ECEN 4517/5517 – Spring 2017

Experiment 3-2 Pre-Lab Due: February 17, 2017, 11:59 pm (Mountain Time)

In Experiment 3-2, you will add sensing circuitry and MPPT control to the buck converter power stage built in Experiment 3-1.

1. Battery current and voltage sensors (50 points)

Draw a complete schematic of the battery current and voltage sensing circuitry. The circuit should have two output signals that will be used as inputs to the TI MSP430 ADC channels. Be sure to include the following considerations:

- The MSP430 ADC input channels have an input voltage range from 0 V to 3.3 V (or less, depending on your ADC configuration choices).
- The high side current sense circuit should have RC filtering at the INA194 input and the MSP430 ADC input, as shown in the Lecture 5 slides.
- Include numerical values for all components.
- Include the pin header labels for connecting the sense signals to the MSP430 development board.
- Write expressions for the ADC input voltages as functions of the battery current and voltage.

2. Perturb and observe peak power tracking algorithm (50 points)

Write a draft of the complete **void main(void)** code block in the main.c file for the task within Experiment 3-2 Lab Assignment entitled: Peak power tracking with the PV system cart. The code does not have to be experimentally validated. You should use appropriate variable names for working with the ADC and PWM peripherals. Turn in the following:

- Short description of how the algorithm works together with a detailed flow chart based on your code.
- The draft **void main(void)** code segment of the main.c file.
- Complete system schematic diagram showing the interconnections between the power stage board, the MSP430 development board and the control breadboard.