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Abstract
The purpose of this thesis is to implement a non-invasive measurement system that can be used to collect the digital volume pulse (DVP) from a finger and a toe simultaneously with penetration infrared sensors. From the DVP data, the pulse wave velocity (PWV) can be calculated in real-time by using a personal computer (PC) for doctors to determine the level of arterial stiffness of the patients. Although there are some drawbacks to using a dual channel system (versus the commonly used single channel), the system proposed in this paper uses real-time processing with better accuracy and reduced complexity. Our software algorithm locates the characteristic point (foot of the pulse wave) without assistance from an electrocardiogram (ECG). The complete system includes: the circuits of the infrared sensor, analog signal processing circuits and real-time analysis software based on a PC. For confirmation of clinical implications, the proposed system has been used in the clinical experiments about the level of arterial stiffness at National Cheng Kung University Medical Center. The clinical results have shown that the proposed system can be operated easily to determine arterial stiffness with high accuracy.
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