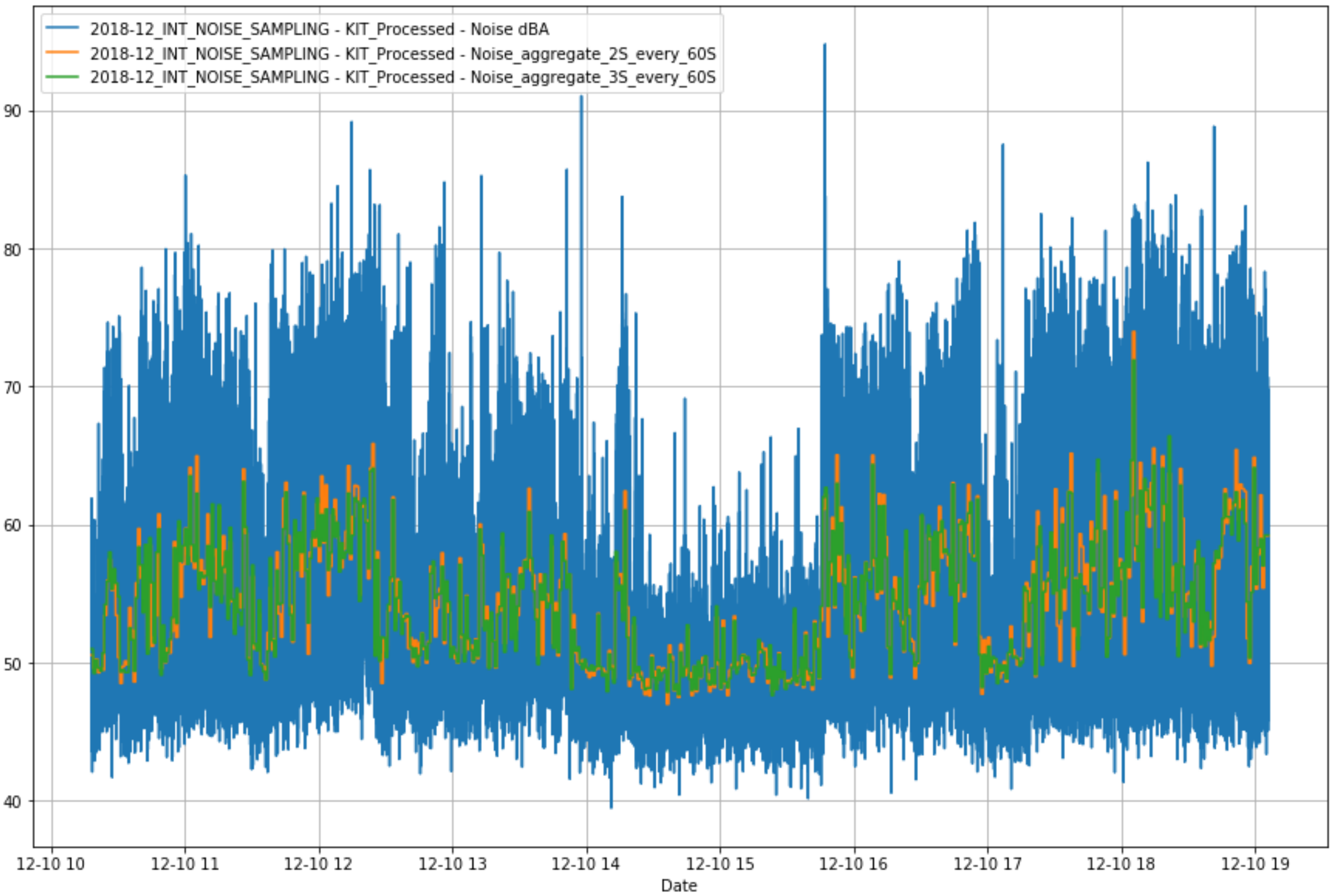
Noise Sampling Analysis

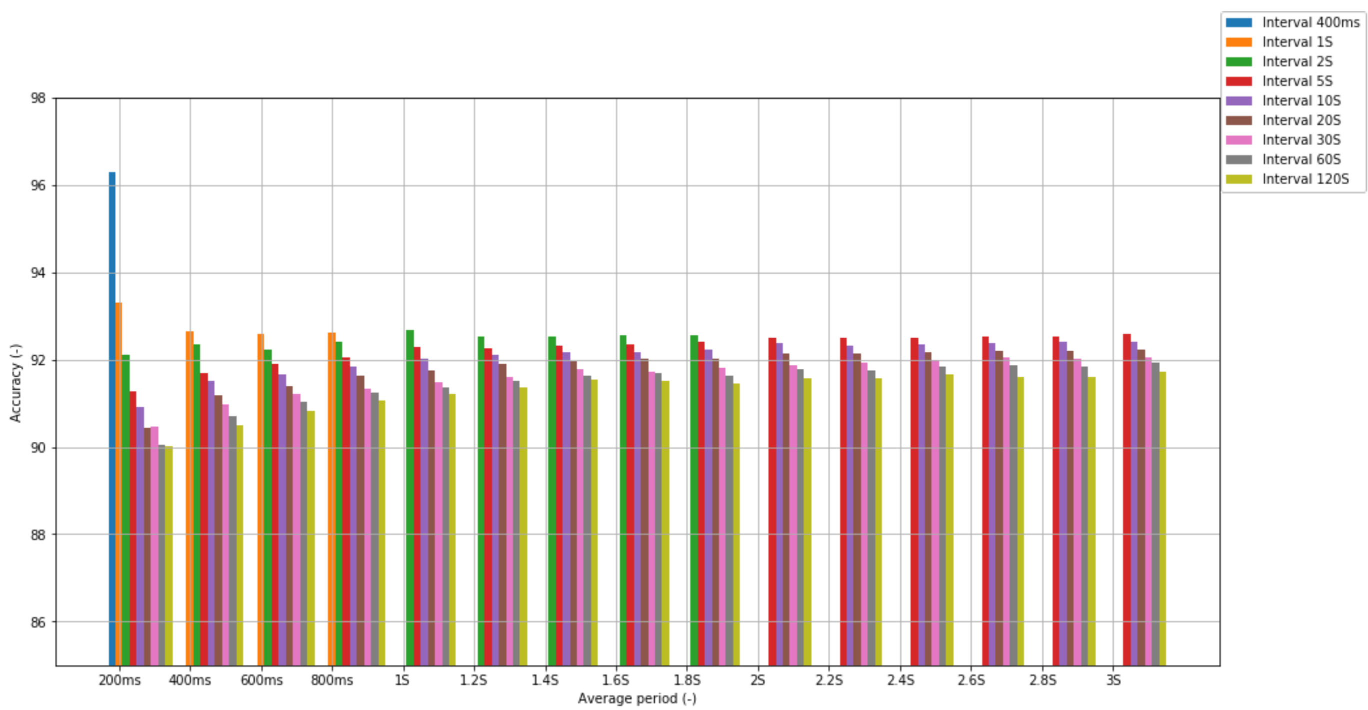
The purpose of this analysis is to show what is the best compromise between the sampling frequency and accuracy, and to show whether or not there is a need for averaging samples to get rid of random noise. For this, a fast measurement was done for several hours, and the comparison between the different accuracies resulting from averaging the samles and their resampling (simulating reading interval) is shown



Analysis

Tabular results

	400ms	1S	2S	5S	10S	20S	30S	60S	120S
200ms	96.284875	93.291742	92.098885	91.261099	90.911463	90.427883	90.457750	90.038844	90.006649
400ms	0.000000	92.654274	92.358467	91.693163	91.518437	91.167825	90.975686	90.708485	90.484243
600ms	0.000000	92.601218	92.233104	91.905100	91.647234	91.377981	91.207657	91.045599	90.831949
800ms	0.000000	92.604061	92.412015	92.040112	91.829969	91.617078	91.328377	91.248158	91.064351
1S	0.000000	0.000000	92.670008	92.282948	92.025849	91.754566	91.472425	91.367784	91.218769
1.2S	0.000000	0.000000	92.522685	92.258459	92.094108	91.890755	91.610351	91.507031	91.367145
1.4S	0.000000	0.000000	92.517479	92.313358	92.172746	91.965357	91.774996	91.628917	91.546272
1.6S	0.000000	0.000000	92.564236	92.350133	92.182168	92.032201	91.726193	91.688873	91.511380
1.8S	0.000000	0.000000	92.568516	92.396189	92.222635	92.031204	91.813339	91.640783	91.450508
2S	0.000000	0.000000	0.000000	92.494630	92.371978	92.134516	91.864434	91.775724	91.582974
2.2S	0.000000	0.000000	0.000000	92.485666	92.326241	92.133561	91.943917	91.742903	91.559130
2.4S	0.000000	0.000000	0.000000	92.496777	92.361741	92.176015	91.998725	91.847838	91.645290
2.6S	0.000000	0.000000	0.000000	92.529034	92.388838	92.189543	92.036695	91.864145	91.607700
2.8S	0.000000	0.000000	0.000000	92.522989	92.394568	92.213132	92.027976	91.853737	91.599501
3S	0.000000	0.000000	0.000000	92.577062	92.404459	92.230600	92.051409	91.917416	91.710140



Conclusions

As seen in the graph above, averaging throughout more than 2-2.2S in any measurement interval does not provide any further interesting information.

For a **reasonable publish interval period**, say, above **20S**, the an optimal averaging time would be between 1.4S and 2.2S, being the fist achieving a target of 92% accuracy. For higher intervals, a longer averaging up until 2.2S shows improvement.

For a **fast measurement interval**, 1S interval with a single shot measurement achieves the best accuracy, and also at 2S interval with 1S averaging.

However given the complexity of this implementation in firmware, and given that the gain for implementing this is <2% accuracy, it is not recommended to apply this.