

PHOTOPLETHYSMOGRAPHY COMBINED WITH IR-CAMERA AND PATTERNS FROM DIFFERENT ANATOMICAL LOCATIONS OF HUMAN BODY

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The biomedical information is increasing, however, diseases like arteriosclerosis (AS) is becoming a vascular disorder among people. It is predicted that the negative impacts of AS on young people can be greater than on the elderly people. Arterial elasticity measurement (AEM) provides a direct indicator for cardiovascular healthiness and would predict AS. Analysis of AEM can be challenging in elderly. Accurate measurements and analysis of the blood vessel properties would be in any case important for better characterization of both arterial diseases and the development of reliable techniques. Photoplethysmography (PPG), and for its results, especially pulse wave decomposition, envelope analysis from the nose, and the ears, and their second order derivatives (SDPPG) combined with ir-imaging could open the new health information on clinics and out-patients. In PPG technology, the main difficulty is its quantitative analysis and comparison of PPG wave measurement obtained from different patients and skin areas. The light intensities and wavelengths (640nm&920nm) are fixed. PPG waveform is based on the propagating pulse wave from the left ventricle travels the arterial circulatory system and arrives the multiple peripheral, parallel capillary arteries. The propagation velocity depends on heart generated pulse and arterial wall elasticity, which is not well known. The whole PPG wave is the summation of forward and backward waves. It is likely sure that the PPG pulse waveform is composed at least five components. The more elastic the arterial wall is, the slower the PPG pulse wave velocity is. Elasticity of the arterial wall changes as a function of aging, and blood pressure. It will be pictured with the high resolution ir-camera with multiple images for automatic processing.

New bioengineering measurements and devices are needed to overcome the burden of healthcare system. Notwithstanding its simplicity, PPG measurements, ir-camera imaging, the analysis have many challenges.

The clinical patient measurements were conducted in Oulu University Hospital (Oulu, Finland), where we studied 17 patients of who 10 subjects exhibited normal arterials and 7 patients with peripheral arterial disease according to the ankle brachial index (ABI).