ICA and Adaptive Filtering based Signal Enhancement for Imaging-type Fourier Spectroscopic Measurement based Pulse Oximeter.

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Pulse oximeter measures arterial oxygen saturation in blood non-invasively and continuously. Generally, Oxyhemoglobin (oxygenated blood) and deoxyhemoglobin (non-oxygenated blood) differ in their absorption of red and infrared light and two-wavelength pulsatile system is used to differentiate them. However, this technique used only two wavelengths and for more comprehensive and accurate measurements, better method is essential covering broad range of wavelengths. Two – dimensional imaging – type Fourier spectroscopy is an ideal candidate to enhance the measurement range and the performances of pulse oximeter due the range of wavelength that can be covered by. Further, this is a wave front division interferometer that can be used to acquire the spectroscopic tomography by scanning the focal plane into the depth direction. Spectroscopic tomography of human finger has already carried out as a feasibility study to develop the fast and accurate pulse oximeter in future. Nevertheless, the measurement includes the signal resulted from pulse rate together with interferogram. Hence, interferogram should be extracted and processed before the calculation of hemoglobin level of blood. In this approach, separation of mixed signals, which independent component analysis known as ICA is used, is paramount for the calculation of absorptions. Further conditioning is carried out using adaptive filtering which eliminated noises and motion artefact that have been incorporated with measured signal. Experiment and signal conditioning was carried out and result shows the effectiveness of propose method.