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Relevant Coursework

Current coursework

- 6.301 (Solid state circuits)
- 6.014 (Quasistatic E&M)
- 6.111 (FPGA programming)

Past coursework

- 6.011 (Signals, systems, and interference)
- 6.013 (Electromagnetic fields and theory)
- 6.101 (Analog electronics lab)
- 6.320 (Feedback system design)
- 6.046 (Design and analysis algorithms)

Selected Projects

Fully Analog Mini Segway (6.101 project)

- Built for a 6.101 final project
- Designed a state space control scheme with state observers in analog electronics
- Designed and built a current–controlled reversible motor controller
- Designed a fully analog pulse width detector

Brushless Motor Controller

- Built a prototype for a 6.320 final project
- Currently designing a power PCB and implementing field oriented control on an STM32F4

Quadcopter

- Built a quadcopter from scratch in high school and programmed an Arduino to act as a flight controller
- Implemented PID controllers for pitch, roll, and yaw and implemented a Kalman filter for attitude estimation

Skills

- Experienced with signal processing and controls
- Very familiar with hardware and PCB design
- Fluent in C, C++, Python, Julia, MATLAB
- Familiar with Linux and embedded systems
- Experience reading and writing technical math and CS papers

Research

A Spectral Element Method for Meshes with Skinny Elements (2016-2018)

- Developed a new method for numerically solving PDEs that is efficient for high precision solutions (mentored by Dr. Alex Townsend)
- Won 2nd place nationally in the Regeneron (formerly Intel) Science Talent Search in 2017
- Paper published in SIURO in 2018

Randomized Algorithms for Approximating a Connected Dominating Set in Wireless Sensor Networks (2014)

- Researched algorithms for finding small connected dominating sets of graphs
- Co–published paper with Dr. Akshaye Dhawan (Ursinus College)
- Published through IEEE in 2015

Employment History

6.003 LA (2019)

- Learning assistant for 6.003 (Intro to Signal Processing)

MITRE (2019)

- Programmed a GNSS emulator to output INS signals
- Embedded CTF competition
- Kalman filter covariance analysis for GNSS

CSAIL Computational Fabrication Group (2018)

- Programmed an autonomous cart to move around with high precision.
- Used OpenCV for object tracking

VideoRay (2017)

- Programed an Arduino to do motor control
- Tested underwater cameras and Ethernet connections

References

Gim Hom: gim@mit.edu
Brian McHugh: bmchugh@mitre.org
Alex Townsend: townsend@cornell.edu
Akshaye Dhawan: adhawan@ursinus.edu