

SPME 425 Biomechanics

Basic Data Collection - Motion Analysis System

WHAT DOES THE SYSTEM DO?

1. Collects coordinate data from markers placed on a subject using the 4 cameras in the room. The cameras have the ability to sample at a rate between 60 and 240 Hz.
2. Using the coordinate data from each camera and for each marker, together with some calibration constants obtained prior to the start of the data collection, the system will compute the 3D coordinates of each marker in terms of a laboratory-based, inertial, orthogonal reference system.
3. The system allows for editing of the coordinate data.
4. The system will compute a host of kinematic data for each marker. An additional software package will perform a wide variety of kinematic and kinetic calculations.
5. Additionally, the system can collect and analyze EMG and force plate data.

GUIDING PRINCIPLES

These principles are inviolate! Failure to heed these precepts will result in a host of problems, most of which will have the following end results: a) damage to the motion analysis system or its data files; b) corruption of the biomechanical data obtained; c) abhorrent behavioral symptomology in the class instructor; and d) probable decrease in your course grade.

1. Never touch or move a camera.
2. Always log off (exit) the Motion Analysis computer when you are finished and follow the shut down procedures.
3. Never give your group ID and password to non-group members.
4. Never have drink or food on any table containing computer equipment.
5. Always turn off all video monitors, computer monitor(s), computer printer(s) and computers when finished.
6. NEVER leave the door to the Biomechanics Lab open if the lab is unoccupied.
7. Always lock the door to the Biomechanics Lab if you are the last person to leave.

USING THE SYSTEM

The Motion Analysis system runs on two computers: the first computer (Peppermint) uses a Windows NT computer operating system and will behave much like a Windows 95/98 system; the second computer (Midas) is a DOS based system. While you can point and click your way through most "basic computer tasks", you will need to pay close attention to detail and all instructions when using the system. In addition, the EVA program that we will use to collect data is very detail oriented, so be certain to follow all instructions carefully.

DATA COLLECTION

1. Turn on the following items
 - A. LaserJet4 Printer
 - B. "Brown" monitor
 - C. Viewsonic computer monitor
 - D. 4 small monitors in the rack
 - E. Strobe lights on each camera – use the power strip on top of the UPS to turn on all cameras.

2. Turn on the peppermint computer.
 - A. Select the first option during startup (Select Windows NT Workstation v 4.0) by pressing the Enter (↵) key or wait for the timer to count down.
 - B. Allow the system to start. When the start up is complete, you will see a screen that says "press CTRL-ALT-DEL to log on".
 - C. **CTRL-ALT-DEL**
 - D. Enter your user name. This will be assigned in class.
 - E. Enter your password. This will also be assigned in class.
 - F. **OK**

3. Once you have logged onto the peppermint computer successfully and you see the windows desktop:
 - A. If the MIDAS computer is off (you do not hear the fan), turn on the MIDAS computer.
 - B. If the computer monitor on top of the Motion Analysis System video cart does not come on when you turn on the MIDAS computer, turn on the computer monitor located on the top of the Motion Analysis System video cart.
 - C. When prompted for a password, type midas and press the Enter (↵) key.
 - D. Should see a screen full of data scroll past and the data will be bounded by lines that read,
"Begin ---- System Initialization " & "End ----- System Initialization End"
at the top and bottom of the data section, respectively.
 - E. You will not have to use the MIDAS computer for any additional operations.

4. Double-click the EVA6.0_Lab? icon on the peppermint computer's desktop. If you are in Lab 1 (12-3) choose the EVA6.0_Lab1 icon; If you are in Lab 2 (3-6) choose the EVA6.0_Lab2 icon.

5. Window "EVA 6.0 3D/2D" will appear. This is the main EVA window.

6. **File – Load**
 - A. File Type – Project
 - B. Select correct project file from the files list by single-clicking on the file name.
The file name will appear in the Selection box.
 - C. Load – Complete Project
 - D. **Load Project**

For this project, your project name is _____.

7. You should get the message – “A complete Project has been successfully loaded” at the bottom of the Eva Load Files window. If not, repeat step 6.

8. **Close**

9. **Acquire – Acquire**

10. Should have the following settings in the Eva Video Acquisition Menu
 - A. Video Setup
 1. Trigger – On Host
 2. Inc. Trial # - Yes
 3. Display Data – Yes
 4. All 4 video channels Active – the square (under the Active column) is gray.
 5. Mode – Camera Direct
 6. Collecting – Trial Data
 7. Monitor Type – Electrohome
 8. Frame Rate – 120
 9. Duration (sec) – 5.00
 10. All other items will default to correct settings.

11. If you are not collecting analog (force plate or EMG) data, skip to step 14.
Otherwise, **Video Setup - Analog Setup**

12. The first 8 channels listed must be:

1. F1X1
2. F1X3
3. F1Y1
4. F1Y3
5. F1Z1
6. F1Z2
7. F1Z3
8. F1Z4

- A. If channel name is missing or incorrect, click in the appropriate box and type the correct name from the list above. If other channel names appear, you can ignore them.

- B. Make certain of the following:
 - 1. Sample Rate – 1200
 - 2. Input Range +/-10V
 - 3. All 8 channels are enabled
 - 4. Preview is off for all channels

13. **Analog Setup – Video Setup**

- 14. You are ready to collect data, prepare the subject (this can be done in advance).
- 15. After the markers have been placed on the subject, you are ready to continue.
- 16. Collect the neutral trial.
 - A. Have the subject stand facing in the positive X direction and in the center of the calibrated area.
 - B. The subject should attempt to approximate the anatomical position, but make certain that no markers are blocked by their body in the view(s) of more than one camera.
- 17. Click in the box – Trial Name. Type the name for your trial, make certain the file name ends with neutral(N) or Static(S).

- 18. Click on the arrows for the trial number box. Reset the trial number to 1.

19. **Collect**

- 20. If you are using the name of a previously named trial, you will get a message indicating that you will overwrite the previous trial. Click either **OK** or **Cancel** as appropriate.
- 21. If you answered OK to step 20, you will immediately start collecting data.

If you did not get the message discussed in Step 20, **Start**.

Data collection will begin.

- 22. You are now at the Eva Raw Data View Screen

- A. Display options, click to change
- B. Play forward
- C. Make certain that all markers appear visible in the camera views.

- 23. If data appear correct, go to step 24. If not, return to step 16 and attempt to collect the trial again.

24. Close the Eva Raw Data View screen. *Press the X in the upper right-hand corner of the window.*
25. Begin collection of the trial data.

Remove any “joint center” or "stationary" or “neutral” markers that were used only for the neutral or static trial(s) for the subject.
26. Have the subject move to the starting position and give them final instructions. If possible, have them move in the positive X direction (in our lab, this is usually toward the sliding panel doors).
27. Click in the box – Trial Name. Type the name for your trial. Make certain that the trial name does not end in N or S, these initials were used to indicate a neutral or static trial in step 17.
28. Click on the arrows for the trial number box. Reset the trial number to 1.
29. **Collect**
30. If you are using the name of a previously named trial, you will get a message indicating that you will overwrite the previous trial. Click either **OK** or **Cancel** as appropriate.
31. If you answered OK to Step 30, you will immediately start collecting data.

If you did not get the message discussed in Step 30, **Start**. Data collection will begin.
32. You are now at the Eva Raw Data View Screen
 - A. Display options, click to change
 - B. Play forward
 - C. Make certain that all markers appear visible in the camera views.
 - D. **Show analog** ---- Use this only if have collected analog data. In this analog view, just make certain that you see some values for each of the collected analog channels.
35. If data appear correct, go to step 36.
If not, return to step 26 and attempt to collect the trial again.
36. Close the Eva Raw Data View screen. *Press the X in the upper right-hand corner of the window.*
37. Return to step 26 to collect additional trials.
38. When complete and all trial data “appears” correct, you are finished.

39. Close Eva Video Acquisition menu. *Press the X in the upper right-hand corner of the window.*
40. All trial data is saved automatically; however, it is good to save the project data at this time.
- A. In the Eva Main window:
 - B. **File**
 - C. **Save Project**
 - D. Will get message indicating that the project was saved.
 - E. **OK**
41. Close the Eva Main window. *Press the X in the upper right-hand corner of the window.*
42. **YES**
43. If you are done using the Motion Analysis System and someone is waiting to use the system (you only want to log out of the system), go to step 44.
- If you are done using the Motion Analysis System and no one is waiting to use the system (you want a complete shut down of the system), go to step 45.
44. A. **CTRL-ALT-DEL**
B. **Log Off**
C. **OK**
D. You should see a screen saying "press CTRL-ALT-DEL to log on". If so, you have logged off successfully and can allow the next user to have access to the system.
45. A. **CTRL-ALT-DEL**
B. **Shut Down**
C. **shutdown**
D. **OK**
E. You should see a message saying "It is ok to turn off the system". If so, you have successfully shut down the system.
46. Turn off all items listed in Step #1, Step #2, and Step #3.
47. Cover monitor, keyboard, table and cart as necessary.
48. Lock the door to the lab on your exit.

If the system is turned on when you begin to use it, replace the instructions in steps 1, 2, 3 with the instructions that follow.

1. Make certain that the following items are on:
 - A. LaserJet4 Printer
 - B. "Brown" monitor
 - C. Viewsonic computer monitor
 - D. 4 small monitors in the rack
 - E. Strobe lights on each camera – use the power strip on top of the UPS to turn on all cameras.

2. On the peppermint computer, you should see a screen that says "press CTRL-ALT-DEL to log on".
 - A. **CTRL-ALT-DEL**
 - B. Enter your user name. This will be assigned in class.
 - C. Enter your password. This will also be assigned in class.
 - D. **OK**

3. Once you have logged onto the peppermint computer successfully and you see the windows desktop. If the MIDAS computer is also on follow the instructions shown below. If the MIDAS computer is turned off, return to the original step #3.
 - A. Make certain that the Princeton Graphic System Computer Monitor on top of the Motion Analysis System video cart is on.
 - B. **CTRL-ALT-DEL**
 - C. When prompted for a password, type midas and press the Enter (↵) key.
 - D. Should see a screen full of data scroll past and the data will be bounded by lines that read,
"Begin ---- System Initialization " & "End ----- System Initialization End"
at the top and bottom of the data section, respectively.
 - E. You will not have to use the MIDAS computer for any additional operations.

4. Return to step 4 on the original handout.