VISUALIZATION
TEXAS A&M UNIVERSITY

VIZA 615 – Computer Animation, Spring 2019
Project #4 – Rig Build & Deformations
Instructor: Tim McLaughlin

Overview of Projects in General

Each project is designed to move your learning experience and skill level forward. Failure to complete or sufficiently explore components of one project will lead to increased difficulty on the succeeding project.

Project Description

- Part A: Procedural Rig Build - Build a blocking model, motion, and control system for an animal or similarly complex organism as a digital character. The key features must include a body, appendages, and motion of significant complexity to provide action equivalent to a quadruped walk cycle or bipedal calisthenics. The motion and control system should be defined by an interpreted programming language, such as python, that can be run as part of the in-class presentation. The program should be accessed and implemented from within the 3D animation software package of your choice. The tool should procedurally set the following:
  - Bone position
  - Bone orientation
  - Direct (hierarchical) relationships,
  - Indirect (constraint and expression-driven) relationships
  - FK and IK solving systems,
  - UI control scaling and placement, and
  - A reasonable and extensible naming convention.

- Part B: Deformations - Present a rendered animated motion cycle of an animal or similarly complex organism with biologically plausible skin deformations. The range of motion should be appropriate for the animal/organism. The motion should be presented from front, side, and three-quarter views and presented with lighting that permits clear understanding of the movement of the surface(s).

Technical Specifications

- Part A: Procedural Rig Build
  - Massing model:
    - Screen shots as image files in JPEG format of CG geometry viewed from front and side.
    - Include background images of the real animal/organism.
    - Include a human-sized guide as reference for scale.
    - File names: <LastNameFirstName>_<animal>-front_VIZA_615.jpg and <LastNameFirstName>_<animal>-side_VIZA_615.jpg.
  - Scripted Rig Build:
    - At demonstration time load only a scene that contains the massing model, background images, and reference locators for joint positions.
    - Load and run scripts to build the motion and control system.
    - Annotated code.
    - File name: <LastNameFirstName>_<animal>-scriptedRig_VIZA_615.<ext>
- Part B: Deformations
    - File format should be .mov Quicktime files.
    - The resolution should be high enough to ensure visual clarity. The frame rate should be either 24 or 30 fps.
    - The geometry of the animal/organism must be textured in a manner that makes deformations of the geometry clearly apparent. Motion blur is not required, but will likely aid believability.
    - File name: <LastNameFirstName>_<animal>-deformations_VIZA_615.<ext>

Project Goals

- Match the size relationships of CG geometry to real-world forms.
- Develop a rest-pose that will minimize deformation and articulation problems.
- Design a geometry construction strategy (edge flow) that will facilitate believable skin deformations.
- Write functional program code in a tool-based scripted language.
- Utilize the strengths of the language.
- Assess the strengths and weaknesses of the script language used.
- Implement a procedural, repeatable, and extensible method for generating a motion and control system for a digital character intended to be used in key-frame animation.
- Organize scripted code in your computing environment so that it is easily accessible from within and outside of the 3D animation software.
- Identify the locations on the body where deformations occur.
- Translate the actions of moving skin from reference of real biological forms to the application of specific CG deformation techniques.
- Create techniques for handling deformation variations in the form of creases, folds, and surface stretch.
- Develop techniques for preserving volume.
- Develop deformation rigging that moves in coordination with animating rigging.
- Develop a work process that economizes effort.
- Evaluate and critique your own work and the work of others.

How Success is Measured

A grade will be determined based upon the following factors:

- Part A – Procedural Rig Build (45%)
  1. Massing model – overall scale; proportions; neutral rest pose; span direction
  2. Scripted rig build
- Ease of Use - Minimal use of existing data; Initiates build with minimal effort; Run speed
- Motion System - Number of bones; Positioning of bones; Orientation of bones
- Control System - Management of global rotation, translation, and scaling; Appropriate behavior of spine or core; Appropriate behavior of appendages.
- Hierarchy - Rational and consistent node naming; Appropriate top stack; Logical sub-hierarchy groupings; Single hierarchy
- Code - Elegant/Succinct; Clearly descriptive comments; Clearly organized; Appropriate use of variables; Clear variable names

- Part B – Deformations (45%)
  1. Preservation of volume
  2. Mitigation of shearing
  3. Appropriate inner and outer folds at hinge joints
  4. Distribution of influence of joints across broad areas
  5. Handling of cavities at appendage connections
  6. Animated motion (believable, cycles, range-of-motion)
  7. Visual quality of imagery

- Presentation (10%)