

Senior Design Meeting Agenda — Microgrid Team

10:00AM Thursday, March 18th, 2021

205 Stinson Remick

Meeting Leader: *Kelsey*

Secretary: *Sylvia*

1. Progress update and plans moving forward by subsystem
2. Parts order status
3. Open questions

Progress Update

Generation Subsystem

- Waiting on ordered parts
 - Solar cells came in Tuesday evening, plan to test today (Thursday)

Testing plan (same as last week, for recap):

- Solar Panels
 - Using one cell, connect (using a breadboard) the positive lead to one end of a small, grounded resistor and the negative lead to ground. Use a multimeter to measure the voltage and current and compare to our expected values of 1.5V and 400mA.
- Bypass diodes
 - Test that the diode works properly by setting the multimeter to Ohms and checking that it conducts in the forward direction but not in the reverse direction.
- Fuses (630mA and 1A)
 - Run current through the fuses and record when they break (using an ammeter or a multimeter's continuity test setting). For a successful test, the current at which the fuses break should be above the max current expected from the subsystem the fuse is connected to but not too much higher than that value. In other words, the current should match the fuse's current rating.
- Test Kelsey's solar light with solar cells

Distribution Subsystem

- Inverter tested w/Tektronix Multimeter & Power Supply
 - Output: 114V AC
- Transformer tested w/Tektronix Multimeter & Power Supply
 - Output: 13.3 V AC
- Rectifier tested w/Tektronix Multimeter & Power Supply
 - Output: 12.25 V DC
- 2-Prong plug/outlet wired
- Resistive load tested w/Rectifier tested w/Tektronix Multimeter & Power Supply
 - Currently 227 Ohm w/3 Red LEDs
 - Consumes all 4W of power provided

- Reactive load: 4W motor demanding more than 400mA current
 - Consulted with Dr. Sauer
 - Considering [lower-rated motor](#) (1-2W as opposed to 4W)
 - Reviews still recommend ~1800 mA at input
 - If not, reactive load from 205 components
- **To Do**
 - Continue sizing resistive & reactive loads
 - Possibility to take advantage of the physical switching to incorporate half-power load options
 - Order duplicates of parts to complete & construct the system

Battery Storage Subsystem

- **To Do**
 - Calibrate to convert 12VDC to 14VDC
 - Test ability to charge battery with 14VDC source, may need to switch to 18V if 14V does not charge

Control System Subsystem

- SSR individual testing done
- Control System logic for switching done in MPLab
 - For testing purposes, use random number generator to give pseudo-power data and perform switching based on that information
- Interfaced MPLab and SSRs and was successful
- Working on implementing the ability to determine battery charge level from power monitoring chip data from the battery, designing logic to include battery data in switching controls
- In the process of writing up documentation for Design Review 2
 - https://docs.google.com/document/d/13d_BGBMyjNUWGmKv5Pi7X0DL6LF5HDro3b1wZfD7MBo/edit
- Looking into resistors with higher power ratings

Power Monitoring Subsystem

- Have received power monitoring chip from Microchip
- Don't yet have LoRa module, on the way
- Don't yet have the PCB adapter boards for power monitoring chip or LoRa, on the way

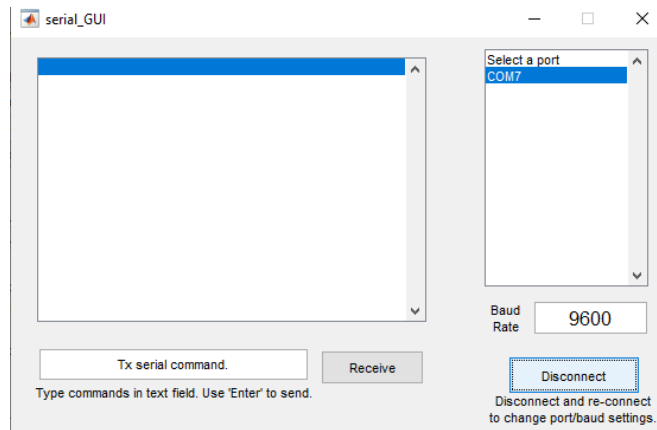
Testing plan (same as last week, for recap):

- **LoRa** (w/ breadboard)
 - Use 2 LoRas, each with an adapter board, 915MHz antenna, microcontroller (use boards from last semester with pinheaders), and accompanying circuitry (capacitors and resistors to solder onto the adapter board that can be found in the lab)
 - Send an I2C message from the transmitting microcontroller to LoRa A, LoRa wirelessly transmits to LoRa B, I2C to receiving microcontroller
 - Set up virtual GUI for LoRa that Maia found on Microchip to adjust LoRa settings (set up LoRa for transceiving and adjust center frequency, etc)

- LoRa transceiving updates
 - In the process of writing software - The two Load/Generation sites will function as class A devices while the main control board will function as a class C device

Display Subsystem

- Using mock GUI to display serial data from simple circuit
- 2k resistor between Vdd and GND
- Transmitted via UART connection for voltage to be read in
- Code completed as well as gui creation and established uart connection
- Fixing terminator issues
- Test GUI:



Part Order Status

- Mouser - expected delivery 3/17
 - Fuses, multiplexers
- Tindie - expected delivery 3/18 (arrived in south bend 3/16 AM)
 - LoRa adapter boards
- Digikey - expected delivery 3/19
 - LoRa modules, power chip adapter board, antennas for LoRa
- [Boost Converter](#)
 - Expected on 3/15 but delivery is running late, current expectation is 3/16-3/17
 - Reordered, to be delivered 3/18 just in case
- [Charge Controller](#)
 - Expected 3/17-3/22