Polytechnic School of Engineering of New York University
Technology, Culture and Society
Integrated Digital Media

[Course #] [Bodies in Motion]

Fall 2015

Instructors: Todd Bryant, Javier Molina
Thursday 6:30 pm-9:00pm; 2 MetroTech, Brooklyn NY, MAGNET room 824
Mandatory weekend lab sessions

To contact instructor: Javier Molina
javier.molina@nyu.edu
Todernst@gmail.com

Office hours: by appointment

Course Prerequisites: Introductory level coding skills, familiarity with 3D computer graphics workflow, and animation. Previous experience using Maya and game engines is a plus.

Course Description: This course provides an introduction to the concepts of motion capture and the motion capture production pipeline to perform and record 3D animations for film and video games as well as stream for live performances. Students will learn all of the tools for tracking props and performers using MAGNET’s cutting edge motion capture studio. Students will also develop concepts around the technology and integrate their data into 3D computer graphics along with keyframe and procedural animation and custom 3D assets to build final projects using the Unreal game engine.

Program Learning Objectives: To design a workflow of MoCap and ‘how to’ guides for diverse type of projects using motion capture and the basics of world and character building in the game engine Unreal. Reading assignments introduce students to constructed historical perspective of MoCap and investigates principles particular to animation and performance. The objective of the course is to allow students to understand the importance of pre-production and planning which includes notions of storytelling, 3D modelling and texturing, best practices to capture the sessions, world building methods in video art and game development, and live show running.

Course Objectives

- To create storyboards and define recording shots before capturing data.
- To understand and use the correct motion capture pipeline
- To learn the skills to direct an effective motion capture session (best calibration)
- To learn the best practices for capturing and cleaning data
- To be able to apply the data to models in Maya, Unreal Engine, and Max/Jitter
- To be able to perform real-time retargeting for Live Performances

Course Structure
The class consists of a weekly lecture and a weekly 2 hour lab session. Students will work in groups and will be required to attend a self-selected lab session on weekends. Examples of motion capture projects will be presented in lectures and discussed in the classroom. Students must demonstrate satisfactory achievement of course objectives through fulfillment of one final project at the end of the semester and a mandatory submission for the programs showcase. Final projects will require students to use a wide variety of software and studio time at MAGNET’s black box mocap studio. Students will be able to process their
motion capture data for use in an animation or live performance. Collaboration with students and faculty from other programs is encouraged.

Readings

The required text for the course is:

MoCap for artists : workflow and techniques for motion capture
Kitagawa, Midori, 1963- • 2008
Publisher:Elsevier/Focal Press
ISBN:9780240810003 Available at NYU Bookstore.

An optional and recommended text is:


Grading

Although the class projects will be done in groups students will be graded individually based on weekly updates on their personal blogs, class attendance and participation, a midterm, and a final.

Attendance

Attendance is mandatory for both in class lectures and weekly lab sessions. The class has the studio reserved on Saturdays and Sundays from 11am – 5pm. Groups choose two hour blocks that they will be working in the studio from the times we offer on Saturday and Sunday. If your group cannot make the time they signed up for then they must arrange to exchange with another group. We will work with groups that cannot meet during the allotted weekend lab times to make accommodations.

No more than two absences.
Contact the professor IN ADVANCE if you will not be in class (in person or by email is preferred).

ACADEMIC ACCOMMODATIONS

If you are student with a disability who is requesting accommodations, please contact New York University’s Moses Center for Students with Disabilities at 212-998-4980 or mosescsd@nyu.edu. You must be registered with CSD to receive accommodations. Information about the Moses Center can be found at http://www.nyu.edu/csd. The Moses Center is located at 726 Broadway on the 2nd floor.
Assignments and groups presentations will be subjected to change at the discretion of the instructors.

Weekly Schedule

Part I: Introduction to Motion Capture and Pre-production of a mocap session

- [09.03.15] Class introductions, syllabus review, mocap history, contemporary recorded projects, introduction to the Unreal Engine interface, demo calibration
  **Readings:** Review the following projects for class discussion
  9 evening of theather and engineering.
  Merce Cunningham: Biped (1999) Mocap Dance
  After ghost Catching: Open Ended Group
  **Assignment:** Begin pre-production: Use Pinterest, Mural.ly or Steller app to start a moodboard and create a story board of the shot you want to record, bring description of 1 character to animate.

- [09.10.15] Alternatives to mocap (other forms of computer vision), different mocap systems (magnetic, optical, mechanical), file management, review calibration, rigid body tracking, skeletal tracker, recording a file (FBX, BVH), demonstration of character animation techniques in Unreal
  **Reading:** Mocap for artist Chapter 2: The importance of pre-production
  **Assignments:** Form groups, choose roles (animator, performer, designer), present to class story to plot for review.

- [09.17.15] Review rigid body & skeletal tracking, process for cleaning data, live streaming props, OSC/UDP, review mid-term and groups - project with recorded data, finding 3D assets and loading them into Unreal, Blueprints, basic animation techniques
  **Reading:** Mocap for artist Chapter 3: Mocap Pipeline
  **Assignments:** Asset creation / placing tracking data onto an asset using Maya (download student version)

Part II: Motion Capture Production

- [09.24.15] Live skeleton tracking using Motionbuilder / Maya, IK Skeletons, Animation Blueprints in Unreal
  **Reading:** Mocap for artists Chapter 5: Skeleton Editing.
  **Assignments:** Put tracking data onto a skeleton using live tracking in the studio. Schedule studio time

  **Assignment:** Begin building environment

- [10.08.15] Unreal / Jitter Live Tracking Demos, Workshop, Demo projects in class for class feedback, Troubleshooting
  **Assignment:** Prepare projects for mid-term review

- [10.15.15] MIDTERM
  Upload your project and/or documentation to bxmc.poly.edu before class.

- [Date] Midterm post-mortems, review contemporary live mocap projects, pre-production, ideation, mood boards, pitching sessions
  **Assignment:** Develop proposal for final project (can be a continuation of mid-term), choose groups
- **[10.22.15] Unreal Demos - Materials, Lighting, and Cameras**
  **Assignment:** Add materials, lighting, and cameras to the world in your project.

- **[10.29.15] Unreal Demos - Particles!!! Sound and Sound Processing**
  **Assignment:** Add particles, sound, and interactive sound processing

- **[11.05.15] Unreal Demos - OSC messages / Live Show Control**
  **Assignment:** Create a cue system for the events of your story

- **[11.12.15] Elevator Pitch, PR, Documentation, Grant Proposals**
  **Assignment:** Develop press release / grant proposal

  **Assignment:** Finalize projects.

- **[12.10.15] Final Presentations & Critiques before IDM show.**