Optimizing Organization and Visualization of Parkinson’s Disease Patients’ Treadmill Data

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Background

- Parkinson’s Disease (PD) patients use Deep Brain Stimulation (DBS) to help mitigate some of their symptoms
- High frequency and low voltage setting for DBS could improve gait performance of PD patients
- PD patients walk on treadmill, and kinematic and kinetic data is obtained using motion capture system

![Figure 1. Gait cycle](http://www.ncbi.nlm.nih.gov/bookshelf/br.fcgi?book=physmedrehab&part=A8414)

Goals

- Determine best method for finding heel strikes and toe-offs in kinematic data
- Take raw data obtained from motion capture system and output it in a form that is easy to manage/visualize
- Streamline data organization and visualization in order to aid data analysis

![Figure 2. Noise in heel marker data](http://www.ncbi.nlm.nih.gov/bookshelf/br.fcgi?book=physmedrehab&part=A8414)

Fundamental Questions/Challenges

- How to organize a large amount of data for easy access and analysis?
- Noise in data makes it hard to find heel strikes and toe-offs (which define a gait cycle)

![Figure 3. Test subject as seen in motion capture software](http://www.ncbi.nlm.nih.gov/bookshelf/br.fcgi?book=physmedrehab&part=A8414)

Research Plan

- Clean the raw data from motion capture system (Vicon) to produce kinematic data
- Use MATLAB to organize, visualize, and store exported data
- Define each gait cycle (100%) using heel and toe markers

![Figure 5. GUI for quickly visualizing data](http://www.ncbi.nlm.nih.gov/bookshelf/br.fcgi?book=physmedrehab&part=A8414)

Research Results

- Developed MATLAB scripts and Graphical User Interface (GUI) for importing, organizing, and viewing data

![Figure 4. Example data structure](http://www.ncbi.nlm.nih.gov/bookshelf/br.fcgi?book=physmedrehab&part=A8414)

Future Work

- Use newly developed analysis techniques to determine the effect of DBS setting on gait performance
- Find ideal DBS setting to improve PD patients’ gait performance

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