

# Colin McDonnell

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**Education** MIT, Class of 2016 • Electrical Eng and Computer Science • GPA 4.4

## **MICROCONTROLLERS, FIRMWARE, EMBEDDED SYSTEMS**

**Protocols** UART • SPI • I2C • BTLE

**Code** Assembly • C • C++ • Arduino • PSoC Programmer

**Misc** PCB layout • actuator control • LCD displays

**Experience** Constructed wireless (BTLE) motor controller for electric longboard  
Modified Ardupilot (open-source flight control firmware) to incorporate high-accuracy real-time kinematic GPS positioning (SwiftNav)

## **MICRO/NANOSCALE TECHNOLOGIES**

**Toolkit** microfabrication process flow (microfluidics, MEMS) • synthetic biology

**Experience** Designed concept for light-programmable DNA logic gate  
Optimized ultrasound microtransducer with multiphysics lumped simulation

## **COMPUTATION AND PROGRAMMING**

**Toolkit** algorithms • data structures • information theory • processor design • functional programming • OOP • complexity theory

**Languages** Python • Lisp/Scheme • JavaScript • C

**Experience** Designed complete 32-bit processor with memory bank and ALU  
Conducted information theory research (MIT RLE)

## **FEEDBACK AND CONTROL THEORY**

**Toolkit** Laplace/Fourier/Z analysis • Bode/Nyquist/root locus • PID

**Experience** Designed robotic arm with haptic path programming and 5-axis PI control implemented entirely in Assembly (unfortunately)

## **DATA ANALYSIS, MACHINE LEARNING, AI**

**Toolkit** Stata • ArcGIS (geodata) • Python (numpy, arcpy, scikit) • MATLAB • Bayesian modelling • HMMs

**Experience** Coded a Minimax-enabled AI bot to play Connect Four  
Analyzed relationship between hydraulic fracturing and real estate prices (National Bureau of Economic Research)

## **POWER ELECTRONICS**

**Toolkit** buck/boost/buckboost converters • rectifiers/inverters • AC drives

**Experience** Designed a high-power (350W) buck converter for Go-Kart