Response to referees’ comments

Manuscript ID: Sensors-384146

Title: Oxygen Saturation measurements from Green and Orange Illumination of Multi-Wavelength Optoelectronic Patch Sensor

We appreciate the additional comment given by the reviewer 2 again. As specified by the reviewer, we have carefully reviewed and rephrased the description in the manuscript and answered the questions as requested in line/compliance with ISO standard about SpO2 reading validation.

The reviewer 2:

Q: The authors have answered my major comments; have not applied. Overall, the paper is interesting since it tests green and orange wavelength, however, the validation has been performed versus a platform which can be inaccurate. Although as the authors have replied, the errors are acceptable in clinical setting [but mainly during rest] to infer about clinical outcomes in an inference based system; from a validation point of view and considering physical exercise, the results cannot be used to make a profound conclusion regarding the system accuracy.

Still I should note that the work is interesting and can make a big impact for healthcare applications but in the current format there is not enough evidence. Optical sensors are very sensitive to motion, considering the benchmark data, TempIRTM pulse oximetry (Shenzhen Jumper Medical Equipment Co. Ltd, China), I am not sure how accurate is the benchmark under physical exercise to be used as a reference for validation. Also, inclusion of hypoxic conditions can help.

A: In the current study, we would like to demonstrate an alternative SpO2 (%) reading with green and orange illuminations of mOEPS is achievable based upon the pulsatile waveforms/PPG signals obtained from mOEPS. This working principle and procedure are the same as standard SpO2(%) readings from red and Infrared illuminations from existing commercial pulse oximetry.
We appreciate the comment on accuracy of SpO2 (%) readings to be validated in hypoxic condition. Referring to ISO 80601-2-61, 2017 along with FDA Pulse Oximeters - Premarket Notification Submissions [510(k)s], 2017, we will work on this with clinical professionals in compliance with these standards in a gas controllable chamber/hypoxic condition against a clinical golden standard of blood gas analyser for SpO2 (%) reading accuracy. This has been added up in the section of conclusion and future work.

Usually, 2-3% of current SpO2 (%) readings is commonly acceptable in a clinical patient monitoring as the trend of SpO2 (%) readings is vital for front-line clinicians to alert the SpO2 (%) variations of patient’s metabolism.

Also, in the study, the existing pulse oximetry was only used during rest as the reading of SpO2 (%) can become inaccurate during any activity. Therefore, in the current study we used the pulse oximetry to validate the mOEPS sensor during the rest condition.

During the physical activities, the mOEPS sensor was used to successfully extract physiological parameters during different exercises by cancelling motions artefact as demonstrated in our previous publications.