Christopher Thomas, PhD

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Goals:

My passion is designing innovative hardware and software for scientific research.

Credentials:

- PhD, Computer Engineering, York University
- MASc, Computer Engineering, University of Toronto

Neuroscience Accomplishments:
(Supervisor: Thilo Womelsdorf, Vanderbilt University)

- "NeuroLoop" real-time stimulation system
  - Implemented a real-time signal processing chain for closed-loop neural stimulation (Open Ephys).
  - Collected and analyzed in vivo pilot data using this closed-loop system.
- "Triad Drive" probe drives
  - Designed and implemented mechanical customization of neural probe drives to allow use of custom probes.
- "Neuro2k" neural recording system
  - Specified and integrated hardware for very-high-channel-count neural recording.
  - Specified and integrated custom probe and headstage hardware for simultaneous neural recording and stimulation.
  - Implemented signal processing workflows for analyzing the resulting high-channel-count data.
- "Kiosk Station" NHP cognitive-behavioral research kiosk
  - Designed and implemented hardware and firmware for a real-time analog data logger and digital signal generator.
  - Designed and implemented a synchronized multi-camera monitoring system.
  - Specified and integrated off-the-shelf computing hardware for use in the kiosk.
  - Contributed towards mechanical design revisions for the version 2 and version 3 Kiosk Station.

Embedded Systems Accomplishments:

- Wearable inertial measurement unit *(Supervisor: Dana Kulić, University of Waterloo)*
  - Designed and implemented hardware and firmware for a wearable sensor module.
  - Designed and implemented wireless network hardware and firmware to aggregate data from these sensors.
- Custom image sensor chip *(Supervisor: Richard Hornsey, York University)*
  - Designed and implemented mixed-signal circuitry and embedded optics for custom image sensor chips.
  - Designed and implemented custom embedded test boards for verification of these sensors.
  - Formulated and tested deblurring and colour reconstruction algorithms for use with these sensors.
- Custom analog to digital converter *(Supervisor: Richard Hornsey, York University)*
  - Designed and implemented an ultra-low-power analog to digital converter chip.
  - Designed and implemented custom embedded test boards for verification of this converter.

Strengths:

- Neuroscience Skills:
  - Experienced with analysis of NHP neural data.
  - Experienced with specifying, integrating, and modifying electronic and mechanical hardware used for NHP neural recording.
  - Familiar with NHP experiment workflows.
- Software and Data Analysis Skills:
  - C++ programmer (26 years).
  - Matlab programmer (18 years).
  - Experienced with neural signal processing (6 years) and image processing (7 years).
- Hardware and Embedded System Skills:
  - PCB design and layout (20 years).
  - Design of microcontroller-based embedded systems (20 years).
  - Integrated circuit design (7 years).
  - Wireless sensor networks (1.5 years).
  - Mechanical design and CAD (7 years).
- Additional strengths:
  - Excellent written communication and technical writing skills.
  - Easily adaptable to new environments and tools.

(**Project keywords:** analog circuit design, ASIC design, Atmel, AVR, board layout, C, C++, CAD, debugging, design documentation, design for manufacturability, electrocorticography, electronics design, electrophysiology, embedded firmware, embedded hardware, embedded systems, Intan, makefiles, Matlab, microcontrollers, mixed-signal electronics, multithreaded programming, object oriented design, Open Ephys, parallel computing, pcb design, prototyping, real-time systems, schematic entry, signal processing, software development, version control)