

Construction of Blood Pressure Monitor by Using Photoplethysmography Calibrating with Upper-arm Blood Pressure Monitor

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A photoplethysmography (PPG) is one of an alternative technique for monitoring personal health with the advantages of non-invasive, inexpensive, and easy to use. In this work, PPG is used to estimate blood pressure with the aim to construct a prototype of blood pressure monitor by photoplethysmography and calibrate with upper-arm blood pressure monitor. The NIR LED light source, and detector is used to obtain PPG signal. The PPG signals from blood pressure prototype are recorded with band pass filter and used for calibration with upper-arm blood pressure monitor in 10 volunteers. It is found that the maximum and minimum value of PPG signals show linear dependence of systolic and diastolic blood pressure from the commercial blood pressure monitor with $R^2=0.72$. The obtained linear relation is applied to calibrate the measured PPG signals and to test with 12 volunteers. From the test, the precision of systolic and diastolic blood pressure from the prototype are 8 mmHg and 6 mmHg respectively and the accuracy is equal to ± 10 mmHg compared with that of commercial blood pressure monitor of ± 3 mmHg. Thus, the prototype of blood pressure shows less accuracy than that of commercial blood pressure monitor and may not medically use for health monitoring. However, the prototype maybe practically use as a screening tool for monitoring blood pressure due to easy to use and fast measurement.

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