

Versatile Training Field: the Wellness Entertainment System using Trampoline Interface

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ABSTRACT

We propose the wellness entertainment system Versatile Training Field (VTF). In this system, we use a mini trampoline as the input device. The system enables the user to move and jump freely in VR space by exaggerated movement corresponding to walking or jumping on the mini trampoline. Improvements in exercise motivation and support for continuous exercise are achieved in our system, since it is possible to enjoy strolling through a virtual space, which is usually difficult to experience, by exercising on the mini trampoline without injury to the user's joints.

1. AUGMENTING TRAMPOBICS

Recently, lifestyle-related diseases have become recognized as problems. Changes in eating habits, stress in day-to-day living, smoking, and excessive drinking all contribute to the development of lifestyle-related diseases. Regular exercise is needed to prevent these diseases. Particularly beneficial are effective and continuous exercises appropriate for our physical strength. Nowadays, exercise machines for home use, such as running machines or aerobics bicycles, are prevalent.

Trampobics is an aerobics training method using a mini trampoline. It substantially decreases damage to the joints compared with floor-based aerobics. Moreover, it has benefits such as constipation prophylaxis, diarrhea prevention, and alleviation of tension in the shoulders. It enables us to exercise effectively in a short time by controlling the heart rate. Because of this, it is expected to be a lifelong exercise.

2. SYSTEM OVERVIEW

Our goal is for the user to enjoy exercising, and reap the benefits of highly effective trampoline exercise, and to alleviate difficulties in maintaining an exercise program. In our proposed system, when the user exercises on a mini trampoline, he or she experiences moving and jumping freely in VR space. We consider the use of our system by a wide range of age groups. Therefore, we envision households as a typical usage environment for our system.

Figure 1 shows the appearance of the experience. Our system is composed of an input device and an image-generation system, which consists of a PC, two short-focus projectors, and two large-scale screens.

The input device consists of a mini trampoline and a position-sensitive detector (PSD) sensor, which is installed beneath the center of the trampoline and measures the amount of change in the trampoline bed. A PC application detects the type and extent of the user's movement by processing the time series of the amount of changes in the trampoline bed. When the application detects the user's motion and calculates the corresponding viewpoint in VR space, the short-focus projector projects the view onto a large-

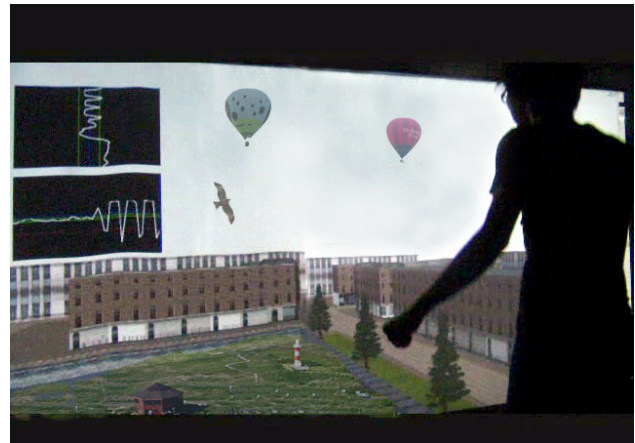


Figure 1. Versatile Training Field.

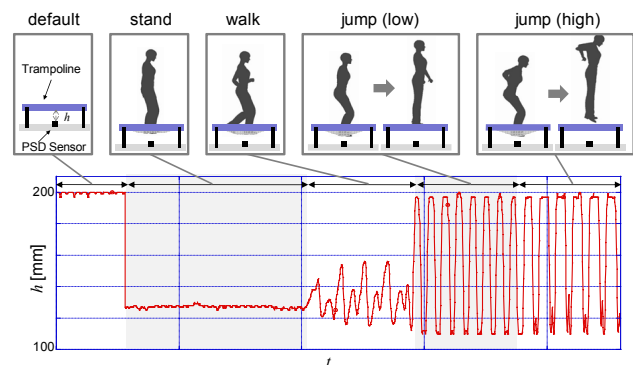


Figure 2. Relationship of exercise and an input signal.

scale screen in front of the user. This projected image, synchronized with the exercise, gives the user the sense that he/she is exercising within the virtual scenery.

3. USER EXPERIENCE

We propose a method to distinguish the type of exercise and status of the user according to the amount of change in the trampoline bed (Figure 2). In particular, our system provides a user with an image of the virtual viewpoint, synchronized with the exercises and varied according to whether the user is standing (at rest), walking, balancing, or jumping on the trampoline.

Our system prepares versatile exercise content in VR selected according to the interests of the user and the desired exercise time. Examples of such content are strolling around streets, jumping higher than the roof of a city building, jumping sky-high in a natural environment such as a mountainous area, playing a sport, having a snowball fight, playing a treasure-hunting game, and so on.