Marker-based XROMM

Please note this page is out of date, and there is a new home page we recommend you use to navigate the wiki. Many of the links on this page may no longer be functional.

There are eight steps in the marker-based XROMM workflow:

1) Implant radiopaque bone markers

2) Record biplanar x-ray videos of movement

- For Brown Users: Getting trained and certified to use x-ray machines and Operating C-arm x-ray machines during data collection
- We recommend reading Radiographics papers for background on x-ray imaging

3) Create 3D polygonal mesh bone and marker surface models

- Creating 3D models from CT scans using Amira software
- Creating 3D models with Microscan Laser Scanner
- Creating 3D models with Horos
- Cleaning up 3D models with Geomagic

4) Measure XYZ coordinates of marker centroids relative to polygonal mesh bone models

- For models from CT scans, measure CT marker coordinates in Maya.
- Procedures for models made from laser scans can be found in Gidmark et al., 2012 (JEB, 215: 2262-2272)

5) Calibrate

- Calculate undistortion transform from grid images
- Undistort calibration cube images, **but DO NOT undistort the X-ray videos for marker-based XROMM**
- Create a framespec file for your calibration object, if necessary
- Calibrate both cameras to get DLT coefficients and mayaCam files
- Check your calibration by creating Maya X-ray cameras and importing the calibration frame (*i.e.* cube) specifications (framespec).

6) Analyze x-ray videos to extract XYZ coordinates of radiopaque markers

- Digitizing x-ray movies using the MATLAB XrayProject.mat procedure.
  - XrayProject MATLAB program written by Ty Hedrick and Dave Baier, and modified and updated by Loretta Reiss

7) Calculate rigid body kinematics from XYZ marker positions

- z_*OBSOLETE* Calculate Rigid Body Motion in Matlab

8) Produce XROMM animations in Autodesk Maya

- Import and animate bones in Maya
- Check your digitized XYZ points and bone animations with MayaCams

Working with XROMM animations in Autodesk Maya

- Maya analysis and visualization methods
- We recommend doing **a rigid body precision study** to determine the precision of the measurements you plan to make from your XROMM animation