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ESE280 Laboratory 11

Section 3

Bench 9

Sensors, Basic Analog-to-Digital Conversion, and the 12bit ADC

Design Task 2 Verification Strategy:

Because the pin of PE3 is now an analog input, we can just directly test this on the microcontroller, without pulling up or down the pin. Thus, the pin is floating, and its analog reading will change with time due to the environment. Thus, we only need to step to make sure the logic is correct.

With the potentiometer and the multimeter, we can specify an analog voltage that PE3 should be at. Once maintained, we can step forward to make sure that the ADC correctly digitizes the number (Following the format of a specific fraction of our ref voltage, 2.5V)

We can check what was analog voltage was read via the debugger. As we step through the program, we can see what was once in the res register of the ADC will now be set in the bcd_entries and led_display arrays in .dseg. Each step of the way, we verify our calculations.

The final result in bcd_entries should be the hand calculated value as hex.

We can repeat this several times to ensure that everything is working correctly.

Design Task 4 Verification Strat:

We can do the same as task 2, hand calculating whatever value that was read from PE3. However, the final result in bcd_entries should be a proper BCD entry that matches the decimal math of the equation $((res * 2500) / 4096) - 500$