using DI DGD0506A MOS-FET gate drivers
Capacitive linear encoder (rev. 1/2)	<b>Bare metal</b> ARM coded in C for <b>STM32F070C5T6</b>	High impedance, low noise front end followed by cascaded <b>active low pass filters</b> into ADC driver	Computationally efficient digital filtering to remove harmonics and <b>phase shift calculation</b> using <b>CORDIC</b>	-
Lunar Knights robotics team software lead (UCF) for NASA Mars Rover Competition	Software written in C++ using <b>ROS framework</b> using NVIDIA Jetson TX2, <b>autonomous navigation and teleoperation</b>	-	<b>PID tuning</b> for wheels and digging arm	<b>Mitigated noise</b> on digging arm position potentiometers, wrote code to interface with <b>CAN-based motor controller</b>
Mind-controlled wheelchair, senior design project (UCF)	Wheelchair controls implemented on <b>Raspberry Pi 3</b> in <b>Python 3</b>	-	<b>Feature extraction</b> from electrodes on scalp, based on steady state visually evoked potential (SSVEP)	Designed <b>laser cut</b> joystick gimbal