Depth sensor based assessment of balance performance

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1 Background

Falls and fall-related injuries among older individuals constitute an increasing problem in society with potentially severe consequences for the individual and large costs for the society. Specific training of balance has been shown to be effective in preventing falls. However, there are obstacles to a wider spread of training, since this has traditionally been an activity in clinical setting led by a physiotherapist. This is gradually changing as gaming technology such as wii fit (Nintendo) and kinect (Microsoft) is gaining popularity as ways of doing exercise and training balance.

In a joint project involving the Department of Information technology, the Department of Public health and caring sciences at UU and the School of Health and Social Studies at Dalarna University, we are developing a system for facilitating balance training using gaming technology. Within this system the training is supervised and supported at a distance by physiotherapists.

Currently we are evaluating existing prototypes to determine how these meet the needs for effective balance training. One key element that is missing in these prototypes is clinical relevant **assessment of balance**. Existing prototypes allows design of purposeful balance training exercises, but lacks the possibility to measure balance performance as is normally done in the clinic.

2 Problem description

The goal of the thesis project is to develop a software framework for implementing clinical balance assessment using a RGB-depth sensor such as Microsoft kinect. One or two typical clinical tests should be implemented also, but focus should lie on developing the framework within which new tests may (more) easily be implemented.

The software must include some basic interaction with the user, to guide the assessment exercises and give some feedback on the results. The design of the user interface should be adequate, but the emphasis should lie on simplicity and not on an immersive gaming-like experience for the user.

The implementation should use open source software as far as possible. There are a number of viable options available, and part of the project is to evaluate different options. For computer vision algorithms, the framework should preferrably be based on openCV (http://opencv.org/). For 3D graphics and user interaction the preferred plaform is blender (http://www.blender.org/). Drivers and SDKs for the RGB-depth sensor may be proprietary software. The preferred programming language is python. The solution should work on Windows, linux and Mac platforms.

3 Contact information

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