# Panagiotis Aigaias Dimtsoudis

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## Education

**University of Pennsylvania** — Philadelphia, PA
M.S.E. in Electrical Engineering (Submatriculation) — Expected May 2028
B.S.E. in Electrical Engineering | **GPA: 3.68/4.00** — Expected May 2028

**Relevant Coursework:** Digital Integrated Circuits and VLSI Fundamentals; Analog Integrated Circuits; Nanoscale Science and Engineering; Power Electronics; Fundamentals of Solid-State Circuits; Embedded Systems Laboratory.

## Project Portfolio (click project titles for details)

**SRAM-Based 4-bit MAC Accelerator — Custom 6T SRAM & Datapath**

- Designed a 6T SRAM bitcell: $\beta/\gamma$ sizing, DRC/LVS-clean layout, and post-Quantus hold/read SNM and write margin.
- Built $16 \times 4$ SRAM macros with 442 ps access: logical-effort row decoder, precharge, write drivers, and self-timed control.
- Built a three-stage MAC datapath: $4 \times 4$ multiplier, 12-bit accumulator, sequencer, and a custom 94 ps flip-flop.
- Closed timing at $T_{CLK,min} = 0.90$ ns on the specified test vectors (0.8 V, extracted SRAMs); 0.39 pJ/MAC w/o clock.
- Automated SNM and write-margin extraction from Spectre exports in Python, cross-checked against a brute-force search.

**Metal Detector PCB**

- Designed and routed an analog PCB with ALD1103 MOSFETs, LC oscillators, a mixer, and filters.
- Compared bench measurements with LTspice: fixed oscillator at 50.2 kHz versus 50.27 kHz simulated.
- Assembled and soldered the PCB; used an oscilloscope to debug each stage and verify output to an 8 Ω speaker.

**Wireless ECG Monitor — Analog Front-End & BLE**

- Built an AD623 instrumentation-amplifier front end with virtual-ground biasing and high-pass/low-pass filtering.
- Measured approximately 61 dB maximum gain in stage testing and a 3 dB roll-off near 190.5 Hz.
- Streamed ECG over BLE at ∼200 Hz; wrote Python scripts for logging, plotting, and R-peak heart-rate estimation.

**Analog Synthesizer — Two-VCO Monophonic Voice**

- Built a monophonic synth voice: two VCOs, sub-osc, noise, mixer, resonant multimode VCF, two ADSRs, VCA, LFO.
- Designed every waveform from op-amps, not a synth IC: TL074 integrator, LM311 comparator, 2N3906 discharge, ±12 V.
- Produced saw, pulse/PWM, triangle, and sine with 1 V/oct tracking, octave/coarse/fine tuning, and hard sync.
- Captured 11 Altium sheets with orderable parts, verified each in LTspice, then laid out and assembled the PCB.

**Guitar Hero Synthesizer**

- Wrote bare-metal C for an ATmega328PB synthesizer with PWM audio, ADC whammy input, and an I2C LCD.
- Resolved speaker-induced shutdowns and audio noise using a 12 V battery and two 5 V regulators.

## Experience

**Device Research and Engineering Laboratory** — Philadelphia, PA
*Research Assistant* — May 2026 – Present

- Characterized 6 nm AlN/AlScN/AlN junctions from 14–400 K using J–V, C–V, PUND, breakdown, and endurance tests.
- Developed Python scripts to extract device parameters and compare switching, retention, and endurance.
- Contributed measurements and analysis to a manuscript in preparation on cryogenic all-nitride ferroelectric memory.
- Built 3D CAD models of the device stack and an $8 \times 8$ crossbar array to support compute-in-memory design.

**ESE 2180: Electronic, Photonic, and Electromechanical Devices** — Philadelphia, PA
*Teaching Assistant* — Aug 2026 – Present

- Develop homework assignments, lab worksheets, and exams for a device physics course of 80+ students.
- Set up equipment and teach labs, connecting device physics to hands-on experiments.
- Hold weekly office hours on transistors, LEDs, and photovoltaics; grade work and explain concepts through feedback.

**Automation Systems Hellas** — Thessaloniki, Greece
*Computer Engineering Intern* — Jun 2024 – Aug 2024

- Developed C and Python utilities for log parsing and configuration checks to support commissioning.
- Updated wiring and I/O documentation, imaged PCs and HMIs, and monitored servers and network devices.

## Skills

**Programming:** C/C++, Python, MATLAB, Java, Assembly, OCaml
**Embedded Systems:** ATmega328PB, UART, I2C, ADC, PWM, BLE
**Hardware:** Analog circuit design, PCB layout, soldering, circuit debugging
**Test & Characterization:** Oscilloscopes, cryogenic probe stations, J–V, C–V, PUND, endurance testing
**Design Tools:** Cadence Virtuoso, Spectre, Pegasus DRC/LVS, Quantus, Altium Designer, LTspice, SolidWorks, Fusion 360
**Languages:** Greek (Native), English (Fluent), German (Intermediate), Japanese (Intermediate)