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Entitled

PIEZOELECTRIC ENHANCED NONINVASIVE LASER-BASED DETECTION OF MULTIPLE VITAL SIGNS

by

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Abstract

In this study, a method for concurrent measurement of heart rate (HR) respiration rate (RR) and blood pressure (BP) using movements of the chest wall is proposed. Unlike conventional approaches that use only laser, in this approach a laser source is used to collect the piezoelectric sensor output without the need for probing. The chest wall movements are transduced using an optical ODSL 8 sensor and a piezoelectric taped to the patient's chest. Measurement data is used for development of algorithms for estimation of HR, RR and BP. Next measurements are taken while the subjects are breathing and holding their breath, and with and without the piezoelectric. For the breathing tests, the RR estimated with and without the piezoelectric are both 64% accurate as compared to reference measurements, while the HR estimated with the piezoelectric material attached to their chest is over 15% less accurate than the tests without the piezoelectric. For the tests done when the subject is holding their breath, the HR estimated from the measurements with the piezoelectric gives the highest accuracy of 92% which is over 20% more accurate than without the piezoelectric. The BP is also equally accurately estimated for the measurements with and without the piezoelectric. The setup demonstrates a feasible, unobtrusive piezoelectric assisted optical multi-vital signs measurement system.

Keywords: Blood pressure, Heart rate, Non-invasive monitoring, Optical, Piezo electric, Respiration rate, Vital signs.