PHOTONICS - EUROPHOTONICS MASTER COURSE
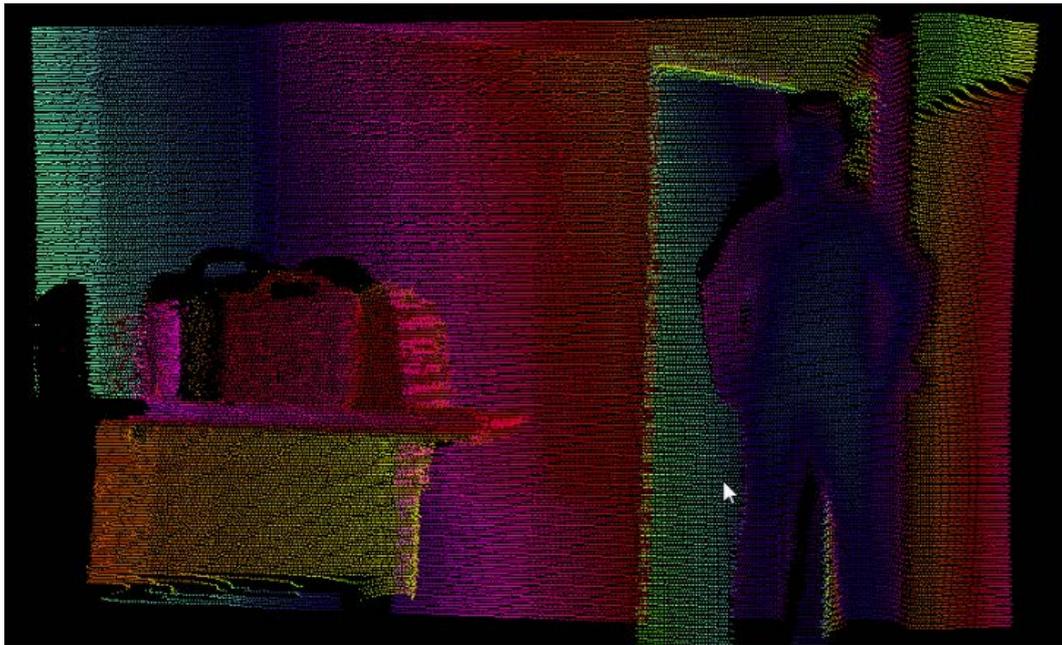
PROPOSAL FOR A MASTER THESIS

Dates : April 1st, 2019 – September 31st, 2019

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

Title of the master thesis :

Design and construction of an operative tabletop lidar imager

Name of the tutor of the master thesis : Santiago Royo
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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.

It is, however, complex to prototype lidar units as usually they are built in the shape of cameras, which are compact but difficult to reconfigure. Furthermore, in several applications special configurations (long distance, large spatial resolution, multiple imaging modes) are required and become difficult to test due to the lack of a reconfigurable prototyping approach.

The student in charge of this work will design a prototype of a simple lidar imager for the testing of different concepts, and will build it with the support of the mechanics and electronics workshops at CD6. This will mean designing the concept of reconfigurable unit, the available ports, the usable optical systems, to validate and construct an operative model of a lidar for future testing of different modalities.

Keywords : lidar, time-of-flight, 3D imaging, optical metrology, optomechanics, optoelectronics

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 <u>confidential</u> 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.
<u>Early incorporation welcome</u>.