Python: Automated Hand Rig

A Python script that automatically rigs a set of hand controllers / joints. The scene consists of a 5 finger right hand (with metacarpal joints), and a 4 finger left hand (without metacarpal joints).

The script:
- differentiates between left/right
- recognizes how many fingers there are (3,4,5,n)
- recognizes if there are meta carpal joints
- renames the joints depending on the finger
- orients joints to match with the wrist joint Y-UP axis, (X axis down the chain)
- allows the rotation of one axis to universally rotate the fingers and make a fist (including thumb)
- creates attributes on the controller, and connects them to the finger joints to create different finger/hand positions

Expression Skeleton:

Created all scene elements except for character mesh. Mesh weighted to a max of 4 influences per vertex. All mesh deformations are purely joint-based, there is no sculpting, blend shapes, or vertex / cluster driven deformations. Automatically translates / rotates weighted helper joints to aid in more anatomically correct / natural muscle deformations.

The Expression functions:

Auto Arm Twist
- based on distance, the parts of the arm rotate in diminishing proportion to the hand/wrist when rotated so as to create a more fluid rotational blend

Auto Forward Stretch Back / Chest Compensate
- as the arms are stretched forward, the back / shoulder blades area is pulled towards the rear to prevent the mesh from caving in, and the chest pulls forward and inward to simulate a compressed pectoral mass

Auto Backward Stretch Back / Chest Compensate
- as the arms are stretched towards the rear, the back / shoulder blades area is pulled toward the center to simulate compressed mass, and the chest is pulled slightly outward to the sides, and towards the rear / shoulder

Auto Pointed Elbow
- based on rotation value, as the forearm is rotated inward, the elbow translates / pulls back to have a sharper elbow point, and

Auto Stretch Rigid Belt Strap
- the chest belt straps follow the upper body deformations, prevent collision and over-stretching with the body, and are based on the rotations of the shoulders / arms

Auto Waist Twist
- based on side to side spine / body rotations, the waist / hip / belt area also has diminished rotation values in proportion to its' distance

Auto Pack Adjust
- as either leg is raised, when the leg's mesh collides with the corresponding pack on the waist / belt, the pack is also raised and rotated inward to accommodate the leg and prevent colliding geometry

Auto Overhead Shoulder / Trapezius / Armpit Compensate
- as the arms are raised overhead, the mass around and on top of the shoulders / trapezius are pulled inward and compressed to form a more natural compressed bulge, also the arm pits are raised and pulled inward to follow the arm's motion and prevent a "cobra" stretching of the latissimus dorsi commonly associated with the pose

Control Rig on Expression Skeleton Breakdown

The Control Rig is combined on top of previously mentioned Expression Skeleton and mesh. All mesh deformations are purely joint-based.

Separate Rig Hierarchy
- rig is separate in hierarchy, making it safe to delete without affecting the skeleton / mesh / other scene components

Scalable
- the rig is scalable to accommodate different scene requirements

Specific Node Grouping
- nurbs curves / surfaces are only used in rig hierarchy
- joints are only used in skeleton hierarchy
- polygon geometry is only used as joint deformed objects

Reverse Foot Rig
- uses IK handles and nodes to manage toe raise, ball twist, and heel raise positions, via custom foot controller attributes

IK / FK and Pole Vector Enable Switch
- IK / FK attribute switch for arms on corresponding hand controller
- pole vector attribute switch for elbow / knee on corresponding hand / foot controller, when enabled, pole vector also translates according to hand / foot control position

Whole or Isolated Spine Control
- using a spine ik and clusters, independently rotate or translate hip, shoulders, and spine

Python: Default Rig Pose

A tool to set the default bind pose of the skeleton / rig, keeping all nodes evaluated.

The script:
- checks to see if the tool is currently open, if so, closes it, opens a new tool window
- selects all nurbs curves / surfaces, specific joints
- checks for locked attributes, unlocks them
- zeros out translation, rotation, and custom channel values for all control handles
- relocks attributes that were previously locked

Original Characters

All original designs, models, textures, rigs, animations. Characters shown are clockwise from top, Ninja wolf with Wolfbane and Katana, Odin with Gungnir, and Nemean.

Nemean Character Pass

Renders
Hardware / Global Illumination - Diffuse texture (no textured anatomy, purely skin texture), and Normal Map texture (Zbrush sculpted anatomy)
Global Illumination - no texture, hardened geometry
Vector - no texture, solid wireframe

Zbrush
- sculpting and texture painting

Textures
- UV Layout
- Diffuse Texture
- Normal Map

Contributions

Resident Evil: Operation Raccoon City (PS3 / X360 / PC)
Character Rigger, Technical Animator
- skeletons, rigs, expressions, face / body weights for characters and monsters
- character geometry and UV fixes
- asset optimization (decrease file size of scenes)
- facial animation and voice syncing
- process development and pipeline improvements
- QA and bug fixing

Fight Night Round 4 (PS3 / X360)
Technical Artist, Rigger
- boxer body / cloth / prop weights
- skeletons, expressions, face / body weights for secondary characters: referee, trainers
- boxer cloth dynamics
- boxer rig and expression maintenance / tuning
- art asset management
- QA and bug fixing

NBA Live 09 / NCAA Basketball 09 (PS3 / X360)
Associate Technical Artist, Rigger
- player body / cloth weights
- tuning player muscle / cloth dynamics
- skeletons, rigs, weights, for other characters: mascots, crowd, referee, coaches etc.
- tutorials and technical documentation
0 outsource asset management / optimization
- tuning player expressions
 - QA and bug fixing

EA active (Wii)
Technical Artist, Lead Rigger
- skeletons, rigs, expressions
- body / face weights
- preproduction planning
- QA and bug fixing

FaceBreaker (PS3 / X360)
Associate Technical Artist, Rigger
- boxer body weights / collisions
- boxer hair weights / dynamics / collisions
- QA and bug fixing