
SHERIFF RAILCAR
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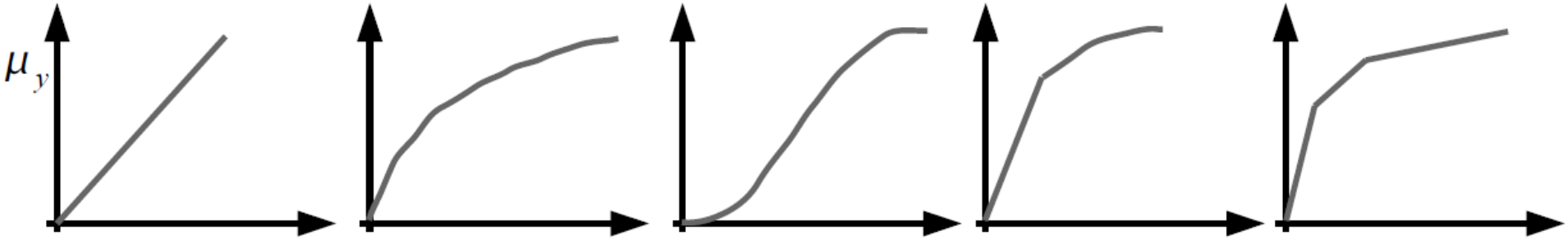
TRACK 24
(c) Arnaud Darmont 2015

Response Curve

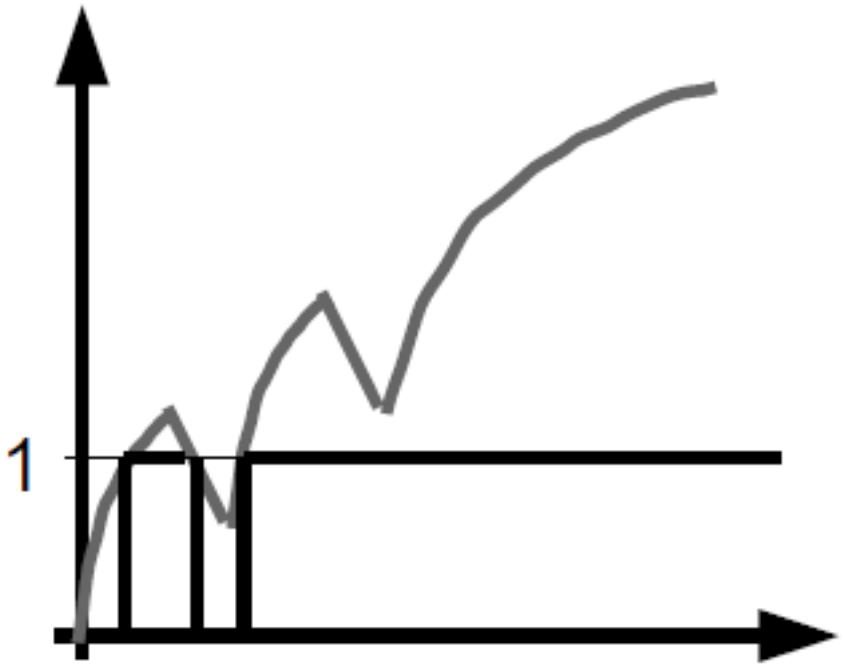
- Average Sensor Output vs Pixel Irradiance



Dynamic Range Gaps

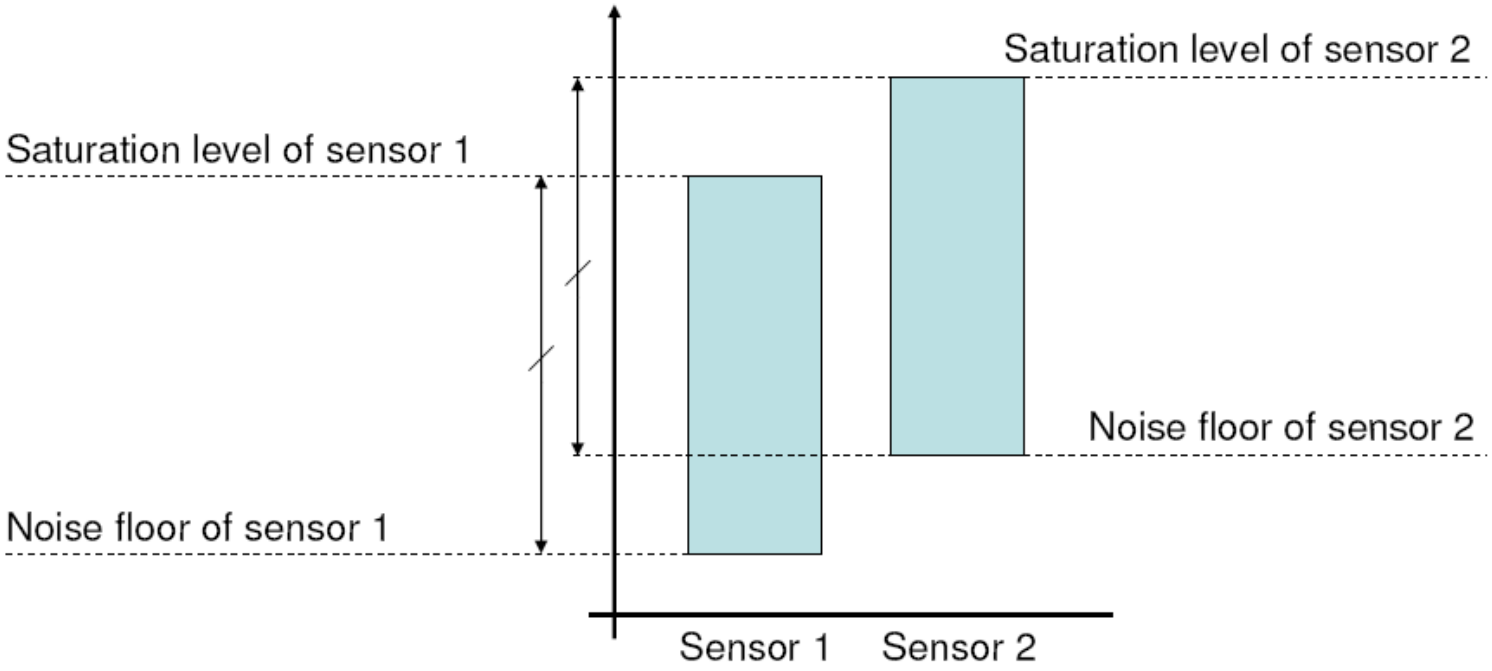
- DRG presence function

$$DRG(\mu_p) = \begin{cases} 1 & when\ SNR \geq 1 \\ 0 & otherwize \end{cases}$$

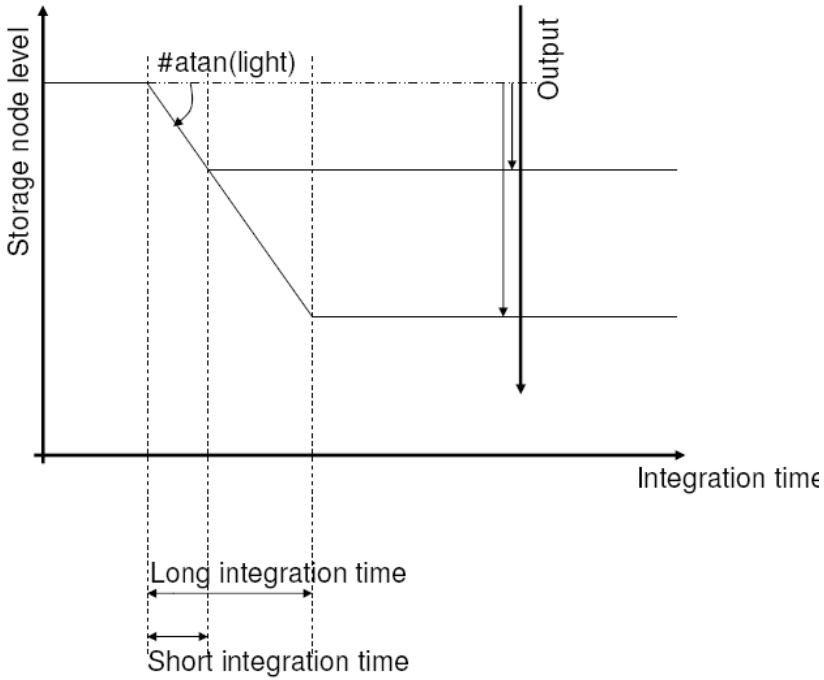


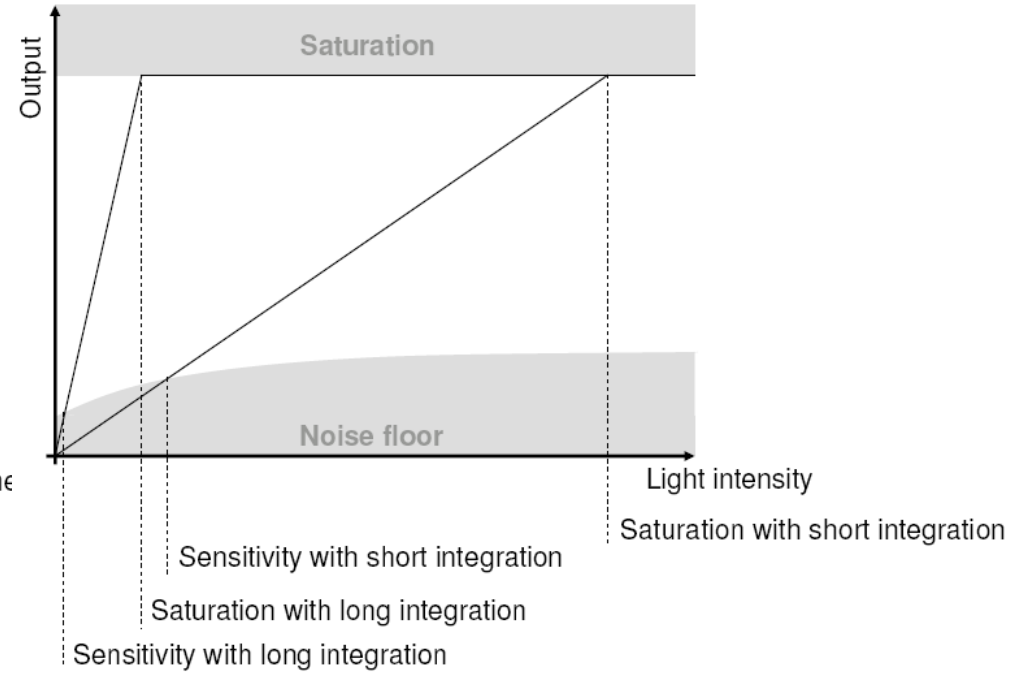
Dynamic Range

- Dynamic Range is a relative measurement



Multi Linear Pixels



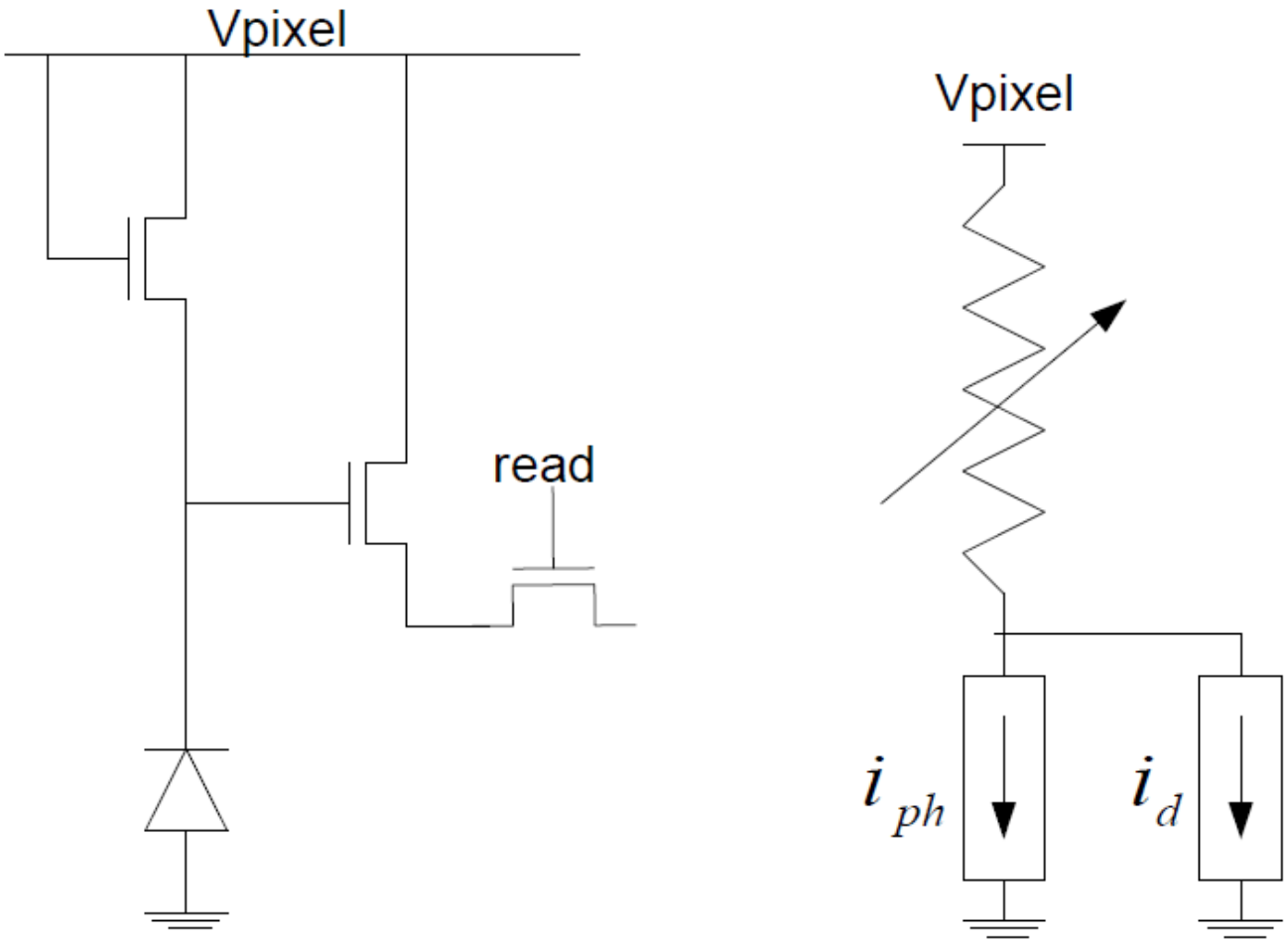


Multi Linear Pixels

- For a bi-linear response with a change of slope at for a voltage $q_k = q_{max}\theta$ with $0 < \theta < 1$ the response is

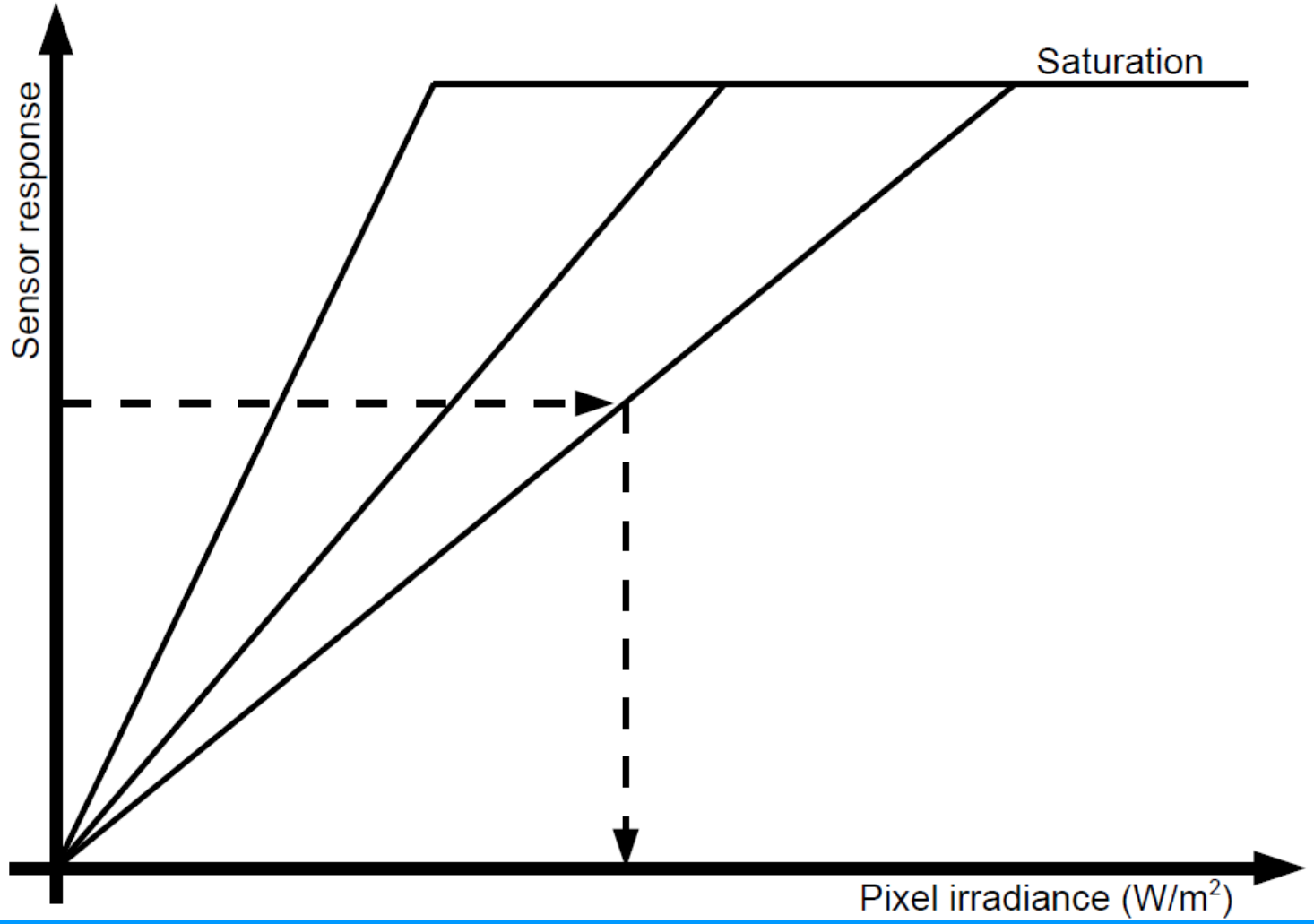
$$f = \begin{cases} \int_0^{t_{int}} I(t)\,dt & if \quad 0 \le i_{ph} < \frac{q_k}{t_1} - i_d \\ q_k + \int_{t_1}^{t_{int}} I(t)\,dt & if \quad \frac{q_k}{t_1} - i_d \le i_{ph} < \frac{q_{max}(1-\theta)}{t_{int} - t_1} - i_d \\ q_{max} & otherwise \end{cases}$$

Logarithmic



Aphesa

HDR Image Data Merging



Aphesa

Misalignements

- Find enough matching point to robustly calculate the homography transformation matrix that will be used to adjust one image to the other.

$$\begin{pmatrix} x'_1 \\ x'_2 \\ x'_3 \end{pmatrix} = \begin{pmatrix} h_{11} & h_{12} & h_{13} \\ h_{21} & h_{22} & h_{23} \\ h_{31} & h_{32} & h_{33} \end{pmatrix} \begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix}$$

Isometry:

$$\begin{pmatrix} x' \\ y' \\ 1 \end{pmatrix} = \begin{pmatrix} \epsilon\cos\theta & -\sin\theta & t_x \\ \epsilon\sin\theta & \cos\theta & t_y \\ 0 & 0 & 1 \end{pmatrix} \begin{pmatrix} x \\ y \\ 1 \end{pmatrix}$$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