



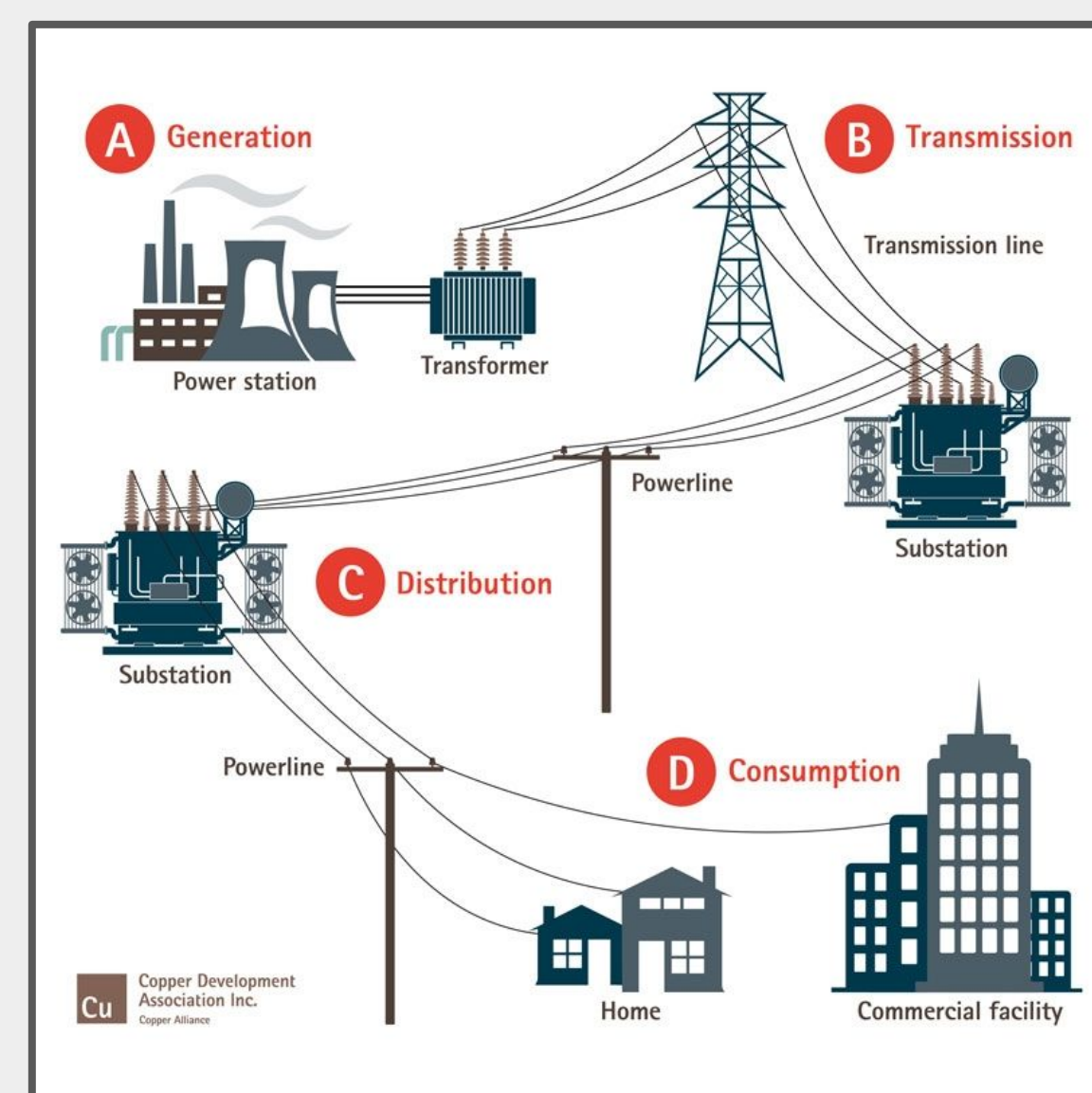
Team 30: Smart Grid

Scale Energy Grid Model | Boston University ECE
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BOSTON
UNIVERSITY

Background

- The energy grid brings electric power to systems that need it: houses, businesses, manufacturing buildings, etc.
- The grid infrastructure is made up of generation, transmission, and distribution, and then consumption by the end use system
- An important function is to integrate multiple different generation sources into the same transmission grid



Purpose

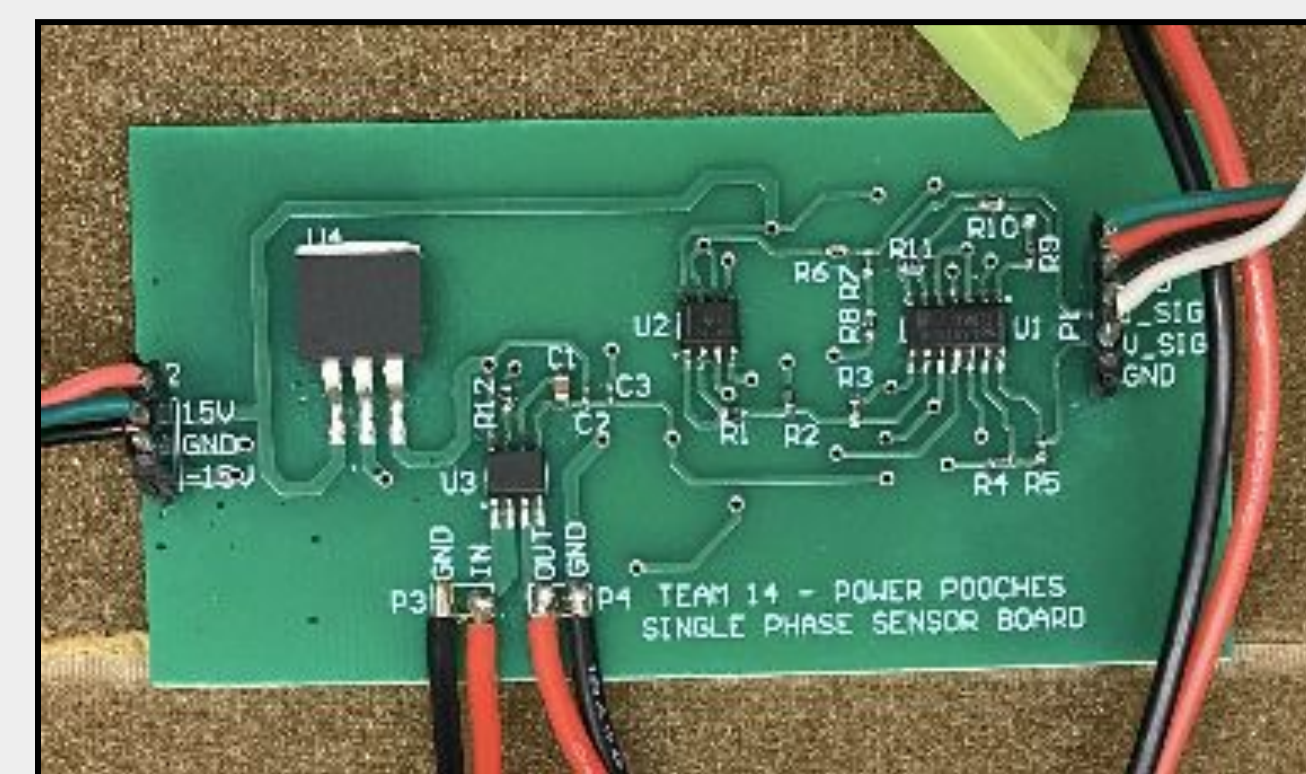
Educational Tool

- Create an educational tool that can be used by a professor to teach students about electrical grids by:
 - Measuring voltage, current, phase angle, and power factor on a grid under different transmission and load configurations
 - Verifying grid measurements using circuit principles learned in class
 - Simulating blackouts

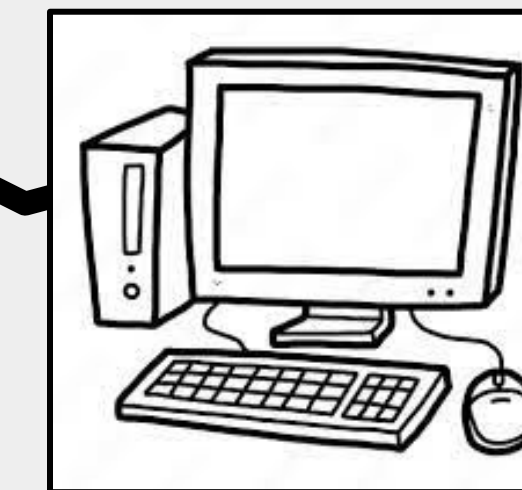
Updated Design

- Fix bugs associated with inherited grid model
- Add data acquisition system to enhance the already-functioning grid

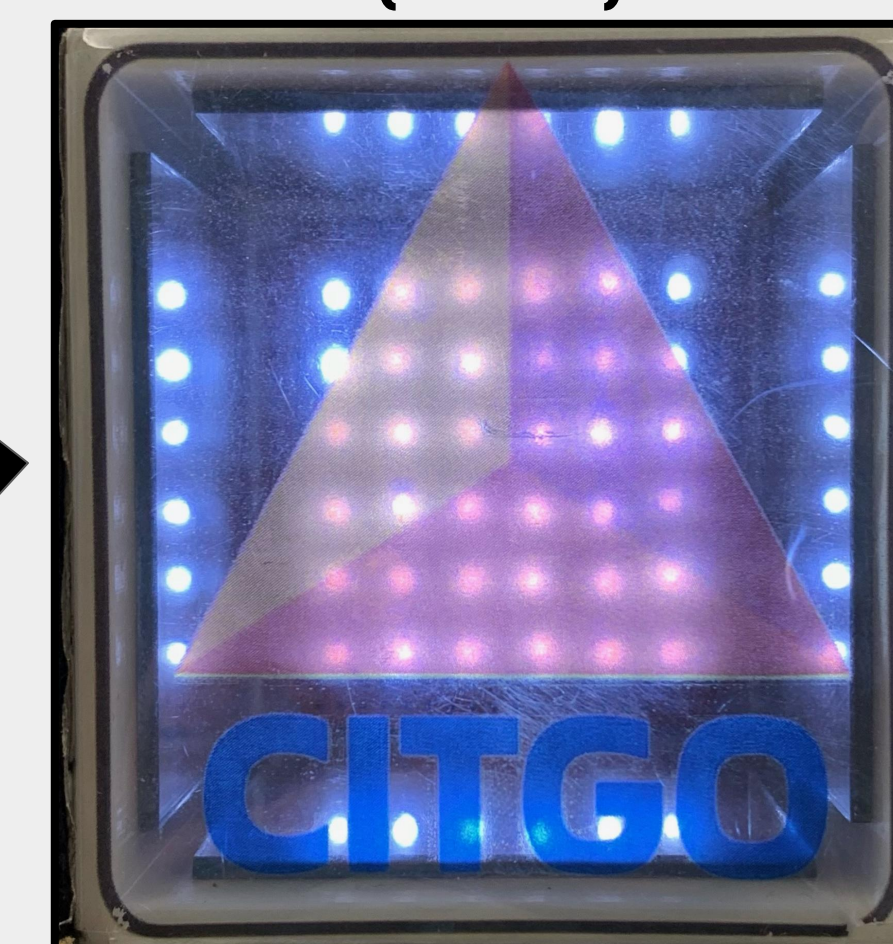
DISTRIBUTION



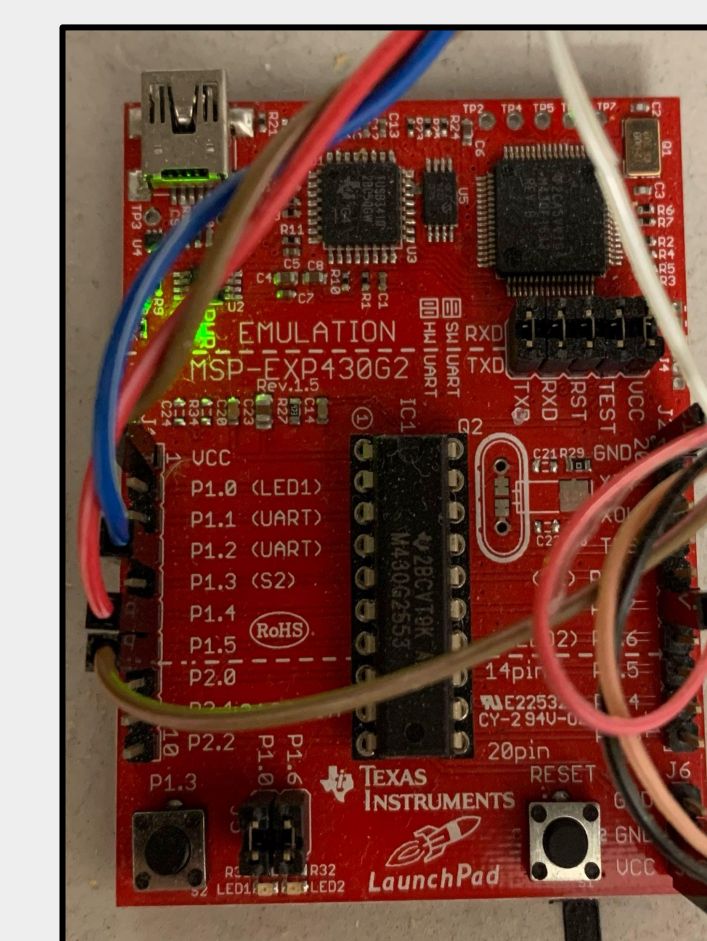
DATA READOUT



CONSUMPTION (LOADS)



FEEDBACK



TRANSMISSION

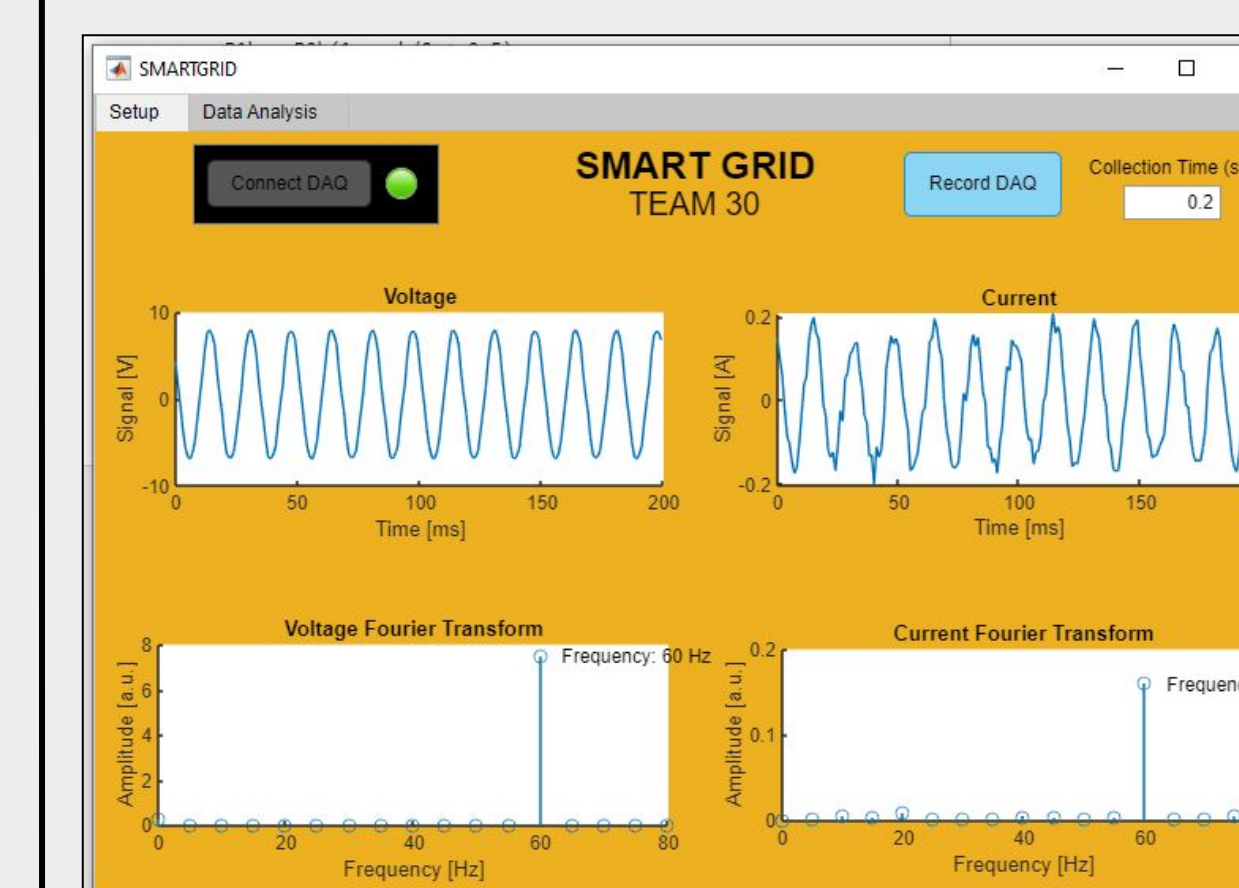
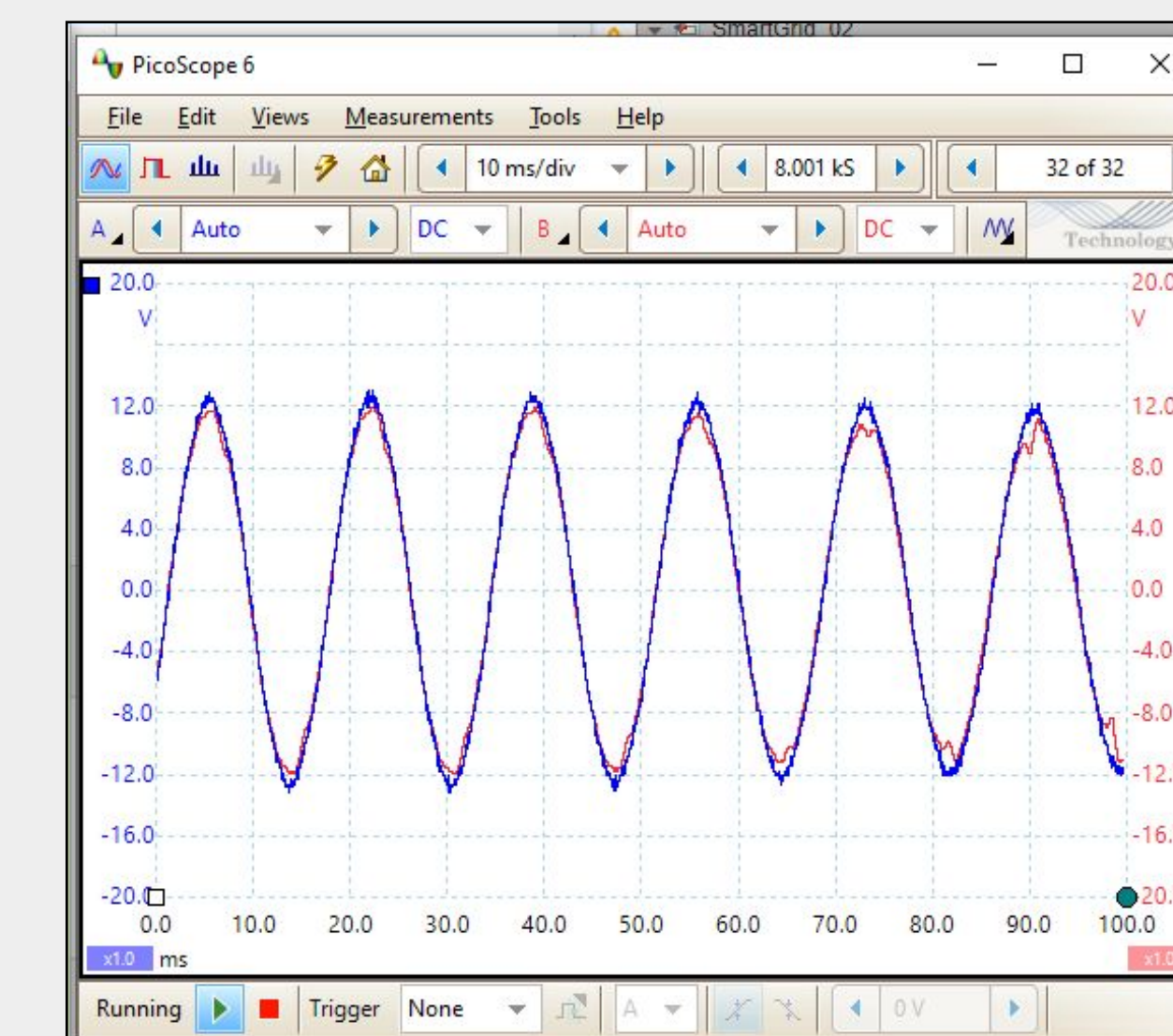


GENERATION

Software

Picoscope

- Live waveform data
- Verify stable grid operation
- Synchronize generators



Connect hardware

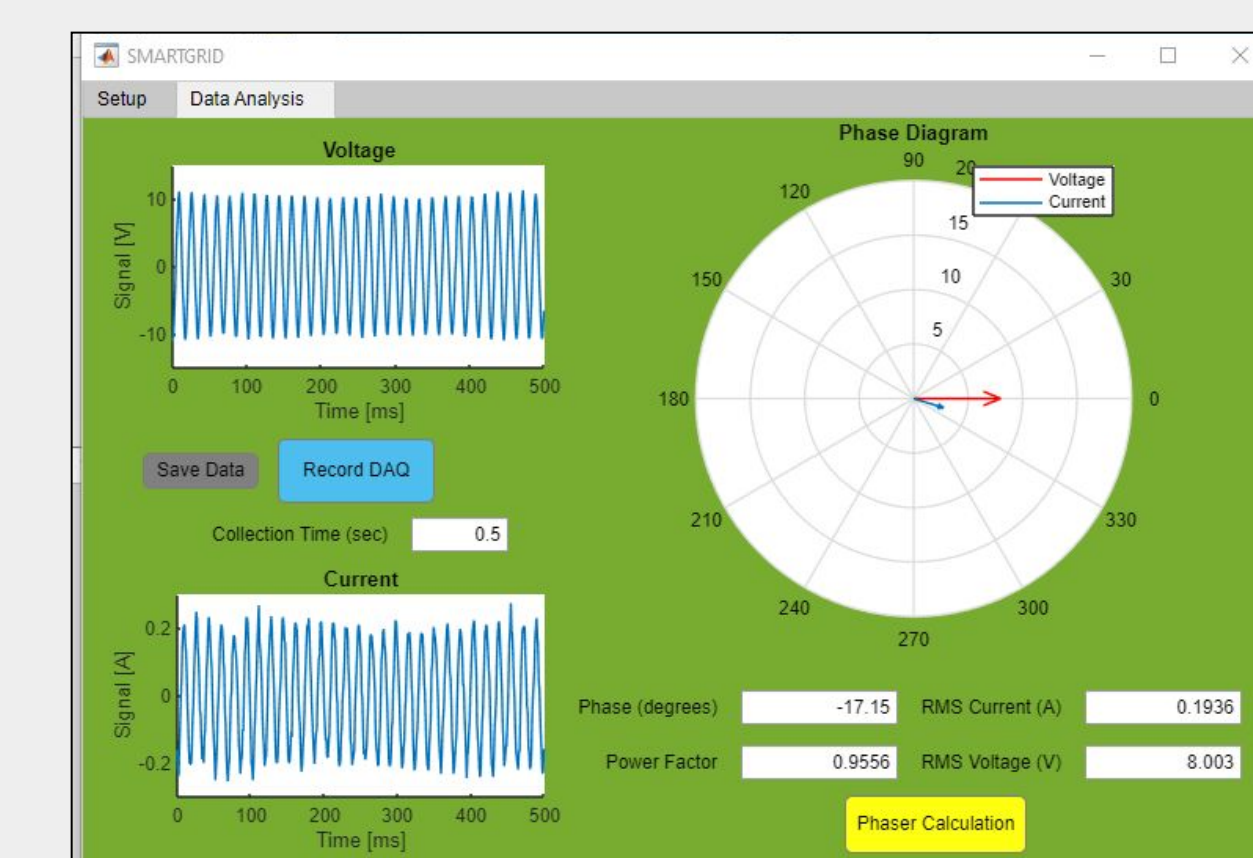
- Connect data acquisition unit at the push of a button

Frequency Analysis

- Graph current and voltage waveforms
- Provide frequency analysis to confirm 60 Hz

Visualization

- Graph current and voltage waveforms
- Plot Phasor Diagram to visualize leading and lagging power factor
- Provide RMS current, RMS voltage, phase angle, and power factor data



Special Thanks to:

- Power Poches for designing the original grid model
- Professors Pisano, Osama and Hirsch for guidance and support