

MBE 4068 Individual final year project 2012-2013

Estimation of human motion based on a pre-constructed 3D model

(Motion capture B)

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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 a motion estimation strategy to eliminate the full-body jacket used in the conventional motion capture systems. This project focuses on two major tasks: (1) construct the model of the human subject prior to the motion capturing step, and (2) optimal gesture estimation of the subject based on the constructed model. The selected student should develop computer software 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.

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 using webcams and store the images in a computer..
- Construct a virtual 3D model from the capture images of a human subject.
- 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
- Interface programming using C++ (for the webcams)
- Graphic user interface developed using Visual C++
- Programming of 3D computer graphics using OpenGL

Students are welcome to contact the supervisor for details of the project.