NC STATE UNIVERSITY

Electrical and Computer Engineering

Communication Interface & Emulator for Residential PV Energy Management Systems

KOOLBRIDGE SOLAR

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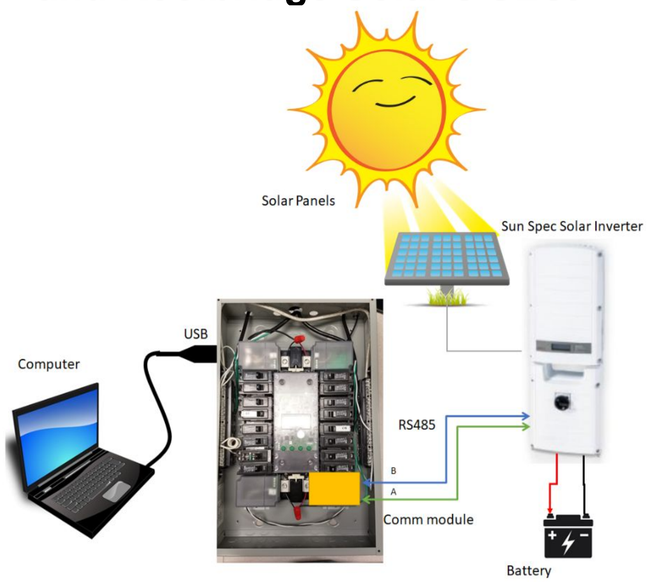
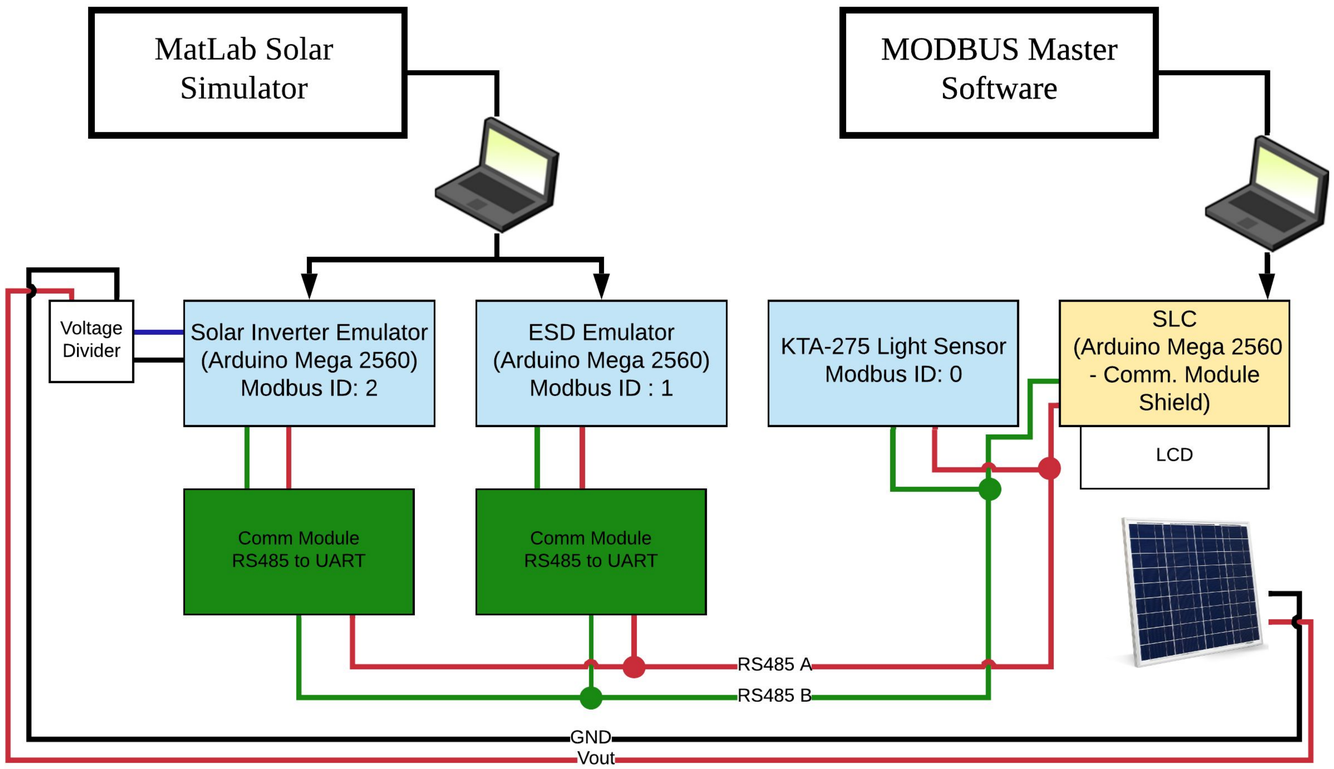
Problem Statement

To create a cost efficient and scalable solution for emulating MODBUS devices and communicating between these devices, real MODBUS devices, and Koolbridge Solar's SLC.

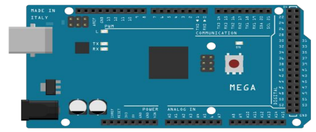


System Diagram

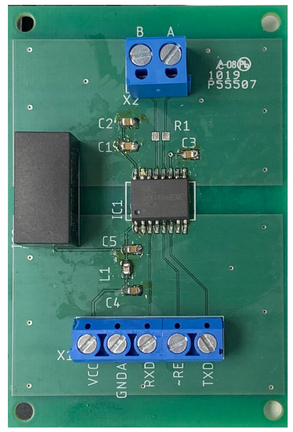


Hardware Components

- **Microcontroller**



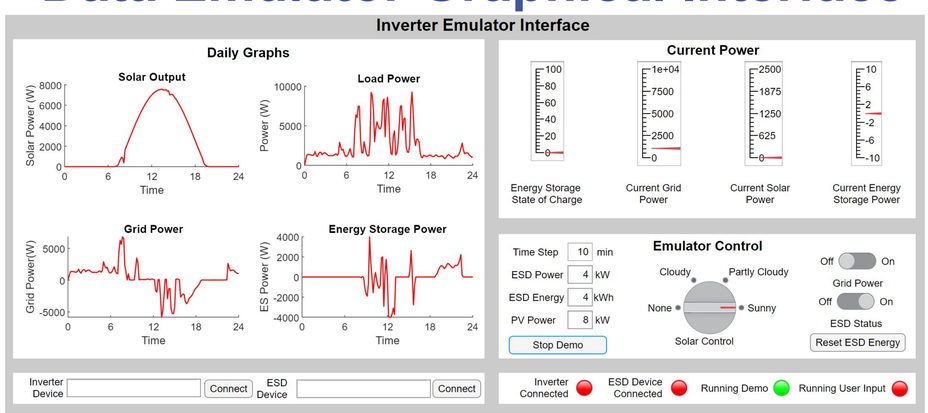
- **Custom PCBA with electrically isolated comm. and power rail**



Product Requirements

- **Use MODBUS protocol**
- **Display Inverter data on LCD**
- **System must emulate SunSpec Solar Inverter, SLC, and ESD**
- **SLC Emulation must recognize error codes from Inverter**

Data Emulator Graphical Interface



Challenges Overcome

- **Created UL compliant power isolation device**
- **Learned how to use and implement MODBUS protocol**
- **No access to SunSpec Inverter**
- **Major project pivot from inverter testing to emulation development**
- **Created custom PCBA**