Project Goals

- Consider the effects of charging a ferry battery on Alaskan microgrids.
- Build a scale model of a battery charging system to obtain charging data.
- Control the charging of the battery to assess effects of different levels of charges.

Background

- **Context:**
  - Alaska's ferry system serves as a lifeline to regional hubs and the mainland.
  - Southeast Alaska's rural location and hydropower abundance make it a strong candidate for federally subsidized infrastructure projects.
- **Project Focus:**
  - Addressing state challenges and fostering dialogue to support sustainable transportation without overwhelming existing infrastructure.
- **Challenges:**
  - Environmental imperative and technical challenge of transitioning to electric ferry technology.
  - Potential strain on local power grids highlighted in previous studies.

System Design

- **Model Design:** Scaled to replicate a ferry battery bank connected to the grid.
- **Components:** DC Power Supply, Buck Converter, Arduino-compatible Microcontroller for System Management.
- **Design Goals/Objectives:**
  - Emulate the charging process of electric ferries.
  - Collect data related to electrical grid and power consumption
  - Assess the impact on microgrids.

Results

- **PWM Signal Generation:**
  - Initial testing verifies effectiveness for battery management.
  - Further verifications and simulations underway.
- **Buck Converter Design:**
  - Validated through PSpice simulations.
  - Ensures compliance with specified ripple and power efficiency standards.
- **Real-World Testing:**
  - Completed for charging and discharging of the battery.

Expected Deliverables

- Ferry battery charging system prototype with data logger for real time monitoring.
- Comprehensive final report, detailing design, simulations, and data analysis.
- Electric ferries in Southeast Alaska feasibility assessment.
- Final presentation and video demonstrating timeline and flow of project.

Endstate

- Construct a ferry battery bank prototype that charges from electrical grid source.
- Prove, through scaled data collection and analysis, whether electric ferry implementation is viable in Southeast Alaska due to limited electrical grid resources.

Acknowledgement

This project is supported by the office of Undergraduate Research and Scholarly Activity.