

# REM 2011

*Vision & known-object tracking  
on a low-end FPGA-based platform*

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## Outline of the presentation

1. Genesis of the «Ball Retriever» project
2. About video processing methods
3. Low-end FPGA video processing: The proof of concept
4. Implications for electric engineering education
5. Question time

### Genesis of the «Ball Retriever» project

- One-month project (Jan.)
- Made by last-year students
- Teams of 4 with a Project Manager
- Free-subject

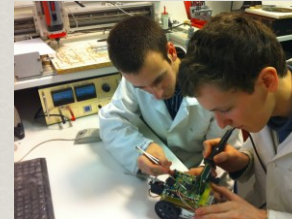


### Genesis of the «Ball Retriever» project

Slide II

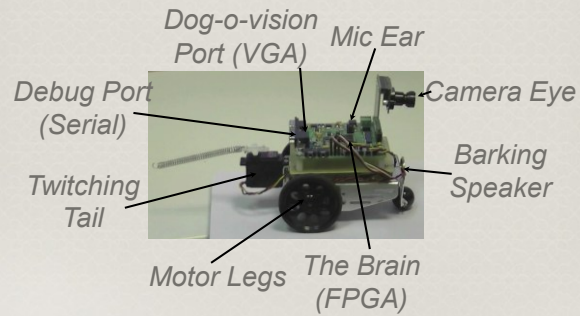
#### The objectives:

- Use low-tech
- Implement as many things on it as possible
- Prefer functionalities considered as high-demanding
- Have fun (last project)!



### Genesis of the «Ball Retriever» project

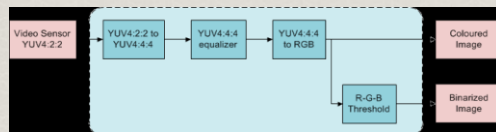
Slide III



### About video processing methods

- | <b>• Software-based</b>   | <b>Hardware-based</b>   |
|---|---|
| <ul style="list-style-type: none"> <li>■ Uses libraries</li> <li>■ Needs an OS running</li> <li>■ Under embedded computing constraints</li> </ul> | <ul style="list-style-type: none"> <li>■ Uses cores</li> <li>■ Is stand-alone</li> <li>■ Can be scaled to specific needs</li> </ul> |

### Low-end FPGA video processing: The proof of concept



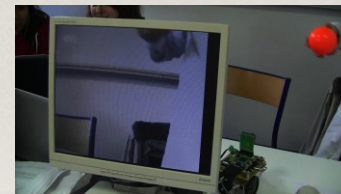
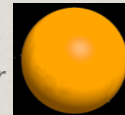
YUV Input stream has to be converted in RGB

### Low-end FPGA video processing: The proof of concept

Slide II

To track an orange ball,  
you need a tracking filter

Orange = Red - Green - Blue



### *Implications for electric engineering education*

- *Learning alternative technologies (ASIC FPGA chips)*
- *Learning different conception langages (VHDL, Verilog...)*
- *Evaluating the appropriate scaling for projects*
- *Save consumption energy*
- *Better education means more efficient industry engineering*

### *Question time*

- ***Thanks for your attention!***
- ***Do you have any questions?***