LAB 1 Grading
Rigid Body Kinematics
Fall 2006

Total Points: 300

OBJECTIVE – 20 points
- Purpose of lab measurements. – 5 pts
- Motivation – 10 pts
- Educational Goals of the lab – 5 pts

METHODS – 180 points
- Digitizer – 15 points
  o Interface with computer and excel output – 5 pts
  o Importance of not moving digitizer or bones when digitizing – 5 pts
  o 3D coordinates are generated at the point of the digitizer – 5 pts
- DMAS – 25 points
  o Include calibration of the DMAS. This allows the software to compute a
    3D volume using know location of markers (calibration frame) – 5 pts
  o DMAS system tracks regions of high contrast. – 5 pts
  o Contrast of markers on cow knee enhanced by gauze application and
    lighting. – 5 pts
  o Cameras can not be bumped after calibration. – 5 pts
  o Necessary to move the knee slowly to not blur image. – 5 pts

- Commenting Code – 140 Points

Main Program - gsuntay.m
DIGITIZER - - - - - - - - - 55 points

Data Loading (16)
  - Digitizer Markers Femur (4) – 8 points
  - Digitizer Ref (4) – 8 points
  - Digitizer Embedded Femur (7) – 14 points
  - Digitizer Embedded Tibia (1) – 3 points

Troubleshooting 1 (4) – 12 points
  - Digitizer Embedded to Ref (2) – 6 points
  - Digitizer Marker to Ref (2) – 6 points

Digitizer Transformation Matrices (2) – 8 points
  - Digitizer femur embedded to marker (1) – 4 points
  - Digitizer tibia marker to embedded (1) – 4 points
Troubleshooting 2 (3) – 9 points
- Digitizer femur marker to tibia marker (1) – 3 points
- Digitizer femur embedded to tibia embedded (1) – 3 points
- Digitizer femur embedded to tibia embedded (1) – 3 points

DMAS - - - - - -54 points

While Loop (3) – 9 points
- Setting variables (1) – 2 pts
- Starting Loop (1) – 5 pts
- Incrementing Loop (1) – 2 pts

Data Loading (6) – 14 points
- DMAS Femur Markers (3) – 7 pts
- DMAS Tibia Markers (3) – 7 pts

Transformation Matrix (1) – 5 points
- Transformation matrices between markers and between embedded (1) – 5 pts

Grood Suntay (7) – 20 points
- Determining Clinical Rotations (3) – 9 pts
- Commenting on flexion if/else statement (1) – 2 pts
- Determining Clinical Translations (3) – 9 pts

Plots (2) – 7 points
- Creating time array (1) – 3 pts
- How plots are made (1) – 4 pts

FUNCTIONS ---------------------- 31 Points

Subroutine – rot.m (1) – 4 pts
- Transformation matrix equation (1)

Subroutine – trans.m (1) – 4 pts
- Formatting 4x4 transformation matrix (1)

Subroutine – mag.m (1) – 3 pts
- Calculating length of a vector (1)

Subroutine – transform.m (6) – 20 points
- How to calculate the appropriate translation vector and rotation matrix (6)
RESULTS/DISCUSSION – 50 points

- Plots – rotations and translations
  o Include plots – 5 pts
  o Plots are correct – 5 pts
  o Interpret the plots – 15 pts
    ▪ What are the rotations in terms of grood-suntay (Flexion, external tibial rotation and abduction are positive on the graphs)
    ▪ Anterior drawer, joint distraction, and lateral motion are positive on the graphs
    ▪ Do the plots make sense considering the motion (i.e. If abduction occurring during flexion, what would be causing it)
    ▪ What are potential sources for error (poor dmas tracking, poor digitizing, laxity of the knee etc.)

- Plots – Group specific – Rotations and translations
  o Include plots – 5 pts
  o Plots are correct – 5 pts
  o Interpret the plots – 15 pts
    ▪ What are the rotations in terms of grood-suntay (Flexion, external tibial rotation and abduction are positive on the graphs)
    ▪ Anterior drawer, joint distraction, and lateral motion are positive on the graphs
    ▪ Do the plots make sense considering the motion (i.e. If abduction occurring during flexion, what would be causing it)
    ▪ What are potential sources for error (poor dmas tracking, poor digitizing, laxity of the knee etc.)

FORMATTING – 35 points

- Following guidelines for upper left corner – 5 pts
- Professional appearance – 10 pts
- Readability – 20 pts