

Cuauhtémoc Macías

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EDUCATION

- Ph.D. in Electrical and Computer Engineering**, *University of Texas at Austin* Aug 2024 – present | Austin, TX
GEM Fellow, GEM Consortium
- M.S.E. in Electrical and Computer Engineering**, *University of Texas at Austin* Aug 2022 – May 2024 | Austin, TX
GEM Fellow, GEM Consortium
- B.S. in Electrical Engineering**, *University of Pittsburgh* Aug 2018 – May 2022 | Pittsburgh, PA

LANGUAGES/SOFTWARE

Software/Coding — MATLAB, C++, Python, LTSPICE, Altium, Simulink | **Natural** — Fluent in Spanish

PROJECTS

Flywheel Energy Storage System (FESS), *Fall 2024*

- Developing and refining a naval power system model with a Flywheel Energy Storage System to power a solid-state load. MATLAB/Simulink model in support of an ongoing, ONR funded project at the Center of Electromechanics (CEM).
- Efforts include model characterization, parameter tuning, automating simulations, and transient analyses. The work will be used to complete my master's thesis and will be confirmed experimentally spring 2024.

250 Watt Electric Bike, *Spring 2024*

- Designed and implemented a 250 watt synchronous DC-DC buck converter on a PCB, to power an integrated inverter module driving a rearhub electric bicycle motor.
- Successfully implemented a discretized current mode controller for both the DC-DC and DC-AC stage.

250 Watt 16-48V DC-DC Boost Converter, *Spring 2023*

- Successfully designed, assembled, and tested a 250 watt, 16V-48V boost converter on a 45.57 cm² (7.06 in²) custom PCB for ECE 394J Fundamentals of Power Electronics. Designed and implemented the digital controller, 6.39 uH ER32 ferrite core inductor, and the custom 4-layer PCB which included thermal and EMI considerations.
- The final iteration of the converter met all required specifications listed by Prof. Alex Hanson, including open and closed loop operation with an achieved efficiency of 96.5% and a power density of 81.44 watts/in³

Constant-On Time Valley Current Mode Buck Converter, *Fall 2022*

- Designed a Power Management IC in Cadence to step down 2.7-5V input to 1.2V output for loads able to draw 0.2A-6A. The entire IC including its dead time control, main logic, valley control, zero-crossing logic, compensator and ON timer blocks were implemented using 180nm process transistors and passive components.
- The final iteration was able to achieve a switching speed of ~600kHz for 3A load with entirely non-ideal components using bandgap references, current sensing circuits, Hysteresis comparators, and Schmitt triggers.

Two-Stage OTA Design Project, *Fall 2022*

- Designed an eight transistor Operational Transconductance Amplifier (OTA) with two stages and capacitive feedback in Cadence to achieve a 67dB DC gain, a 14 MHz crossover frequency, 60° PM, 0.03% dynamic settling error, a 0.2% static settling error, an output swing of 0.2V-1.5V, and a total output noise of 290uV.
- Based on a 180nm process using a 1.8V DC supply and a single ideal current source, driving 1pF capacitive load.

Trade Study for Rare-Earth-Free IPMSM Using MnBi Permanent Magnets | **ECCE 2022**, *Fall 2021*

- Assisted the Pitt Electrical Power Systems Lab in designing an 80kW Internal Permanent Magnet Synchronous Machine (IPMSM) using Ansys MotorCAD and OptiSlang to research design tradeoffs of using MnBi in lieu of NdFeB in IPMSMs
- Simulated an 80 kW Nissan Leaf IPMSM model using MnBi magnets and resolved issues concerning the magnet's BH profiles and ran a python script in OptiSlang that used D³ sizing equations to run parameter sweeps on design topologies.

PROFESSIONAL EXPERIENCE

Electrical Engineering Intern, *Lam Research*

May 2024 – Aug 2024 | Fremont, CA

- Developed, simulated, and prototyped a RF constant impedance load for dielectric etch tools.
- Confirmed general viability and highlighted issues in a final design review.

Electrical Engineering Intern, *Lam Research*

May 2023 – Aug 2023 | Fremont, CA

- Developed and executed test procedure for a process module cleaning step in production/test environments.
- Performed market study on potential solutions and coordinated collaboration with manufacturers to support experiments.

Electrical Engineering Intern, *Lam Research*

May 2022 – Aug 2022 | Fremont, CA

- Supported two ongoing RF projects and built test fixtures to validate modules' compliance with specifications.

- Tested modules under different operating conditions and summarized results in weekly team meetings.

Graduate Teaching Assistant, University of Texas at Austin

Aug 2022 – May 2023 | Austin, TX

- Worked 20hr/week as graduate TA for the Fa22 honors section of Intro to Electrical Engineering and for the Sp23 offering of Intro to Embedded Systems course.
- Responsibilities for both courses included holding weekly office hours, grading exams/HW/labs/, leading and directing weekly lab sessions, and lecturing as needed.

Electrical Engineering EID Intern, GE Power Portfolio

Jun 2020 – Aug 2020 | Cranberry Twp, PA

- Assisted the GE Power Conversion team in the completion of both the costing and technical compliance volumes as part of the Energy Magazine proposal for the Office of Naval Research.
- Compiled a schematic of the entire Energy Magazine solution in Microsoft Visio for the purpose of checking compliance with technical requirements totaling over 120 pages.

ORGANIZATIONS

Society of Hispanic Professional Engineers (SHPE), President

2020 – 2021 | Pittsburgh, PA

- Point of contact between the SHPE student chapter at Pitt and companies and organizations in the Pittsburgh area, as well as between the chapter and on campus student organizations and administration.
- The Pitt chapter was recognized as the most improved chapter by SHPE National Board at the 2020 SHPE National Conference. The award recognized our chapter's efforts while I was External VP (2019-2020) and President (2020-2021).