

Visualization of Range of Motion Data for the Hip Joint

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The hip joint (connection between the femur and acetabulum of the pelvis) is one of the biggest joints in the human body and plays an important role in supporting the weight of the body during standing and walking. The collection of hip range of motion data provided us with a unique research tool for a better understanding of hip kinematics. However, to transfer this knowledge into a clinical application it is necessary to display the obtained motion information in such a way that the physician or surgeon can make clinically relevant conclusions. For each frame of motion a multiplicity of information are collected, such as: flexion/extension, abduction/adduction, and internal/external rotation of the leg; movement of the center of the femur inside the acetabulum cup and the direction of this movement; possible impingement between femur and acetabulum and position of this impingement. This large amount of information for each frame makes the visualization in a conclusive way very challenging.

In this project the students will investigate and implement existing visualization methods, and explore novel ideas for displaying range of motion. At the end of the project, a small feasibility study involving senior surgeons and surgical residences will be designed and performed by the students to compare the effectiveness of the implemented methods.

Project Milestones:

- Literature search for visualization methods of joint range of motion data
- Implementation of existing methods
- Design and implementation of novel concepts for hip range of motion visualization
- Study to investigate the effectiveness of various visualization methods.

Requirements:

- C++
- Matlab
- Prior knowledge in computer visualization method will be a plus

Number of students in the project: 2-3 (the number of implemented methods will depend on how many students will be in the project)

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