

OPTIMAL CONTROL FOR MULTIDIMENSIONAL MICROSCOPY

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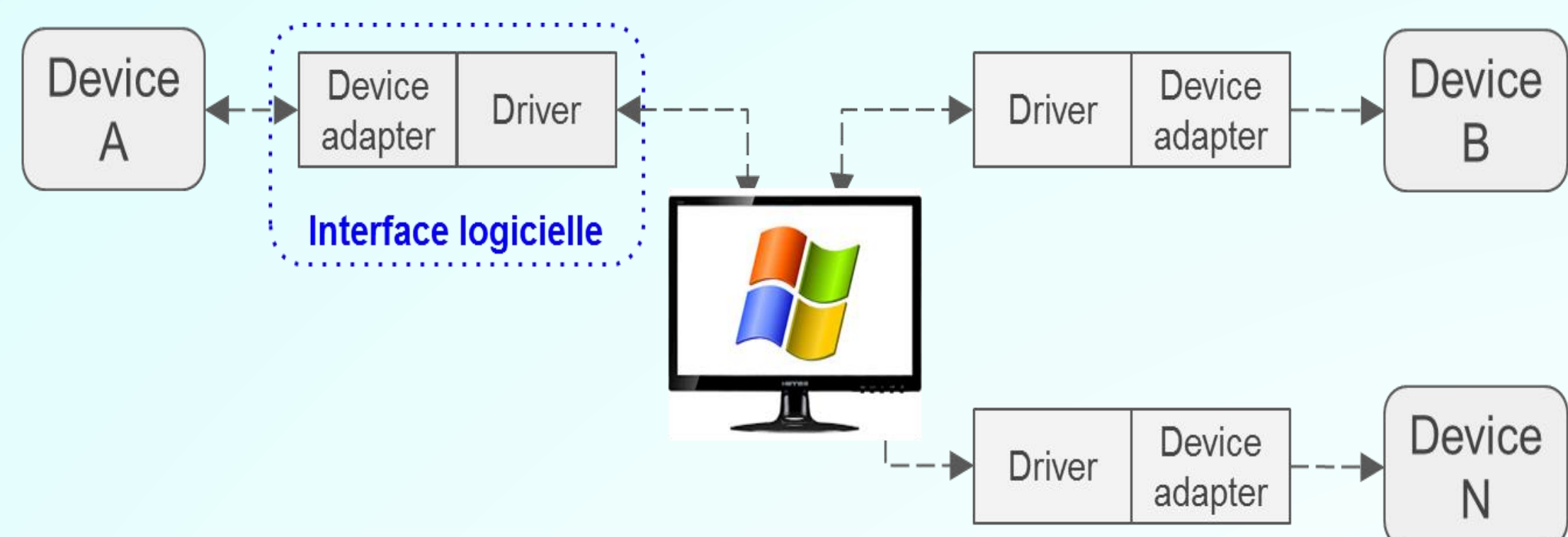
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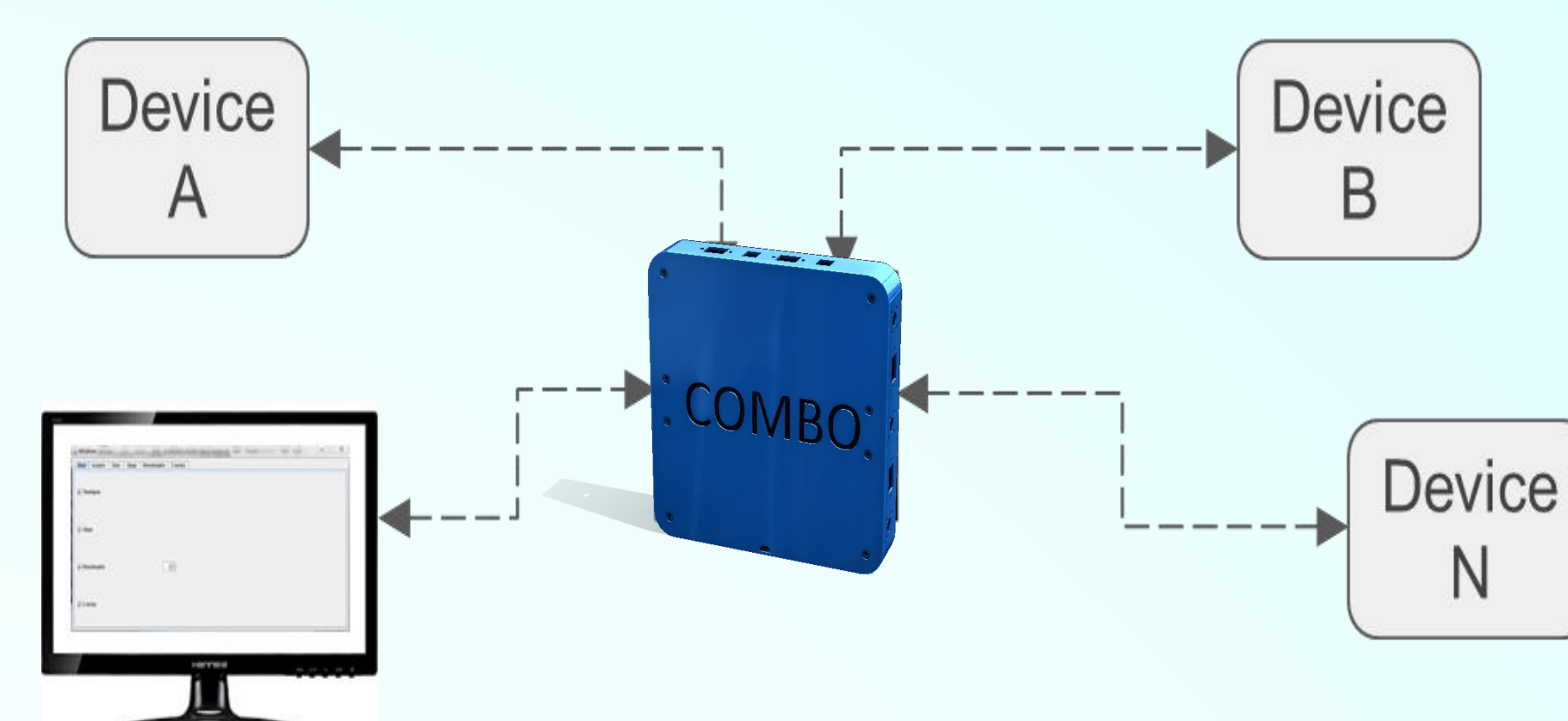
Project

From software solutions to control microscopes



- (i) the device controlling process is centralized, the CPU cannot completely focus entirely on multidimensional acquisition process;
- (ii) the acquisition software calls a software driver for each device which is directly dependent on OS version has to be constantly upgraded;
- (iii) during acquisition process, communication between the software and all devices is sequential, the software cannot communicate with two or more devices in parallel.

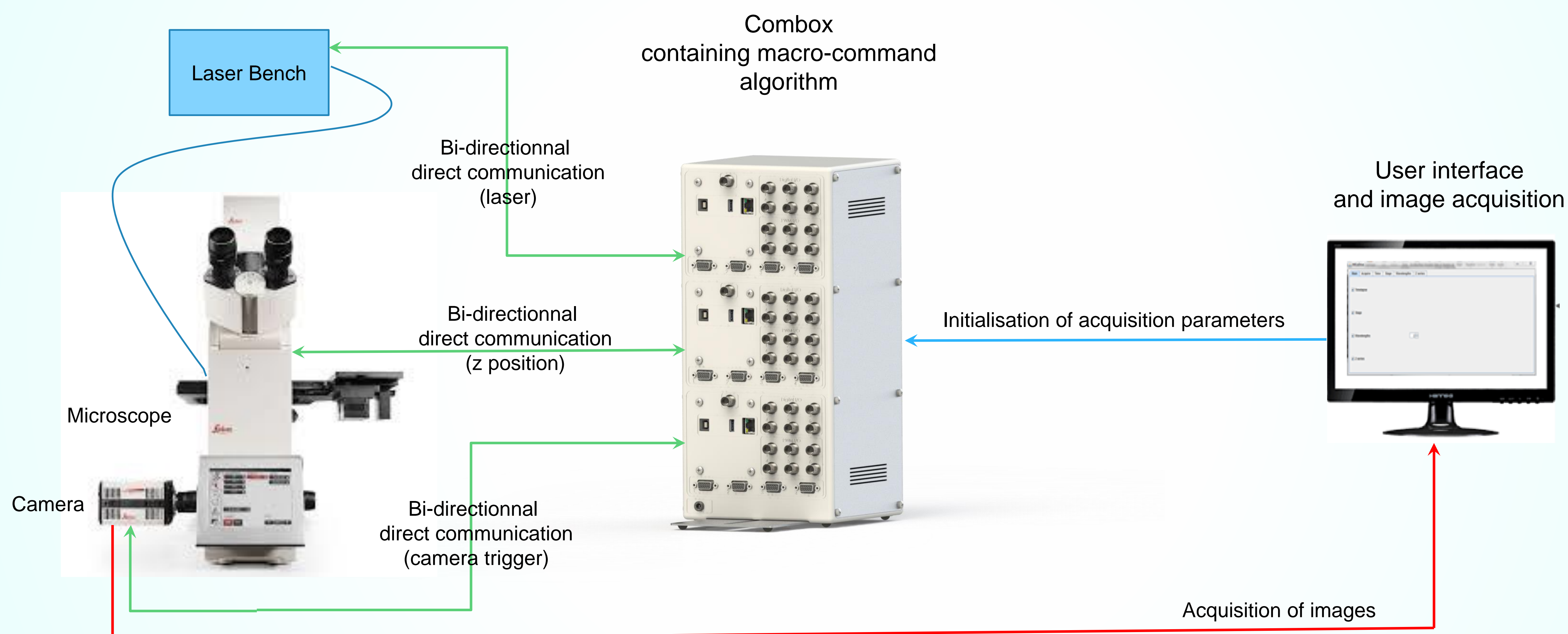
To microcontroller solution to control microscopes



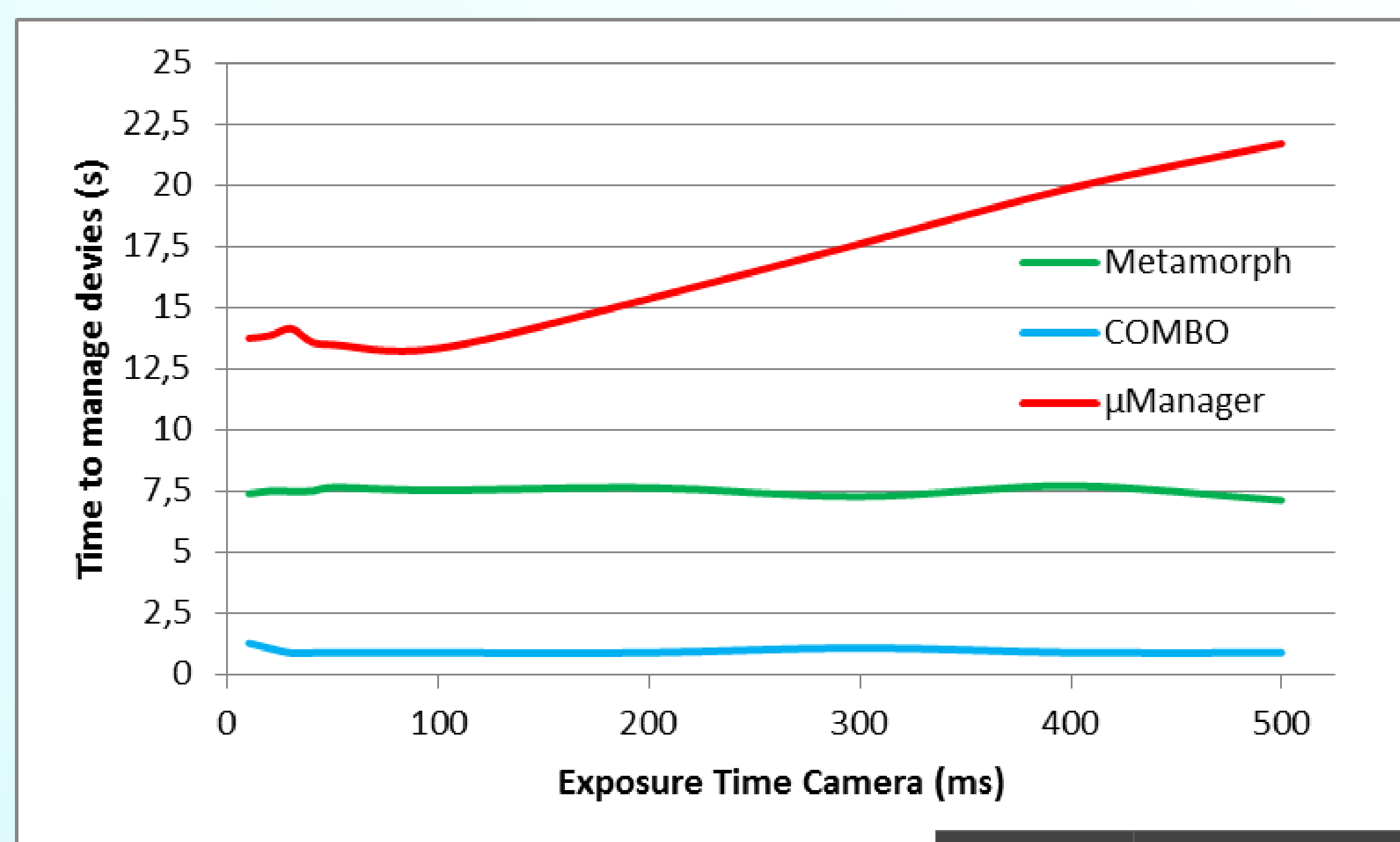
How to optimize the acquisition speed?

- (i) microcontroller entirely dedicated to multidimensional acquisition process;
- (ii) direct communications which do not require any device software driver to operate and provides various types of interfaces (COM, TTL, and USB) with the possibility to add many others;
- (iii) bidirectional communication and parallel management based on state machine.

How it works?



Proof of concept



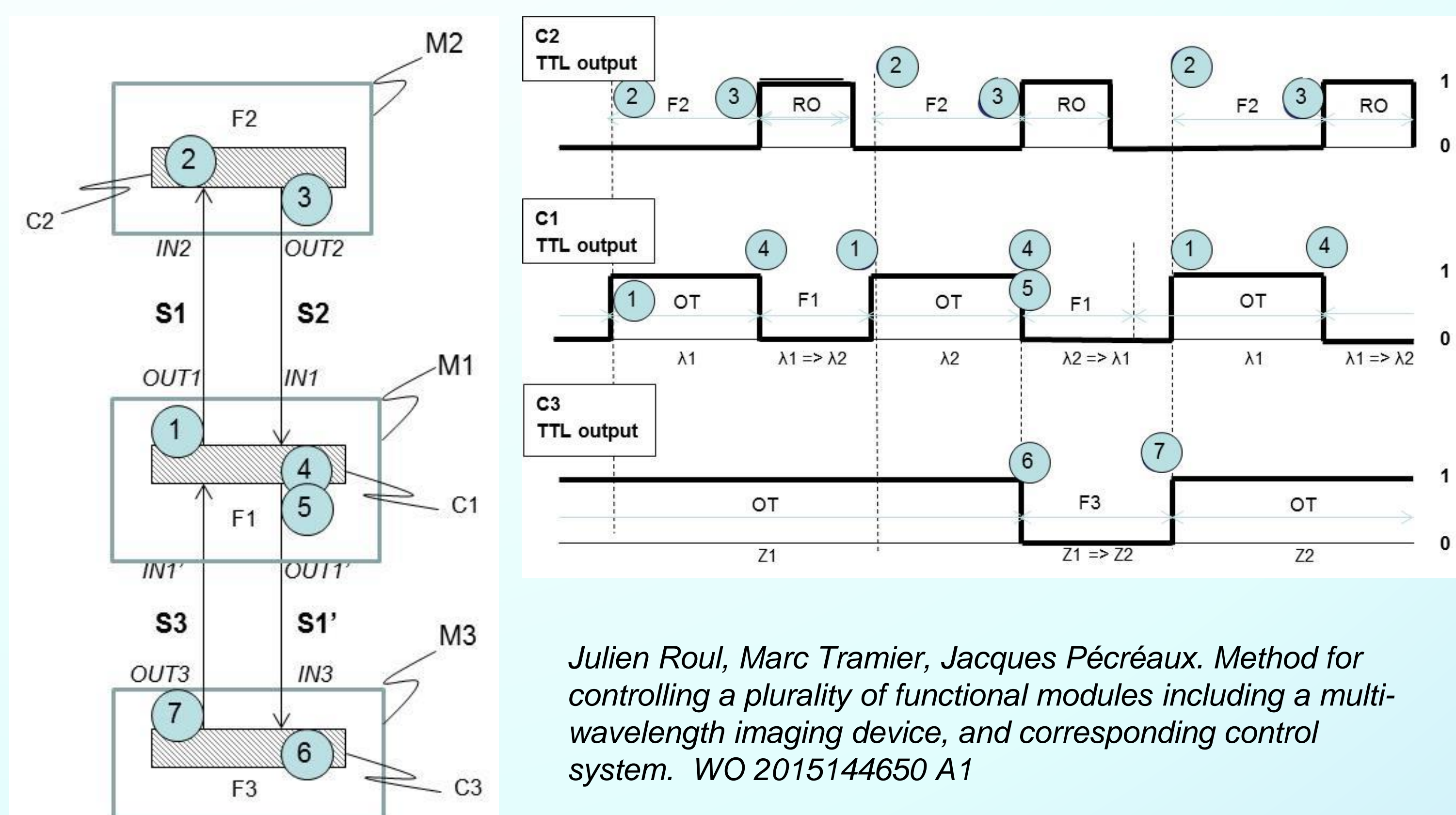
The figure represents the time to manage devices during an acquisition of 22 images for 2 illumination settings and 11 Z-stack.

The time to manage devices is calculated by subtracting the total exposure time to the total acquisition time.

Microscope	Leica DMIRBE
Camera	PCO.edge 4.2
Piezo Controller	PI E-709.SRG
Light Source	Fianum whitelase SC480
Shutter	Uniblitz VMM-D1, Lambda SC
Wavelength Selector	Based on PI controller C-867.260

Innovation

- Optimizing the communication between the the different devices
- Parallelized bidirectional asynchronous communication



Julien Roul, Marc Tramier, Jacques Pécréaux. Method for controlling a plurality of functional modules including a multi-wavelength imaging device, and corresponding control system. WO 2015144650 A1

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