A NEW METHOD OF NOISE REMOVAL FOR BODY VIBRATION SIGNALS IN WIRELESS SENSOR NETWORKS

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ABSTRACT. *In this paper we present a novel model of noise removal for the human body vibration signals in wireless sensor networks. This model assumes that the noise is not a continuous or periodic signal, but a transient signal. It distributes sparsely in time domain with larger energy than human body vibration signals. Furthermore, on the base of the model a new algorithm is developed which takes advantages of wavelet transforms to remove the noise by the method of processing wavelet transformation coefficients at each level. The results of the experiments indicate that the new algorithm has removed the noise of the signals successfully in the case of both human's one discrete action and continuous activities. Finally, the system is built to implement the performance using our proposed method, which is verified to be feasible and promising in practice.*
Keywords: Body vibration signals, Model of noise removal, Wavelet, Coefficients thresholding

1. **Introduction.** The technology of human activity recognition is widely explored in varieties of monitoring systems such as safe monitor system, healthcare system and so on, for the reason that a person's behavior can reflect one's status and surrounding environment. Especially in healthcare, objective measurements of the effects of medical interventions are gaining importance. Clinicians, administrators, medical researchers, and third-party payers need to make decisions about the quality of care and the effectiveness of new medical treatments. Objective evaluations, often referred to as "outcomes assessment" [1] are increasingly sought as the basis for these decisions. In many areas of research and medicine, objective data describing an individual's ambulatory function are sought as useful indicators of that person's condition. The extent to which a person is able and willing to move around the world is often a strong indicator of his/her condition. Frequently, a clinician will simply observe the individual walking into or around the exam room. Although a number of devices to measure physical activity have been sporadically used for research and clinical evaluation, such as Personal Activity Computer and Step Activity Monitor [1-3], their methods have some limits [4,5]. For example, they transfer data in wire mode, which brings troubles to check individual's condition and limits activity space. And noise in the transferring process has not been considered.

When more objective physical measures are needed, we use wireless sensor modules Ni3 [6] with accelerometers to sample and transmit vibration signals of the human body's