Opto-physiological monitoring

Subjects: Transportation
Contributor: Sijung Hu

Opto-physiological monitoring (OPM) considers biological tissue as a set of optical media, study how light interacts within biological tissue, where the optical properties of the latter reflect the mechanical, physical and biochemical functions of the living organism. OPM includes optoelectronic sensor based contact monitoring and image sensor based remote monitoring.

Keywords: Opto-physiological monitoring ; multi-wavelength illumination ; mutliplexed driver ; demultiplexed signals ; pulsatile waveform ; contact optoelectronic sensor ; non-contact imaging photoplethysmography

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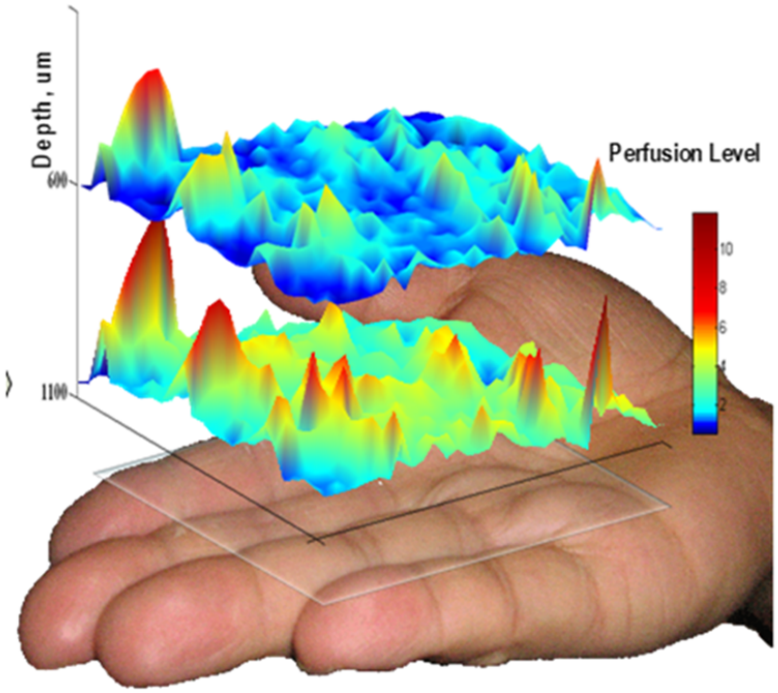
Dr. Sijung Hu is the Leader of Photonics Engineering Research Group, and Reader in Biomedical Engineering, Loughborough University, UK. After being awarded a PhD at Loughborough University in 2000, Sijung was invited to join Kalibrant Ltd as a Senior Scientist for R&D in vitro diagnostics instrumentation. Sijung joined the Wolfson School of Mechanical, Electrical and Manufacturing Engineering, Loughborough University as a research fellow in 2002 and sensor research fellow in 2006. Sijung has contributed in Photonics based Biomedical Engineering with creation of Opto-physiological monitoring and assessment that was recognized as a milestone in worldwide pulse oximetry research in 2008 by Drexel University, USA (http://www.pages.drexel.edu/~kmg462/currentresearch.html), and non-contact vital signs monitoring/imaging photoplethysmography (iPPG) was included in NASA's Future of Emergency Care (NASA/TM-2011-216145), and an innovative optoelectronic sensor (Carelight) was highlighted in Atlas of Science 2015 (https://atlasofscience.org/new-generation-opto-electronic-patch-sensor-oeps-carelight/) with the potential for commercialization worldwide. Sijung has successfully supervised 23 completed PhDs (2002–2019) with very satisfactory outcomes of original research reflecting in major leading journal publications (Google citations >6000). Five completed senior scholars' supervision for four biomedical engineering projects; eight on-going PhDs supervision with the research topics covering the range of from in vivo physiological monitoring to in vitro diagnosis POC device manufacturing and dynamic breathy pressure sensing.

OPM has a clear scientific approach with the interest in the photonics and dynamics are govern the interaction of light and biological tissues, as well as the practical engineering implementation required to translate laboratory results into commercial products. The research is mainly specialized in Photonics based Biomedical Engineering, i.e., photoplethysmography, tissue optics engineering simulation, light scattering etc., and has the generic expertise on optics/tissue Optics, (μ)electronics , software design and systems integration at component and systems levels, combined with a team approach to problem solving, allows for a clear and rapid progression from fundamental research ideas to industrial prototypes. Research activities include areas of sport technologies, human physiology, computing science, and mechanical and systems engineering. The OPM has been collaborating in biomedical engineering research projects and programs with a number of national and international research groups and institutions. It has attained international recognition for its research in opto-physiological modelling to describe human physiological phenomena by effective capture of light trans-illuminating tissue, and non-contact vital signs monitoring, as referenced) [1][2][3][4][5][6][7][8][9][10][11][12][13][14][15][16][17][18][19][20][21][22][23][24][25][26][27][28].



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