

A Portable Device for Pulse Wave Velocity Measurements

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Abstract : Pulse wave velocity (PWV) of blood flow provides important information of vessel property and blood pressure which can be used to assess cardiovascular disease. However, the above measurements need expensive equipment, such as Doppler ultrasound, MRI, angiography etc. The photoplethysmograph (PPG) signals are commonly utilized to detect blood volume changes. In this study, two infrared (IR) probes are designed and placed at a fixed distance from finger base and fingertip. An analog circuit with automatic gain adjustment is implemented to get the stable original PPG signals from above two IR probes. In order to obtain the time delay precisely between two PPG signals, we obtain the pulse transit time from the second derivative of the original PPG signals. To get a portable, wireless and low power consumption PWV measurement device, the low energy Bluetooth 4.0 (BLE) and the microprocessor (Cortex™-M3) are used in this study. The PWV is highly correlated with blood pressure. This portable device has potential to be used for continuous blood pressure monitoring.

Keywords : pulse wave velocity, photoplethysmography, portable device, biomedical engineering

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