

# EE270 Final Project Proposal

Proposal Due: Dec 5th, 2023 @ Class

**Abstract:** In this course, each student will be responsible for a project. This project is a preliminary training of your research skills. In this project, you will work individually to design, analyze, and simulate a novel power electronic converter/control method/modeling method that improves the performance of the existing converter/control method from the literature. You will conduct a literature review, propose your project, submit your proposal, implement your project in simulation, and write a project report.

You are expected to follow the procedures below.

**Select your topic:** First, you need to select a topic according to your research interest. Topic domains include, but are not limited to:

- CRM Totem Pole PFC converter
- ZVS DC/DC converters
- Class-E power amplifiers
- Z-source converters
- Datacenter power conversion and dynamics
- Switch capacitor based power converters
- Modeling techniques of power converters
- AC/DC PFC rectifiers
- Modular multi-level converters
- Power electronics in LED lighting
- Controlling techniques of inverters
- Bidirectional DC/DC converters
- Multi-port converters
- PEV onboard chargers
- Micro inverters
- Battery management systems
- Fault tolerant control
- Integrated power converters
- Power electronic interfaces for renewable energy harvesting systems
- Resonant converters
- Other advanced topics

**Review the literature:** Next, you need to further narrow down your research scope and conduct a comprehensive literature review around it. It is recommended that you select around 10 recently published academic papers and read them thoroughly. Only recent papers published during the past ten years (since 2012/09) may be considered. Please note that you are recommended to select papers within the scope of:

- IEEE Transactions on Power Electronics
- IEEE Transactions on Industrial Electronics
- IEEE Journal of Emerging and Selected Topics in Power Electronics
- IEEE Transactions on Industry Applications
- IEEE Transactions on Transportation Electrification
- IEEE Applied Power Electronics Conference and Expo.(APEC)
- IEEE Energy Conversion Congress and Expo. (ECCE)

**Select a base paper:** Next, you need to further narrow down your research scope to a single base journal paper. It is required that the base journal paper be published during the past 5 years (since 2018/9).

**Schedule a meeting:** Each of you need to schedule an individual meeting with me before the due date. Discuss with me about both the research status and what you plan to do in this project. Confirm with me about your goals and expectations in this project.

**Write a proposal:** After the meeting with me, each student needs to write a proposal. In this proposal, you need to:

- Introduce the background.
- Evaluate the research status, review the state of the art comprehensively.
- Propose your work in your project
- Summarize your expected contributions/results.

**Simulation software:** You might use the following software to facilitate your design and simulation.

- Matlab/Simulink
- PLECS.
- PSIM.
- LTSpice.
- Maxwell.

**Proposal format requirement:**

- Page limit: maximum 2 pages (reference list does not count pages)
- Font size: minimum 10 point
- Column: double column
- Line space: single
- Figures should be plotted by yourself (not copy and paste).