



Education and Culture DG

ERASMUS MUNDUS



EUROPHOTONICS-POESII MASTER COURSE

PROPOSAL FOR A MASTER THESIS

Dates: April 1st, 2016 – September 30th, 2016

Laboratory : Intelligent lighting laboratory, Catalonia Institute for Energy Research (IREC)

City, Country : Sant Adrià de Besòs, Barcelona, Spain

Title of the master thesis: Multifunction LED lighting system combining tunable spectrum, data communication and sensing.

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Summary of the subject (maximum 1 page):

The aim of this master thesis is to compare two different lighting systems combining tunable illumination, visible light communications (VLC) and sensing capabilities. The first method is based on light emitting diodes (LED) as light source and multifunction smart sensors and the second one with LEDs and micro-spectrometer to be included in the transceiver and/or receiver. Both systems are intended for future lighting sensor networks that combine standardized optical communications according the standard IEEE802.15.7 and sensing (illuminance, proximity, colour, and spectrum detection) for indoor environments. Figure 1 shows the form factor for the multifunction smart sensor and micro-spectrometer to be integrated in the lighting system.

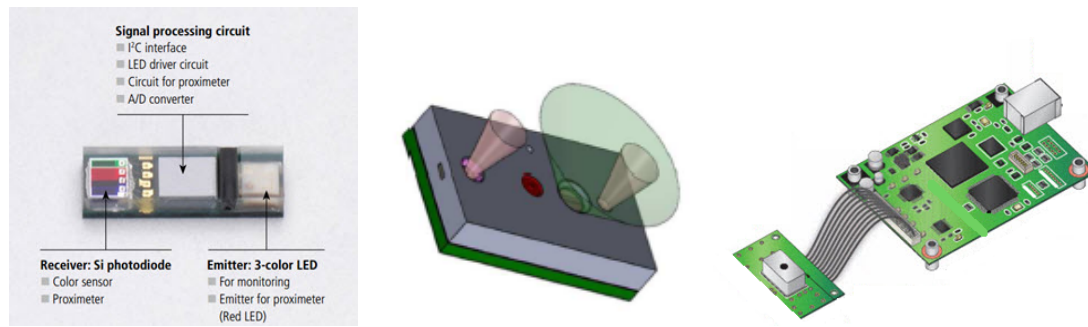


Fig.1 Optical multifunction smart sensors for portable applications

As a result of the project, it is expected to end up with a smart light engine module prepared for illumination, VLC communications and sensing to monitor indoors environments.

Keywords: smart sensor, visible light communications, digital colour sensor, illuminance sensor, micro-spectrometer, Colour quality, RGB, colour temperature, CIE 1931 spectral plot.

Additional information:

* Required skills: PCB hardware design, Programming skills in some of these languages C#, C++, Python or Matlab. A background of lighting: blackbody radiators, radiometric quantities [radiant flux, radiance, irradiance], photometric quantities [luminous flux, luminance, illuminance], colorimetry basics.

* Miscellaneous: Teamworking and autonomous working.