

PHOTONICS - EUROPHOTONICS MASTER COURSE

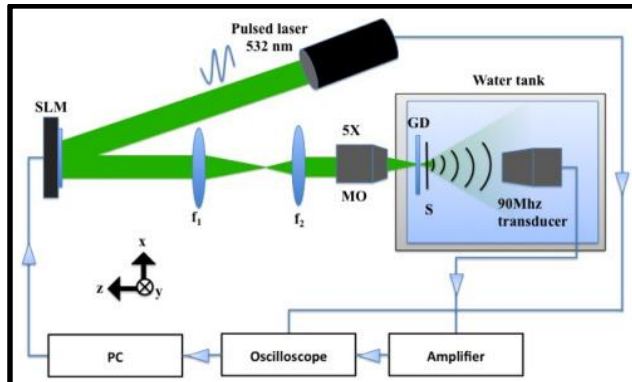
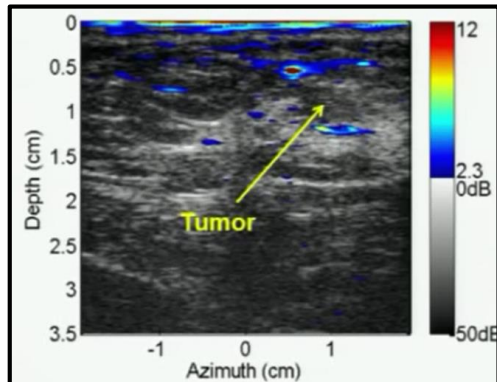
PROPOSAL FOR A MASTER THESIS

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

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

Title of the master thesis :

Design and construction of a photoacoustic imaging setup



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Summary of the subject (maximum 1 page):

Photocoustics (PA, also called optoacoustics) is a powerful medical imaging arrangement of increasing popularity which combines the benefits of optical absorption and ultrasound propagation in living tissues to extract information on the properties of the media. The optics/ultrasound combination enables retrieving information from depths unattainable to optical techniques based only in scattering. When the media considered is living tissue, local changes of absorption or scattering values may usually be identified with interesting medical features. The main fields of application are the noninvasive detection of tumours, and the functional imaging of different parts of the body, including the brain.

At CD6 we are building an initial proof of concept setup for PA imaging in the framework of a larger research project. The student(s) joining this project will join the team involved in the development of the setup, in order to specify, design, construct and finally build the system required for PA imaging, which includes the illumination and detection geometry and components, and the selection and/or construction of photacoustic phantoms to adjust the capabilities of the device. Tasks in the tomographic reconstruction of the obtained images or in modelling of the excitation are equally foreseen to extract with the best possible accuracy the optical properties of the tissue involved. The final goal is to develop an operative, compact PA setup which is able to provide information on device testing.

Keywords : Photocoustics, optoacoustics, medical diagnostics, optomechanics, tissue optics, biomedical photonics.

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 innovation needs.

Basic concepts in optical metrology and optical engineering

Programming (C++, MatLab) and scientific software packages (Sigmaplot,...)

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 technique 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.