GAIT ANALYSIS

Instructors: Fong-Chin Su

Lecture Hours: 9:10-12:00 AM Tuesday

Course Objective
The course will give an overview of the current techniques and applications in gait analysis. First object is to use lab exercises to strengthen the students' understanding of gait analysis concepts. The second objective, a description of the engineering tools needed to study gait analysis, will be described by exploring marker set description, kinematic data determination, and basic kinetic computation. The third objective is the introduction of clinical application of gait analysis.

Text Book:
- Lecture Notes

References:

Grading
30% Laboratory reports: Kinematics Lab, Force Platform Lab
30% Midterm Exam
40% Term Paper

Topics:
- Introduction to Clinical Gait Analysis
  - Gait Analysis Techniques
  - 3D vs 2D Approach to Gait Analysis
  - The Normal Data-base
  - Laboratory and System Description
- Marker Set Description
- Kinematic Data Determination
  - Overview
  - More Details
  - Embedded Coordinate Systems Determination
  - Joint Centering Algorithms
  - Limb Rotation or Joint Angles
Term Paper

Assignment
Survey the literature on a specific topic in the field of gait analysis. Describe the current state-of-the-art and suggest areas that require further research. Then briefly describe how you might try to investigate the problem yourself.

Topic
Some possible areas from which a specific topic might be chosen include: Muscle models, joint models, human movement measurement techniques, gait analysis, electromyography, neural control of movement, movement disorders (e.g. Parkinson disease), methods of estimating joint moments, tendon transfer surgeries, lower back pain, and strength training (e.g., open vs. closed kinetic chain exercises).

Note: nearly all of these areas are too broad. A specific topic from within these fields must be chosen.

The manuscript should be technically well written and organized. It should be well referenced using primary journal articles (i.e., not text books). The following sources may be useful:
ASME Journal of Biomechanical Engineering
Gait & Posture
Human Movement
Journal of Biomechanics
Clinical Biomechanics
Journal of Electromyography & Kinesiology
Journal of Motor Behavior
Other journals which may be of secondary assistance:
Clinical Orthopaedics and Related Research
Experimental Brain Research
IEEE Trans. on Rehabilitation Engineering
IEEE Transactions on Biomedical Engineering
Journal of Applied Physiology
Journal of Bone and Joint Surgery
Journal of Orthopaedic Research

Format

The paper should be written in the following form, where sections A-C are a maximum of 12 double-spaced pages:

TITLE PAGE

ABSTRACT (max 150 words)

A. INTRODUCTION & BACKGROUND (~1-2 pages)
   Briefly describe what you will be presenting and why it is important.
   Relate concisely the anatomical, biological and clinical framework of your topic.

B. PREVIOUS INVESTIGATIONS (~7 pages)
   Present a literature review of previous research on this topic. Do not simply list in expanded form a number of references, but try to digest what has been done. This section should be in a form such that the current "state-of-the-art" is easily appreciated.

C. PROPOSED RESEARCH (~3-4 pages)
   State what you think are the shortcomings in our current knowledge.
   Suggest areas that require further research.

   From these topics, state concisely and specifically a particular research problem that you propose to address. In broad terms, describe how this might be done experimentally. Point out the difficulties that you may expect to encounter in this research.

   State what you believe will be the significance of your proposed research.

REFERENCES
   References and reference citations should conform to the style of the Journal of Biomechanics. At least ten references are expected.