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PHOTONICS - EUROPHOTONICS MASTER COURSE

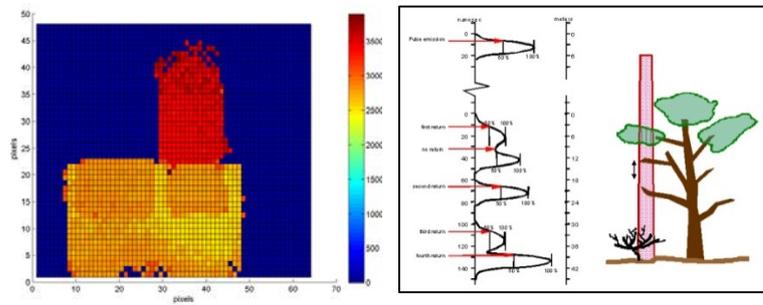
PROPOSAL FOR A MASTER THESIS

Dates : April 1st, 2018 – September 31th, 2018

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

Title of the master thesis :

Calibration of a lidar imaging camera system



Name of the tutor of the master thesis : Santiago Royo

Email address : santiago.royo@upc.edu

Phone number : 34 93 7398904

Mail address : Rambla Sant Nebridi 10 E08222 Terrassa

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.

At CD6 we are finishing our second, application targeted prototype of a novel type of camera with proprietary technology, which includes the use of several active subcomponents which may present nonlinear behaviors. Currently, the calibration procedure is done unit by unit, which is not efficient and depends on a variety of external parameters, so a established procedure, including the design of a potential testing setup or the required tools, would be very useful. The student in this project will be in charge of the design and implementation of the experimental setup and procedure for the characterization of active components (MEMS micromirrors) and another one for system calibration. Contributions are expected essentially in prototype testing and validation, hands-on optomechanical design and construction, and software processing for data acquisition. Student will be supported by CD6 specialists in hardware and software.

Keywords : ladar cameras, calibration, time-of-flight, 3D imaging,

Additional information :

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

Grants available. To be discussed depending on the value of candidate.

Thesis within a collaboration project with a spin-off company.

* 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.