

W. Ourique de Morais, A. Sant'Anna, N. Wickström. A wearable accelerometer based platform to encourage physical activity for the elderly. *Gerontechnology* 2008; 7(2):181. Projections show¹ that in the next 40 years, the largest growth of the world population will be among elderly people. Therefore, new technologies and advances must be developed to treat common geriatric problems that are normally associated with physical debilitations, cognitive impairments, and low social interaction. In particular, falls represent a great issue concerning elderly independence². This work encourages elderly people to perform physical activities through computer games using a wearable accelerometer-based platform. Gaming interaction through body movements may improve physical condition as well as cognitive aspects of aging and provide social interaction. One candidate game application is a Virtual Tai Chi Instructor (*Figure 1*). Tai Chi training has been shown to improve certain physical attributes and influence cognitive performance³. One study has been concerned with tracking and classifying Tai Chi movements using accelerometers and gyroscopes⁴. In our work, wireless communication between devices has been adopted as a new feature. The system stores scores and provides motivating feedback to the user so he is encouraged to keep playing and sharing his results with others. **Methods** The system is composed of wireless wearable sensors that, depending on the user's context, communicate with a PDA or a computer. The wearable sensor is designed with one low-power 3-axis accelerometer with an acceleration range of $\pm 6g$ and a Bluetooth module. The acceleration of each movement provides information about velocity and displacement that, in turn, are used as input to interact with a virtual instructor. The system is designed to have a layered architecture where each layer is responsible for different functions, ranging from sensor abstractions to a service provider to the application layer. **Results and discussion** The wearable platform has shown to be unobtrusive and practical for movement tracking since it is small-sized, light-weight and uses wireless communication. The system is designed to be used at home and outdoors, in contrast with systems that use special devices and settings for motion recognition. Challenges faced during the work were, among others, decision on how many sensors are needed and their placement, signal segmentation, hardware configuration, and real-time processing. Current efforts are addressing improvements in the sensor calibration, power consumption and network awareness. The project has been presented to healthcare professionals who have shown a great interest in using it as a measurement system in their exercise program for the elderly community.

References

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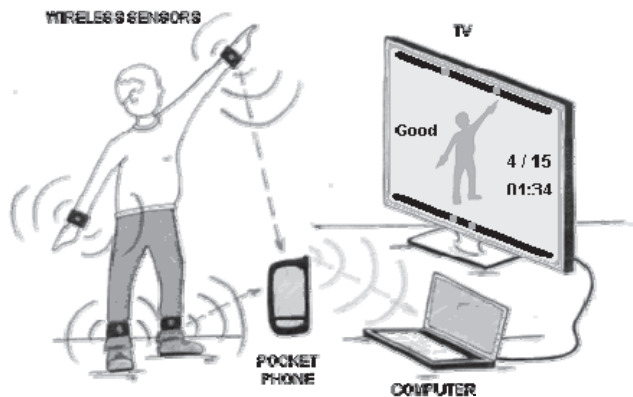


Figure 1 Game interaction with wearable sensors