FILM A222: INTRODUCTION TO PERFORMANCE CAPTURE

Item	Value
Curriculum Committee Approval Date	02/08/2023
Top Code	069900 - Other Media and Communications
Units	3 Total Units
Hours	72 Total Hours (Lecture Hours 45; Lab Hours 27)
Total Outside of Class Hours	0
Course Credit Status	Credit: Degree Applicable (D)
Material Fee	No
Basic Skills	Not Basic Skills (N)
Repeatable	No
Grading Policy	Standard Letter (S)

Course Description

An introduction to Performance Capture techniques used in animation for multiple industries, including Film & Television, Virtual & Augmented Reality, Animation, Acting, and Game Design, from both the technician and performer side of the production workflow. Students will learn key terminology, techniques, and current best practices related to the Performance Capture profession. Students interested in the tech side will operate the capture systems and work with performance data to animate computer-generated characters. Students interested in the performer side will wear the performance capture suits and equipment while learning how to effectively act and perform as virtual characters. Students will be able to complete the class choosing to specialize either in tech or performance techniques, or both. The class will work together to produce character animations for both flat and 360-degree VR animations. ADVISORY: FILM A220 and DMAD A281. Transfer Credit: CSU.

Course Level Student Learning Outcome(s)

1. Discriminate between a variety of Performance Capture systems, techniques, and uses in content creation.
2. Demonstrate a basic level of proficiency in: a. Performance Capture setup and safety. b. Recording a Performance Capture session (either as the tech or performer, or both). c. Animating a computer generated character using the Performance Capture data (performer participants may satisfy this as a live, real-time performance.)
3. Demonstrate a basic theoretical understanding of Performance Capture, related to creating animated sequences for films, games, and VR/AR projects.

Course Objectives

- 1. Understand the current industry trends, history, and future potential of Performance Capture for Film, VR/AR, Animation, and Game Design applications.
- 2. List the basic techniques and essential equipment used in Performance Capture, from state-of-the-art to consumer-released, and how they can be used most effectively.
- 3. Understand and use the unique planning and production workflow of a Performance Capture session (from either the duties of the technician or performer, or both).
- 4. Understand essential, industry-standard, terminology used in Performance Capture.
- 5. Experience and critique commercially available animated films, games, and VR/AR experiences which used Performance Capture in their creation.
- 6. Demonstrate effective setup and use of a Performance Capture system, including both motion and face capture (from either the duties of the technician or performer, or both).
- 7. Demonstrate proficiency in recording a Performance Capture session, cleaning up the data, and exporting it for use in animating a computer-generated character (from either the duties of the technician or performer, or both).
- 8. Understand the variety of use cases and industries related to Performance Capture, including Animated Films, Pre-visualization, VR/AR, Game Design, and Motion Research.
- 9. Recognize important technologies related to VR, including AR, haptics, and motion-capture.
- 10. Understand the business of Performance Capture from all angles, including scheduling, contracts, liability, unions, and rates.
- 11. Demonstrate proficiency in product testing a final project created using Performance Capture to animate a virtual character.

Lecture Content

I. Introduction to Performance Capture as an industry and artform A. History of Performance Capture B. Overview of the relevant industries and use cases C. Skills needed for both tech and performer to seek employment   II. Performance Capture Terminology Practices A. Essential terminology B. Essential roles and job titles C. Standard techniques used by professionals   III. Hardware and Software A. Motion-Capture hardware software B. Face-Capture hardware software C. Industry-standard vs. "Indie" and DIY solutions   IV. Basic Production Pipeline A. Steps needed to create a Performance Capture project B. Idea conception and brainstorming C. Problem-solving using various techniques and styles D. Production workflow checklist from conception to completion   V. Casting Crewing Up A. How to cast performers B. Body motion skills and facial expressions useful in animation C. How to find crew and facilities D. Important technical skills unique to Performance Capture   VI. Becoming a Capture Performer A. Techniques for Motion-Capture B. Techniques for Face-Capture C. Analyzing famous performances by professional capture artists   VII. Becoming a Capture Technician A. Techniques for setting up hardware B. Techniques for setting up software and file management C. Finishing a session and exporting to a variety of platforms   VIII. Pre-visualization A. Use of Performance Capture in the Pre-Vis stage of a film or game B. Using Performance Capture to save time and money during Pre-Vis   IX. Business of Performance Capture A. Financial breakdown of various capture situations p> B. Resource gathering C. Scheduling, booking, liability, and legal contracts D. Marketing yourself and your skills   X. Integration of Capture Data with 3D Modeling and Game Engines A. Cleaning up raw capture data for transfer B. Applying final capture data to a rigged avatar C. Animating a CG character in 3D Modeling software D. Gamifying a CG character in a Game Engine   XI. The Future of Performance Capture A. New trends in capture technology and emerging media B. Real-time capture in live performance art and dance C. Future use in Virtual and Augmented Reality

Lab Content

I. Experiencing and analyzing a Range of Capture Performances A. Animated Feature Films Television Shows B. Video Games C. Virtual and

Augmented Reality (VR/AR) D. Live Theater and Dance E. Kinesiology and Body Motion Research F. Face-specific Character Performances   II. Setup Practice for the PERFORMER A. Clearing the Performance Space B. Wearing and setting up a mo-cap suit C. Calibrating the sensors and markers D. Industry-standard commands and on-set terminology E. Safety, Hygiene, and Etiquette   III. Setup Practice for the TECH A. Preparing the Performance Facility and Equipment B. Directing and Communicating with Performance Actors/Dancers C. Calibration Methods D. Industry-standard commands and on-set terminology E. Recording Capture data and File Management Practice VI. Demonstrations by a Professional Capture TECH   V. Demonstrations by a Professional Capture PERFORMER   VI. Practice Run-Throughs by Student TECHS   VII. Practice Run-Throughs by Student PERFORMERS   VIII. Integrating a Face-Capture System to a Mo-Cap Session A. Setting up the hardware on a performer B. Calibration and testing C. Differences between Face and Body capture data   IX. Building a Range of Facial Expressions and Body Movements A. Referenced from existing media B. Referenced from observation in the real world C. Referenced from the Animal Kingdom D. Original Ideas   X. Working with Raw Capture Data, Cleaning, and Exporting A. Data Capture practice B. Data Clean-up practice C. Data Processing and Export practice (to various platforms)   XI. Real-time Capture for Live Performance of CG Characters A. For live Dance Theater on stage B. For Performance-Art Exhibits and Location-Based Advertising C. For Online, Social Media, VR/AR   XII. OPEN LAB for practice and experimentation XIII. FIELD TRIP TO PROFESSIONAL PERFORMANCE CAPTURE FACILITY (availability permitting)

Method(s) of Instruction

- Lecture (02)
- Lab (04)

Instructional Techniques

1. Lecture 2. Demonstration 3. Video examples 4. One-on-one instruction 5. Individual assignments 6. Group assignments 7. Assignment critique 8. Examinations

Reading Assignments

Students will Read 1-2 hours per week from assigned from handouts, equipment and software manuals, and online sources.

Writing Assignments

Students will spend 1-2 hours writing scripts and choreography diagrams related to performance capture setups to be performed and captured.

Out-of-class Assignments

Students will spend 1-2 hours creating performance capture setups and recording data sets to be integrated into 3D computer models and animations. Video tutorials of capture products and techniques will also be recommended as a supplement.

Demonstration of Critical Thinking

A. Assigned individual projects B. Assigned group projects C. Examinations

Required Writing, Problem Solving, Skills Demonstration

Students will be required to interpret an animation script and storyboard (either provided by the instructor or their own creation), and produce an effective Performance Capture session based on it for their final project. Proficiency will be demonstrated by satisfactorily completing assignments and by incorporating the elements of Performance Capture they have learned. Students will demonstrate critical thinking and

problem solving skills through the utilization of unique Performance Capture techniques, and by working through production and post-production challenges individually and in groups.

Eligible Disciplines

Broadcasting technology (film making/video, media production, radio/TV): Any bachelors degree and two years of professional experience, or any associate degree and six years of professional experience. Multimedia: Any bachelors degree and two years of professional experience, or any associate degree and six years of professional experience.

Other Resources

1. Instructor provided handouts. 2. Instructor selected videos.