

PHOTONICS - EUROPHOTONICS MASTER COURSE

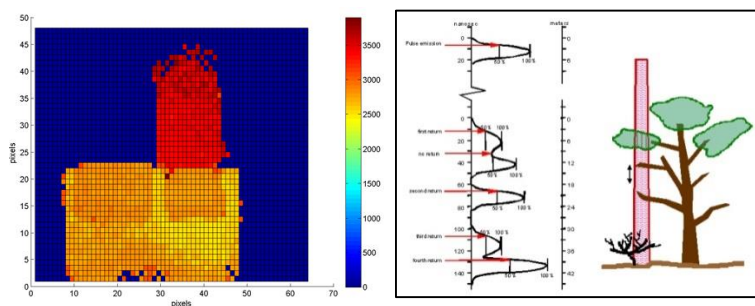
PROPOSAL FOR A MASTER THESIS

Dates : April 1st, 2016 – September 31th, 2016

Laboratory : Centre for Sensors, Instrumentation and systems Development (UPC-CD6)
City, Country : Terrassa, Spain

Title of the master thesis :

Development of a multihit ladar imaging camera system



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Summary of the subject (maximum 1 page):

Lidar imaging is a powerful measurement technique where a laser pulse is shone onto an object and the beam reflected back is recovered at some solid-state detector. The time elapsed is counted so an automated measurement of the distance to the target is obtained, without any further calculation. The concept is also referred to as ladar or time-of-flight imaging. Different scanning mechanisms have been proposed to recover complete 3D images out of this pointwise approach. Most popular recent applications involve landing aids, object recognition, self-guided vehicles and safety and security applications in transport.

In several applications, though, the performance of lidar units becomes limited by the presence of obstacles which partially block the laser beam. Applications involving fog or smoke, or the detection of objects after leaves or obscurants require the detection of very fast events and the reconstruction of either first or last returns to compose the lidar image and remove the clutter in the optical path.

At CD6 we are finishing our second, application targetted prototype of a novel type of camera with proprietary technology, which includes a self-developed ASIC-oriented chip for the management of multi-hit conditions as part of a pre-prototype to be launched. The student in charge of this project will contribute to the testing and validation of this novel camera, and will build and put to test the camera prototype under different imaging conditions. Contributions are expected essentially in prototype testing and validation for different applications, but also in modelling skills, including lidar equations for energy transfer in multihit environments, hands-on optomechanical design and construction, and software processing including visualization, image processing for object detection, movement compensation or interfacing will be required from one or more MSc projects.

Keywords : flash ladar cameras, time-of-flight, 3D imaging, optical metrology, aerospace, transport

Additional information :

* Amount of the monthly allowance (if it is the case):

To be discussed depending on the value of candidate.

* Required skills :

Interest in application-driven experimental work for solving real-world problems.

Basic concepts in optical metrology and optical engineering

Programming (C++, MatLab) and use of scientific software packages (Zemax, Labview...)

Search of resources, both scientific and technical

Self-motivated, objective-driven, capable of autonomous working within a multidisciplinary team.

* Miscellaneous :

This thesis contents will be considered confidential due to its closeness to market.

International team with several years of experience in the topic proposed.

Multidisciplinary environment with electronics and mechanics workshops, and specialists and technicians in metrology, optics, mechatronics, and electronics.

Possibility of joining the Centre for a PhD/Project Manager career in case of common interest.

Early incorporation welcome.