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Problem 1)

1) A suitable filter for this problem is the mobile mean filter, providing a rectangular weighting function with amplitude A and duration TF. In order to have a different peak values for different Tp values we choose TF=TPmax. Worst case is the case with TPmin.$V_{P,MIN} = 3\sqrt{\frac{S_V}{2}\frac{T_{PMAX}}{T_{PMIN}^2}} = 268\mu V$.
2) The additional pulse can be used to limit the impact of 1/f noise by acquiring a sample right before the pulse and subtracting it to the output of the mobile mean filter. In this scenario, the white noise contribution would be dominant ($468\mu V$) with respect to 1/f noise ($2.27\mu V$). Overall, $V_{P,MIN} = 5{,}61mV$.
3) The filtering action on white noise must be improved. The time interval between pulses can be used to implement a correlated double filtering. Integration window on noise: 250ns. $V_{P,MIN} \approx 273{,}6\mu V$

Problem 2)

1) Wheatstone bridge, 4 strain gauges (G=2, R=100 Ohm) with 2 active devices and two dummy ones for temperature compensation (necessary). Constant power supply V_A=1V. Resistor noise is the dominant contribution (Stot=4kTR). F_{MIN}=56.32N.
2) Multiple samples can be exploited to improve the SNR. Exponential weighting function to take into account slow variations with T_F=20ms. F_{MIN}=0.84N.
3) Sinusoidal bias can be used to modulate the signal above the 1/f noise corner frequency. Keeping the same power dissipation, the amplitude of the sinusoid can be as high as 1.41V. Sampling the positive and negative peaks of the sinusoid we can provide a high pass filtering action on noise, which is necessary for 1/f noise. We can provide a constant weight to samples since N*Tsample<<100ms. In this scenario we have a dominant contribution of white noise. Considering the syncs that fall within the preamp bandwidth, we have $F_{MIN} \approx 4N$ (by considering a digital approach with N samples we would compute $F_{MIN} \approx 4.96N$). 1/f noise is negligible already with two samples.