# Michael Acquaviva
*Electrical & Computer Engineer*

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## Experience

**Prandtl Dynamics Inc.**                                    **Feb 2024 – June 2025**
*Co-Founder & CTO*                                    Richmond Hill, ON, Canada
- Co-founded a startup developing counter-drone systems. The first company to successfully use focused ultrasonic wave technology for C-UAS applications.
  - Outperformed Boeing and Teledyne in the 2024 CUAS Sandbox demo, placing 2nd and securing $375k in grants from the Canadian DnD.
  - Pitched VCs and raised $125k from Jason Calacanis, LAUNCH.
  - Featured in WSJ and The Economist as an emerging deep-tech firm.
- Led a team of 6 engineers to build functioning detection and defeat systems.
  - Designed acoustic phased-array systems with millisecond-latency active beam control using DDS on FPGAs.
  - Designed high-power PCBs (Altium); custom power-supplies (AC/DC & DC/DC converters), microcontrollers, comms (CAN, ethernet, I2C, UART), and amplifiers.
  - Developed firmware for targeting systems (C/C++); multi-modal detection & classification ML model (Python, PyTorch) running in CUDA.
- Drafted & filed provisional and full PCT patents, working with legal counsel.
  - Pending PCT patent (G10034715P1US) on acoustic disruption of electromechanical systems.

**Analog Devices Inc.**                                    **May 2023 – Sept 2024**
*IC Design Engineer*                                    Toronto, ON, Canada
- Worked with the Advanced Cores Group, developing mixed-signal data converters for low-power & low-noise communications and instrumentation applications.
- Involved in two tapeouts: 16nm CT-pipeline ADC, 28nm $\Delta\Sigma$ ADC.
- Developed a MATLAB applet to synthesize & analyse GDS layouts for integrated inductors, optimizing for Q-factor and SRF.
  - Saved designers multiple iterations, reducing the need to run long full-wave EM sims.
  - Saved layout engineers an average of 2 hours per inductor per iteration.
- Designed schematics and layout for a quadrature-locked-loop polyphase clocking circuit in 16nm (using Cadence tools). Blocks included: mixer, ring-oscillator, variable-G.
  - Allowed us to increase sample rate from 6.4 GHz to 8 GHz, maintaining the noise floor.
- Wrote the register-level firmware (C and ASM) for foreground calibrations and the tester code to run eval & calibrations (Java) on an ADC.
  - Authored the firmware manual, which would later be used calibrate the chips after tapeout.

## Education

**University of Toronto**                                    **Sept 2020 – June 2025**
*BASc in Engineering Science, Electrical & Computer Stream*                                    Toronto, ON, Canada
- **GPA: 3.9/4.0**; *EngSci Excellence Award*
- Minor in *Artificial Intelligence (AI) Engineering*; Certificate in *Engineering Business*
- Thesis: *The Interpolated Factored Green Function Method for the Accelerated Evaluation of Potentials in Electromagnetic Simulators*, supervised by Prof. Piero Triverio

## Selected Projects

**Electromagnetic Simulator**                                    **Sept 2024 – April 2025**
*University of Toronto, Modelics Lab*                          *macqua.io/projects/thesis*
- Developed an electromagnetic simulator, in C++, leveraging the novel Interpolated Factored Green Function (IFGF) method to solve BVPs in O(N log N) time and space.
  - Unlike AIM or FMM, used in solvers like HFSS or Maxwell, IFGF is *embarrassingly parallel*.
  - Tested in homogeneous media on PECs.
- Paper and presentation available at the link listed above.

**GAN-Accelerated Raytracer**                                     **May 2022 – Sept 2022**
*University of Toronto, Computational Electromagnetics Lab*    *macqua.io/projects/raytracing*
- Used a *generative adversarial network* (GAN) to accelerate raytracing algorithms. The method works by limiting the number of ray-interactions and later using the physics-informed GAN to correct for errors.
  - Achieved a 4% mean relative error against precise RT, while reducing overall runtime by 85%.
- Designed and constructed the model architecture using PyTorch. Generated the training data and executed the training, validation, and testing.
- Paper and presentation available at the link listed above.

**Other projects** include a balloon-borne imaging telescope, autonomous car, Pong on an FPGA, and VHF radio & antenna – these can be explored at: macqua.io/projects.

## Skills Summary

**Languages:** C/C++, Verilog, Java, SQL, Perl, Python, HTML, JavaScript, ASM: x86 & ARM, CUDA, MATLAB
**CAD & EDA Tools:** ADS, Altium, Cadence Virtuoso, ANSYS HFSS, LabView, ModelSim, SolidWorks
**Soft:** Entrepreneurship, Pitching, Presentations, Writing, Negotiations
**Other:** Intermediate in Italian, MS automation tools, Patents

## Awards & Honours

EngSci Award of Excellence                                       *University of Toronto*
- cGPA > 3.9. Awarded to the top ~10% of the class.                                 2025

CUAS Sandbox "Diamond in the Rough" Prize                 *Department of National Defense*
- $375k grant for the most innovative counter-UAS solutions.                        2024

Best Undergraduate Research Presentation (ECE)                   *University of Toronto*
- For my work on GAN-Accelerated Raytracing.                                        2022

NSERC Undergraduate Student Research Award                              *NSERC Canada*
- $7500 to fund my work on GAN-Accelerated Raytracing.                              2022

Shaw Design Scholarship                                          *University of Toronto*
- $3500 for academic excellence in engineering design.                              2022

University of Toronto Scholars' Award                            *University of Toronto*
- $7500 for academic excellence and exceptional achievement.                        2020

Governor General's Bronze Academic Medal                          *Rideau Hall, Canada*
- Top graduating student in the TDSB (99.2%)                                         2020