

## Lecture 11 Report Requirement

**The report only needs to answer the questions below.**

Send your report in PDF format to 1430090453@qq.com, named as “report11\_[first name][last name].pdf” (e.g., report11\_ZhangChen.pdf). **Please also include your name (both English and Chinese) at the beginning of the report.** The report is due on 10 am, China Standard Time, **April 29**, 2020.

### Report Questions:

#### **“First-Photon Imaging”**

1. What is SPAD device? And list one or more applications of SPAD based imaging system.
2. Describe the three steps of the first-photon imaging system.
3. What is Poisson Noise and give the formulation of Poisson noise?
4. Scene with higher reflectivity results in larger or smaller  $n(x, y)$  values? and why?
5. List at least two issues of the first-photon imaging system.

#### **“Signal Processing Based Pile-up Compensation for Gated Single-Photon Avalanche Diodes”**

6. What is Pile-up phenomenon and describe the reason for this issue?
7. What's the difference between the SPAD and Gated SPAD?
8. How to derive the Cramer-Rao bound?
9. Why does the author use the conjugate prior for the multinomial distribution?
10. List at least one issue of this work?