**Boston University**

**Electrical & Computer Engineering**

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**Second Prototype Testing Plan**

By Team 29

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**Required Material:**

Hardware:

* Raspberry Pi
* INA219 Current Power Sensor
* Solar Panel Assembly & High Power LED Light
* ‘Power Supply’ Switch box
* 6V DC Power Supply
* Relay HAT
* 7 Segment LCD Display
* Renogy Wanderer Solar Charge Controller
* 12V Lead Acid Battery
* Buck/Boost Converter
* Buck Converter
* Resistor

Software:

* Python:
  + Gets data from INA219 Current Power Sensor
  + Initializes LCD Display and prints voltage and current data
  + Reads from the GPIO pins to determine the position of switch for the EDS
  + Activates the relay to turn on and off the dummy EDS

**Set-Up:**

The essence of our prototype testing is to utilize the circuit we currently have assembled as well as demonstrate activation of the circuit through both power coming in from the panel (as demonstrated with our high wattage LED lamp) as well as with a direct supply of power fed into the circuit through our power supply. Since the circuit is still a prototype, it is not yet installed into the interior of our cooler assembly, however it is functionally all as if it were. This should not affect performance.

We will additionally be demonstrating that the solar panel can charge a connected battery and power a connected load. This will be a separate demonstration, since we have yet to incorporate these two systems together.

**Pre-Testing Procedure (Part 1):**

1. Place solar panel assembly on floor beneath high voltage lamp
2. Ensure that the physical circuit is laid out neatly on the table so that all connections and components are clearly visible.
3. Boot python in the Raspberry Pi for switch demonstration.

**Testing Procedure (Part 1):**

1. Activate the high wattage lamp and adjust the power setting with the dial on the side. You should notice the readings on the LCD screen alternate, demonstrating that power is coming from the panel and interacting with the components within the circuit.
2. Record the power readings associated with the solar panel directly.
3. Switch activated in order to demonstrate that power can be provided to the power supply circuit when they become available to our team.

**Measuring Criteria (Part 1)**

The criteria for successful running and output is as follows:

1. The circuit is able to read the voltage and current from the INA219 current power sensor..
2. Circuit behavior changes as expected based on the level of light making contact with the solar panel.
3. Proper behavior of switch used to represent whether or not there is power fed to the power supply.
4. Python properly demonstrates electric current and voltage in the LED display.

**Score Sheet (Part 1)**

| Expected Behavior | Observed? |
| --- | --- |
| Correct Voltage & Current Reading from INA219 |  |
| Python Code Runs with no error |  |
| Proper Behavior of Switch (turns LED on and off) |  |

**Pre-Testing Procedure (Part 2):**

1. Place solar panel assembly on the floor beneath the high voltage lamp.
2. Connect the solar panel to the solar charge controller.
3. Connect power converters and resistor to the solar charge controller.
4. Connect the battery to the solar charge controller.
5. Ensure that the physical circuit is laid out neatly on the table so that all connections and components are clearly visible.

**Testing Procedure (Part 2):**

1. Turn on the lamp. The solar charge controller should display a higher panel voltage, and it should indicate that the battery is being charged.
2. On the charge controller, turn on the load supply. The power converters should power on and show that power is being sent to the load.

**Measuring Criteria (Part 2)**

The criteria for successful running and output is as follows:

1. The charge controller receives power from the solar panel.
2. The battery is able to charge.
3. The load is powered from the battery/solar panel.

**Score Sheet (Part 2)**

| Expected Behavior | Observed? (Y/N) |
| --- | --- |
| Charge controller reads high voltage (>10V) from illuminated panel |  |
| Charge controller displays that battery is charging |  |
| Load turns on when triggered from solar charge controller |  |