Exercises to inf5442_h14_9

Submit latest 1-Dec-2014

1. Illustrate how a CMOS image sensor pixel output signal looks like and at which point the signal is sampled to perform correlated double-sampling
2. List temporal noise sources generated by the pixel
3. A pixel is read out with correlated double-sampling with readnoise equal to 5e- rms. How many photo-electrons is needed to capture to reach SNR=5dB?
4. A pixel is read out with correlated double-sampling with readnoise equal to 3e- rms and PRNU=1% rms. How many photo-electrons is needed to capture to reach SNR=5dB?
5. How does color crosstalk influence image quality in a Bayer RGB sensors?
6. What is the formula for calculating output noise of a digital CDS circuit, σ^2 (LSB^2) for a given spectral density of input noise, $N_{pix}(f)$, and transfer function, H(f)?
7. Write down the impulse response function of a digital CDS process.
8. Write down the impulse response function of a digital CDS process with correlated multi-sampling.