

Digital Image Fundamentals



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Human Vision and Digital Vision

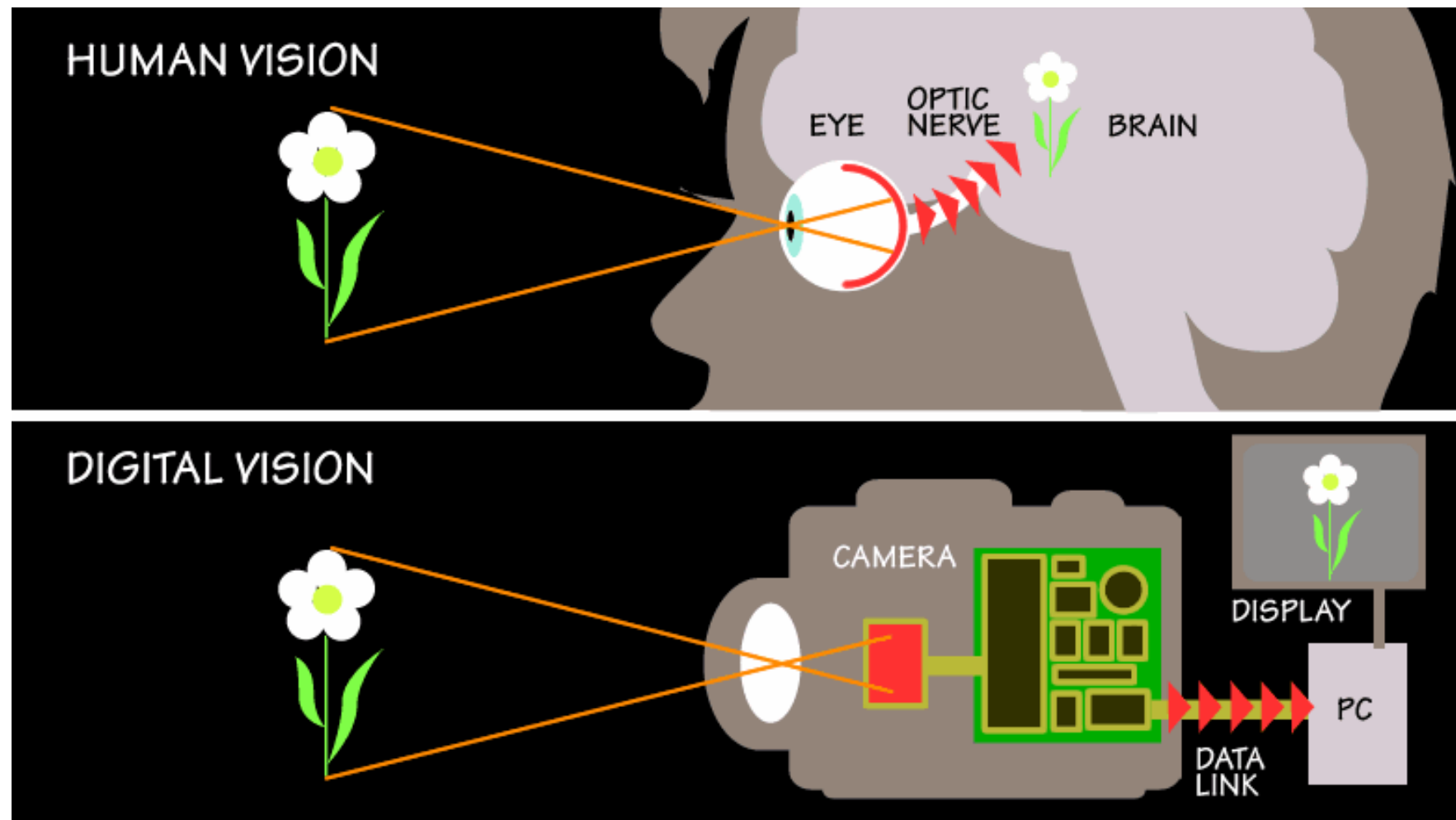
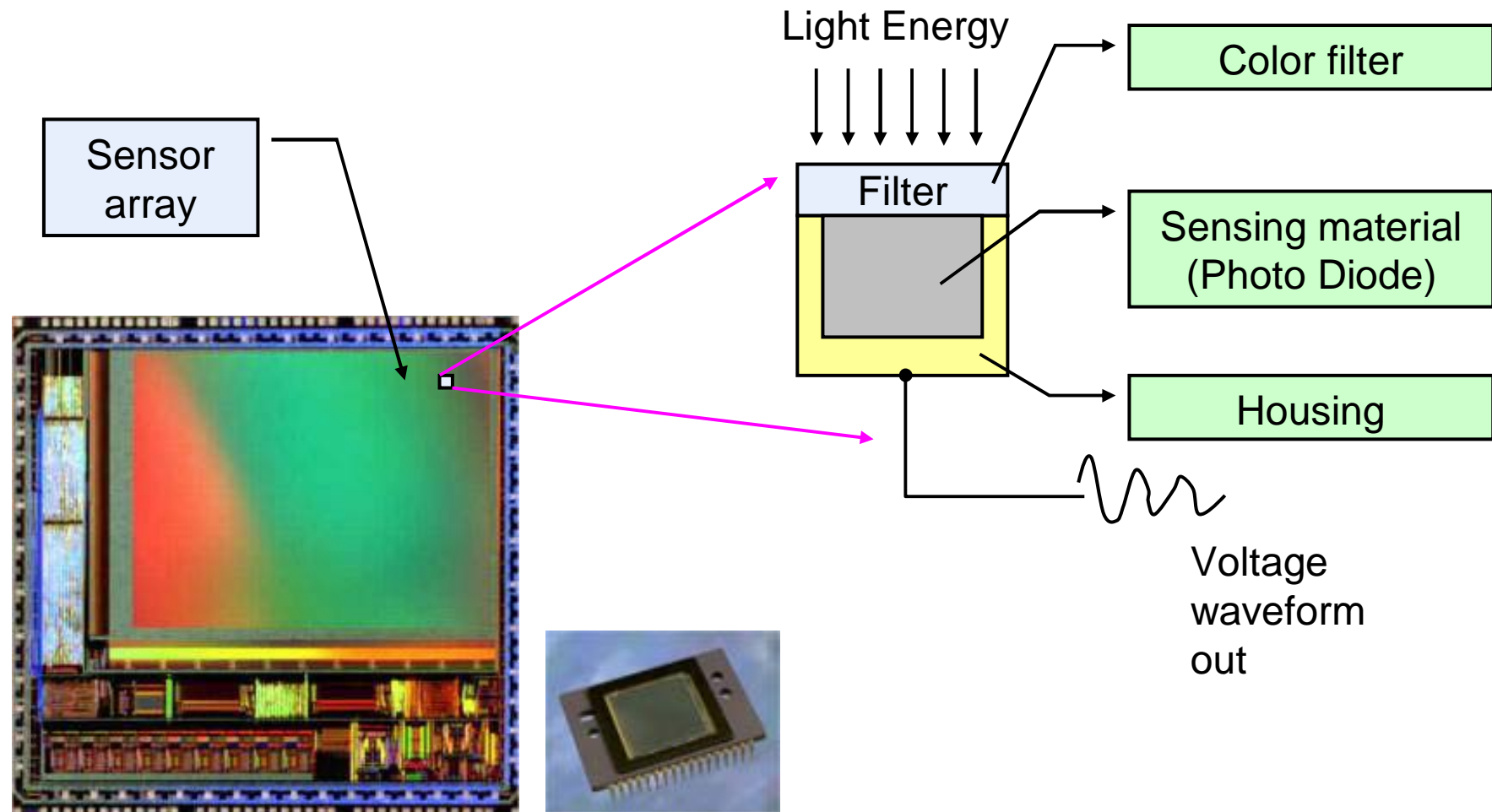


IMAGE CAPTURE ►► PROCESSING ►► TRANSMISSION ►► IMAGE RECONSTRUCTION

Sensors

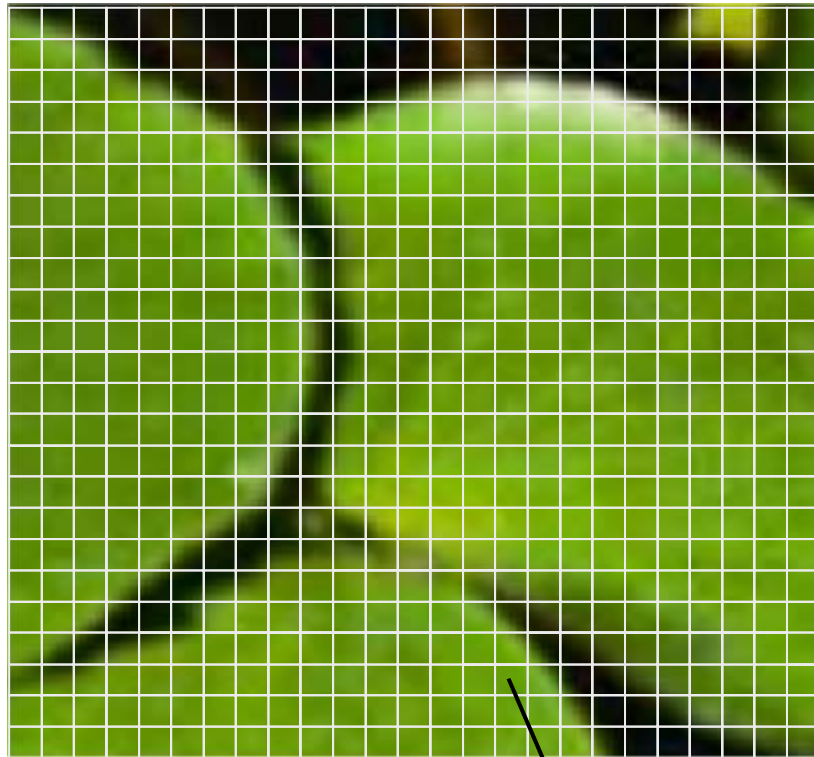


Sensors

- CCD vs CMOS

	CCD	CMOS
structure	Sensor+CCD	Sensor+CMOS
Image Quality	Good	Normal
Sensitivity	Good	Bad
IC one-chip	x	o
Cost	High	Low
Power	High	Low
Frame Rate	Normal	High

Image Acquisition Using Sensor Arrays



Sensor Array

Image Acquisition Using Sensor Arrays

- Pixel = picture elements

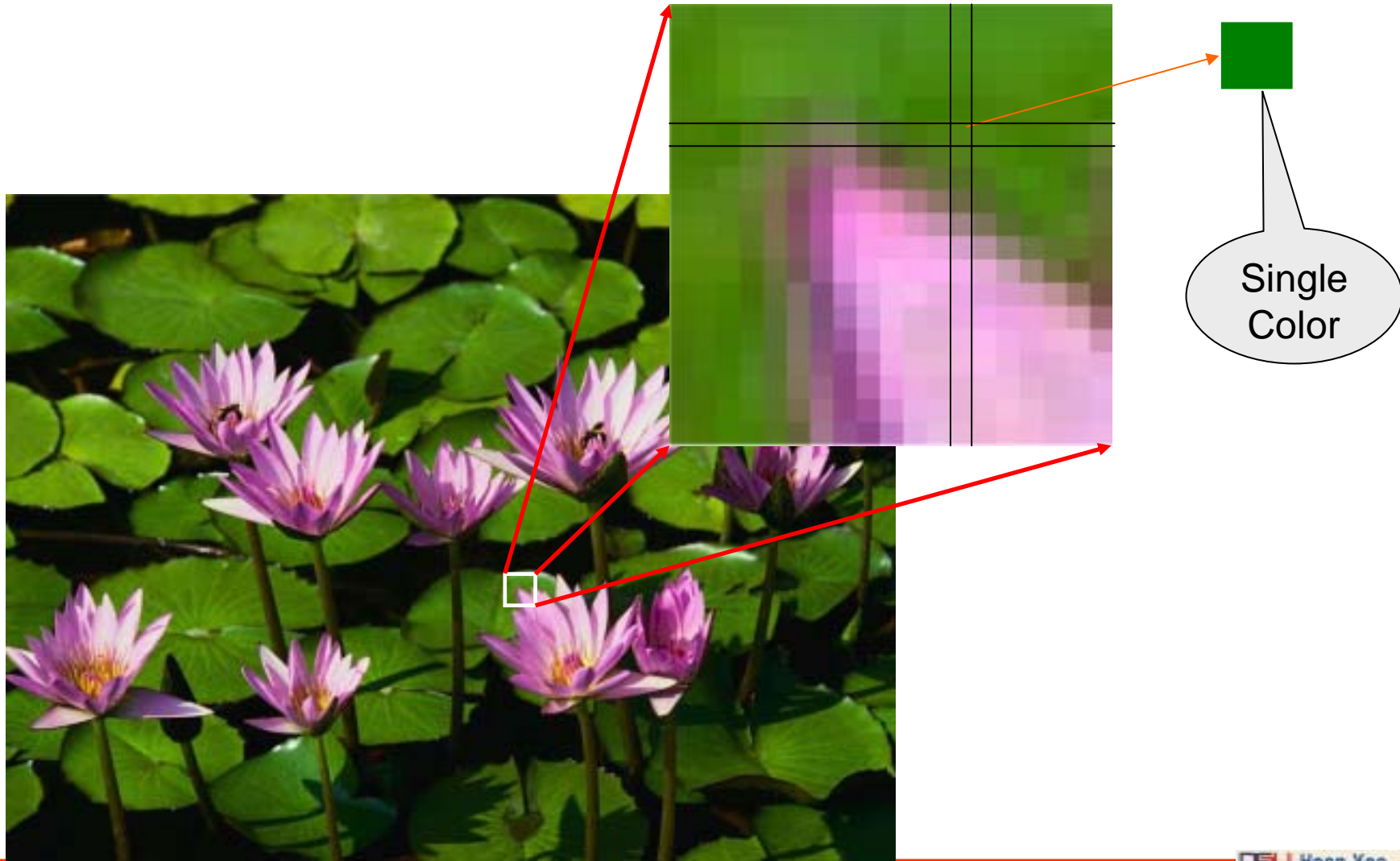
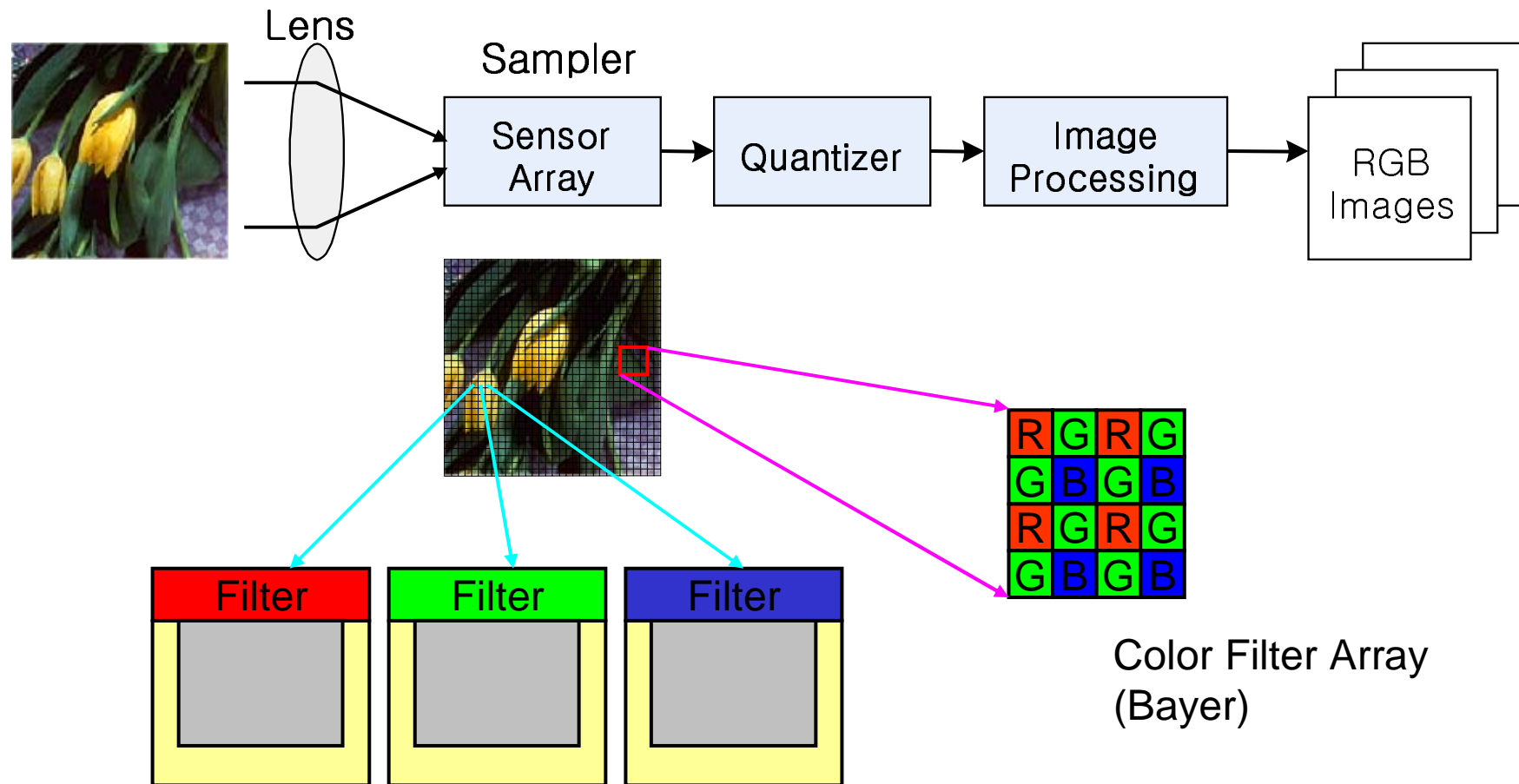


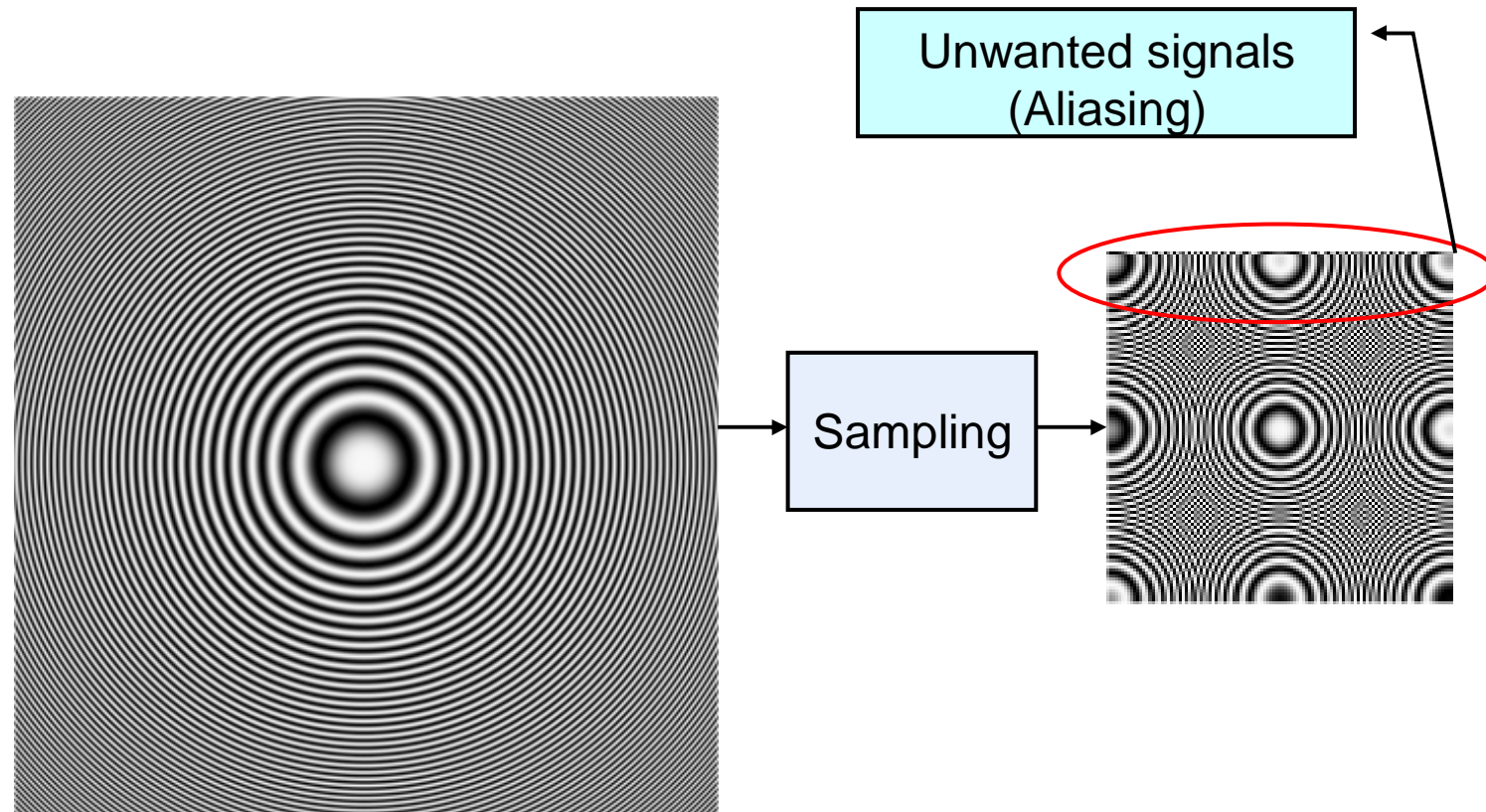
Image Acquisition

- Camera device



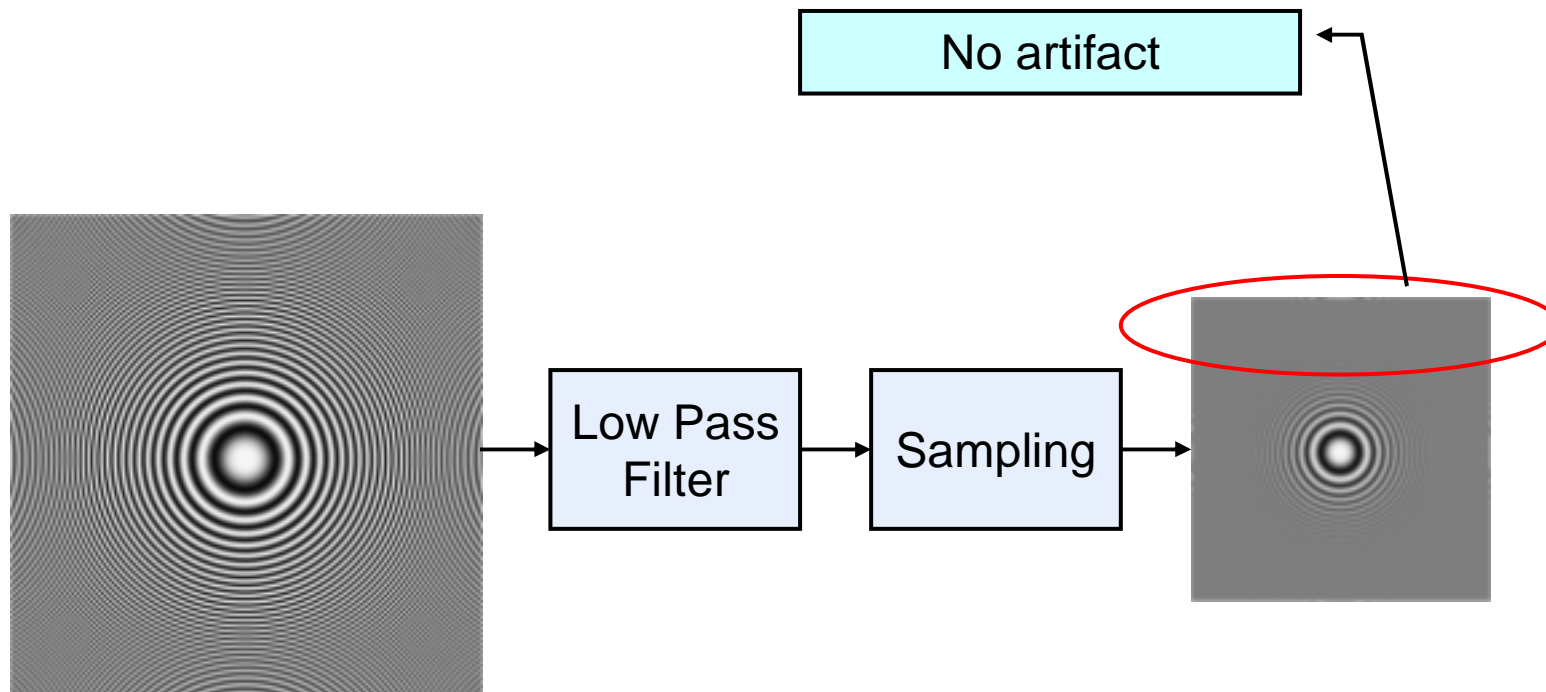
Aliasing Problem

- When sampling frequency are less than image bandwidth

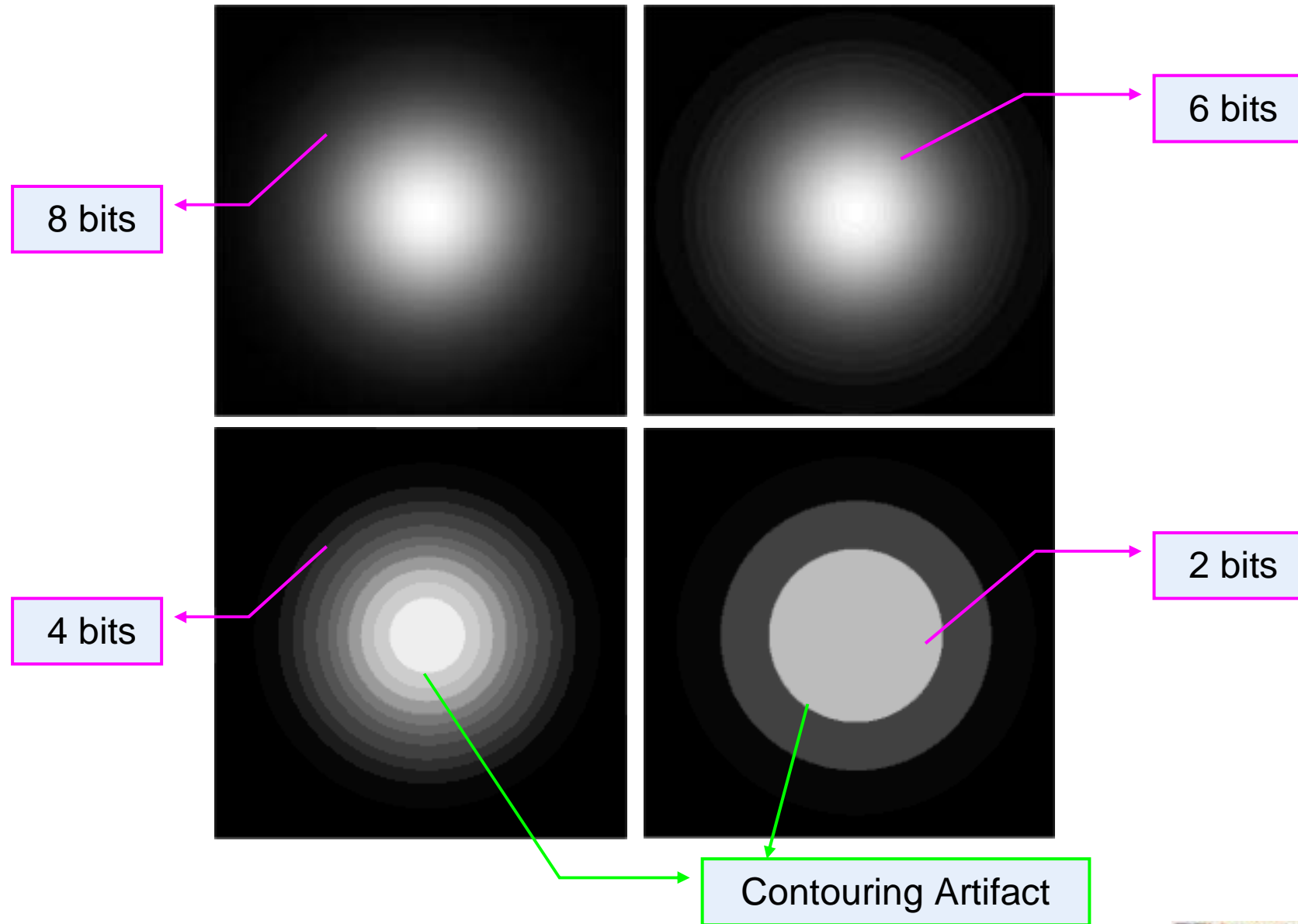


Aliasing Problem

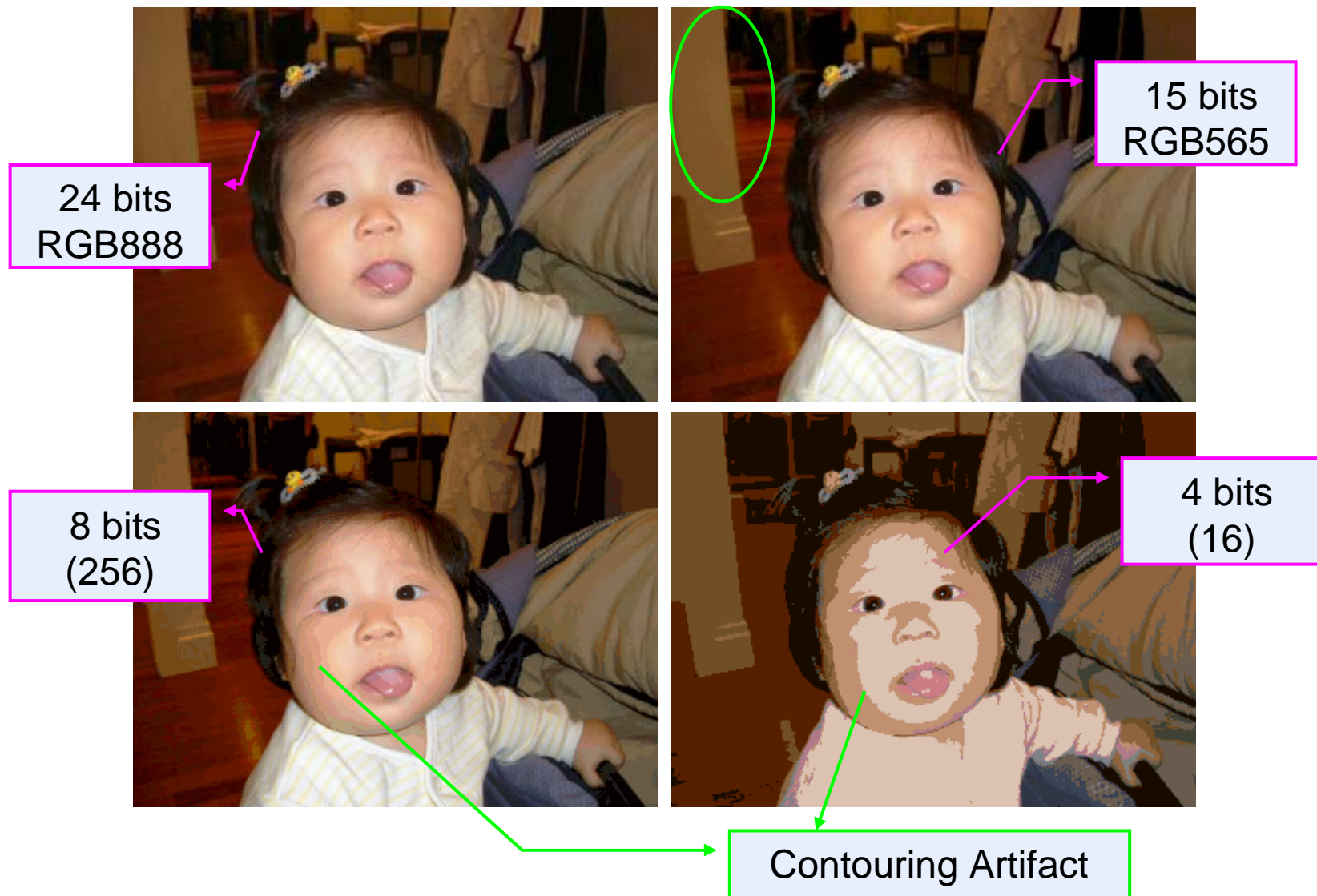
- Anti-aliasing filter (Low pass filter)



Quantization Effects



Quantization Effects



Summary

- Image sensors
 - Photo diode + CCD module or CMOS
- Color Filter Array
- Aliasing and Anti-aliasing filter
- Quantization and contouring artifact