# Senior Design Meeting Agenda — Microgrid Team

**10:00AM Thursday, February 18th, 2021**
**205 Stinson Remick**
**Meeting Leader:** *Sylvia*
**Secretary:** *Dan*

## Parts List

### Generation - Sylvia

- Explanation of system
- Parts
    - Solar Cells
        - https://www.amazon.com/AMX3d-Micro-Mini-Solar-Cells/dp/B01N38GZFD/ref=asc_df_B01N38GZFD/?tag=hyprod-20&linkCode=df0&hvadid=167157220945&hvpos=&hvnetw=g&hvrand=3614752947271761703&hvpone=&hvptwo=&hvqmt=&hvdev=c&hvdvcmdl=&hvlocint=&hvlocphy=9016280&hvtargid=pla-314689476883&psc=1
            - Buy 4 packs of 4 ($26.25x4 = $105) to make 2 generations each at 12V, 400mA → 4.8W
            - Connect 8 of the panels in series for each generation
    - Sun-simulating lamp
        - https://carex.com/products/carex-day-light-classic-plus-light-therapy-sun-lamp
            - Already own this
            - Is this a full-spectrum light?
        - https://www.amazon.com/WhitePoplar-Spectrum-Therapy-Dimmable-Sunlight/dp/B08CK9F7B2/ref=sr_1_1_sspa?crid=72YOB7AB5KP&dchild=1&keywords=full+spectrum+light&qid=1613339873&refinements=p_36%3A-2000&rnid=386636011&s=hpc&sprefix=full+spectrum+%2Chpc%2C196&sr=1-1-spons&psc=1&smid=AAQ98DZ0LGITM&spLa=ZW5jcnlwdGVkUXVhbGlmaWVyPUEyV0RBVDRTV0RJRVg3JmVuY3J5cHRlZElkPUEwNDExOTQ0MVhaRjUxR09SRzc2SyZlbmNyeXB0ZWRBZElkPUExMDI5NDc0MzU1VEtCUE5MUDQ5ViZ3aWRnZXROYW1lPXNwX2F0ZiZhY3Rpb249Y2xpY2tSZWRpcmVjdCZkb05vdExvZ0NsaWNrPXRydWU=
            - 2 9W (60W equivalent) light bulbs ($19.99)
            - Includes visible light and infrared
            - Having 2 would make it easy to separate the two generator locations if desired

### Distribution - Dan

- Explanation of system
    - Solar Cells generating 4.8W
    - 2 Loads - one 4W & one 4W+4VAR

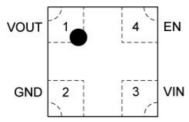
    - Invert 12VDC to 120VAC for distribution, transform 120VAC to 12VAC at loads
- Parts
    - 12-Gauge Silicone Wire + tape, connectors, etc ($10)
    - 12 VDC - 120 VAC Inverter ($52)
        - Rated at 300W
        - 110V/150W much more common - but less efficient for the transformer?
    - 110/120 VAC - 12 VAC/2.1A ($17)
        - Rated at 25W
        - Connector?
        - 
    - Loads:
        - *Purely Resistive:* 72 Ohm to run at 2W (same as LEDs)
            - Would pull 167mA of current
        - Set of Resistors ($14)
        - *Inductive:* 18 Ohm in series with ~48 mH
            - From 4 + j4 = (12^2)/(R + jwL)
            - Set of Inductors ($21)
            - *Let's talk about max operating current & internal resistance of inductors*
        - 12 VAC/2W LEDs - 20W Halogen Replacements ($15)
            - 2-pin base, should be easy to wire up in series w/resistor
        - Physical Switches to Toggle Loads ($10)

**Storage - Brian**

- Explanation of system
- Parts
    - Fuses
        - 1 for each branch (estimated 2)
    - Rechargeable batteries
        - A pack of 20 3V batteries
    - Amp hour meter
    - Switches
        - Estimated x1

- Structure components
  - Components needed to implement batteries in an array

## Control System - Kelsey

- Explanation of system
- Parts
  - Microcontroller
    - PIC32MM0256GPM064 -- https://ww1.microchip.com/downloads/en/DeviceDoc/PIC32MM0256GPM064-Family-Data-Sheet-DS60001387D.pdf
      - Receives information from the Power Monitoring Subsystem and Battery Storage Subsystem (power info, battery charge %, etc)
      - Logic for opening/closing switches (setting EN of switches low/high) to control amount of battery power supplied to loads
        - Logic to control switches is based on the information received from the Power Monitoring and Battery Storage Subsystems
  - Switches
    - MIC94040 https://www.microchip.com/wwwproducts/en/MIC94040 Single input, single output, EN (active high), GND → https://ww1.microchip.com/downloads/en/DeviceDoc/mic9404x.pdf
      - 

Top View

4-Pin (1.2mm x1.2mm) MLF®
    - MIC94090 is essentially the same switch as MIC94040, just with a lower operating current, so there is are multiple options based on how we choose to design our subsystem(s)

## Display - Maia

- Explanation of system involves using Matlab to:
  - Create a serial port object to enable receiving data from microcontroller

    - Read and process the data by putting them in their respective fields and calculating the percentage of current coming from generation vs storage
    - Make functions to continuously plot to data and adjust the gui display
    - Allow the user to choose which subsystem to view, and whether they want to overlay graphs to show the connection between apparent power and real power

# Previous Meeting Concerns

## I2C Concerns - Brian

- How is the information being transmitted from the power chip? (ie which communication protocol)
- In what ways can the system chip receive data?