Joshua Talbot

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Education

Massachusetts Institute of Technology — Cambridge, MA

- *B.S. in Electrical Engineering and Computer Science, B.S. in Physics, Minor in Mathematics (GPA: 4.5)* — *Class of 2022*
  - **Notable Coursework**: Power Electronics Lab, Microcomputer Lab, Introduction to Digital Systems Lab, Digital Signal Processing, Techniques in Experimental Physics, General Relativity, Quantum Mechanics I & II

Experience

- **Electronics Development Engineer at Cascodium LLC** — Andover, MA
  Developed, simulated, analyzed custom electronic equipment (aerospace, medical) — *Dec 2023 - Feb 2025*
  - Analyzed and revised specifications in collaboration with client based off of design possibilities.
  - Redesigned prototypes:
    - Selected new parts to meet increased environmental specifications with attention to cost-effectiveness and availability.
    - Redesigned power electronics systems (linear and switching converters) to meet new environmental specifications.
    - Added amplifier circuitry to capture analog mesurements for custom precision instrumentation.
  - Prepared and ran simulations of PCB designs to confirm intended performance against client requirements.
  - Created detailed schematics, layouts and fabrication specifications for new PCBs. Participated in verification reviews for board layout, schematic, and fabrication notes. Prepared GERBER files and associated materials.
  - Developed PCB bootloader firmware and tested iteratively with GNU debugger to meet PCB functional requirements.
  - Modified graphical user interface software to integrate with custom firmware.
  - Developed high speed PID loops during operational code using interrupt handling. Used oscilloscope for testing.

- **Self-Employed Contractor** — Cambridge, MA
  Firmware development and signal processing consultant — *Summer 2023*
  - **Music Synthesizer**: For a music synthesizer designer, debugged custom firmware state-machine (STM32 MCU).
  - **Heart Monitor**: For a heart monitor designer, implemented FFT/zero-padding techniques for pulse detection.

- **MIT EECS Teaching Assistant/Web Maintainer for 6.300 (Signal Processing)** — Cambridge, MA
  Modified structure of class web/grading system to reflect changes in curriculum grading procedures in a custom tool (CAT-SOOP) and worked with students in common hours — *Fall 2021-Spring 2023*

- **MIT Undergraduate Researcher** — Cambridge, MA
  Designed PCBs and microcontroller firmware/analyzed data from CERN's Large Hadron Collider — *Summer 2021*
  - **MIT RLE Mechanical Systems Group**: Designed and delivered a schematic and layout for a magnetic sensing PCB to extract the flow rate from existing water meters. Selected and designed with precision digital sensors, MCUs and memory/energy storge devices.
  - **MIT Particle Physics Collaboration (Summer 2019)**: Developed scripts to subtract background events in data from the CMS detector at CERN's Large Hadron Collider. Analyzed dimuon decays of b-flavored hadrons using inference techniques.
  - **MIT Particle Physics Collaboration (Summer 2018)**: Developed a Python package to analyze and simulate pulses in oscilloscope data (pulse fitting, counting, and simulation). Helped calculate accuracy of electron detection in data from CERN's CMS detector as part of a search for dark photons.

- **Teaching/Lab Assistant** — Cambridge, MA
  Physics I (Classical Mechanics), Physics II (E&M) — *2018-19, 2020-21*
  Circuits and Electronics, Signals and Systems — *Spring 2021, Fall 2019*
  A Brief Introduction to Programming in Python — *Winter 2018-19*

Programming/Software Skills

- **Languages**: C, Python, Verilog, GNU Octave/Matlab
  Software: Altium, Linux, Libero, VSCode Debugger, Vivado, KiCAD, CAT-SOOP, Emacs, Vim, LTSpice
  Hardware: Keysight Oscilliscope, STM32, Cypress PSoc 5LP, MCUs, Xilinx Nexys 4 DDR

University Projects

- **Water Meter Magnetic Flow Rate Sensor** — Cambridge, MA
  Built/designed/programmed Cypress PSoC-based PCB to convert magnetic field data into a flow rate — *Summer 2021*
- **FPGA Go Board** — Cambridge, MA
  Built/designed/programmed an FPGA Go board handling game logic and wireless communication — *Fall 2020*

Additional Activites/Projects

- **Tailwind Bassist** — Cambridge, MA
  Bassist for a folk-funk jam band in the Boston area — *2022-Present*
- **Peaceworks Member** — Chatham, NJ
  Member of community service group dedicated to helping grassroots organizations in Nicaragua — *2012-Present*
- **Helios.NPO Instructor for Math/English** — Online
  Taught two semester-long classes to high school students in Afghanistan focusing on SAT English and Mathematics skills — *Fall 2022-Spring 2023*
- **Asian University for Women Instructor for Math/Science** — Chattogram, Bangladesh
  Conducted a 2-week course for high school students in probability, physics, electronics and topics in mathematics in a collaborative format — *Summer 2022*
- **Teacher for MIT's Educational Studies Program** — Cambridge, MA
  Taught and designed math curriculum for kids in middle school and high school — *Spring 2018-Spring 2020*
  - **Classes Taught**: How to Win Games, Mathematical Gems, Complex Numbers (7 week summer course), Meditation, Jam Session, Watching Animated Shorts