



Simulation and augmented reality visualization of muscle movement

Project Management and Software Development
for Medical Applications

General Info

Project Title: **Simulation and augmented reality visualization of muscle movement**

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Project Abstract

The goal of this project is to implement a skeleton animation for an augmented reality magic mirror

Background and Motivation

We have previously shown an augmented reality (AR) magic mirror. It creates the illusion that a user standing in front of the system can look inside the own body. We now want to build a system for education of human anatomy using augmented reality visualization.

We want to use the system to visualize muscle activity. The user is standing in front of the system and while moving she can see muscle activity. Real-time simulation of muscle activity is not possible using current technology. Instead of providing a full simulation of muscle activity for arbitrary poses, we will define poses which are of interest in a certain, defined context. The user will be asked to perform a motion where the user is instructed to use e.g. a certain twist of the arm. Muscle activity for this motion will be pre-computed using OpenSim. So e.g. a patient or a medical doctor who has to learn how to perform a certain rehabilitation exercise would stand in front of the magic mirror, is instructed to perform a movement, and can see the related muscle movement on the own body.

Student's Tasks Description

The students will make themselves familiar with the OpenSim software and simulate basic muscle movements. They will render the simulated movement within an augmented reality framework for the magic mirror.

Technical Prerequisites

The students should have good knowledge in C++ or C# and basic knowledge in OpenGL or DirectX.

Administrative Info

Working Time: 100h

Project Location: **Garching**

Required Equipment: **a Kinect will be provided**

Timeline and Milestones

Week 3: The students have made themselves familiar with OpenSim and can simulate muscle movement

Week 5: A plan for integration of OpenSim into the magic mirror is presented

Week 10: One movement of a muscle can be replayed in the magic mirror

Week 15: The user can control the muscle movement of one muscle

References

mirracle: An Augmented Reality Magic Mirror System for Anatomy Education. T Blum, V Kleeberger, C Bichlmeier, N Navab. VR 2012

Please send the completed document to us (Ralf.stauder@tum.de) before the project proposal deadline, **September 30th**. Please note that this proposal will be evaluated by the BMC coordinators and will be assigned to a student only in the case of acceptance.