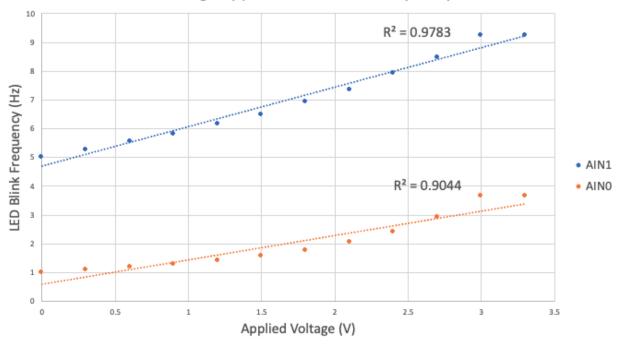Diagram 1: Voltage Applied vs LED Blink Frequency Data Analysis

The linear fit between applied voltage and LED 3 blink frequency has an R^2 of 0.9783. This value is relatively high and shows that there is a clear linear and direct relationship between voltage input and the blink frequency. An interesting observation is that the blink frequency didn't completely reach 10 Hz as expected. This is due to the ADC not being able to convert anything higher than 3 V. Therefore the frequency plateaus at 9.2569 Hz. This is due to the parameters set in the overlay file. ADC_REF_INTERNAL is 0.6 V and the closest gain to 3.3V is ADC_gain_1_5, which gets the voltage up to 3 V. If this plateau is taken into account and the last 3.3 V datapoint is removed, the R^2 value will be even higher.

The linear fit between applied voltage and LED 2 blink frequency has an R^2 of 0.9044. This value is decent and shows that there is a linear and direct relationship between voltage input and the blink frequency. Again, the voltage plateauing effect is displayed as the ADC voltage reading peaks at 3 V and the LED blink rate at 3.6487. Removing the last redundant datapoint will increase R^2 value.

As expected, the R^2 value is higher for AIN1 than AIN0 line. This is the case as the bit depth for channel 1 is 12 as compared to 8 for channel 0. This means that the reading could be even more accurate. A potential error I observed is fluctatuations in the waveform on the oscilloscope. This is likely due to the voltage input being unstable. This causes the ADC voltage readings to also fluctuation (which I observed) and the blink frequency to also fluctuate.

Voltage Input (V)	LED 2 Blink Frequency (Hz)	LED 3 Blink Frequency (Hz)
0	4.9999	0.99799
0.3	5.263	1.0775
0.6	5.5538	1.1709
0.9	5.812	1.2754
1.2	6.1711	1.4083
1.5	6.4912	1.5723
1.8	6.9421	1.7729
2.1	7.3502	2.0405
2.4	7.9341	2.4037
2.7	8.4722	2.9238
3	9.2569	3.6487
3.3	9.2569	3.6487

Table 1: Voltage Applied vs LED Blink Frequency Raw Data