MICRO-523: Optical Detectors

Week Six: CCD cameras – Exercises

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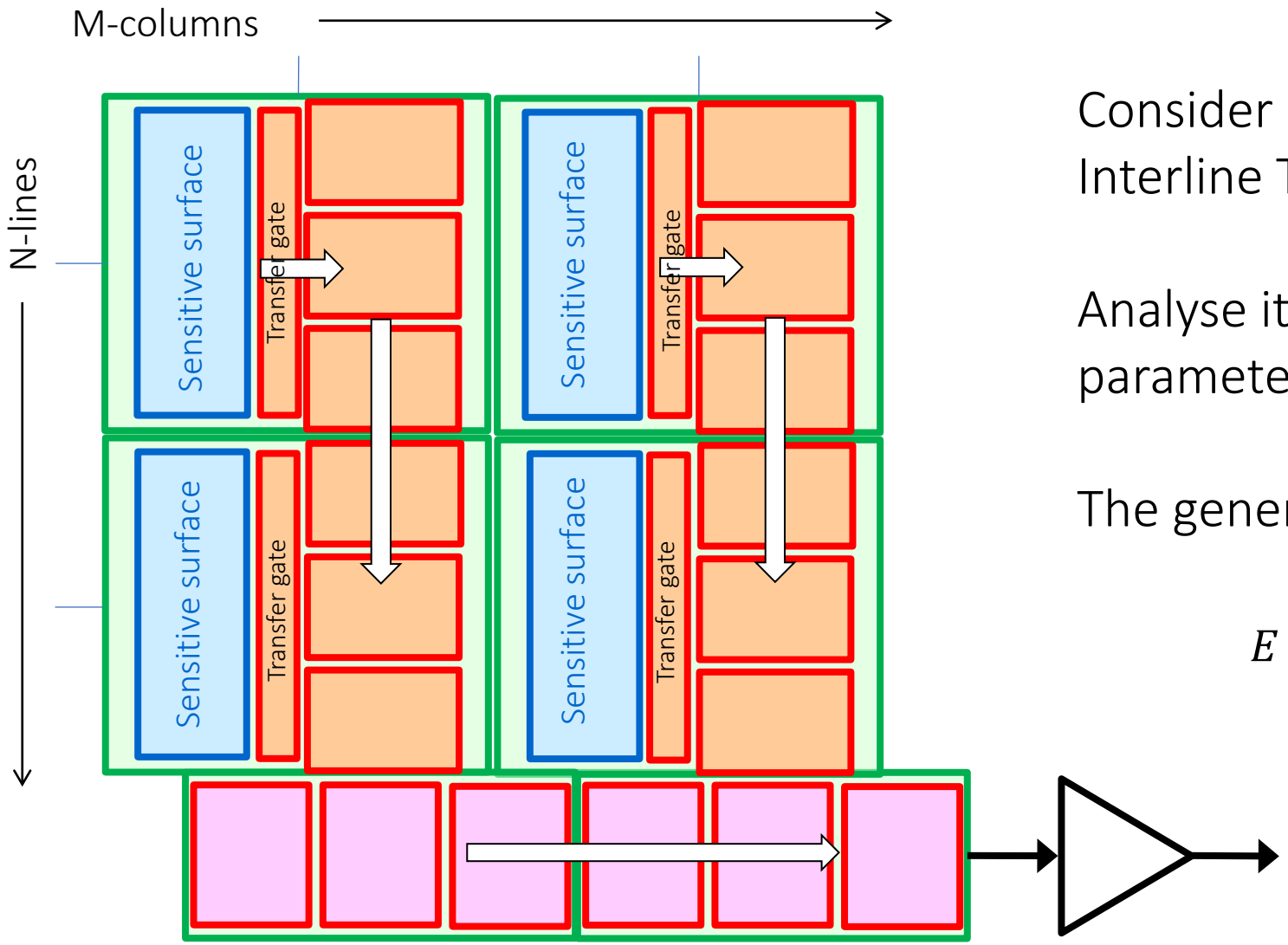
Outline

Exercise 6.1: Consumption of CCDs



Consider a CCD camera with Interline Transfer.

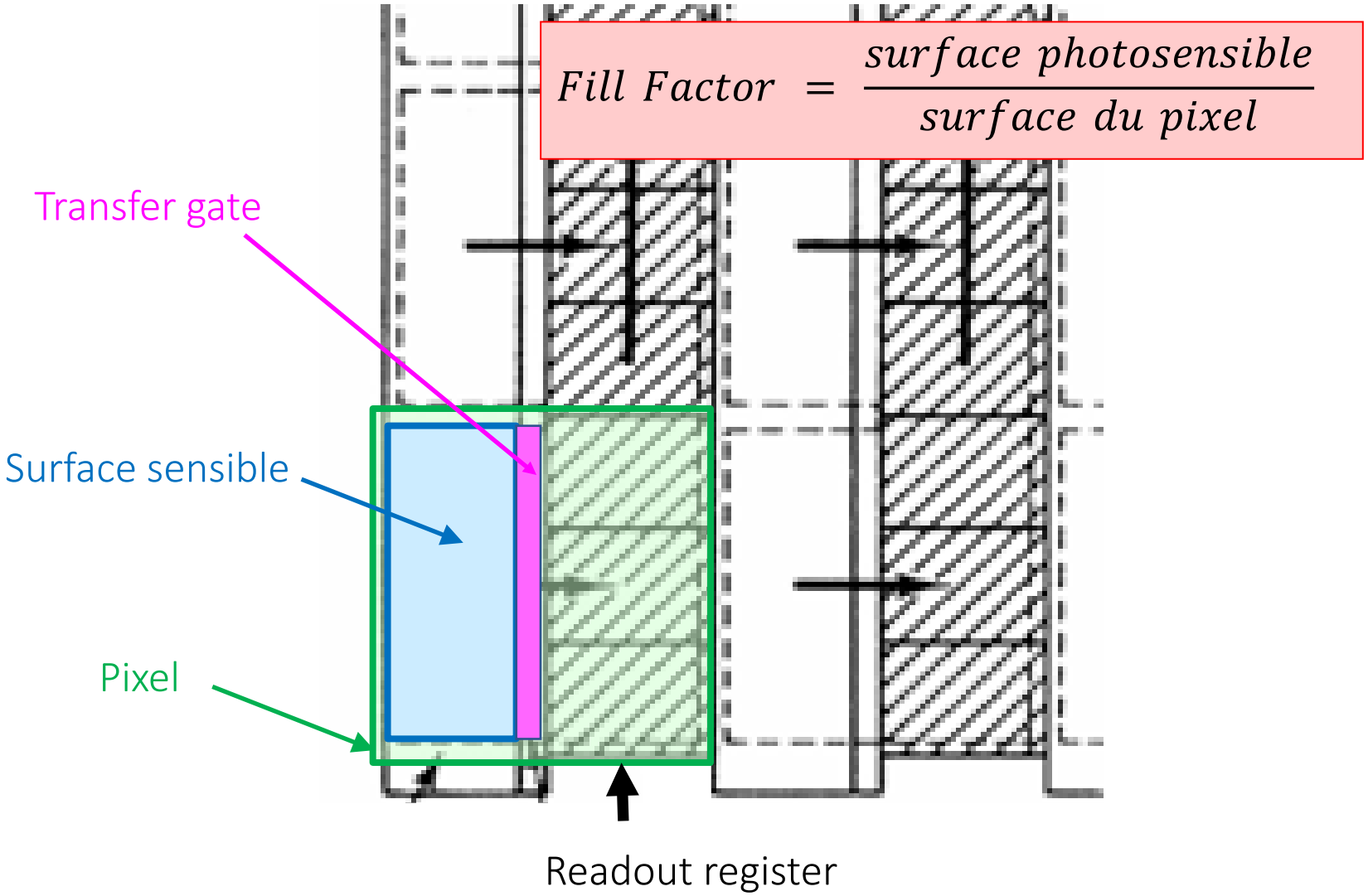
Analyse its consumption using the parameters given below.

The generic formula for energy is:

$$E = \frac{1}{2} C V^2$$

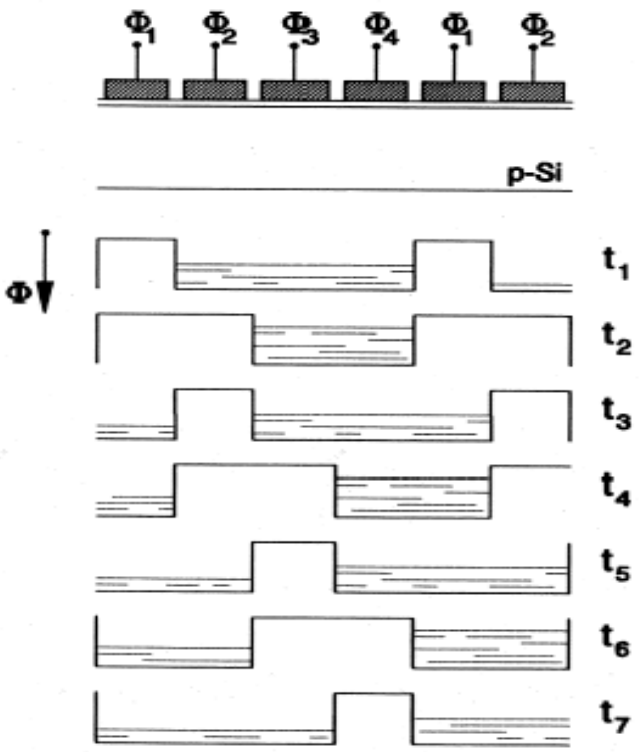
Exercise 6.2: Fill Factor

$$Fill\ Factor = \frac{surface\ photosensible}{surface\ du\ pixel}$$



Exercise 6.3: Charge Transfer Efficiency CTE

- CTE: Charge Transfer Efficiency = ability to transfer all the charge from storage site to storage site
- (1-CTE) Charge Transfer Inefficiency



The net efficiency varies with the pixel position in the array. The farthest pixel from the sense node suffers higher loss: For a 1,000x1,000 pixels sensor with 4 phases, the charge packet farthest from the output has to travel 2,000 pixels or pass through 8,000 wells.

→ Which CTE is needed to keep the information in the right cell after several thousand transfers?