

Characterization of Human Motion Based on a Skeleton Model

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Category: In-house

Project description

Motion of human or any physical objects can be detected using a computer vision system. One typical example is the human motion capture system used extensively in movie filming (*e.g.* Avatar). To record a character's movement, a motion actor typically wears a black full-body jacket attached with multiple yellow balls. Multiple cameras are then used to take shots of the actor from different angles in order to reconstruct his motion and map to a virtual character, say, drawn by computer graphics software.

Herein we propose to apply the *Microsoft Kinect* launched in 2009 to capture human motions to eliminate the full-body jacket used in the conventional motion capture systems. This project focuses on three major tasks: (1) optimal gesture estimation of the subject based on the constructed model, (2) analysis of a specified motion (*e.g.* related to a sport/martial art) and (3) quantification its 'performance' captured from multiple subjects. The selected student should develop computation algorithms in this project. Additionally, after the project completion, the student should be able to re-establish the motion capture system oneself easily for future use in his/her own career, or just for fun.

Remarks: *Full resources of the past related projects (on basketball free thron, soccer shooting, etc.) can be provided.*

Preliminary sub-tasks

The followings are very brief tasks breaking down the overall objective into multiple achievable sub-goals. They are yet unconfirmed, but are listed to provide an idea of what the works are about.

- Capture images and skeletons using *Kinect* and store the images in a computer.
- Construct a virtual 3D model in the computer interface program.
- Reconstruct the human gestures based on the constructed 3D human model.

Technical contents

These are the components that the selected student is expected to acquire (mainly provided by the supervisor), therefore only minimal or no prerequisite knowledge of the candidate is required.

- Knowledge on kinetics, optimization, image analysis and processing
- Graphic user interface developed using Visual C++
- Programming of 3D computer graphics using OpenGL

Students are highly recommended to contact the supervisor for details in advance.