ARCH 423/523 Spring 2023

DREAMING IN ANIMATION SPACE

Lawrence 383  M, W, 10:00 to 11:50 am  https://blogs.uoregon.edu/dreamingspaces/
Instructor:  Visiting Associate Professor Earl Mark, emark@uoregon.edu

“I shall not discuss theorems in the manner of the profound Euclid, but rather some flowers picked from his most abundant gardens, and other authors”

— Sebastiano Serlio On Architecture, 1545, translation by Hart & Hicks, Yale University Press, 1996

ARCH 423/523 Dreaming in Animation Space is an interdisciplinary hands-on class that explores moviemaking and storytelling through exercises in 3D computer animation and modeling. The content may range in subject area according to the background and interests of the student whether the focus be character animation shorts, visualization in design or some other field. Correspondingly, the animation software, Maya, is widely used in the arts, design, environmental and physics-based simulation, biomedical engineering, 3D character animation, scientific visualization, and cinematic production. We also explore the numerical basis and invisible geometrical order of shapes found in architecture and nature, similar to picking “Flowers” from Euclid’s Garden cited by Serlio (see caption above) and from more contemporary “other authors”. For example, D’Arcy Thompson’s 1917 studies of growth and form break down seemingly complex shapes and phenomenon into much simpler more readily understandable and reproducible build-up sequences. Seed patterns on a daisy head can be replicated on a decelerating outward spiral. The shape of a Nautilus Spiral is replicated by an accelerating outward spiral. Forms of waves hitting the beach are generated by fluid dynamic simulation.

The work of the class is informed by screenings of student exercises and other movies. Discussion of perceptual phenomenon provides a conceptual framework for the development and critique of this work. There are no perquisites or expectations of previous experience. The course is open to students within the College of Design. Interest by students from other disciplines is encouraged. The software is free. Questions about the class may be sent to emark@uoregon.edu. Details are posed on the web at https://blogs.uoregon.edu/dreamingspaces/.
LEARNING METHOD:
Four animation shorts constitute the work of the term culminating in a final 3-minute (+/-) movie project. Learning to work with Maya doesn't require advanced preparation or a technology background. It is developed for geometrical modeling, simulation, and animation with state-of-art tools. For example, it is used by Pixar and Walt Disney to meet the needs of creative workflow and production, by designers to explore dynamically changing environments with realistic simulation of physical phenomenon, and others, such as biomedical engineers to predict the interactions required within an operating room, or computer musicians to imaginatively expand the reach of their work. Hands on tutorials are incrementally sequenced with direct one-on-one support.

SIMULATION:
Simulation includes the application of Newtonian forces (i.e., gravity, mass, friction, attraction and repulsion, collisions, etc.). It includes fluid dynamics applicable to wind, air, liquids (e.g., molasses, water, fountains, ocean surfaces). Particle generation is applicable to instances of many types of objects (e.g., snow, rain, clouds). Mechanical objects (e.g., springs, hinges, pin joints, mass), fabric (e.g., clothing, tension membrane fabric), and other kinds of physical phenomenon (hair, skin, grass) will be included in classroom tutorials. Techniques in characterizing human and animal movement, such as inverse and forward kinematics, skeletons, joints, and materials, modeling people and working with motion capture data provide a number of ways that will be covered. Recorded or synthesized sound will be applied to generate animated sequences and forms. Highly realistic simulation of light, atmosphere, and materials, based upon advances in global illumination technology, will be used to simulate artificial lighting, reflective and refractive atmosphere conditions, and natural daylight. A grant of Academy Award winning V-Ray (e.g., Game of Thrones) plugin to Maya, provided by Chaos Group for teaching this animation course, may also be used.

MODELING FORM:
An exploration of three-dimensional modeling will be the basis for representing built and natural environments, sculpting characters, and creating other geometrical forms. The scope for individual projects may range from short narratives to the analysis of micro-scale environments or larger architecture and landscape settings. We emphasize process-based growth and form descriptions in the manner of D’Arcy Thompson’s “On Growth and Form”. Maya’s core engine is fully parametric. For Maya, this means that re-editing any single earlier step in the “history” of making a 3D model will automatically propagate needed updates to the later step dependent parts of the model in a kind of dynamic chain reaction.

CORE REQUIREMENTS:
Four exercises each consist of short animations of roughly 1 to 3 minutes. The first three animations each count for 20% of the course. The final animation counts for 30% of the course. Class participation / attendance counts towards 10%. Regular attendance is essential to the incremental learning sequence and the primary key to making the course fun and straightforward to follow. The evaluation of student work is based primarily upon storytelling idea rather than technical competence. There are no exams or required costs. We will have access to lab and public virtual computers for some supplemental technology options.

INSTRUCTOR:
Visiting Associate Professor of Architecture Earl Mark, PhD, has expertise in 3D computer animation, geometrical modeling, computer aided design and moviemaking. His work in computer visualization and animation has been on long term national exhibition, such as at the Smithsonian, Monticello, Historic Jamestown, and the National Building Museum. He studied filmmaking under direct cinema pioneer Ricky Leacock. He has taught animation and moviemaking at the University of Oregon, the University of Virginia (his home institution), MIT, and Harvard. He is a past senior software engineer of computer aided design products in architecture, naval architecture, and perspective visualization.