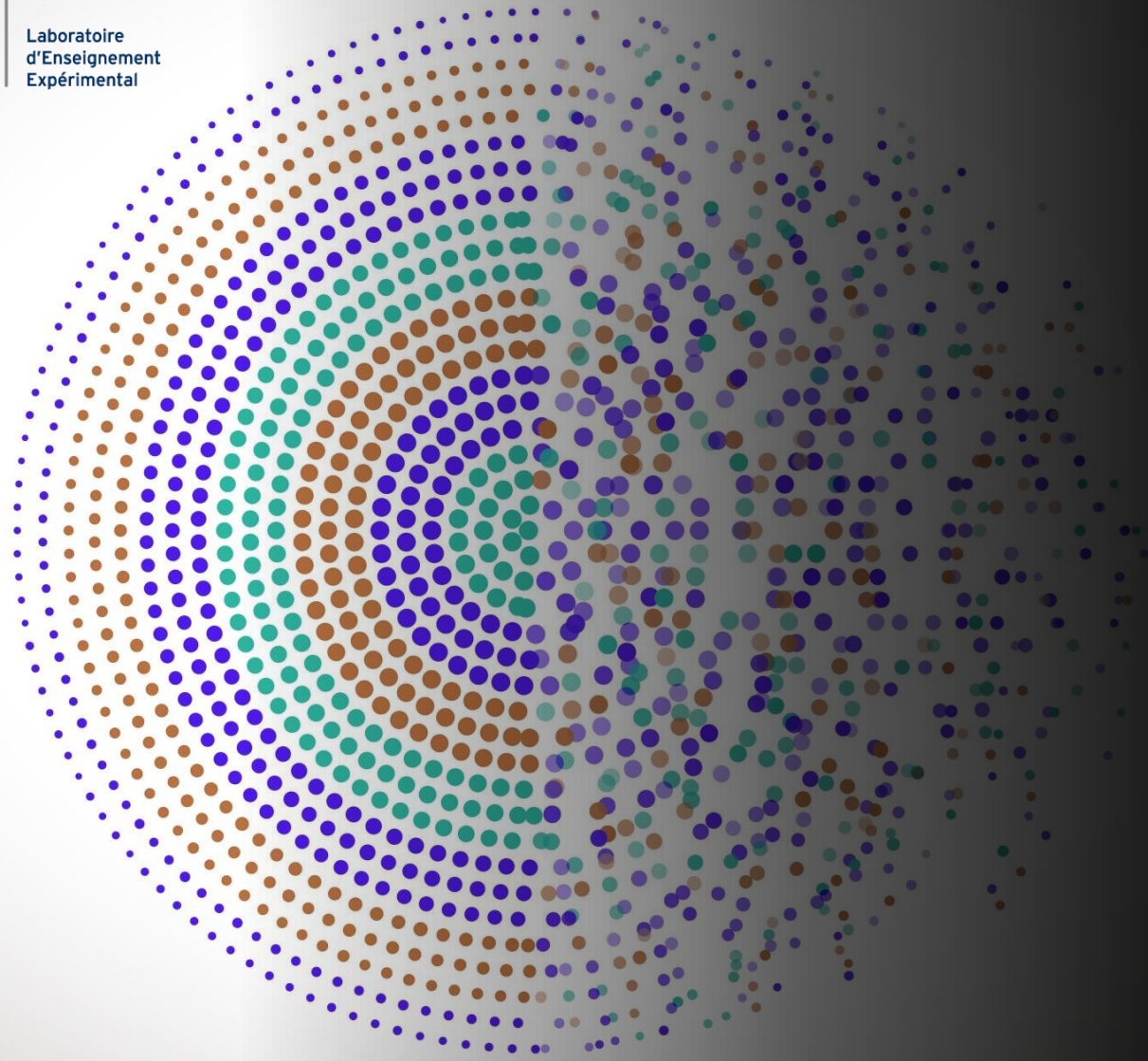
INSTITUT d'OPTIQUE GRADUATE SCHOOL ParisTech | LEnsE Laboratoire d'Enseignement Expérimental

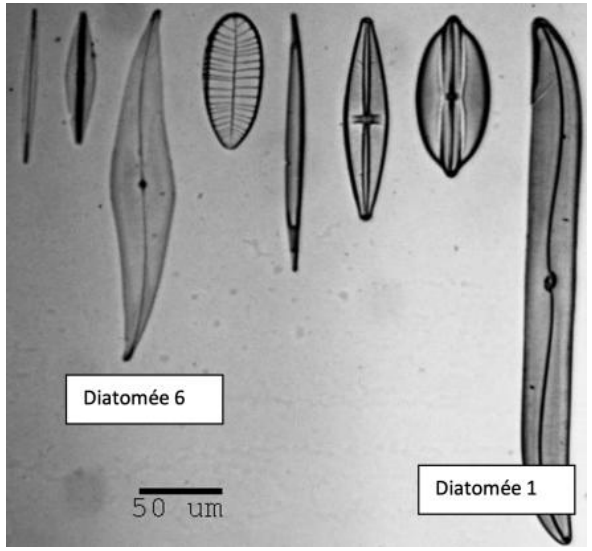


UE Interfaçage Numérique

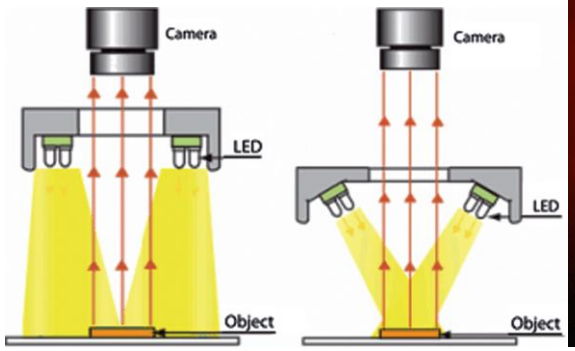
IntNum / Semestre 6
Institut d'Optique

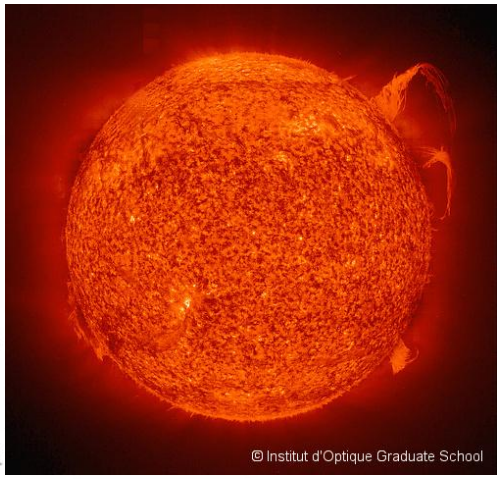
Julien VILLEMEJANE

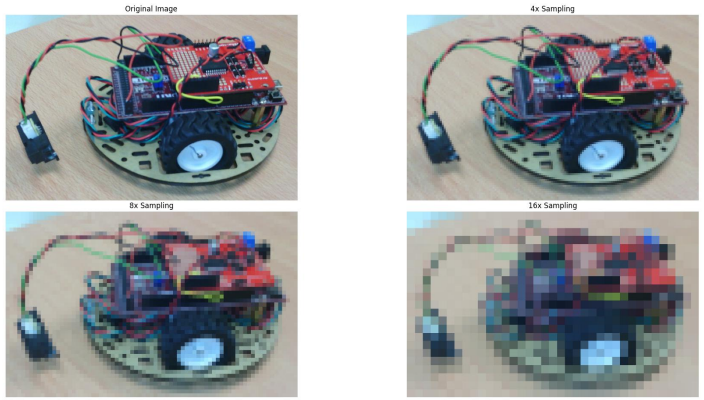
Interfaçage Numérique / S6-FISE



- Génération de photons
- Conception optique / « Fabrication d'images »
- Acquisition de données
- Traitement des informations



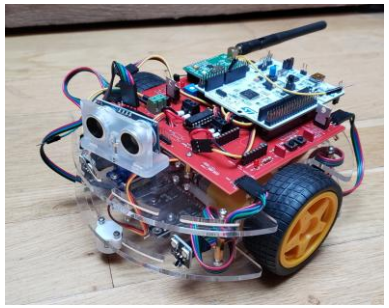


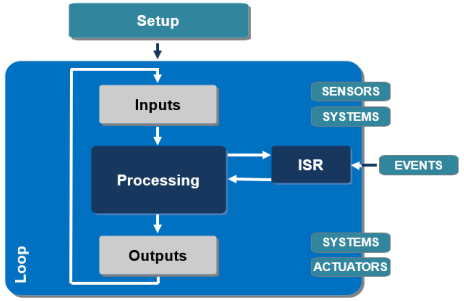


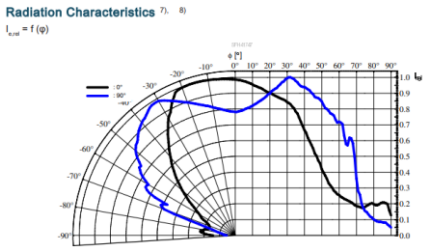
Dong, Jing-Tao & lu, rs & Shi, Yan-Qiong & Xia, Rui-Xue & Li, Qi & Xu, Yan. (2011). Optical design of color light-emitting diode ring light for machine vision inspection. Optical Engineering - OPT ENG. 50. 10.1117/1.3567053.

Interfaçage Numérique / S6-FISE

Comment **contrôler / piloter un système** pour :
- Le rendre autonome ?
- Acquérir des données ?

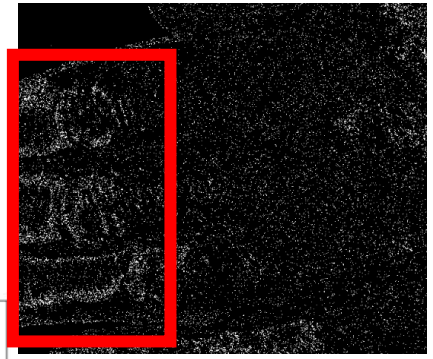


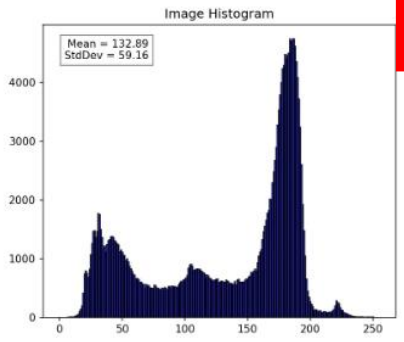


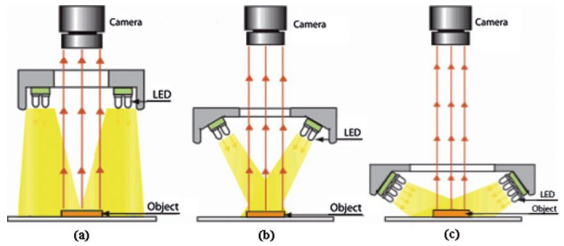


Comment **acquérir une image** numérique exploitable ?

Comment **préparer une image** numérique pour un traitement ?







Dong, Jing-Tao & lu, rs & Shi, Yan-Qiong & Xia, Rui-Xue & Li, Qi & Xu, Yan. (2011). Optical design of color light-emitting diode ring light for machine vision inspection. Optical Engineering - OPT ENG. 50. 10.1117/1.3567053.

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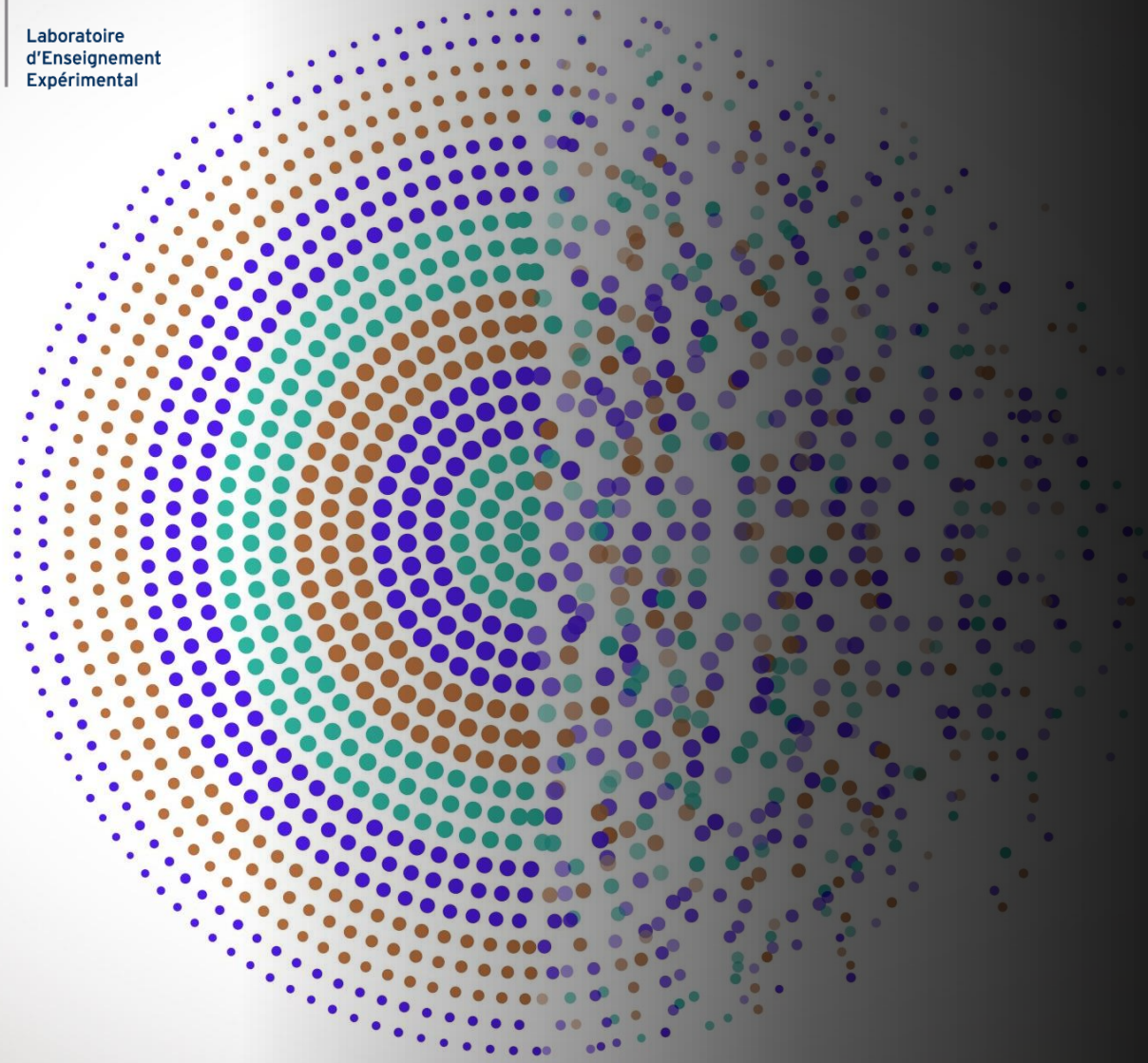

Systèmes embarqués

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Institut d'Optique

Systèmes embarqués

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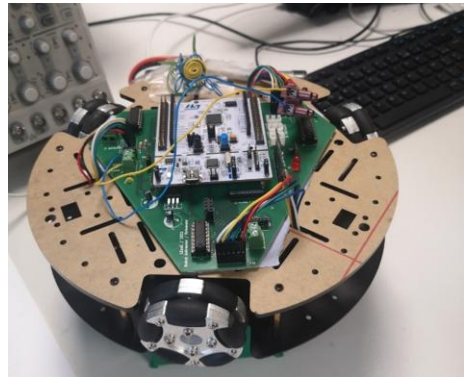
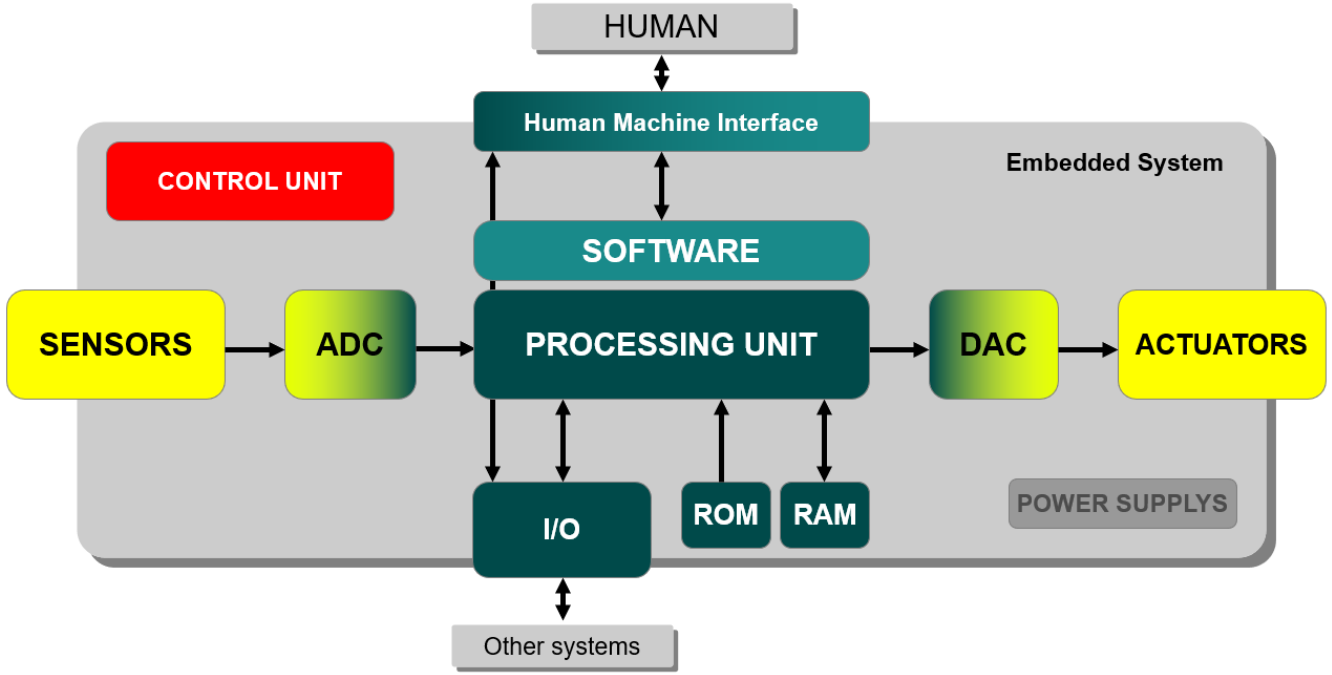
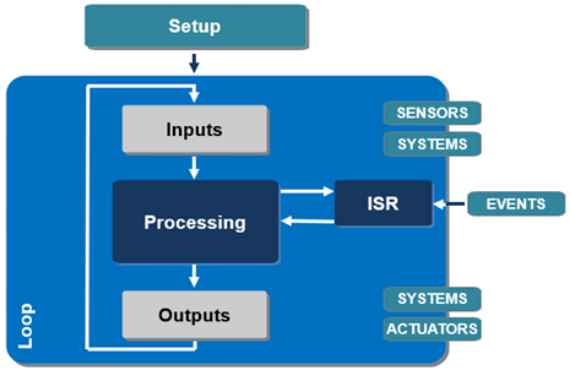
Spécificités d'un système embarqué

- regroupement d'un **système matériel** et d'un **logiciel**
- **architecture spécifique** / exécution d'un ensemble de tâches particulières
- réactif, autonome et en contact permanent avec son environnement







Systèmes embarqués

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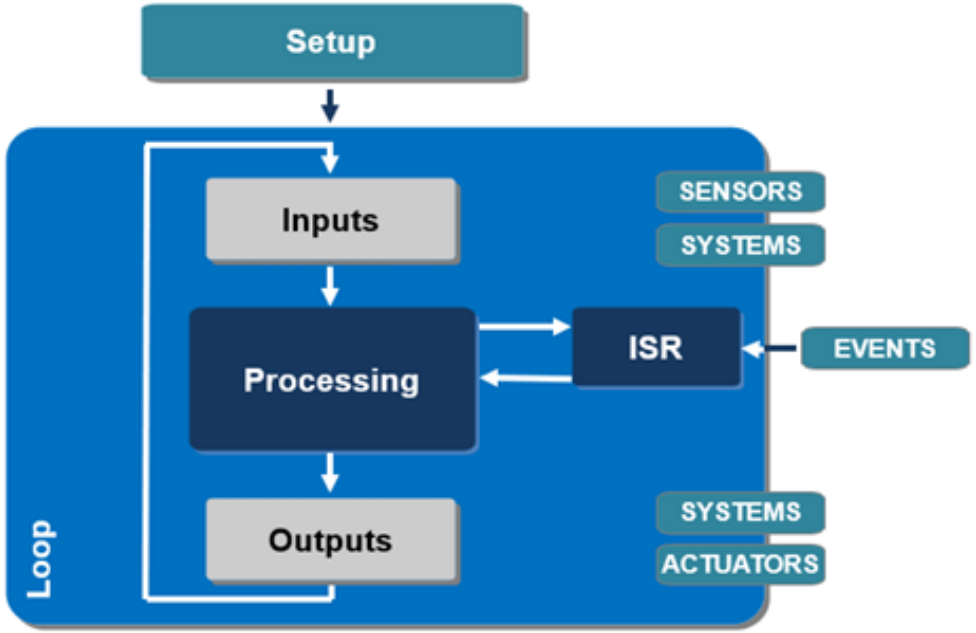
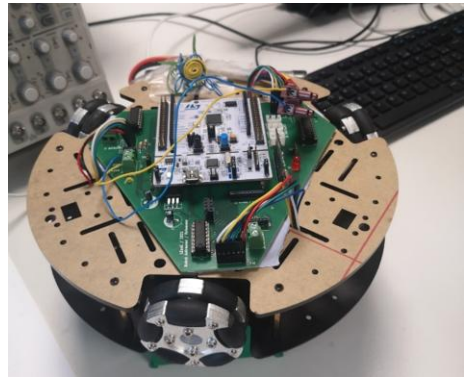
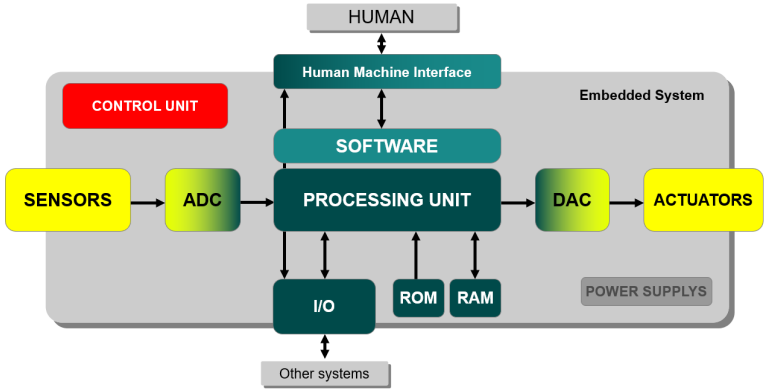
Programmation d'un système embarqué







Systèmes embarqués

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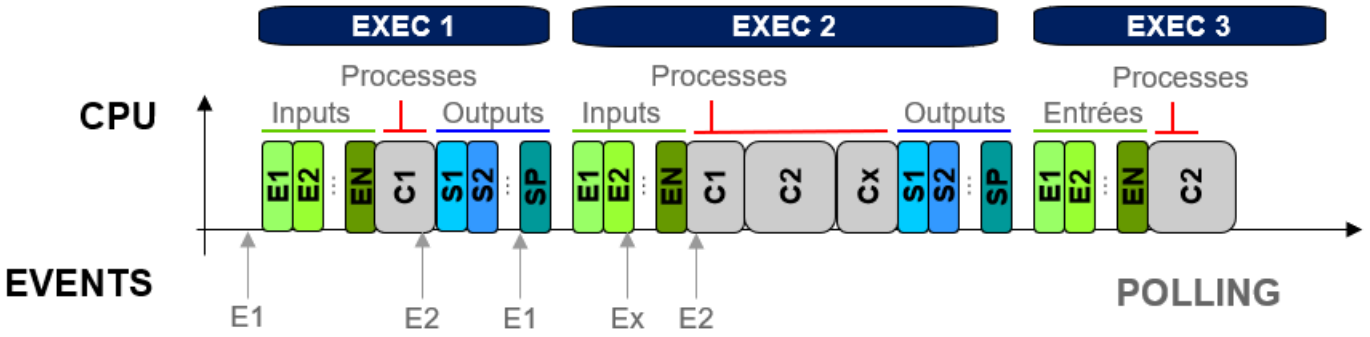
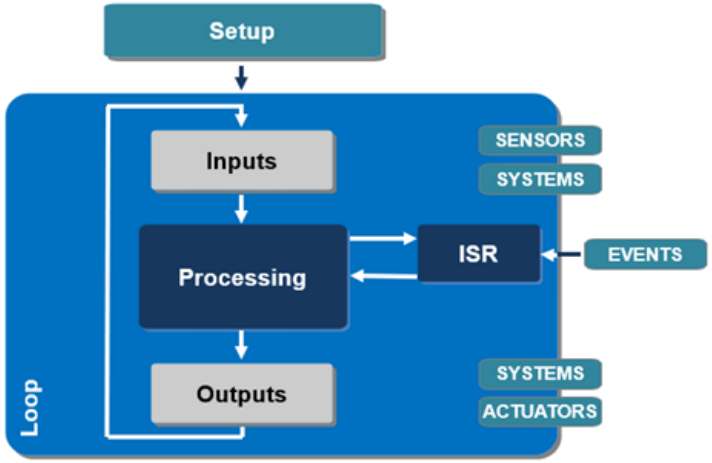
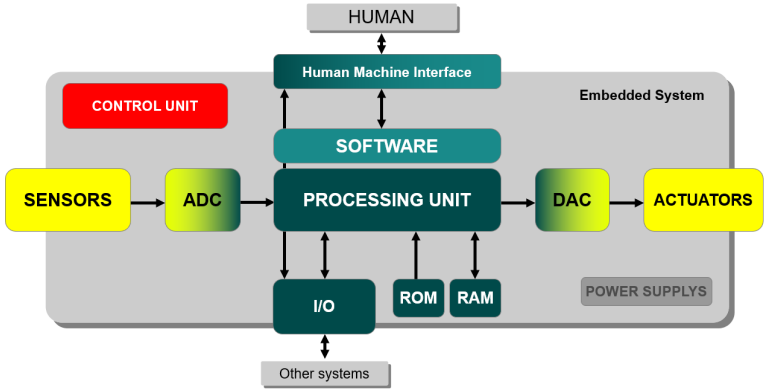
Programmation d'un système embarqué







Systèmes embarqués

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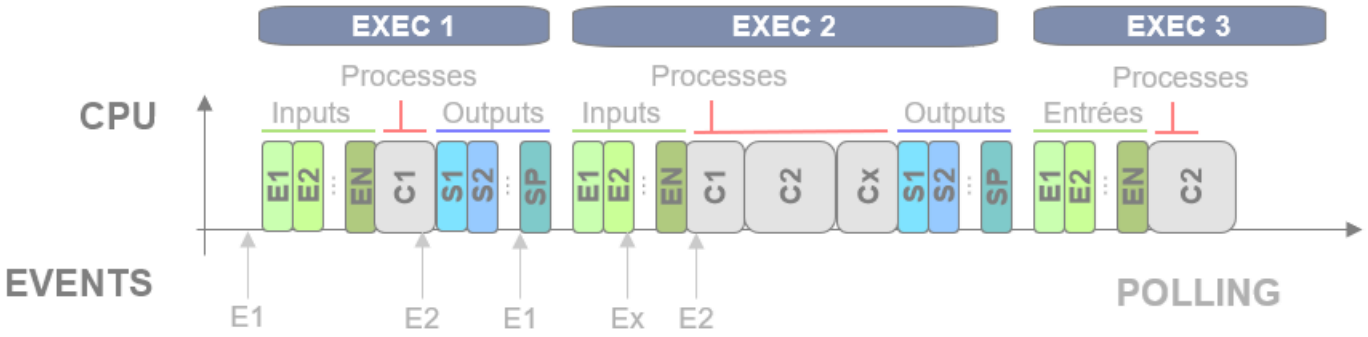
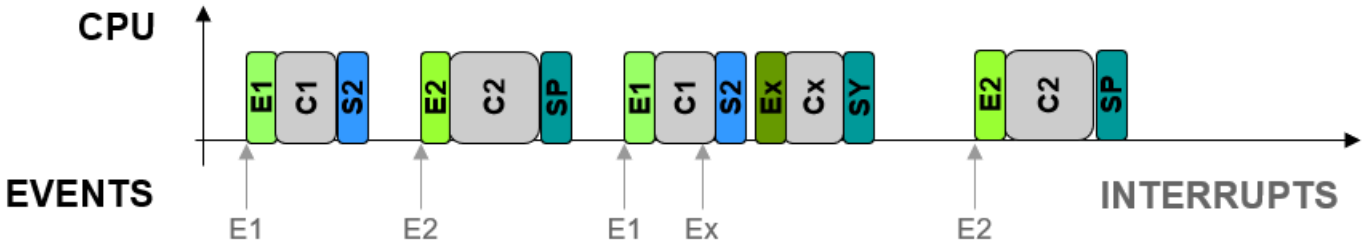
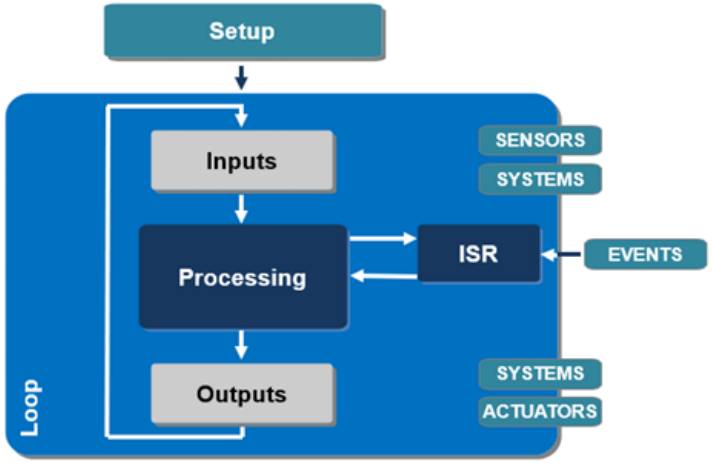
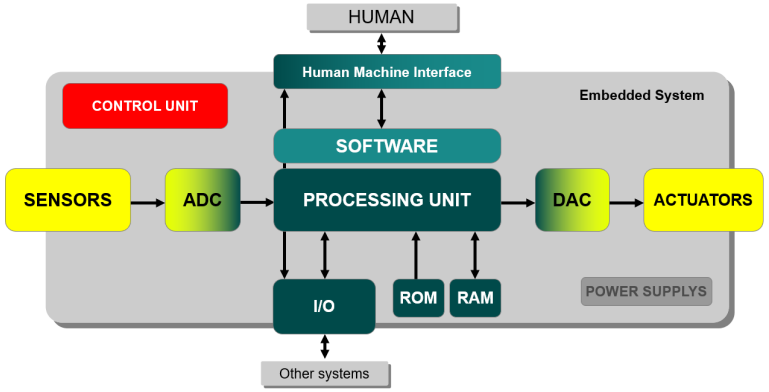
Programmation d'un système embarqué









Systèmes embarqués / TP

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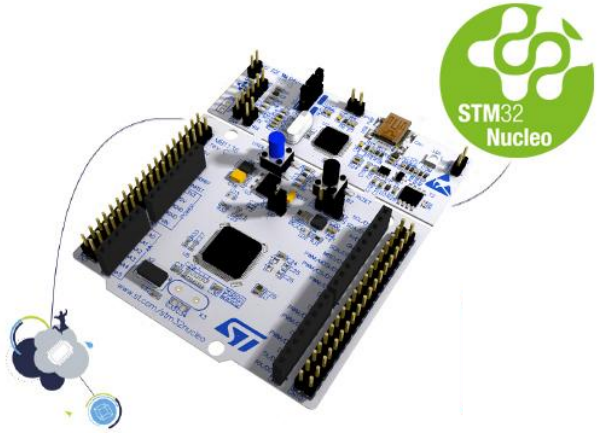
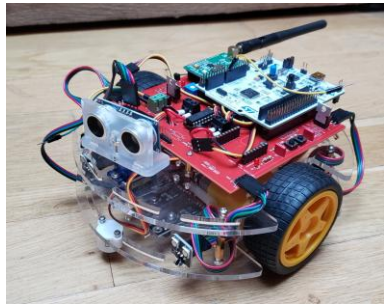
ARDUINO



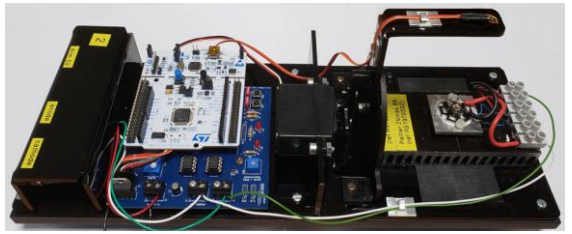
Robot

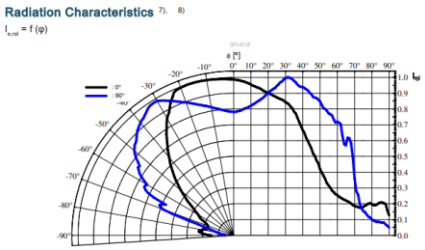
Arduino / Nucleo | Robotique | Communication



Rayonnement de LEDs

Arduino / Nucleo | Protocole Série | LEDs Puissance





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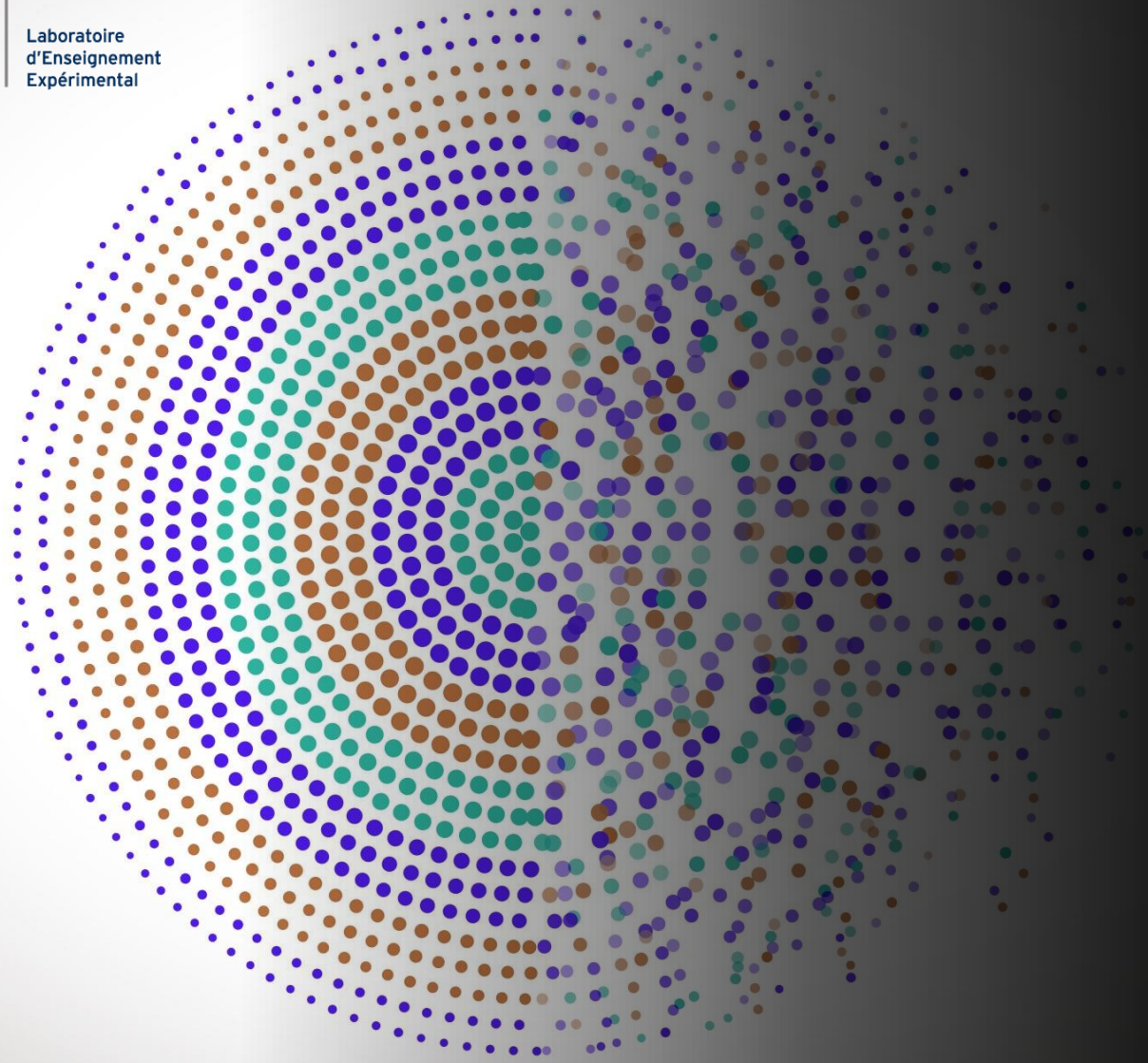
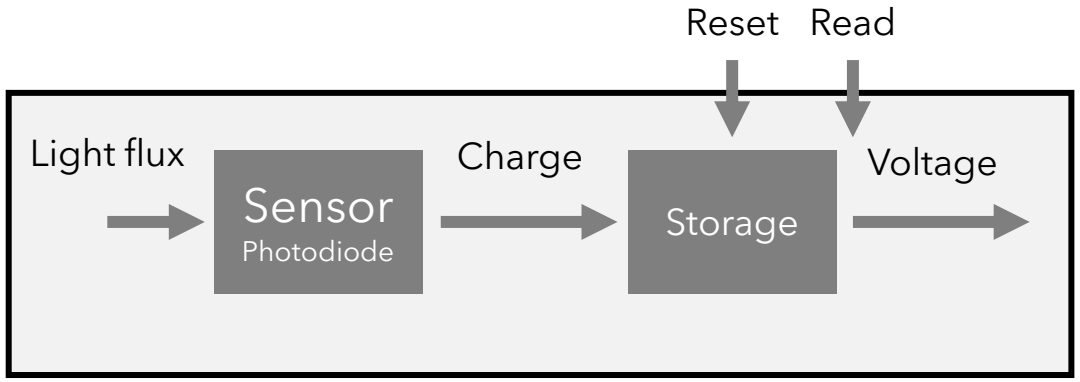


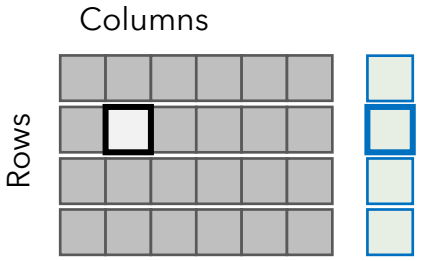
Caméras et images

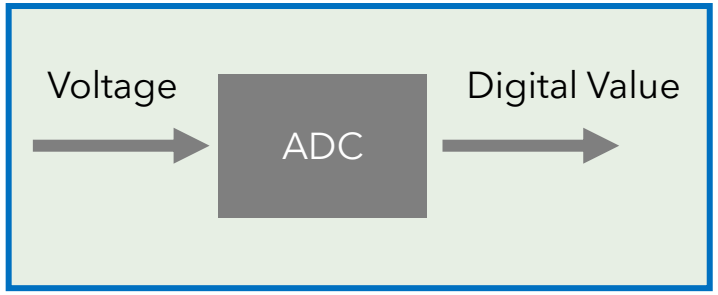
IntNum / Semestre 6
Institut d'Optique

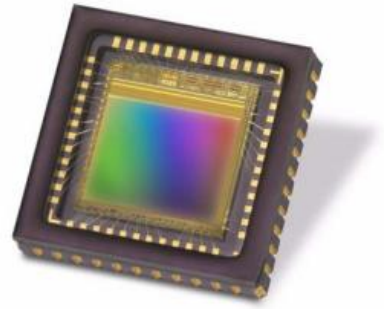
Caméras

Structure d'une caméra – stockage de charges







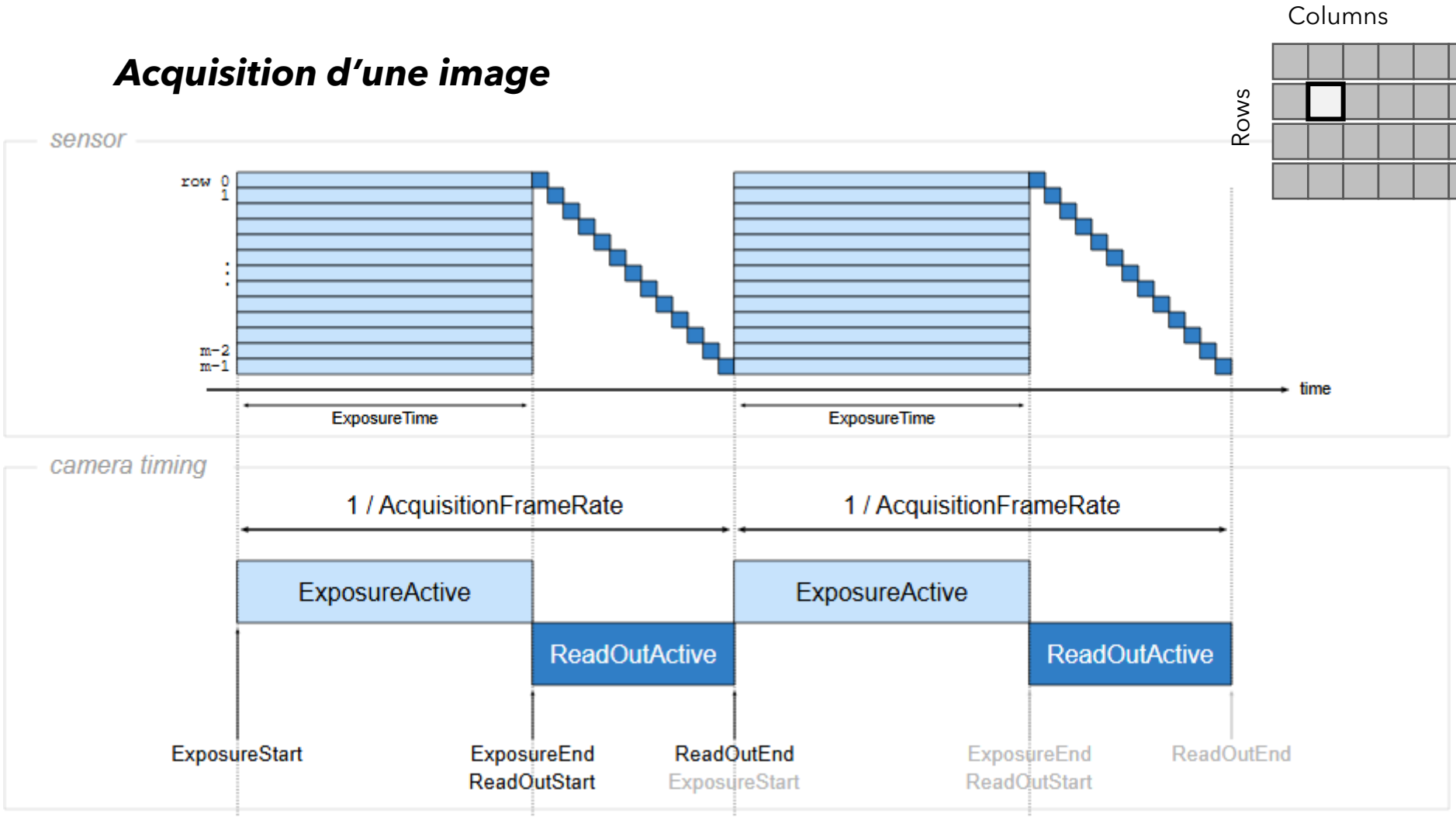


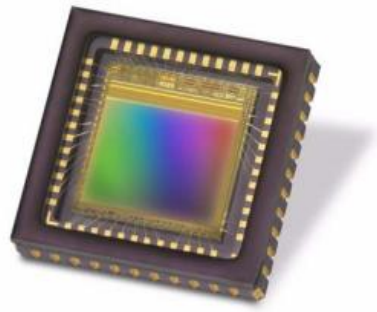
e2v sensor EV76C560ACT

IDS UI-1240SE-C-HQ

Caméras

Acquisition d'une image



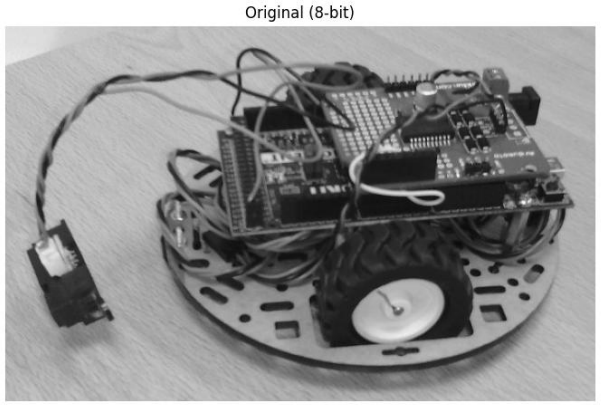


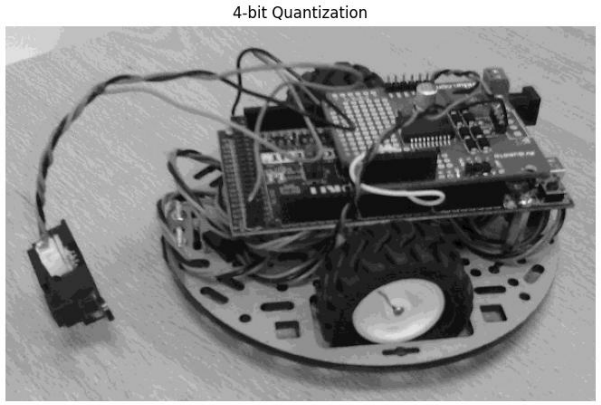
e2v sensor EV76C560ACT

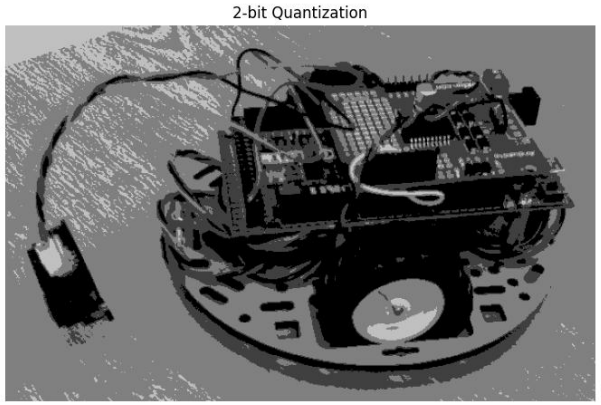
IDS UI-1240SE-C-HQ

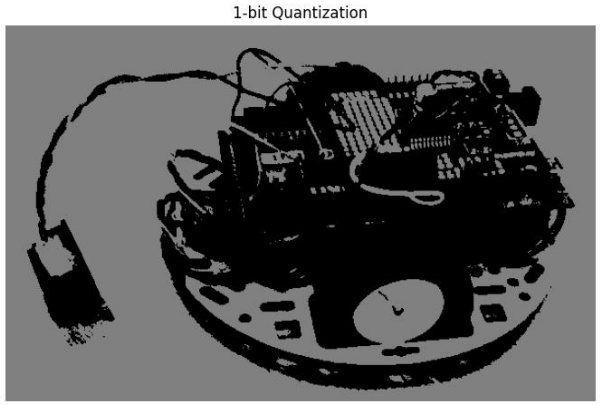
Caméras

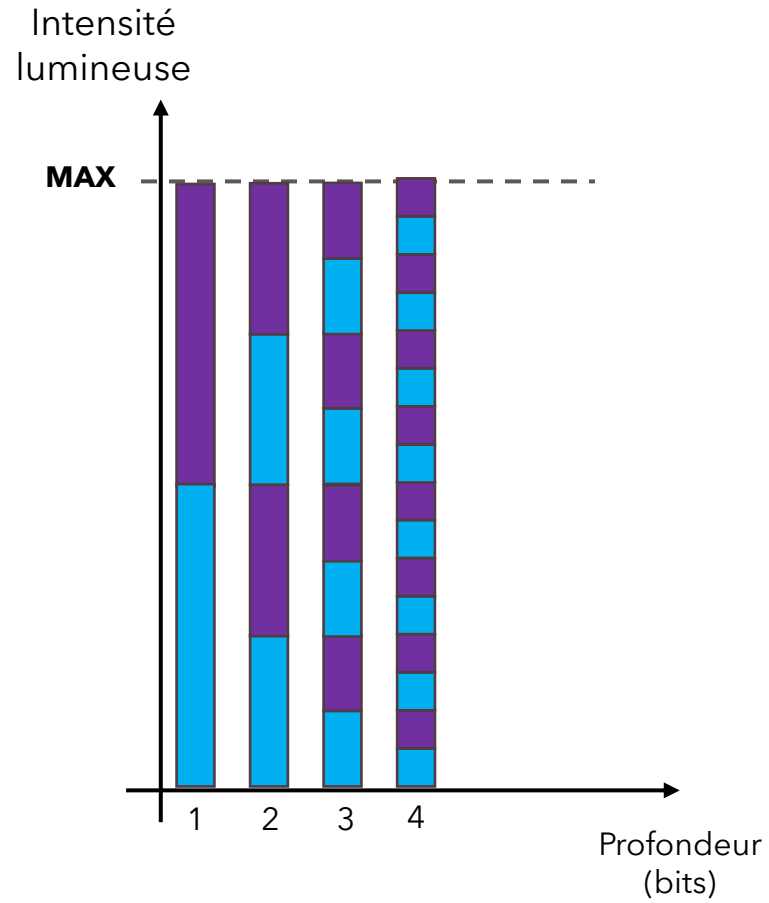
Quantification





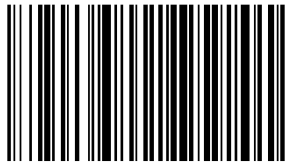


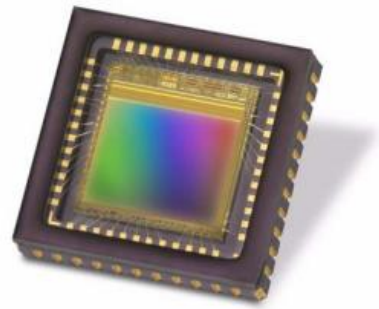




Caméras

Echantillonnage





e2v sensor EV76C560ACT

IDS UI-1240SE-C-HQ

Caméras

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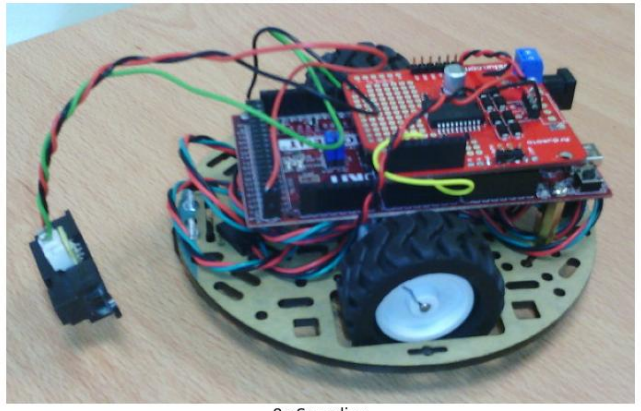
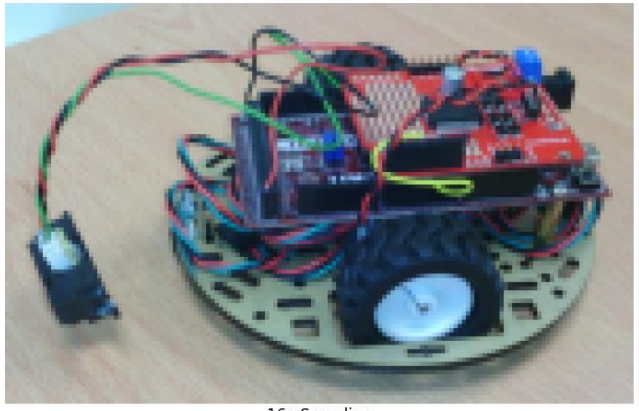
Echantillonnage

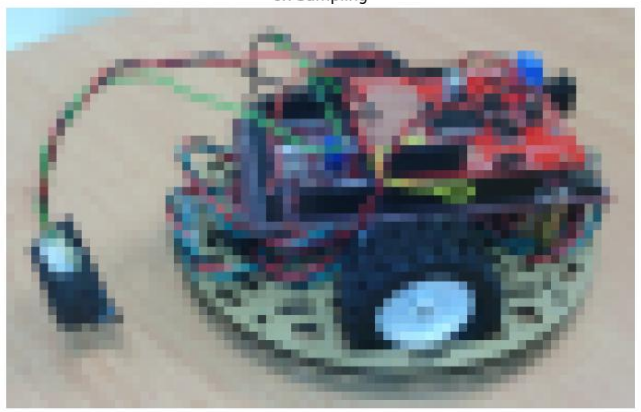
Original Image



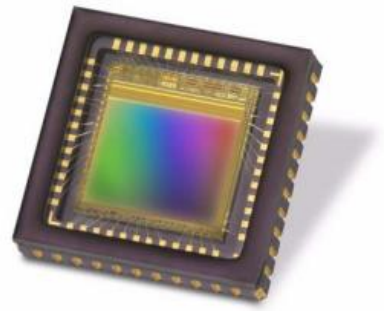
4x Sampling



8x Sampling



16x Sampling



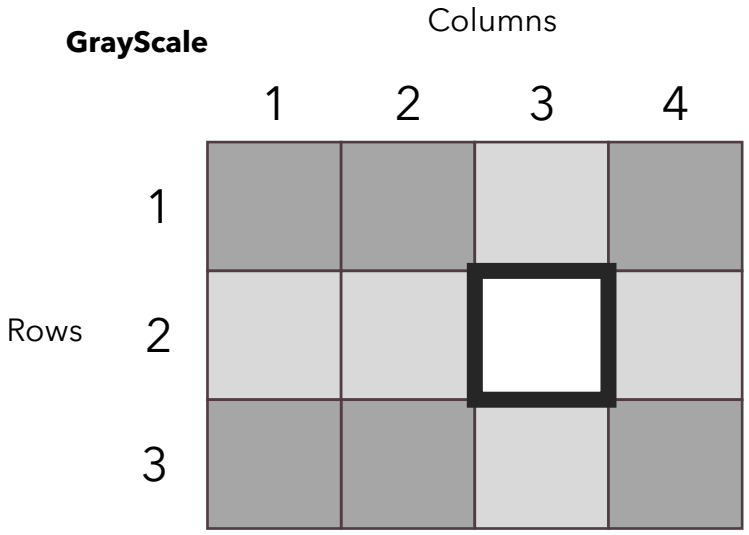
e2v sensor EV76C560ACT

IDS UI-1240SE-C-HQ

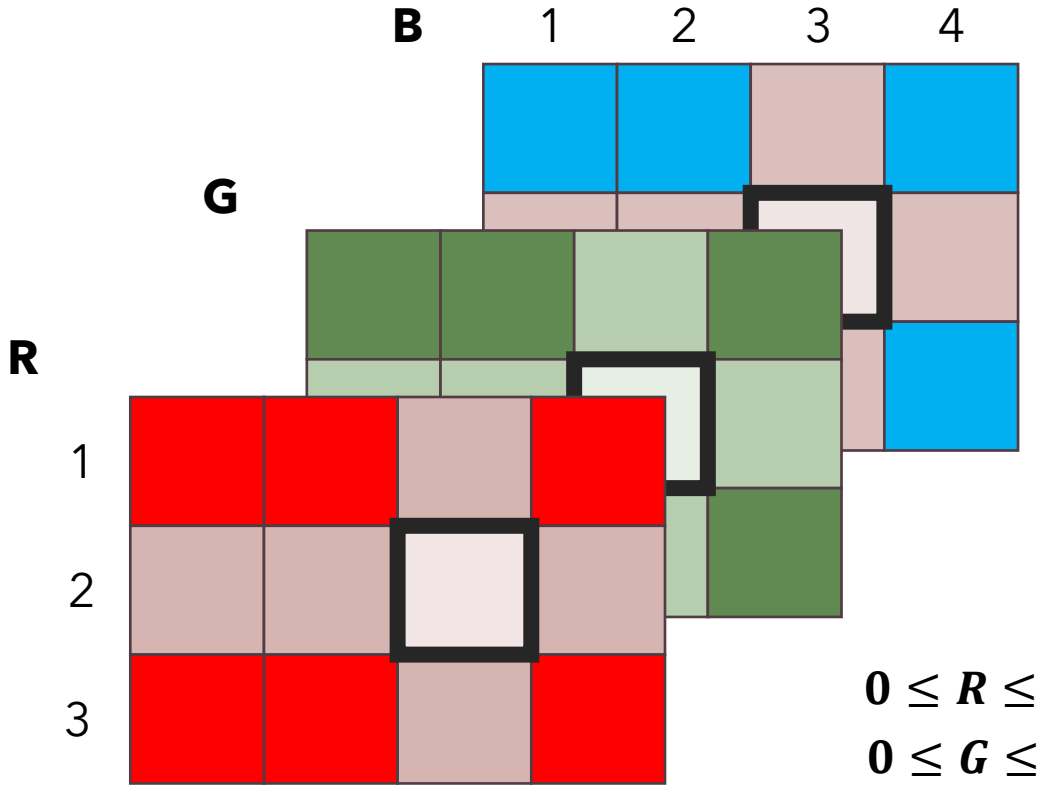
Images

Images

Nb of pixels = **h** x **v**



Each pixel is converted into **n bits**.



RGB : 3 channels of 8 bits

$$0 \leq R \leq 255$$
$$0 \leq G \leq 255$$
$$0 \leq B \leq 255$$

R=200, G=100, G=50

Images

Traitement d'images

Image from the camera

- **Noise**
- Bad contrast
- Inhomogeneous Lighting
- …

Desired image with objects with **well-defined contours**

- Homogeneous zones
- Transition zones

Images

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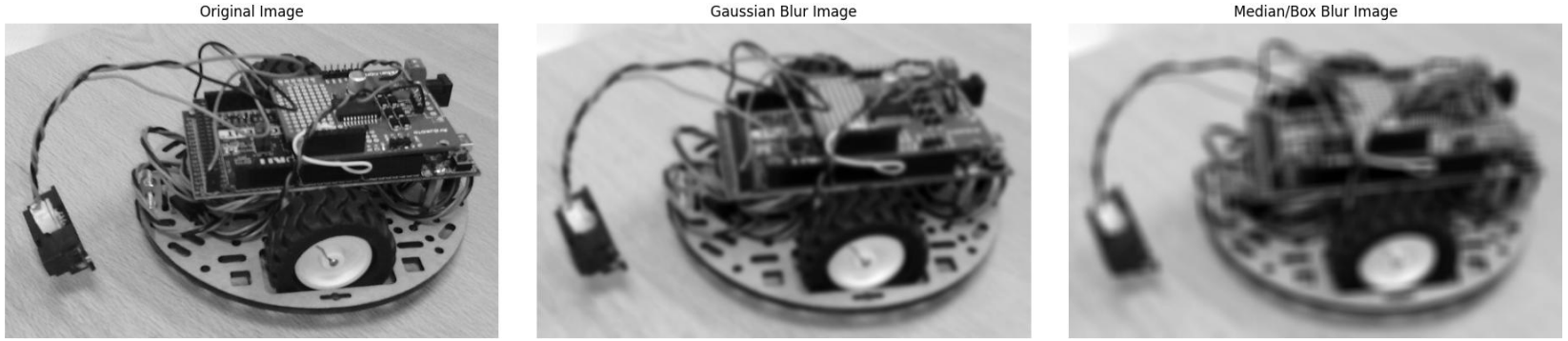
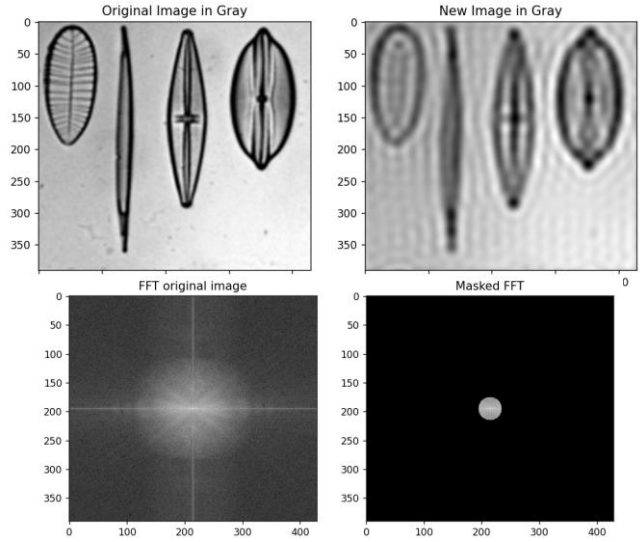
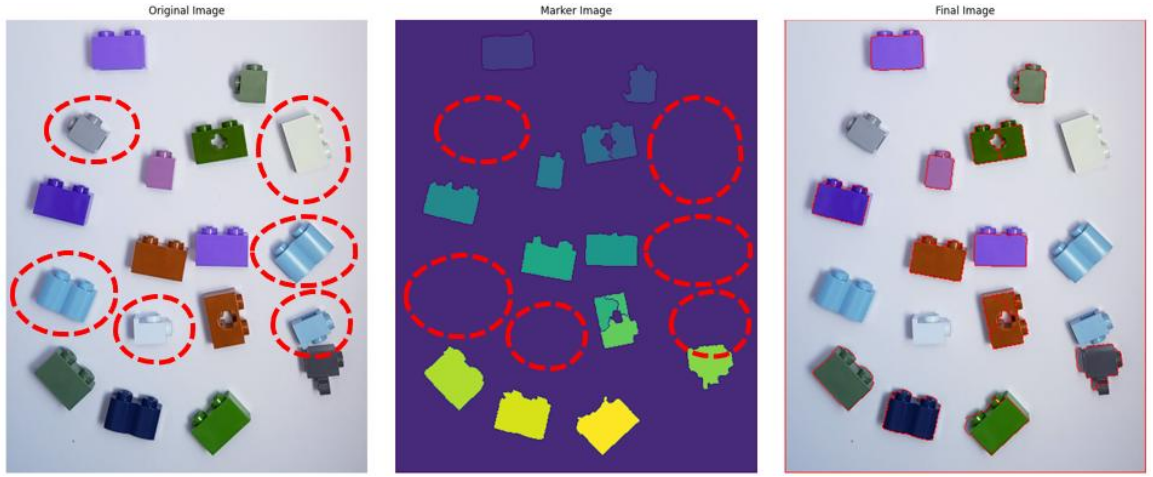
Traitement d'images



OpenCV





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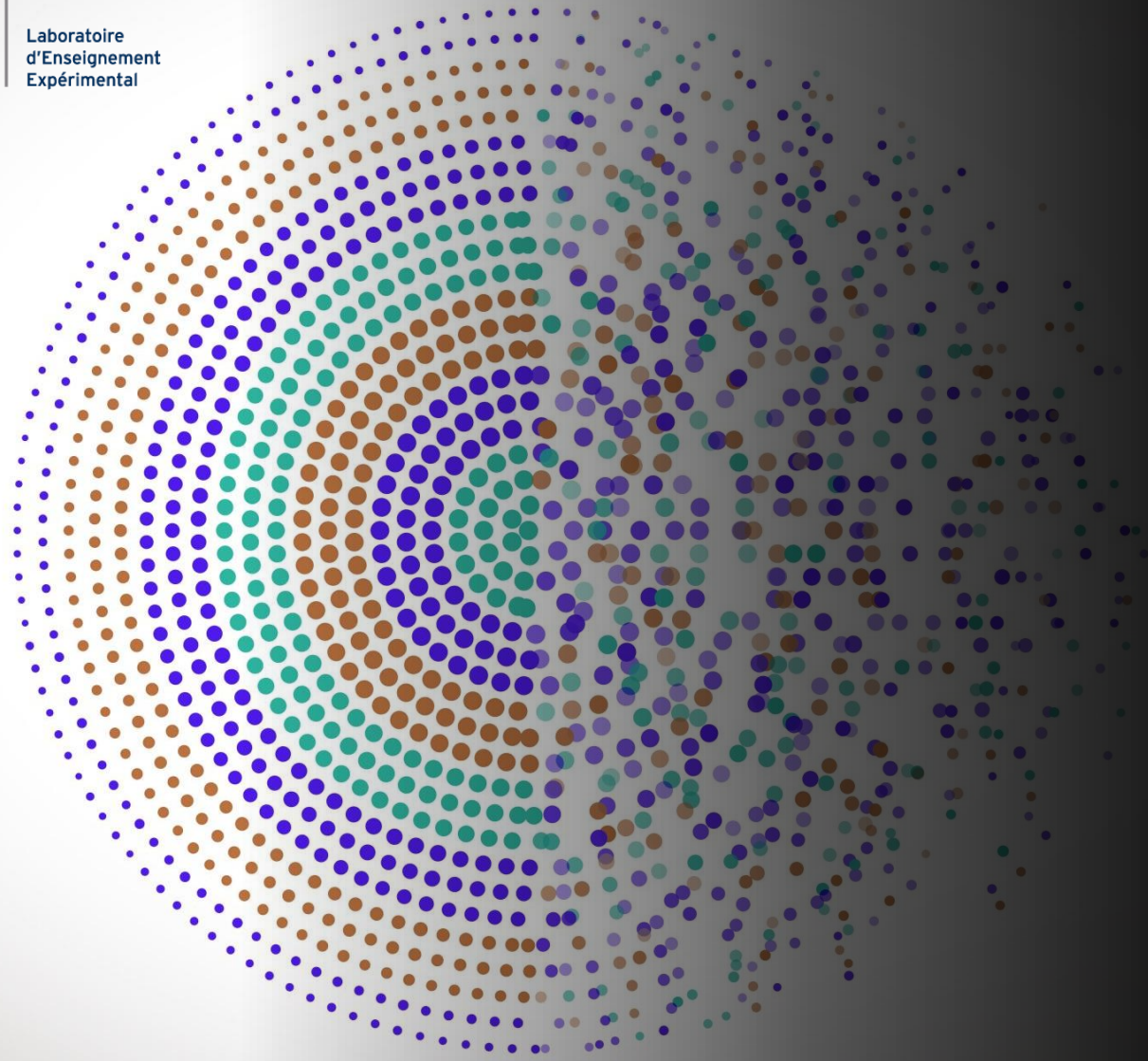


UE Interfaçage Numérique

Déroulement et sujets

IntNum / Semestre 6
Institut d'Optique

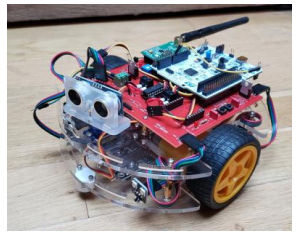
Interfaçage Numérique / S6-FISE

INSTITUT d'OPTIQUE GRADUATE SCHOOL ParisTech | LEnsE Laboratoire d'Enseignement Expérimental

Volume horaire de 46,5h pour **5 ECTS**
(*European Credit Transfer and Accumulation System*)

16 % du S6

Comment **contrôler / piloter un système** pour :
- Le rendre autonome ?
- Acquérir des données ?



Comment **acquérir une image** numérique exploitable ?

Comment **préparer une image** numérique pour un traitement ?

8 séances de TP

4h30 / en binôme

4 séances de TD

1h30

2 séances de TD Machine

1h30

Découverte de Matlab

Responsables

Fabienne BERNARD
Julien VILLEMEJANE

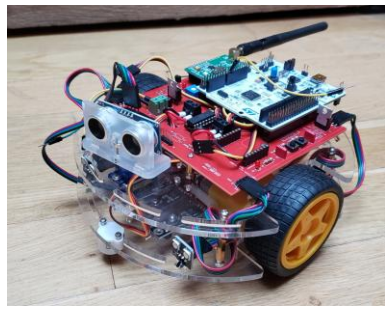
Interfaçage Numérique / S6-FISE

INSTITUT d'OPTIQUE GRADUATE SCHOOL ParisTech | LEnsE Laboratoire d'Enseignement Expérimental

A choisir !!

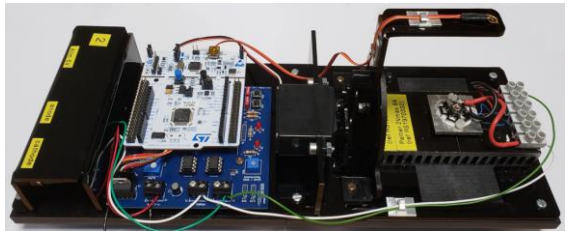
Robot

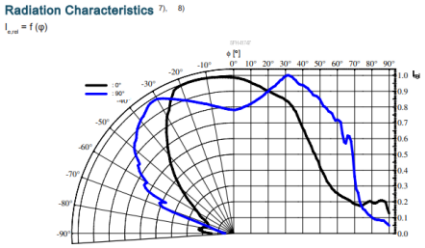
Arduino / Nucleo | Robotique | Communication



Rayonnement de LEDs

Arduino / Nucleo | Protocole Série | LEDs Puissance



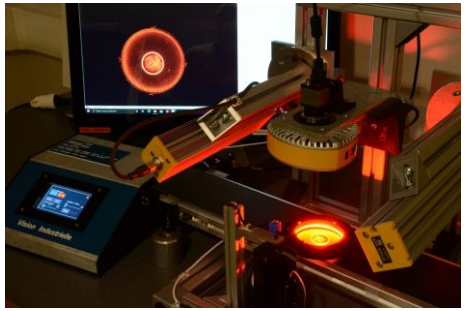


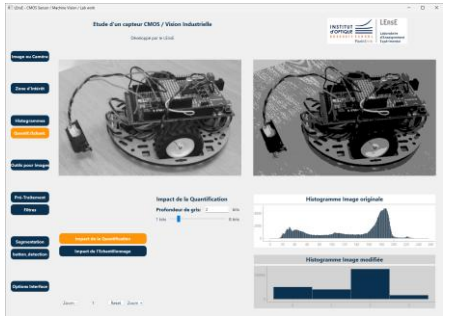
4 séances

Camera et Images

2 séances

Vision Industrielle | Traitement Images | Python





IHM sous Python

2 séances

PyQt6

Images et OpenCV

OpenCV

A choisir !!