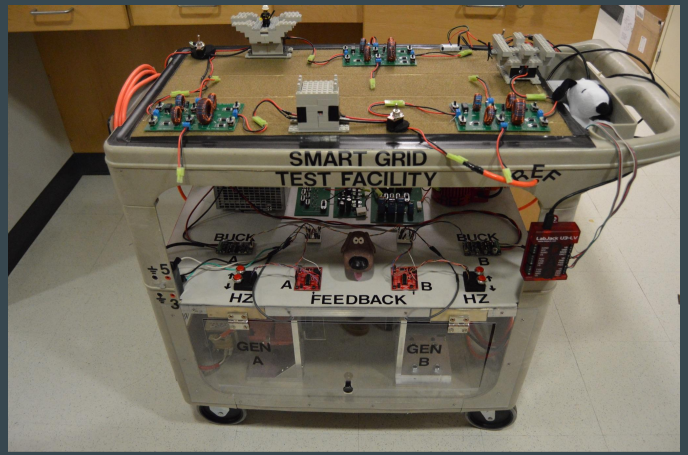
Team 30: Smart Grid

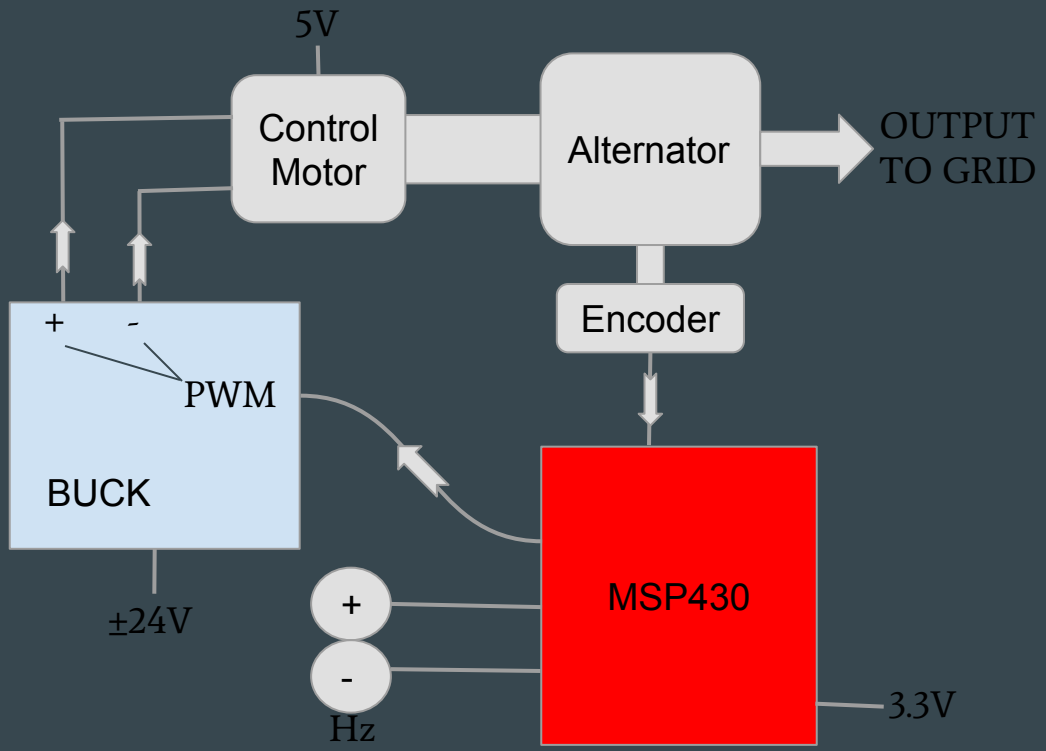
By: Aidan McCall and Jonas Escobar

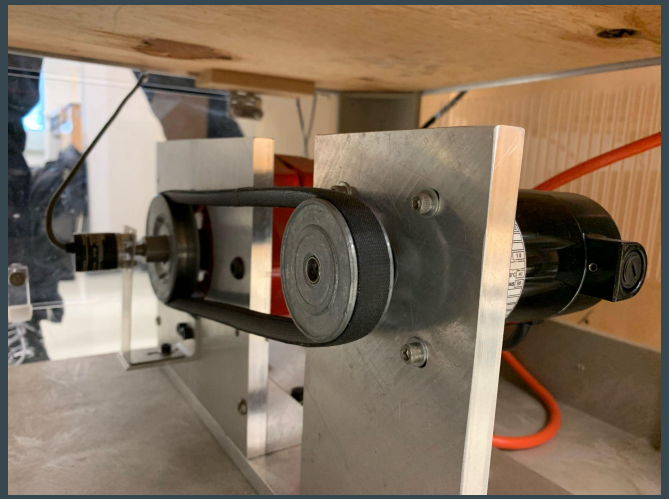
Problem Statement

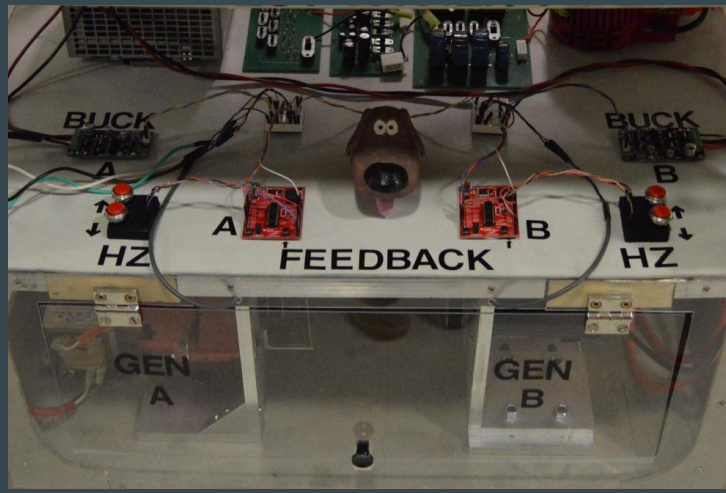
We have a fully functional Electric Grid model from a previous Senior Design team that has no working method for data collection, so it cannot be properly utilized by professors for classes like EC 417.

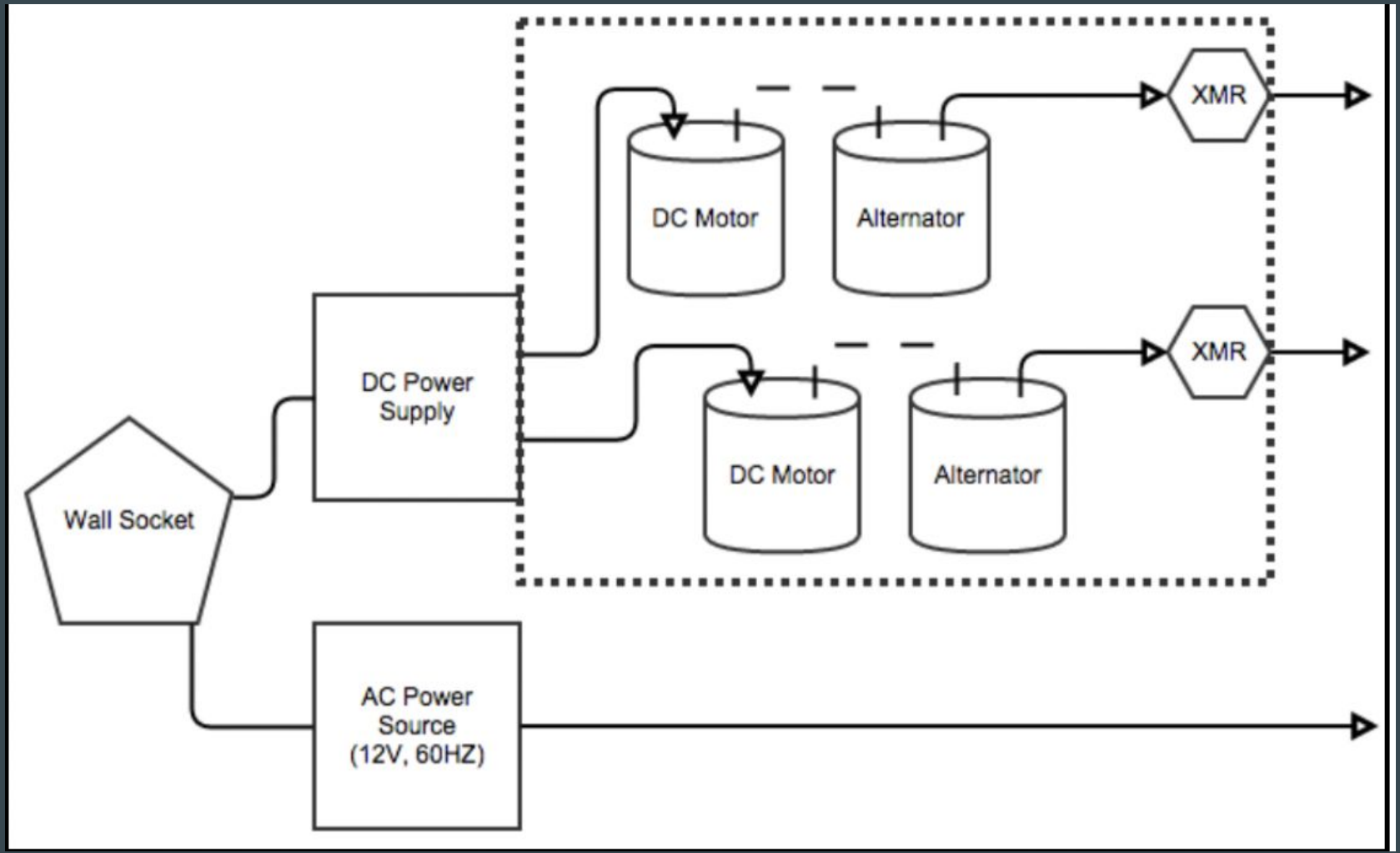


The Smart Grid Model



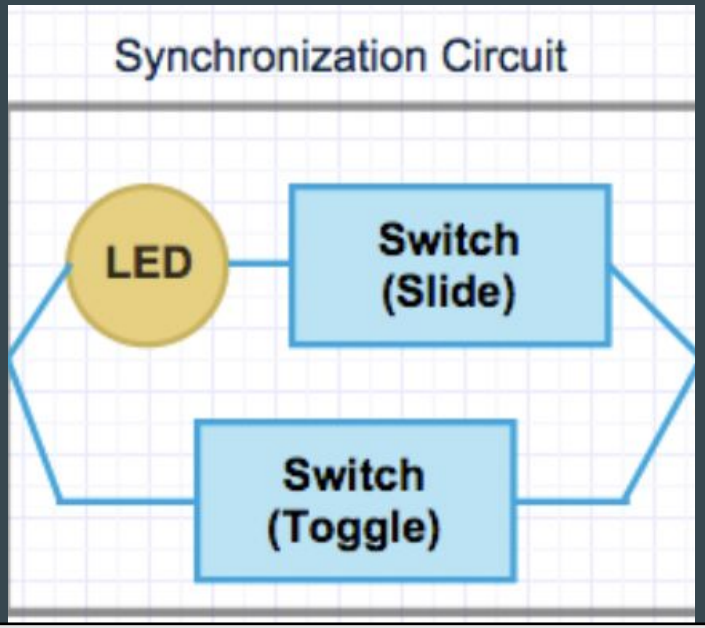


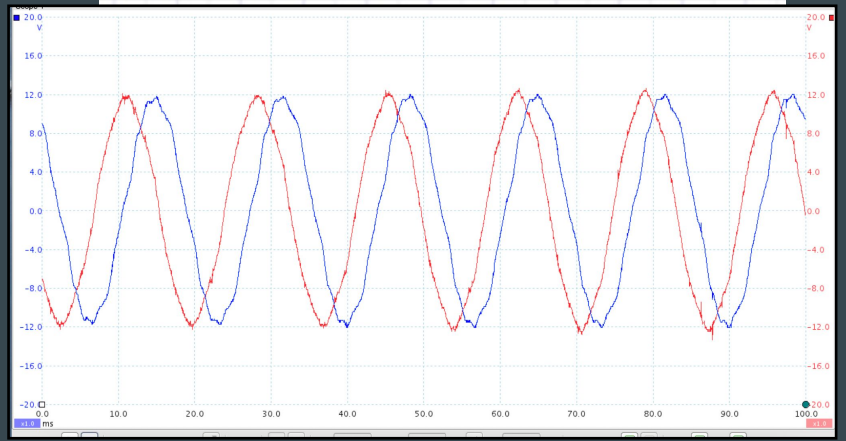



XMR
DC Motor
Alternator
XMR
DC Motor
Alternator
DC Power Supply
Wall Socket
AC Power Source (12V, 60HZ)

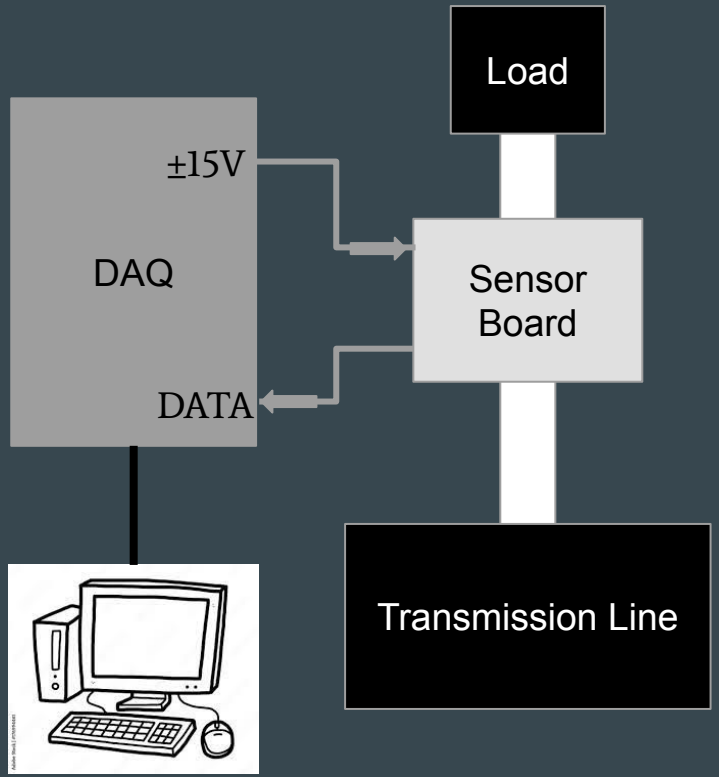
Synchronization

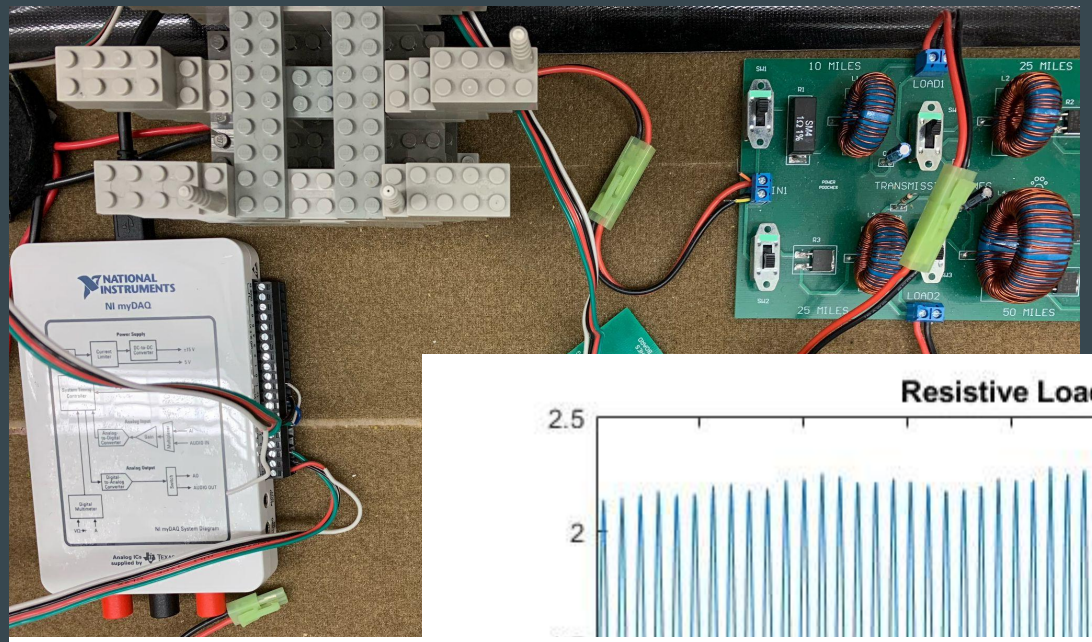
- Synchronization
  - "Sync Bulb" method
- Problem: LED can be hard to time and a big oscilloscope can practically be transported
- Solution: Picoscope

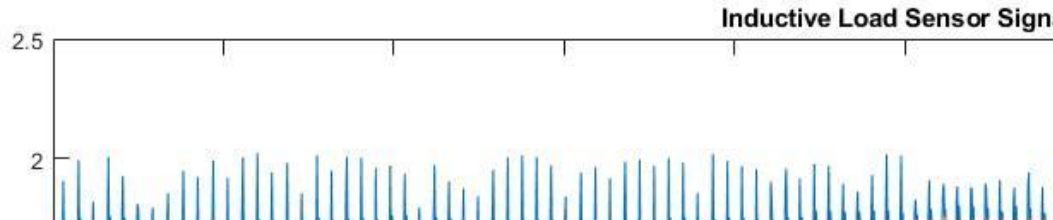




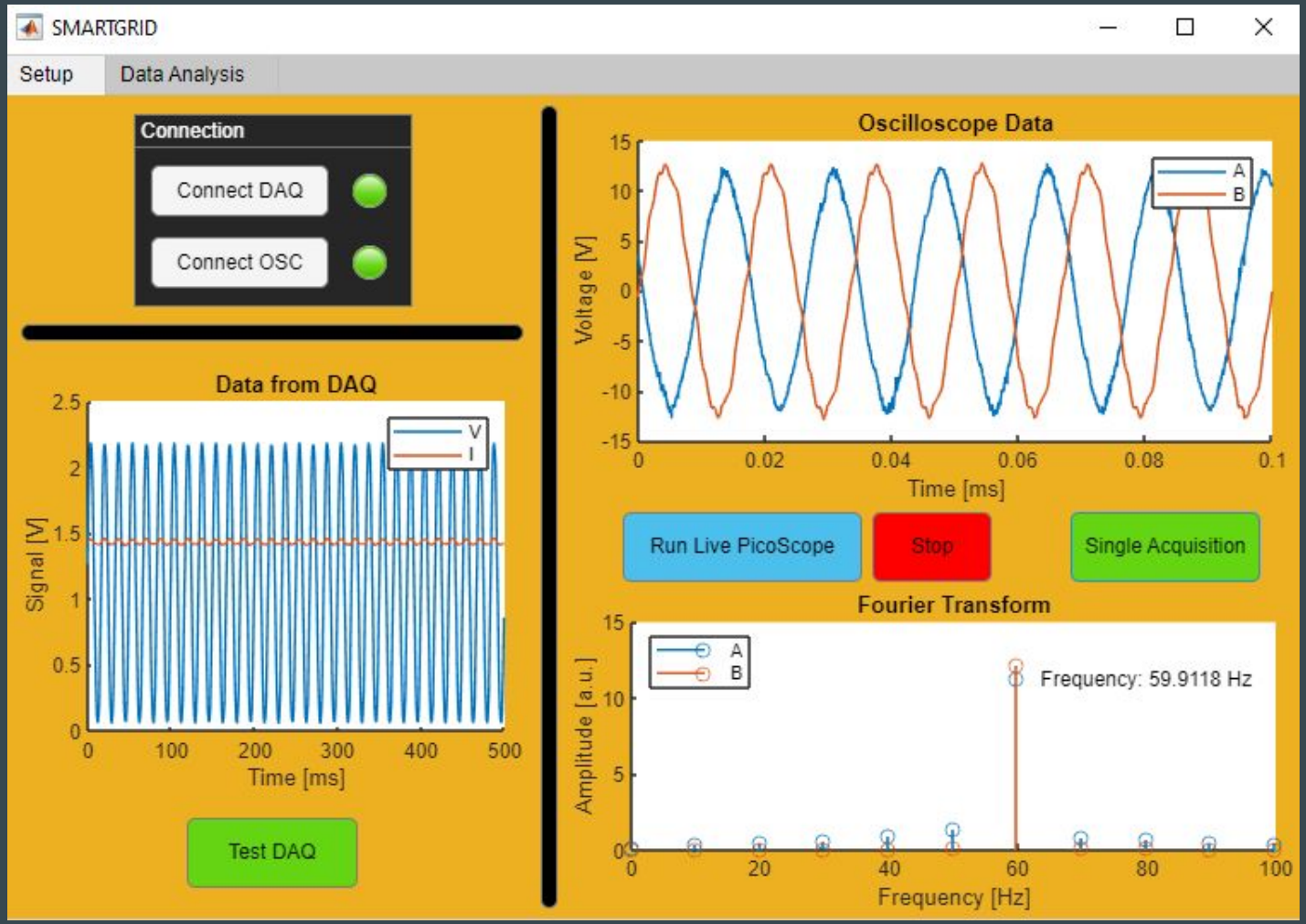
Data Collection





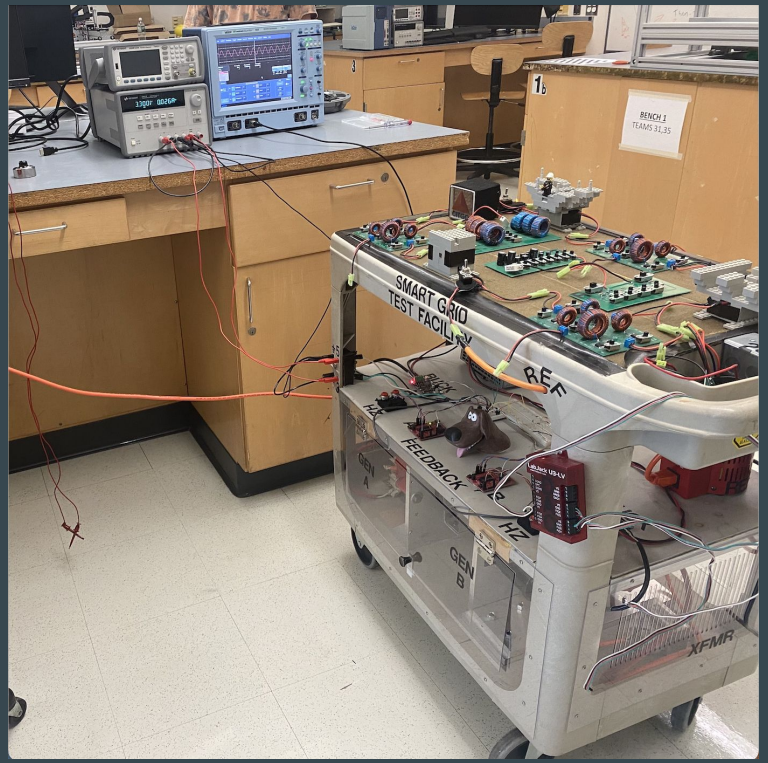


GUI

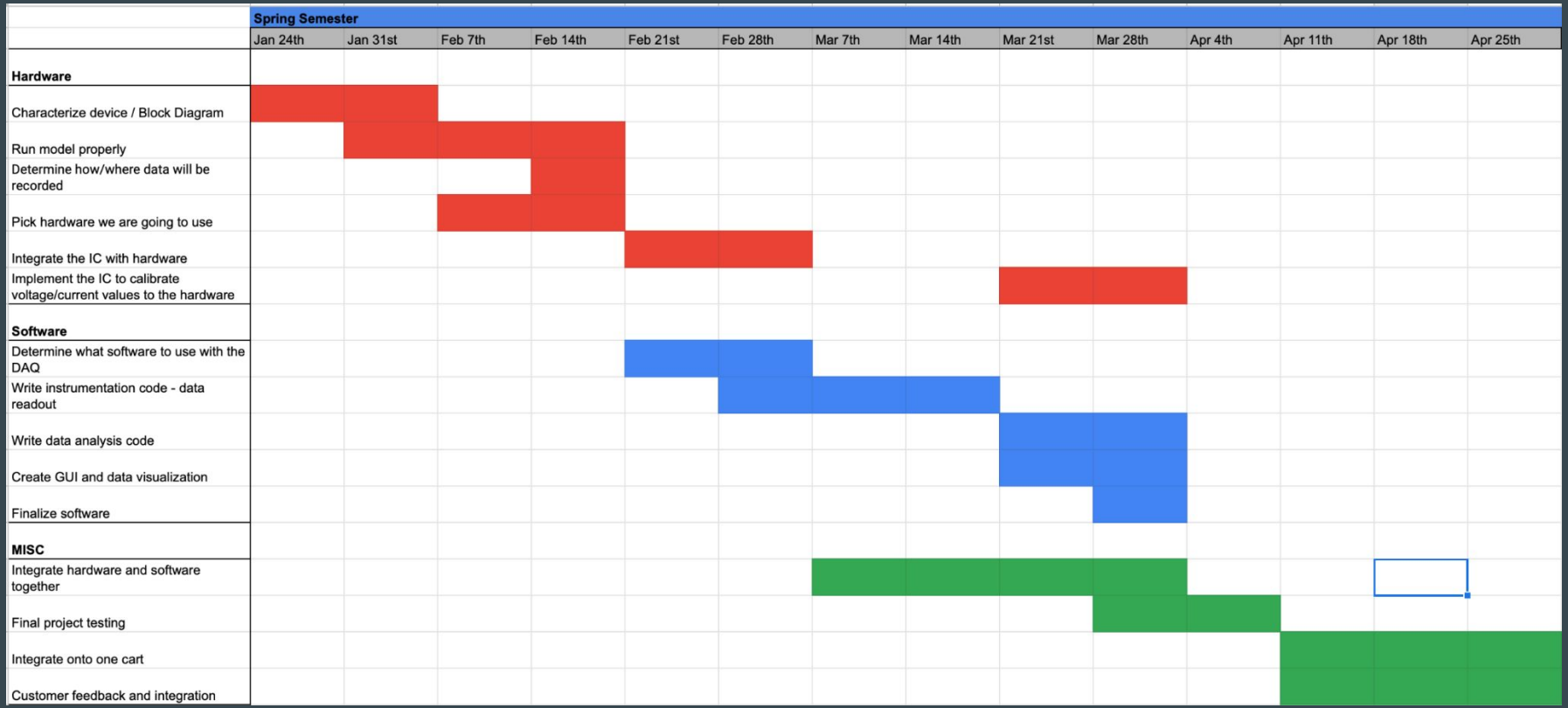

SMARTGRID
Setup
Data Analysis
Connection
Connect DAQ
Connect OSC
Data from DAQ
Signal [V]
Time [ms]
V
I
Test DAQ
Oscilloscope Data
Voltage [V]
Time [ms]
A
B
Run Live PicoScope
Stop
Single Acquisition
Fourier Transform
Amplitude [a.u.]
Frequency [Hz]
Frequency: 59.9118 Hz

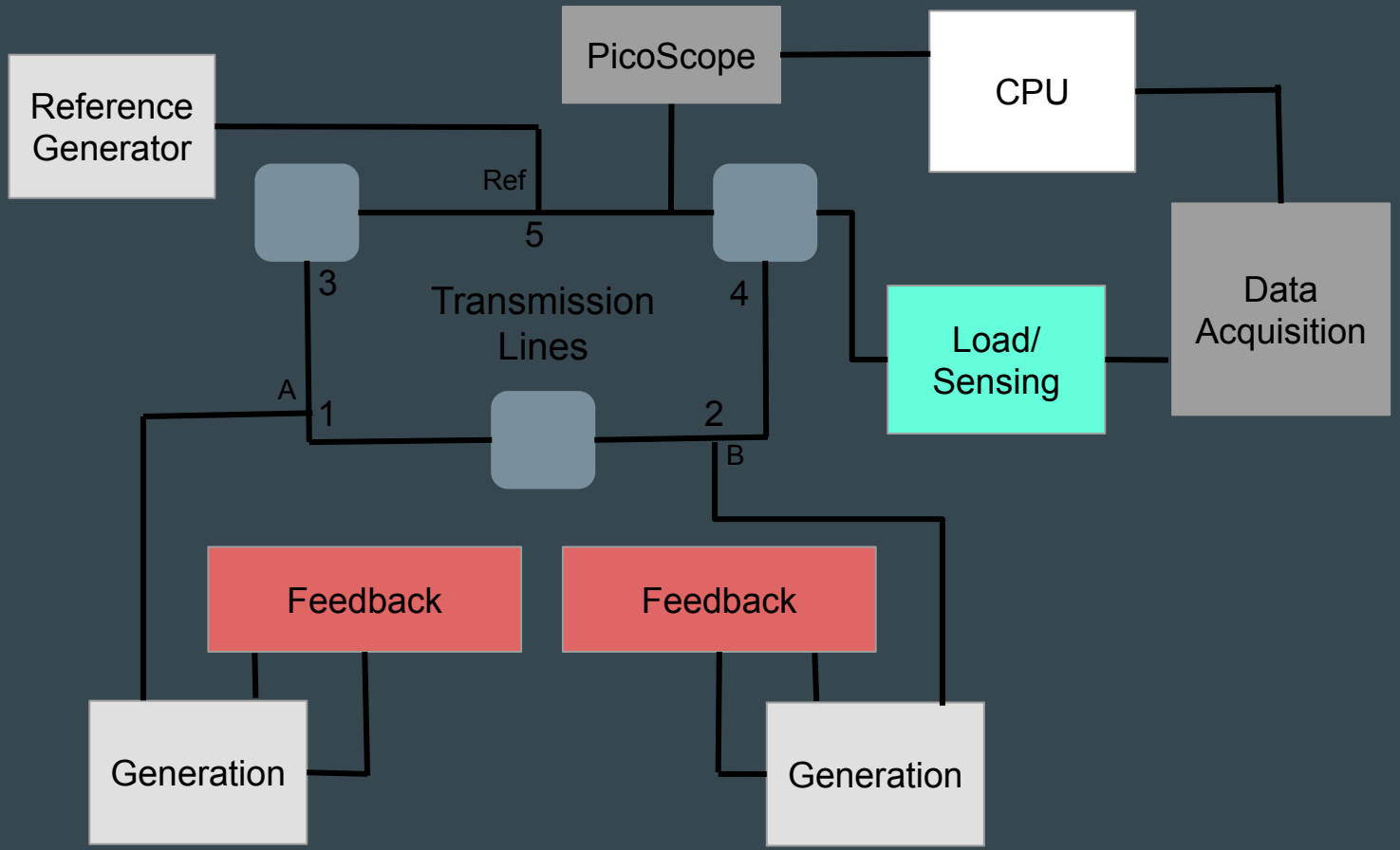
Next Steps

- Consolidate everything into one movable cart
  - Use the DAQ
- Update our GUI and DAQ code to be able to calculate phasors (and therefore power factor)



Gantt Chart


Spring Semester
Jan 24th
Jan 31st
Feb 7th
Feb 14th
Feb 21st
Feb 28th
Mar 7th
Mar 14th
Mar 21st
Mar 28th
Apr 4th
Apr 11th
Apr 18th
Apr 25th
Hardware
Characterize device / Block Diagram
Run model properly
Determine how/where data will be recorded
Pick hardware we are going to use
Integrate the IC with hardware
Implement the IC to calibrate voltage/current values to the hardware
Software
Determine what software to use with the DAQ
Write instrumentation code - data readout
Write data analysis code
Create GUI and data visualization
Finalize software
MISC
Integrate hardware and software together
Final project testing
Integrate onto one cart
Customer feedback and integration


PicoScope
CPU
Reference Generator
Ref
5
3
4
Transmission Lines
Data Acquisition
Load/ Sensing
A
1
2
B
Feedback
Feedback
Generation
Generation