ACCAD 7101 Syllabus: Performance and Installation Technologies

Instructor: Matthew Lewis, Office: 339C Sullivant, Phone: (614) 292-0747
Spring 2015: Rm 349A Sullivant Hall, Tues/Thurs 12:45-2:05PM, 3 credits
Prerequisites: graduate standing or permission of instructor.
Not open to students with credit for ArtsCol 758.
Description: An overview of technologies useful for creating interactive installations and performance systems, using video projection, 3D graphics, environmental sensors, and visual programming.

Course Objectives and/or Student Learning Outcomes:

There is a long-standing interest from an increasing number of disciplines in migrating interactive computer graphics away from traditional keyboard/monitor/mouse interaction and out into the broader environment. Applications commonly obtain data from disparate media sources (e.g., sound, video, network data feeds, sensors), process this data in real-time, and ultimately represent information in different forms. Movement becomes color, video controls sound, and light drives motion.

This course will expose students to current emerging flexible technologies that enable the creation of complex data re-mappings without requiring traditional in-depth software programming. They will learn underlying concepts relevant to the representation and translation of data to and from digital and analog forms. Most importantly students will learn processes they can use to track emerging technologies and integrate them with their current interests and skills.

Course Methodology:

The course will survey important issues surrounding the creation of systems for sampling, processing, and presenting visual media in installation and performance environments. Students will be shown existing work spanning the disciplines of art, dance, design, theater, music, computer science, and architecture. Examples of varying levels of complexity will be presented to demonstrate different techniques. Students will be required to use these techniques to design their own interactive, real-time data processing examples. (Basic knowledge of creating and manipulating digital images, video, 3D geometry, and HTML files will be assumed.) The assignments will be flexible enough to allow students from different disciplines to create demonstrations appropriate for their disparate fields and goals. While some students might work toward creating an art installation or dance performance system, others might create immersive design tools or an accessible information point. Collaboration will be encouraged.

While images, videos, and web sites illustrating different approaches will be demonstrated throughout the course, students will learn primarily by creating and experimenting with their own projects. The class format will take on a variety of styles as the disparate subjects dictate. Examples will be presented in lectures and demonstrations, and in-class hands-on labs will allow students to work together on problem solving. Assignment results will be presented in group critique sessions.

Students must demonstrate satisfactory achievement of course objectives through fulfillment of course projects and by contributing to class discussions and critiques. Course projects will require students to use a wide variety of software and equipment at ACCAD. Collaboration between students in the course and other faculty, staff and students at ACCAD is encouraged. Course evaluation will be based on the following:

Projects one through five:	12% each
Final Project (project six):	30%
Class Participation:	10%

A = 94 -100	A- = 91 - 93	
B+ = 89 - 90	B = 83 - 88	B- = 80 - 82
C+ = 78 - 79	C = 73 - 77	C- = 71 - 72
D+ = 69 - 70	D = 64 - 68	E = 0 - 64

Grading Policy:

All students are required to be on time and in **attendance** for each and every class. Students arriving to class more than 10 minutes late will be counted as absent. Two absences will lower a final grade by 1/2 a letter, three absences will lower a final grade by one letter and four absences will result in failure of the course.

Adherence to deadlines is expected. It is the individual student's responsibility to keep track of deadlines and to present the work to the class and instructor on the specified dates. 15% per day will be subtracted from late assignments.

Students choosing to use "at home" hardware and software must have their current working files on the system and available for review at the beginning of each and every class. Problems with home systems and/or incompatibility will not be an acceptable excuse for missed goals. Technical problems will happen frequently during the quarter and students may have trouble accessing the computer lab during "prime time" hours. Students must make their own arrangements for overcoming these difficulties and submitting their work on time. Unless there is a complete system failure in a computer-related course, technical difficulties are never an acceptable excuse for not meeting a deadline. Students should plan their time and work so as to anticipate the technical hurdles that are a part of this profession.

It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term “academic misconduct” includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5- 487). For additional information, see the Code of Student
Conduct http://studentlife.osu.edu/csc/.

“Students with disabilities that have been certified by the Office for Disability Services will be appropriately accommodated and should inform the instructor as soon as possible of their needs. The Office for Disability Services is located in 150 Pomerene Hall, 1760 Neil Avenue; telephone 292-3307, TDD 292-0901; http://www.ods.ohio-state.edu/.”

Topics and Assignments:

1. Introduction, Overview, Resources
    a. Hardware and software overview
    b. Installation, performance, data remapping examples
    c. Hardware, software, state transition diagrams
2. Data-processing Environment
    a. Objects, message passing
    b. Math, logic
    c. Assignment 1 due (system design)
3. Programming, Visual Data Representation
    a. Encapsulation, functional decomposition
    b. Debugging, style
    c. Matrices, planes, channels, frames, pixels, codecs
4. Video Filtering and Mixing
    a. Realtime image processing
    b. Compositing methods
    c. Assignment 2 due (data processing system infrastructure)
5. Live Video, Computer Vision
    a. Analog vs digital signals
    b. DV, uncompressed, wireless, VGA, HD
    c. Hardware: displays, projection, surfaces
    d. Detection, tracking (color/motion)
    e. Assignment 3 due (real-time processing and compositing)
6. Computer Vision, Sound Generation
    a. Image Analysis
    b. Depth cameras
    c. Digital audio introduction
7. Sampling, Playback Control

   a. Input, output, modifying properties
   b. Processing sound clips
   c. Interfacing with video
8. Cameras, Geometry, Rendering
   a. Geometry processing via matrix manipulation
   b. Transformations, animation
   c. Interactive control
   d. Assignment 4 due (interactive live video manipulation/control)
9. Lighting, Texturing
   a. Color, intensity, placement
   b. Video mapping, fog, and lighting
   c. Dynamic texture mapping
10. Spring Break
11. 3d Motion and Networking Introduction
   a. Animation control
   b. Physics
   c. LAN/WAN
12. Networking
   a. Web upload / download
   b. MIDI, Bluetooth, OSC
   c. Assignment 5 due (sound + 3D graphics control)
13. Physical Computing
   a. Sensor intro
   b. Electronics interface overview
14. Physical Computing
   a. External control resources
   b. Simple circuit examples
15. Final project
   a. Problem solving
   b. Evaluation
   c. Assignment 6 due (finals week at scheduled final time)

Assignments:

1. **System diagrams:** create multiple high-level dataflow diagrams for hypothetical computer-mediated systems. These will visually communicate data sources, output, translation, control, and interaction.
2. **System infrastructure:** learn to use our system architecture by creating a series of simple solutions to given problems. Create a basic drawing system applying these concepts.
3. **Designing Diversity:** Create a real-time, non-interactive stochastic system using video manipulation and compositing.
4. **Multi-modal Integration:** Create a system that drives video and sound mixing and manipulation via interaction with a live video feed.
5. **Virtual Environments**: Create a system in which user interaction drives multiple attributes (position, color, sound, texture, lighting, etc) of a 3D environment containing live video.
6. **Final Project:** Explore, extend, and/or integrate one or more of the previous concepts or projects.

Reading List:

There are no required textbooks. Software documentation, tutorials, and examples are provided with the software installation and are available for download, on the class web pages, and on ACCAD computers. Links to blogs, artist web sites, etc. are updated constantly reflecting current technologies.

For examples of recent online resources for several topic areas see:

http://accad.osu.edu/~mlewis/Jitter/Class/DataRemappingExamples.html
http://accad.osu.edu/~mlewis/Jitter/Class/L08.html
http://accad.osu.edu/~mlewis/Jitter/Class/L16.html

Bibliography and Resources:

Chamagne, Mathieu and Lê Quan Ninh. “Max Objects Database.” http://maxobjects.com
Cycling ’74, “Cycling ’74 Forums.” http://cycling74.com/forums/
Fry, Ben and Casey Reas. “Processing.” http://processing.org/
Moere, Andrew Vande. “Information Aesthetics” http://infosthetics.com/
Vice Media, “The Creators Project” http://thecreatorsproject.vice.com
Watz, Marius. “Generator.x” http://www.generatorx.no/
Winkler, Todd. *Composing Interactive Music: Techniques and Ideas Using Max*. MIT Press, 1998. ISBN 0-262-23198-X. (Contains chapters on Max programming and interface design.)

Updated 12/16/14