ADC Verification

- Make sure input impedance of sensors is < 10kOhms
- I think we are okay but it is good to check

Step 1 to see if I get anything

- For transient testing use a scope waveform generator and triggered screenshots NOT DAC plots amplitude vs frequency
    - Process oscope waveform data for graphics?
- I want to see maximum I am not sure it is worth the work to graph the bode plot myself but I think that can be an option if needed
- For sweep have it slowly so we have good

- How to properly test sweep???
    - For now can we test 0V 0.25V 0.5V 1.5 2.5V 3.75V 4.1V
    - Test the dac at each level for a certain amount of time so when you get oscope data you know for a fact the dac output and the what the adc should be reading
    - I can use that data to check each point

Voltage Reference

- 5.25-5.49V -> bypass caps?
- 1.5-1.8Vpp

Ground

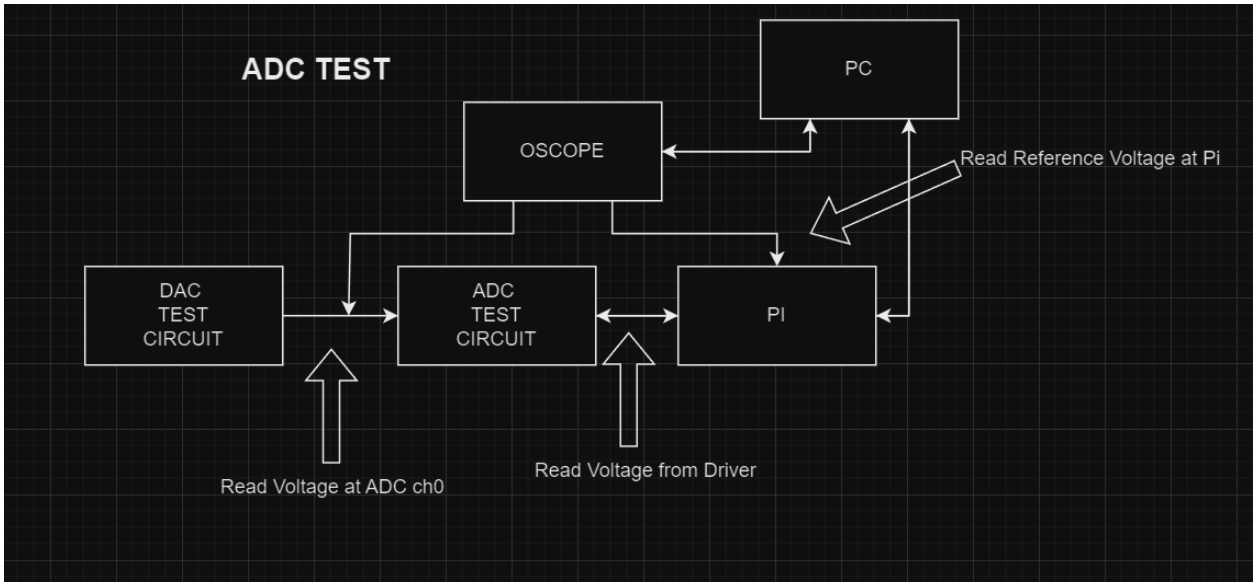
- 750-830mV
- 1.5-1.8Vpp

SPI Lines

ToDo:

- dive into code
- dive into hardware

Goal:
Get the lowest system error rate as possible



Test sequence

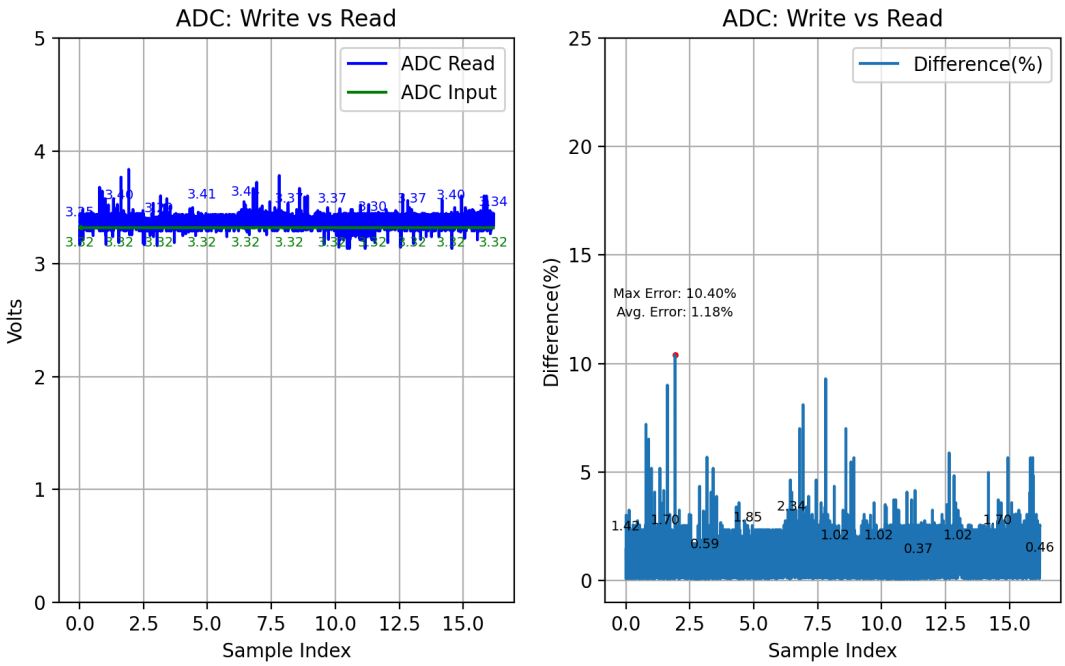
1) Run Pi script -> test.py
2) Run pc script -> oscope1.py
3) Run for 10 seconds
4) Get pitime.txt and data.txt data from pi
    a) How to get SCP to work
5) End pc test
6) Enter into excel
7) Compare times for proper comparison
8) Sweep would be next!!!

Updates made to test

- Pi script for ADC time is 40ms -> 0.2ms with c++ file handling
- Python script improved +20ms -> 2ms read time with separate read and processing

All test is set up just need to run script and set up excel data
May want to change c++ file to clear files each run

Concluded First Test and Got These Results



Even though avg error is 1.18% doing some excel math I got

	avg	std	v
3	1.18	0.92	
5	upper avg	lower avg	
3	2.10	0.26	
2	mode(% error)	median	
9	5.07	5.07	
5			

Showing that even though the average is 1.18% avg is considered to >2% which exceeds our limits we will add hardware improvements before looking into software filtering methods

Tests needed

- steady DC Voltage with 1.1%
-sweep DC Voltage with 1.1%
- Transient AC response with 1.5%

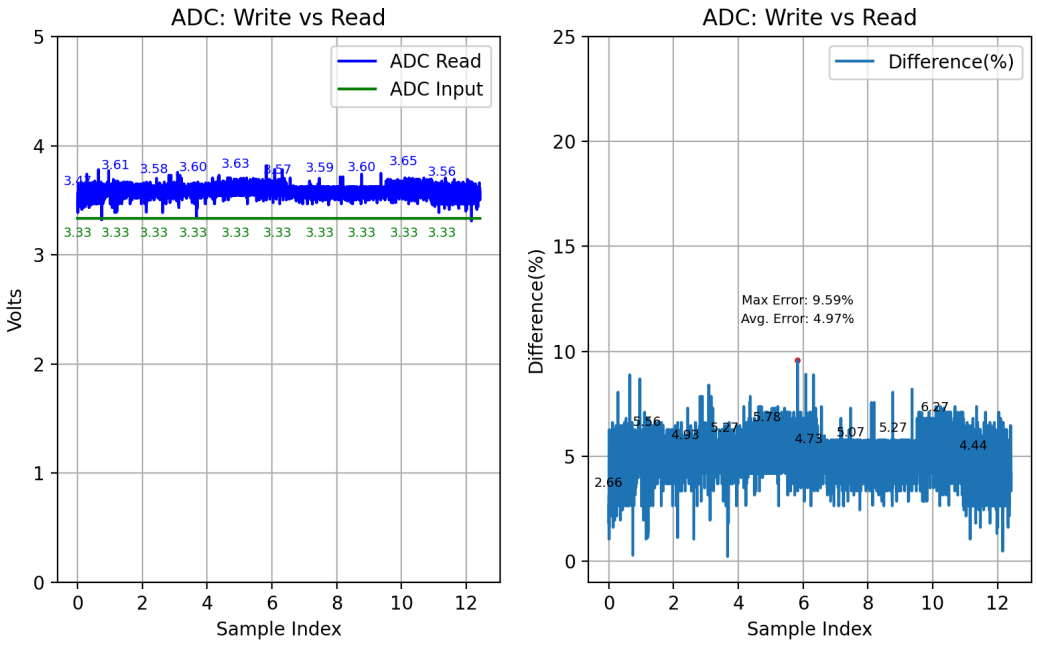
- Max Frequency > 3kHz

Better Measurements

- better grounding about 10-15mV off
- better reference voltage
- Did 60Hz coupling cause an issue
- Wiring can be an issue

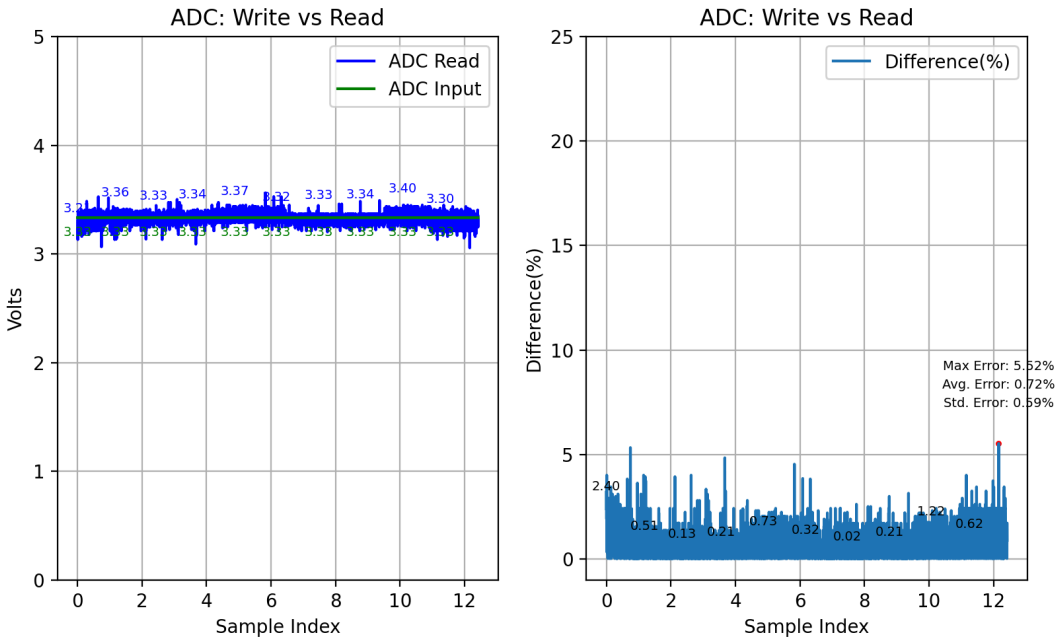
We are close enough that I feel comfortable moving forward with other tests and hardware

This was my second attempt at testing with a focus on improved grounding by connecting more ground and twisting ground wires with other signals



These are the results. Why it is more inaccurate I am not sure but excel math tells us that the std from the average is significantly better

First test had a an average error of 1.18 % std dev of 0.92% so double the % error error so that so that 2% variations This test has average error of 5.101% but std of 0.05% meaning voltage was extremely steady in the set up with a variation of 0.05% or 2.5mV while the old test saw a so a change of 46mV. If we subtract each entry by the average amount we get an error rate of 0.72%.



These are well within our limits so are next move is to find a way to guarantee a constant voltage reference and voltage output.

So I know we can get a error rate of 0.72% and a std of .05
Look on datasheet about reference voltage regulation-> bypass caps will come in handy