BIOE-ME 485 Spring 2018

Welcome to the main resource page for BIOE/ME 485: Modeling and Simulation of Human Movement. This course is being taught by Prof. Scott Delp at Stanford University in the Spring, 2018 quarter. Variations of this course have been offered by instructors elsewhere:

- B.J. Fregly at Rice University
- Rick Neptune at The University of Texas at Austin
- Jeff Reinbolt at The University of Tennessee (course webpage)
- Darryl Thelen at University of Wisconsin–Madison

Student Project Pages

- Combining Kinematic and Coordination Gait Modifications to Reduce Medial Knee Contact Force During Walking
- Comparing Knee Angle for Subject IMU Self-Placement
- Development of Upper-Extremity IMU to OpenSim Data Conversion Method
- Modeling Bilateral Hip-Knee-Ankle Exoskeleton Assistance
- OpenSim Teaching Materials -- Educational Cycling Model
- Sensitivity Analysis of Gait Models for Realistic Variation of Muscle-tendon Parameters
- Upper Extremity Wearable Assistive Device

Assignments

OpenSim Tutorials

- Tutorial 1 - Intro to Musculoskeletal Modeling
- Tutorial 2 - Simulation and Analysis of a Tendon Transfer Surgery
- Tutorial 3 - Scaling, Inverse Kinematics, and Inverse Dynamics

Lab 0 (done in ME 281)

- Simulation-Based Design to Prevent Ankle Injuries

Lab 1

- The Strength of Simulation: Estimating Leg Muscle Forces in Stance and Swing

Lab 2

- Pulling Out the Stops: Designing a Muscle for a Tug-of-War Competition

Lab 3

- Depreciated_CPP_From the Ground Up: Building a Passive Dynamic Walker Model

Lab 4 (in-class exercise)

- Sky High: Coordinating Muscles for Optimal Jump Performance

Resources

Documentation

- Custom Google search box at opensim.stanford.edu
- OpenSim 3.3 Documentation (doxygen)
- Simbody 3.5 Documentation (doxygen)
- More Simbody documentation can be found on simtk.org and on GitHub

Getting Started with OpenSim

- Download OpenSim
- Running OpenSim on Mac OS X or Linux using a Windows Virtual Machine
- Examples and Tutorials
- C++ API Examples
- Adding New Functionality
- Scripting in the OpenSim GUI, MATLAB, and Python
- OpenSim User's Forum
- OpenSim source code on GitHub

Project Links

- See project videos from previous offerings of the course:

        - BIOE-ME 485 Spring 2017
        - BIOE-ME 485 Spring 2014
        - BIOE-ME 485 Spring 2013
- Tips for creating videos
- Free software for creating a video from a sequence of pngs (RAD Video Tools)
- Free screen recording software (CamStudio)