Dwight Look College of
ENGINEERING
TEXAS A&M UNIVERSITY

Project name: WBG Devices-Based Matrix Converter

Team members: Jack Alagood, Kyle Bedrich, Ian Farrar

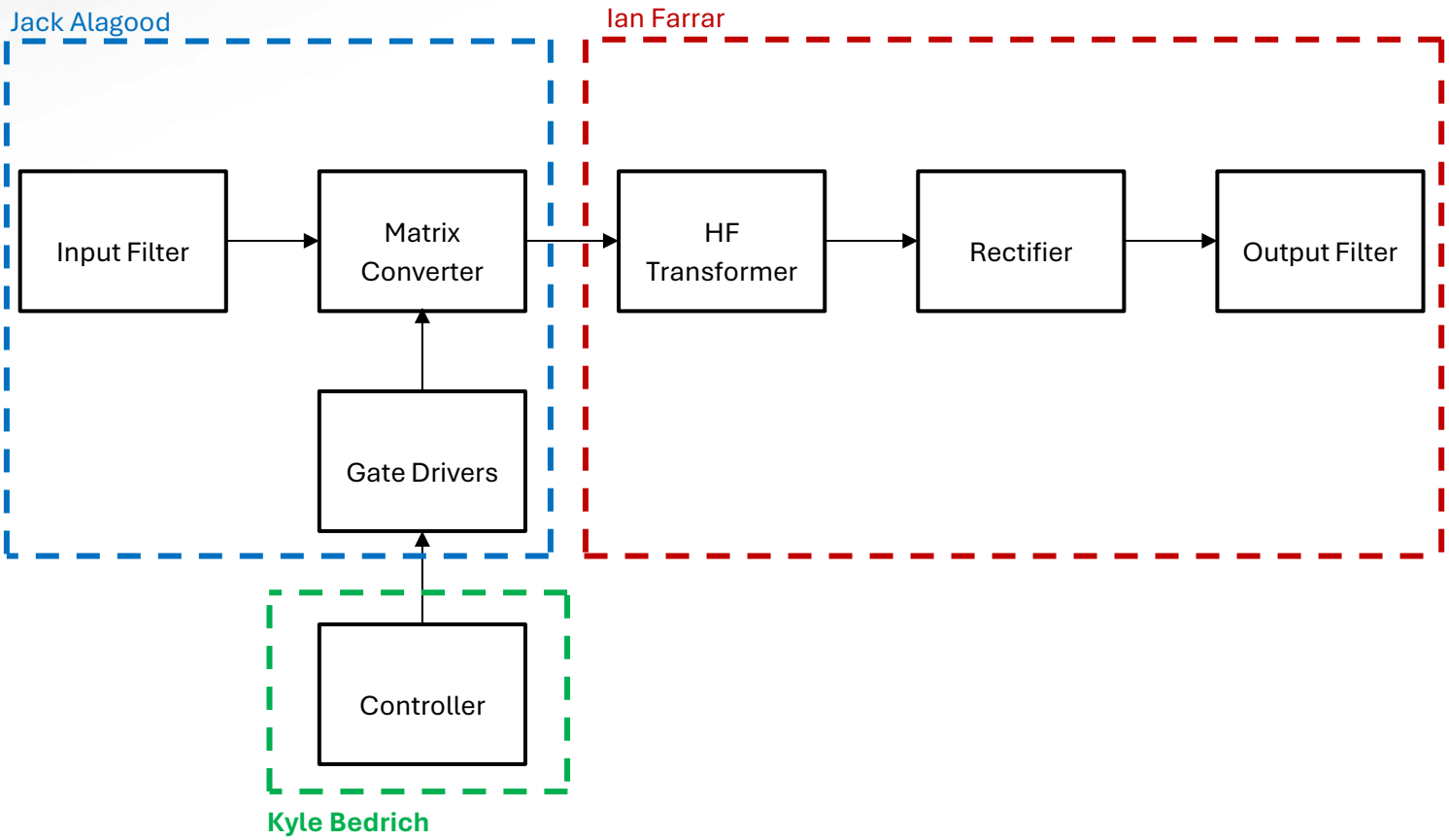
Problem Statement

- The rise of energy-intensive computing (AI model training, cloud computing, data centers, etc.) creates a need to optimize power delivery to these loads
- Though many solutions have been presented, there remains room for improvement in efficiency and cost

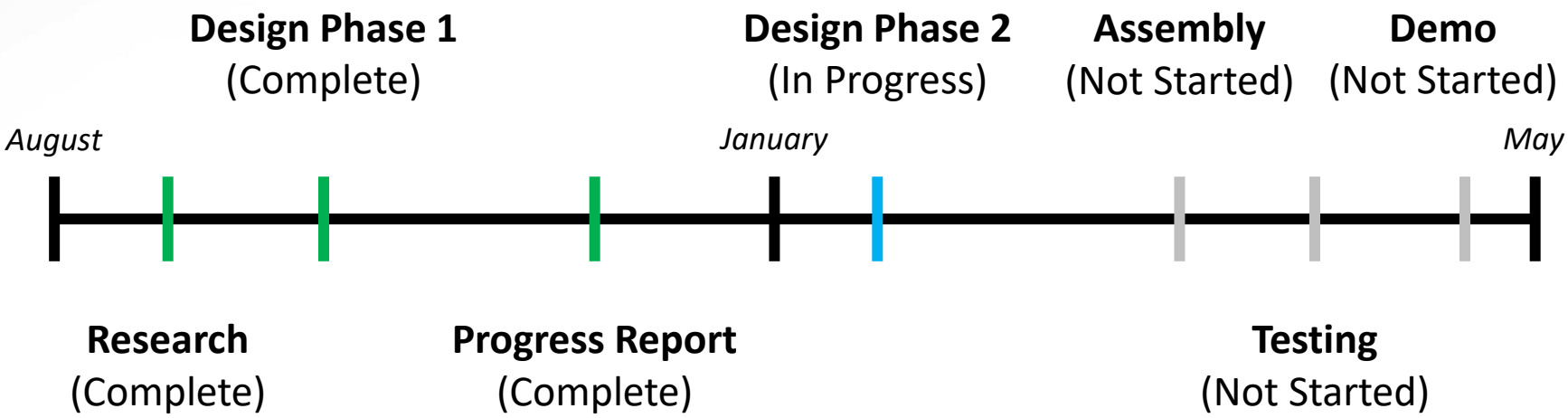
Proposed Solution

- GaN technology promises greater power density than SiC
- Matrix converters offer bi-directional power flow, adjustable input power factor, and greater power density due to less storage elements

System Diagram



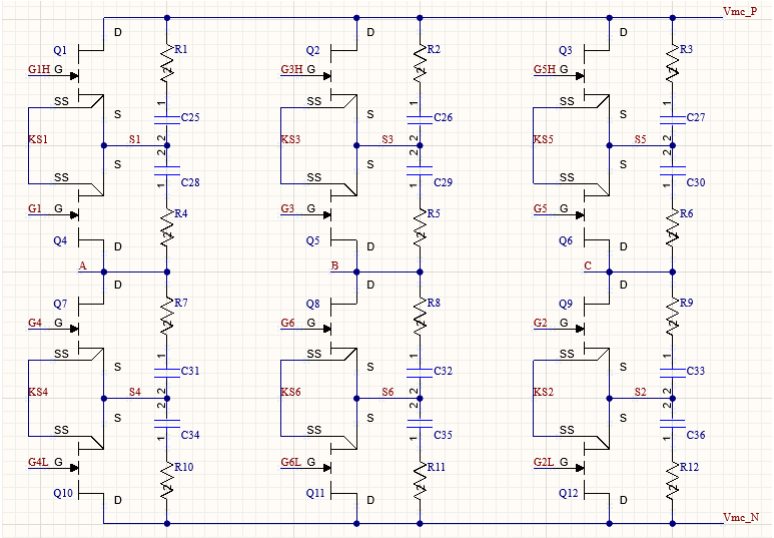
Project Timeline

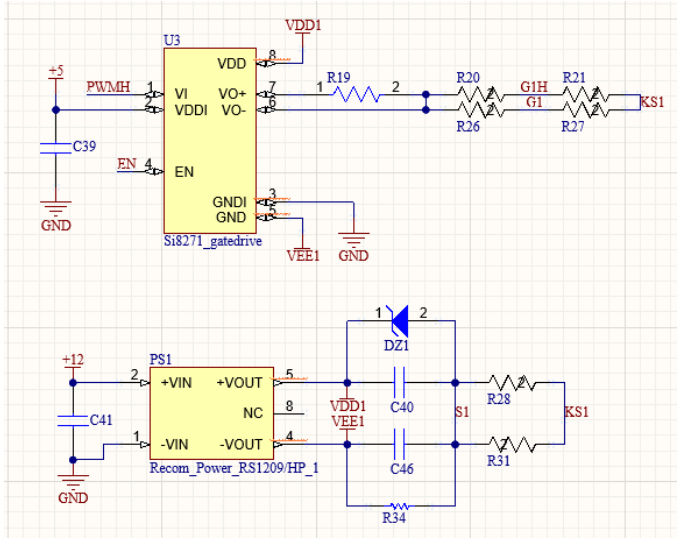


Subsystem 1 (Primary Side)

Jack Alagood

Accomplishments since 403	Ongoing progress/problems and plans until the next presentation
• Extended single-phase matrix converter schematics to 3-phase (5h)	• Extend PCB to 3-phase



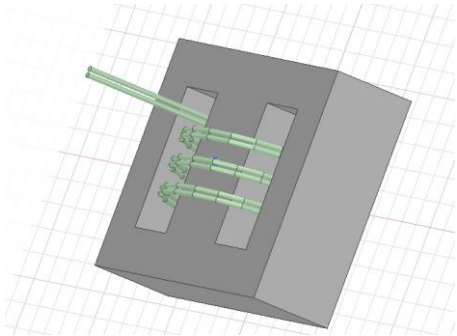


x6

Subsystem 2 (Secondary Side)

Ian Farrar

Accomplishments since 403	**Ongoing progress/problems and plans until the next presentation**
• Finished research needed to outline simulation procedure for transformer • Modelled basic transformer design to test simulation procedure	• Finish research/reading regarding transformer design to finalize transformer configurations of interest for simulation



Basic transformer model used for testing procedure

Subsystem 3 (Controls)

Kyle Bedrich

Accomplishments since 403	Ongoing progress/problems and plans until the next presentation
• Small progress on GPIO output. Unable to test without HIL • Typhoon HIL training underway	• Get GPIO output pins working and test on Typhoon HIL

Parts Ordering Status

- No parts ordered yet
- All parts to be ordered have a hard deadline of **March 7th**

Execution/Validation Plans

ECEN 404	Owner(s)	1/12/2025	1/19/2025	1/26/2025	2/2/2025	2/9/2025	2/16/2025	2/23/2025	3/2/2025
Schematic 3-phase Extension	Jack								
PCB 3-phase Extension	Jack								
Transformer Design	Ian								
Transformer Testing	Ian								
DSP Debugging	Kyle								
DSP Testing	Kyle								
Simulations	Each								
		3/9/2025	3/16/2025	3/23/2025	3/30/2025	4/6/2025	4/13/2025	4/20/2025	4/27/2025
Board Assembly	Group								
Board Testing	Group								
Final Presentation	Group								
Final Demo	Group								
Final Report	Group								

Task	Deadline	Status
Schematic 3-phase Extension	1/31/2025	Complete
PCB 3-phase Extension	2/21/2025	In Progress
Transformer Design	2/7/2025	In Progress
Transformer Testing	2/21/2025	Not Started
DSP Debugging	2/14/2025	In Progress
DSP Testing	2/21/2025	Not Started
Simulations	3/7/2025	Not Started
Board Assembly	3/21/2025	Not Started
Board Testing	4/11/2025	Not Started
Final Presentation	4/16/2025	Not Started
Final Demo	4/26/2025	Not Started
Final Report	4/28/2025	Not Started

Thank You