INF5350

Obligatory exercises following lecture #7 – High Dynamic Range

Please submit latest 25-Oct-2019 to Tohid (tohidm@ifi.uio.no)

1. Define dynamic range for image sensors and explain the terms.
2. A CIS has FWC=10ke- and RN=4e- rms at 1x analog gain. Calculate the DR of this sensor. At 10x analog gain the RN drops to 2e- rms. What is the new DR?
3. The sensor from Q2 above is used in a dual exposure HDR mode with T1=10ms and T2=1ms. Calculate the total DR assuming (a) 1x gain in both captures, (b) T1 capture with 10x gain and T2 capture with 1x gain.
4. Why is line memory needed in staggered HDR image sensors?
5. Why is line memory not needed in a 2-exposure skimming HDR sensor?
6. A dual conversion gain HDR sensor has FWC=5ke- at High CG=200uV/e- and FWC=50ke- at Low CG=20uV/e-. The RN is 2e- rms and 5e- rms respectively. What is the total DR?
7. An HDR sensor outputs 20bit pixel values. To visualize such HDR image on a regular 8bit computer monitor (i.e. 3x8b, RGB) some processing is required. Briefly explain what kind of processing this is.
8. Explain why it’s a waste to use 20b ADCs in a 20b HDR sensor.