PHOTONICS - EUROPHOTONICS MASTER COURSE
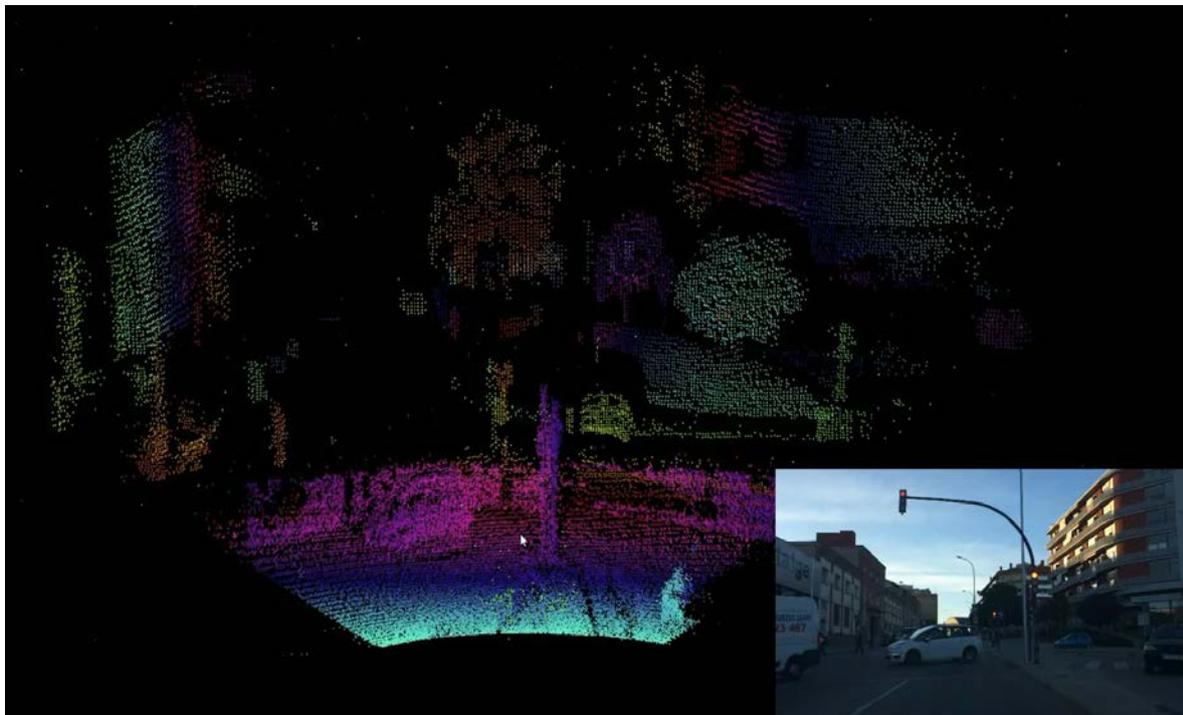
PROPOSAL FOR A MASTER THESIS

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 :

Ego-motion compensated lidar imaging

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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. Most popular recent applications involve landing aids, object recognition, self-guided vehicles and safety and security applications in transport.

A number of autonomous vehicle applications (drones, boats, pedestrians) require ego-motion compensation, that is, the compensation of the measured movement of the vehicle in the measured point clouds. The ego-motion is usually measured using an IMU (Inertial Measurement Unit) , which afterwards compensates the measured point clouds with some geometrical compensation.

The student in charge of this project will propose and design the setup for an ego-motion measurement and compensation system. This involves to select the components, design and build the setup, acquire the data elaborate the geometrical compensation model, and calibrate and set at work the prototype with some acquisition system. He will have full support form the experienced prototyping people in electronics and software.

Keywords : lidar cameras**,** IMU, ego-motion, calibration, 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>