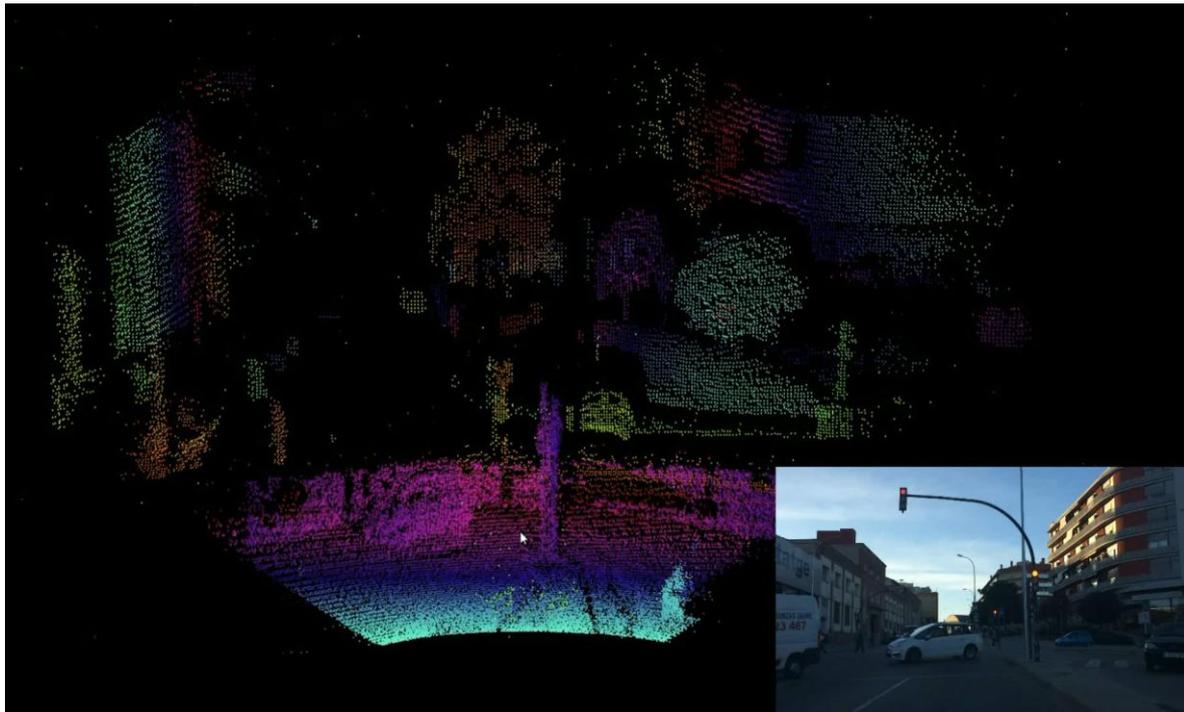# PHOTONICS - EUROPHOTONICS MASTER COURSE

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 :
Management of point clouds with open-source libraries

Name of the tutor of the master thesis : Santiago Royo
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Mail address : Rambla Sant Nebridi 10 E08222 Terrassa

Summary of the subject (maximum 1 page):

Lidar imaging is a powerful measurement technique qhere a laser pulse is sent to a target and the backscattered light pulse recovered in a 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.

The results of the measurement are usually delivered in the shape of point clouds. The raw results present, however, a large number of defects due to different deformations intrinsic to the principle of time-of flight imaging. This includes the presence of outliers, geometrical deformations, flashes due to reflective objects or detector saturation, and walk error. The improvement of colour coding, the point density, and interpolation of missing outliers are othe potential improvements.

The student in charge of this project will learn to use an open source library (the Point Cloud Library, PCL) to process point clouds and improve the quality of its representation. Off-ine and online versions will be considered.

This project requires some experience in programming in C++/C sharp.

Keywords : lidar cameras**, e**go-motion, point clouds, PCL libraries, 3D imaging, data fusion

Additional information :
* Amount of the monthly allowance (if it is the case):
Grant scheme available. Amount 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 in C++/C sharp
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, software, 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>.