

Motion Captor Optical Motion Capture System

A collaboration between the
Department of Visual and Performing
Arts and the Envision Center for Data
Perceptualization

Motion Capture

What is it used for?

- Biomechanics
 - Gait Analysis
 - Sports Science
 - Animal Motion
 - Posture & Balance
- Entertainment
 - Films
 - Television
 - Games
 - Education
- Engineering
 - Virtual Reality
 - Object Tracking
 - Simulation
 - Ergonomics



Motion Capture

STT Motion Captor

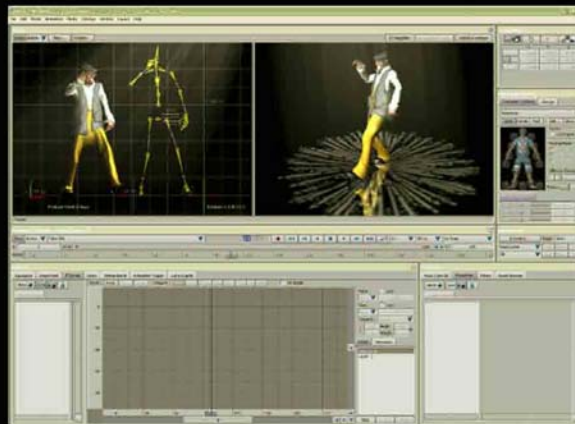
- 6 camera optical system
 - Infrared light
- Markers
 - Retroreflective
 - 19 or 25
 - Reconfigurable (mostly)
- Two People or more markers
- Portable
 - Tripods, Cameras, Computers



Motion Capture

Software

- STT Motion Captor
- Kaydara Motion Builder/Motion Capture/Online
- Project Specific



Motion Capture

What you need to know

- Training
 - Envision Team
- Space
 - As big as possible or as you need
- A Plan
 - Use your time wisely – Know what movement you want
- Scheme for working with the data
 - Know what you are going to do with it. Work with it before capturing if possible



Motion Capture

Project with Dance, CGT, and Theatre

- Carol Cunningham - Dance
- Rick Thomas - Theatre
- CGT Graduate Students
- Theatre Graduate Students
- CGT 411 Group
- Developed a dance that included sound and graphics triggered by the dancer's movement and a virtual character



Motion Capture Script

- This is an “Optical Motion Capture System” called “Motion Captor” made by STT from Spain
- It is here in association with the Department of Visual and Performing Arts
- Motion Capture is used in the fields of
 - Biomechanics
 - Gait Analysis
 - Sports Science
 - Animal Motion
 - Posture & Balance
 - Entertainment
 - Films
 - Television
 - Games
 - Education
 - Engineering
 - Virtual Reality
 - Object Tracking
 - Simulation
 - Ergonomics
- This system is capable of capturing one (1) or two (2) performers or up to 50 points in space simultaneously
- It uses either four (4) or six (6) infrared cameras to define the capture space
- Retro-Reflective “balls,” called markers, are worn by the person being captured.
- Each camera has an array of infrared LED lights surrounding its lens that illuminates the space
 - Light from the individual camera head hits the markers and bounces back only bright “spots” in the image
- Each “bright spot” in the image from each camera is tracked by one computer called the “Grabber”
- The tracking information is then sent to another computer called “Capture”
 - The Capture computer combines the tracking information to calculate the 3D position of each marker
 - It also derives the position of markers that are being “occluded,” or covered by the body
- The 3D data can be recorded or visualized in real time
- For real time visualization of the data and applying the data to a virtual human, Kaydara’s Motion Capture software is used
- The system is portable
- The marker set can be changed to accommodate different moving objects, so it can be used for animals or even mechanical objects

FAQ

- Why 4 or 6 cameras?
 - For capturing one person or capturing in a small space, 4 cameras are sufficient
 - Six cameras will produce smoother motion and are needed for tracking more than 25 markers and for capturing in larger spaces
- How fast does it track?
 - Currently the cameras capture at 50 frames per second (fps)
 - The camera hardware is capable of 200 fps
- What about Golf?
 - We have specific software and a club that will capture your swing and compare it to a Golf Pro's swing
 - NOTE: I have to check and see if our software will work with the new cameras. I will ask the company for an update and I know we have the golf marker set for Kaydara's software

Motion Capture

The Envision Center houses a motion capture system for recording live motion events and translating them into usable mathematical terms. The system tracks a number of key points in space over time and combines them to obtain a single 3D representation of a performance. With six cameras on tripods connected to three computers, the STT Motion Captor optical system is portable and can capture two people at the same time. The captured data can be viewed in real time and translated into many standard file formats.



Motion capture is used for entertainment graphics for film and games and for ergonomic studies and motion analysis. This system also can analyze a golf-swing.



Envision Center staff, computer graphics technology graduate students, and faculty from the divisions of dance and theatre in the Department of Visual and Performing Arts are using this system to produce a live dance performance that incorporates 3D/2D imagery and sound.



Project Lead: Scott Meador