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TEXAS A&M UNIVERSITY

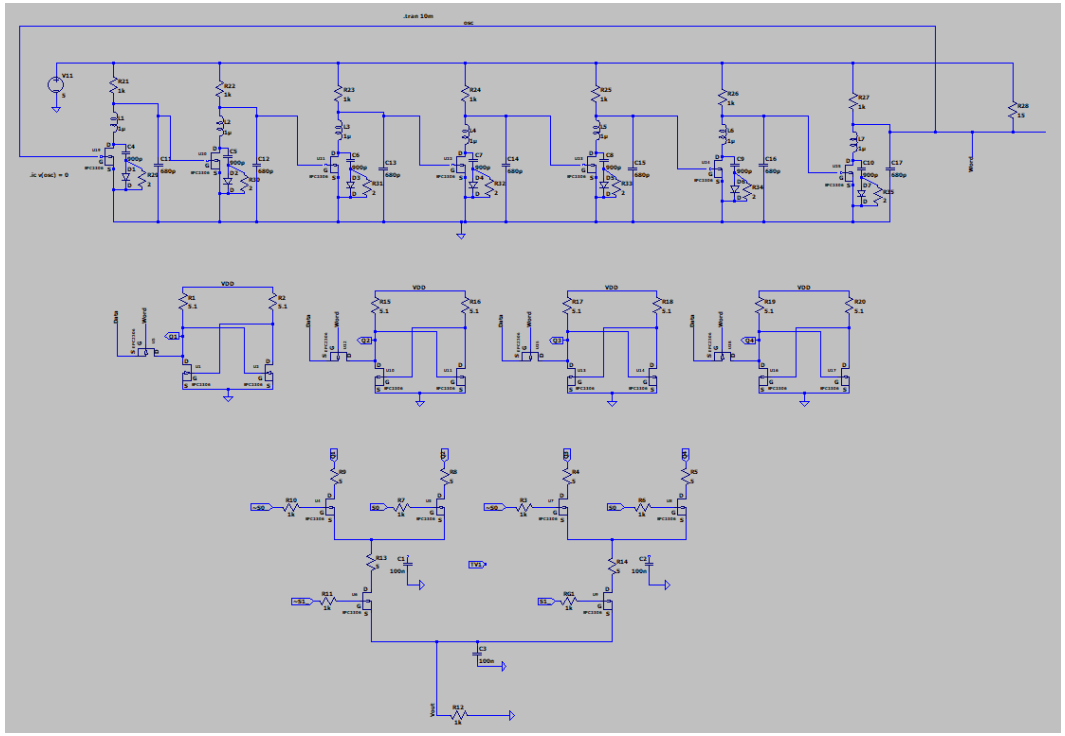
Team 1: Radiation Resilient Logic Circuit Study with WBG Devices Bi-Weekly Update 2

Nia Baireddy, Kaylee Choate, Nomar Lebron
Sponsor: Sandia National Laboratory
TA: Eric Robles

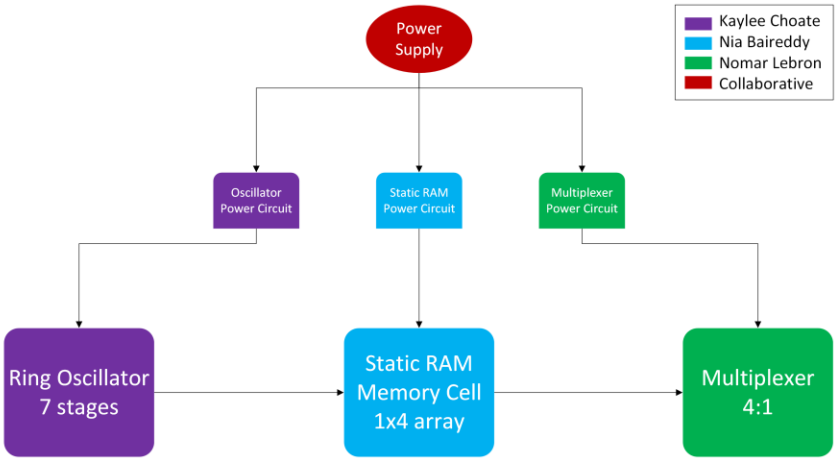
Project Summary and Solution

- Radiation effects on circuits are detrimental and must be mitigated for robust applications in space, military, and nuclear industries.

- Use radiation hardening by design techniques to modify various logic circuits for reliable operation in radiation environments.

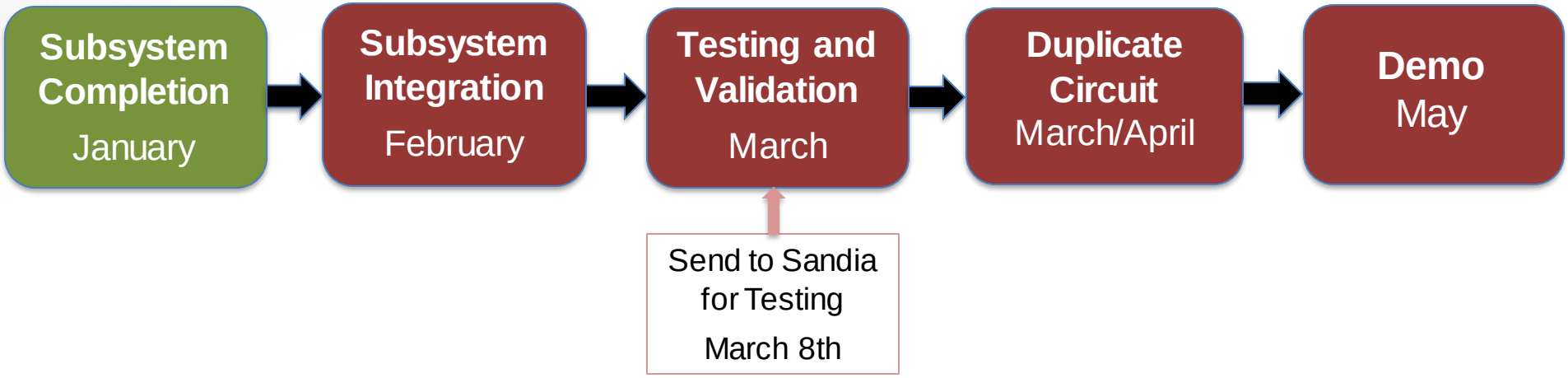


Project/Subsystem Overview



- Radiation resilient wide bandgap material (GaN)
- Hardened components
  - Low resistance wirewound resistors
  - Multi-layer ceramic capacitors
- Alternative circuit layout
  - NMOS only
  - Trace width
  - Trace spacing

Project Timeline



Seven-Stage Ring Oscillator

Kaylee Choate

Accomplishments since last update 15 hrs of effort	Ongoing progress/problems and plans until the next presentation
• Simulated voltage spike in ltspice and corrected voltage spike by adding RCD snubber • Added RCD snubber to PCB design and ordered PCB for testing in preparation for integration	• Assemble PCB/Test resistor and capacitor values • Finish integrated system simulation on LTSpice • Start integrated Altium PCB

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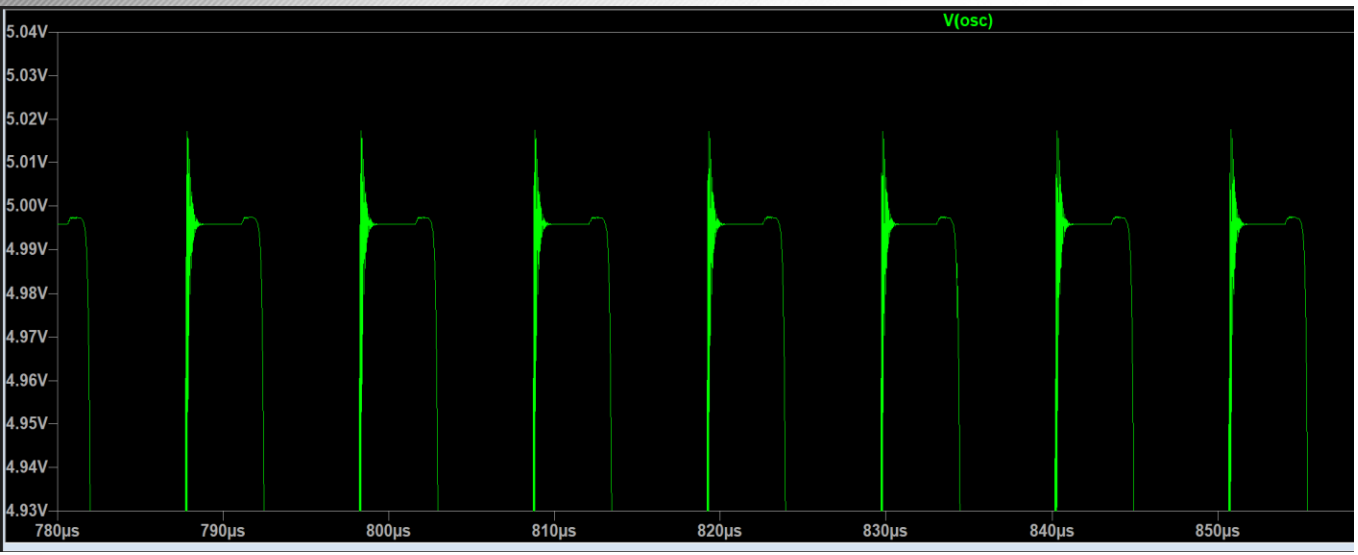
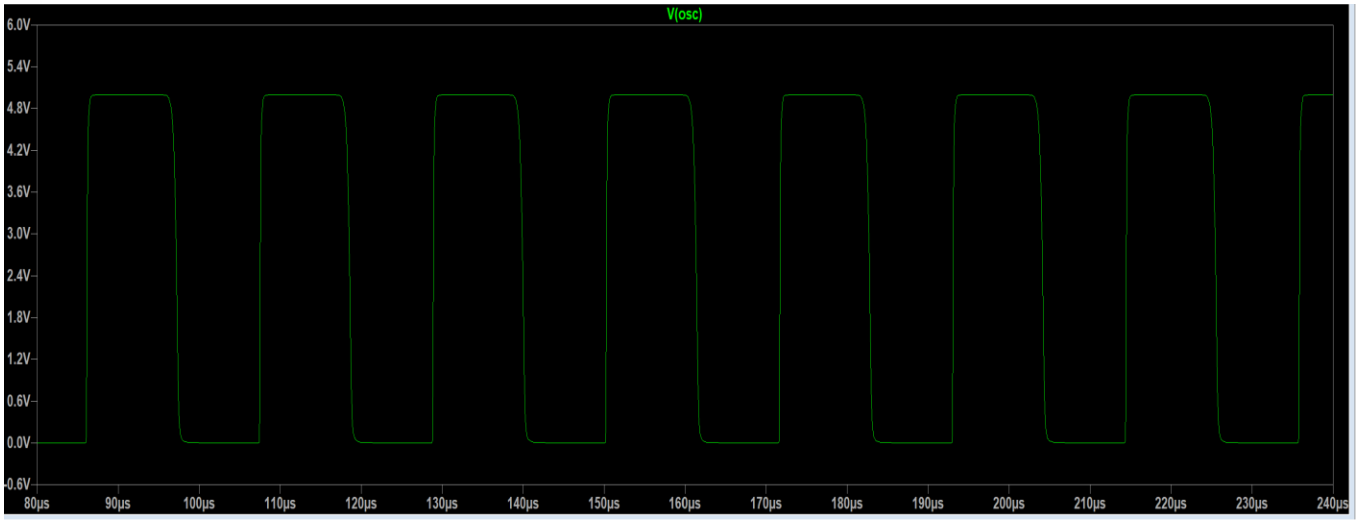
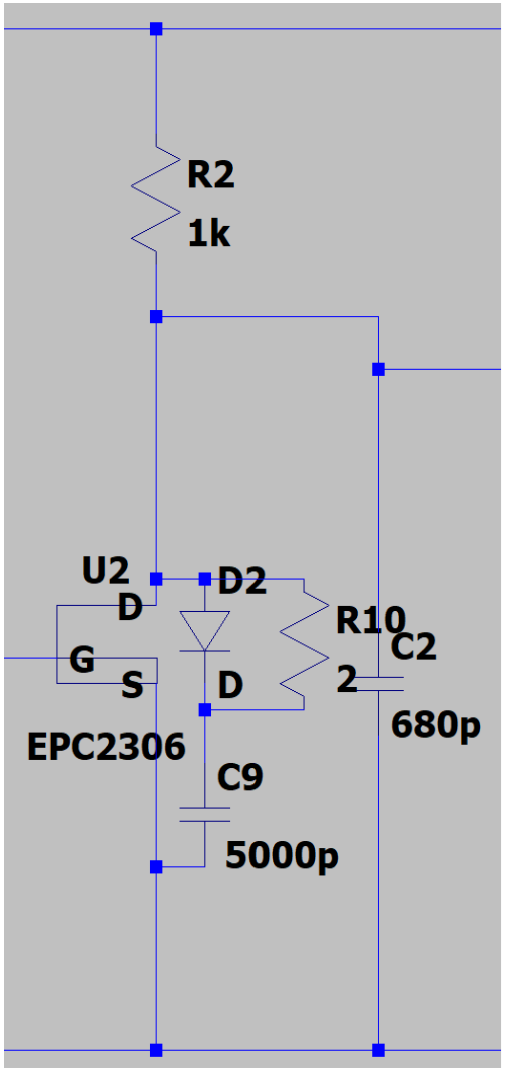
Seven-Stage Ring Oscillator

Kaylee Choate







1x4 SRAM Cell Array

Nia Baireddy

Accomplishments since last update 15 hrs of effort	Ongoing progress/problems and plans until the next presentation
• Modified PCB and verified correct circuit behavior in preparation for integration • Worked on preliminary integrated design • Began design for subsystem power circuitry for integrated system power distribution	• Finish integrated system simulations in LTSpice • Start integrated Altium PCB • Compile additional parts list for integrated system

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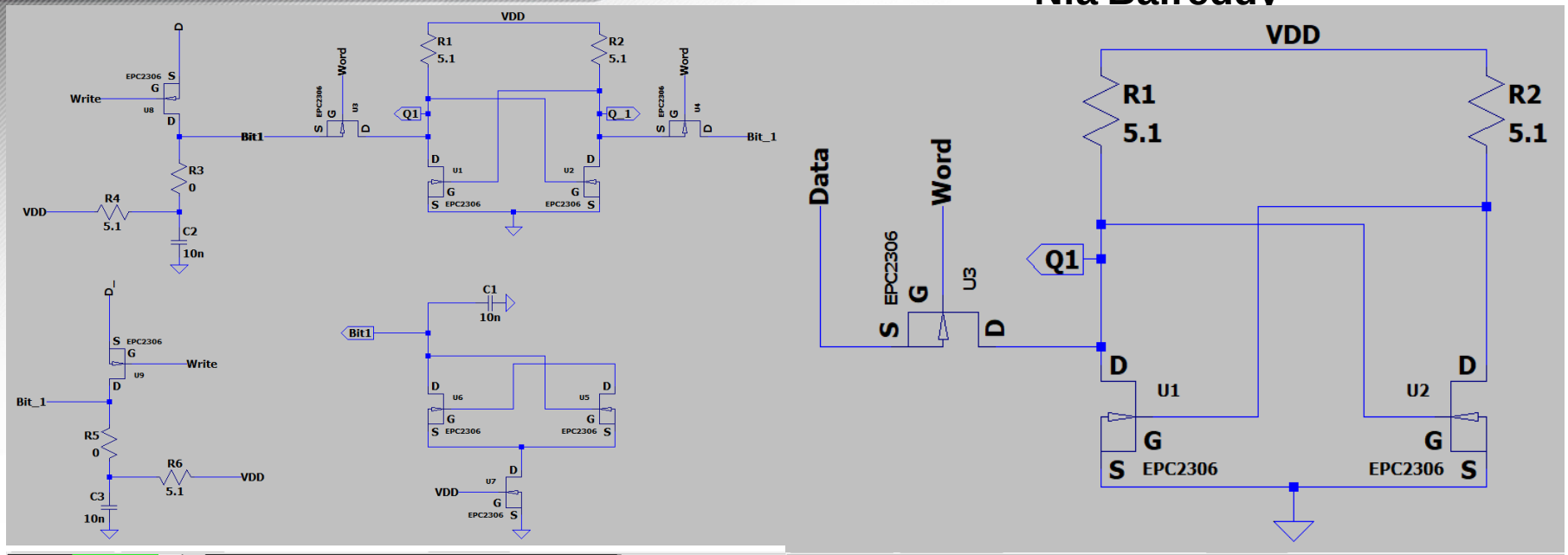
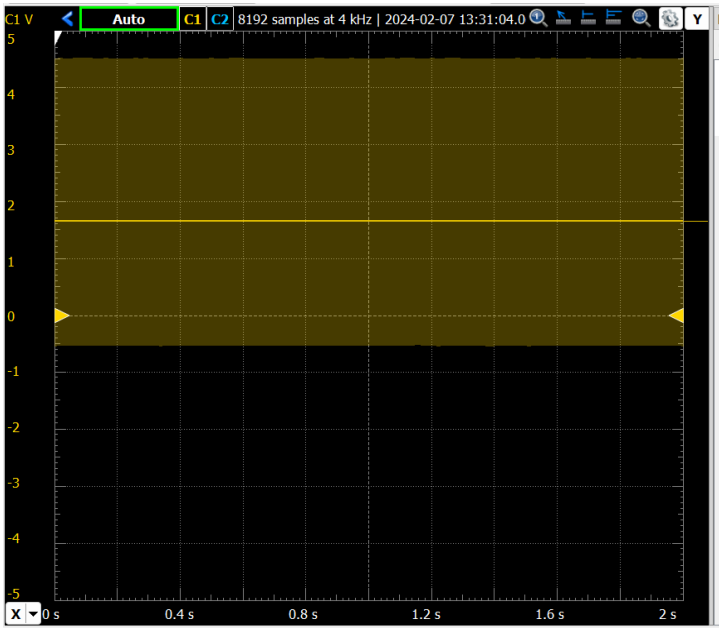
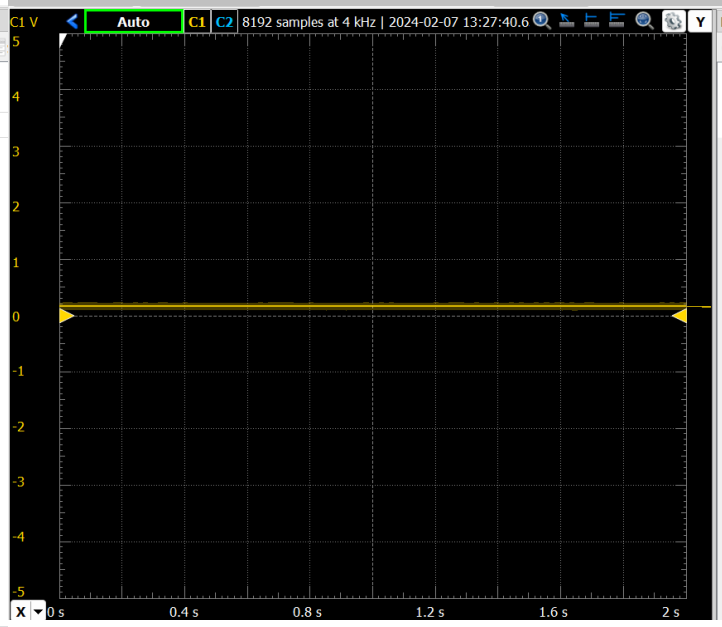
1x4 SRAM Cell Array

Nia Baireddy







4:1 Multiplexer

Nomar Lebron

Accomplishments since last update 15 hrs of effort	Ongoing progress/problems and plans until the next presentation
• Simulated voltage divider gate driver • Simulated decoupling capacitor • Tested decoupling capacitor on PCB in preparation for integration	• Implement user interface LEDs for selection bits • Finish integrated system simulation on LTSpice • Begin integrated PCB design on Altium

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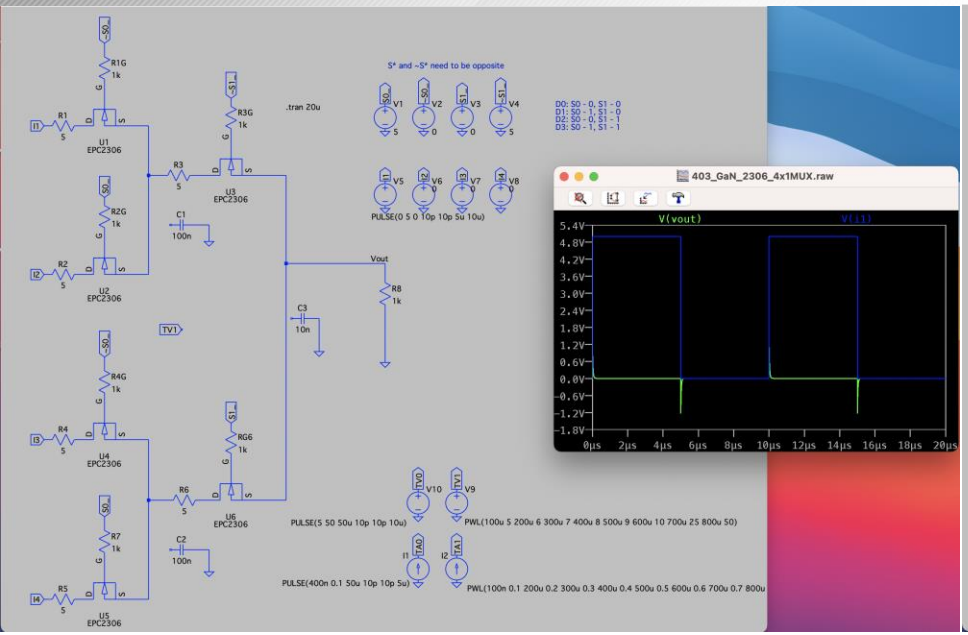
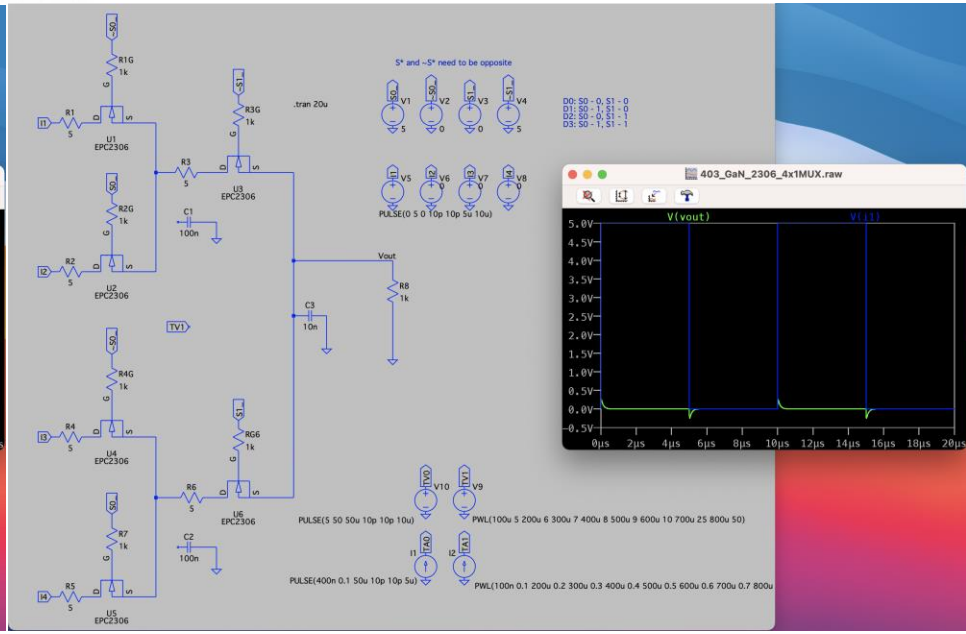
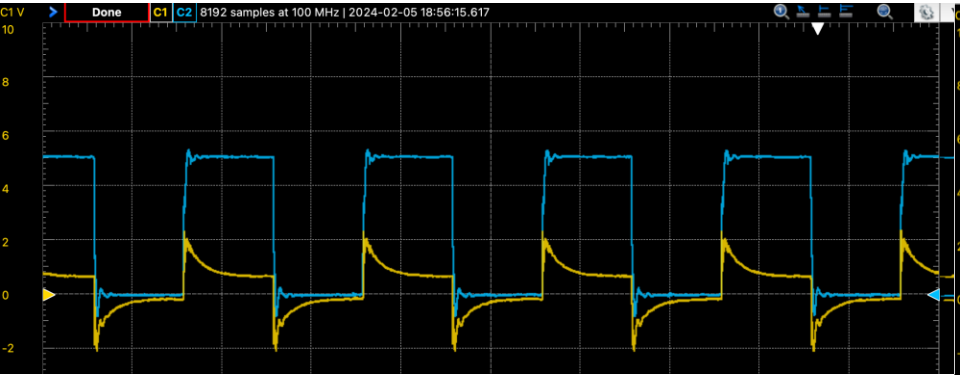
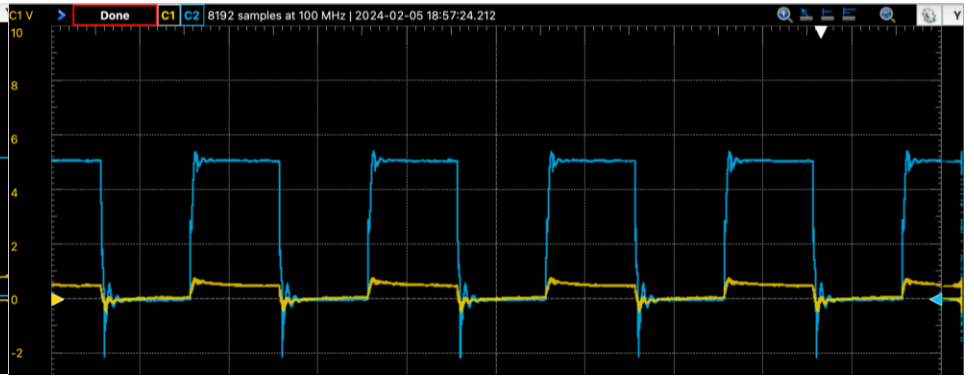
4:1 Multiplexer

Nomar Lebron

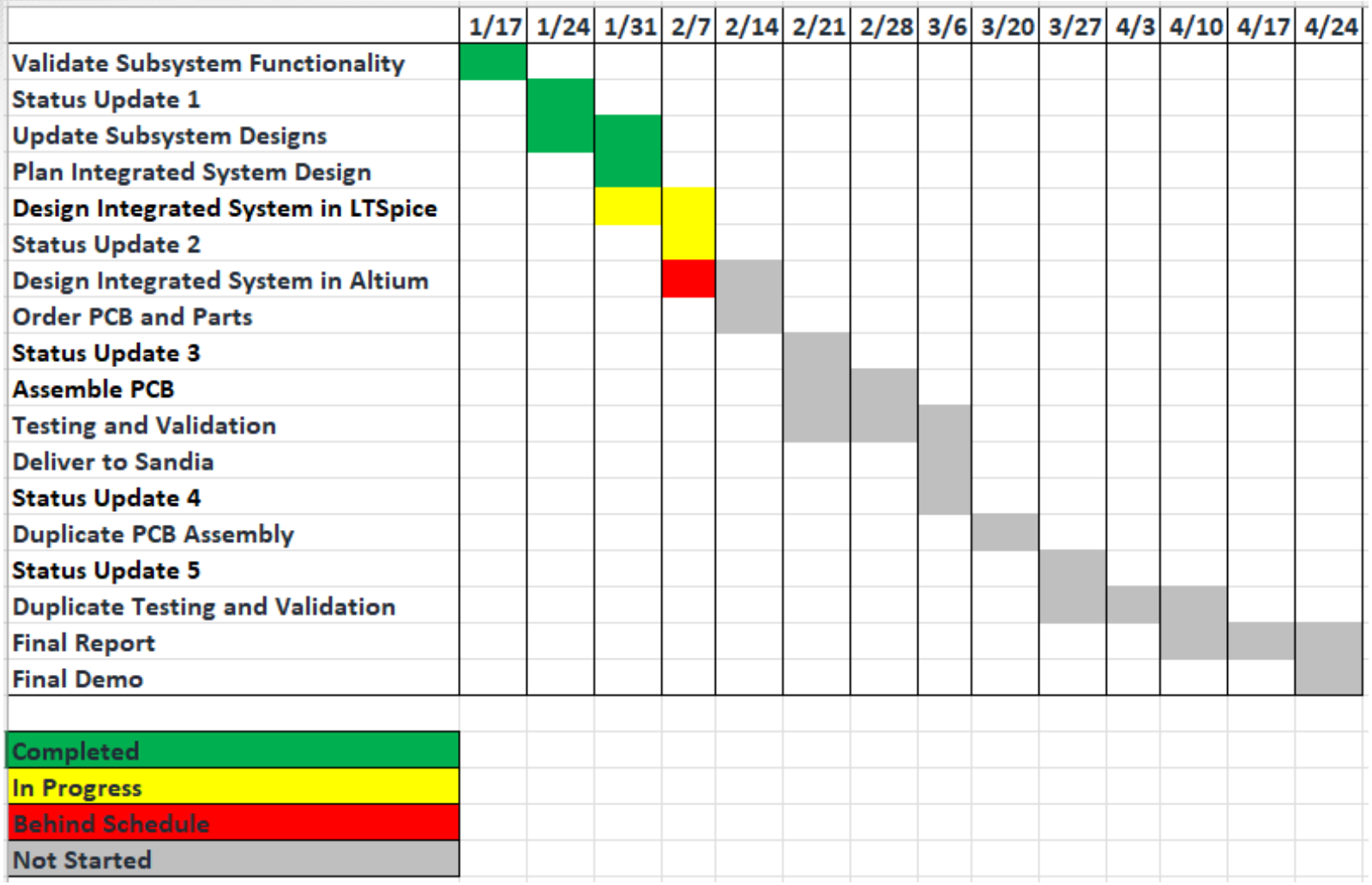








Execution Plan



Thanks and Gig ‘Em!

Questions?