1 -- Creating a simple Armature (Skeleton)

**1. Add an initial armature base bone**

   a. In Object Mode, add the first armature bone (the "Master bone") at the cursor (i.e., at the origin), using **Add → Armature** *HINT: To avoid a TAGE importer bug: don't rotate this "master" bone!*

   b. To see the bone, select the armature, go into Object Properties by clicking the little orange square in the Properties pane on the right, and in "Viewport Display" enable the "in Front" checkbox.

2. Confirm that the <u>armature</u>'s rotation and scale transforms are correctly initialized (necessary for some Armature tools to work)

   a. select base bone (in Edit mode, at lower left it says "Armature")

   b. Again in the Properties pane on the right, under *Transforms*, clear all rotations to 0.0, and all scales to 1.0

3. Add more bones to the Armature

   a. select the tip of the armature base bone

   b. go into EDIT mode

   c. use the E key and move the mouse to extrude a new bone

   d. repeat to add additional bones
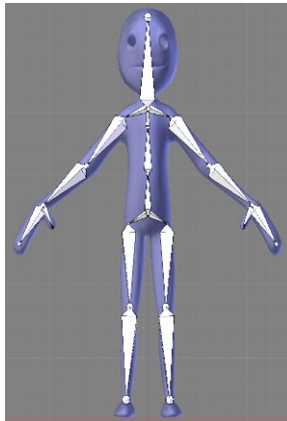
4. <u>Rename</u> the bones

Naming is critical for the next steps. Left/Right Bones must have "symmetrical" names, ending with _L or _R (or .L / .R)

   a. In the Properties Panel, select the *Bone Properties* pane ("bone" icon)

   b. select each bone one at a time, and enter new names for them

   c. In the Object Properties pane (the little "man" icon), under Viewport check the "Names" box, and the bone names should appear in the 3D view alongside the bones.

2 -- Rigging

1. Set the Armature to be the "Parent" of the Mesh

   a. in **Object** mode, FIRST select the *model,* THEN <u>shift</u>-select the *armature,* so that both are selected. The order is important.

   b. Open the menu (<u>Object → Parent</u>). Then "<u>Armature Deform → with Empty Groups</u>". This makes the armature the "parent" of the mesh, so that changes to the armature affect the mesh. It also adds an *armature modifier* to the mesh, and creates *vertex groups* to specify which vertices are attached to which bones. Initially, the vertex groups are empty.

2. Complete the setup for the Armature:

   a. select the *mesh, then* in *Properties Window,* select *Modifiers* panel (the "wrench" icon)

   b. If there is more than one modifier (not likely), locate the *armature modifier* and click the "up arrow" to move that modifier to the top of the list.

   c. check the "Preserve Volume" box in the Armature panel, so that Blender will attempt to minimize distortions when objects move

3. Assigning Vertices to Bones Manually Using <u>Vertex Groups</u>

   a. in **Object** mode, select the *mesh,* then in the *Properties* panel, select the **Object Data** pane (the little triangle icon)

   b. In *Vertex Groups*, notice each bone is listed; this is where we will put groups of vertices associated with each of the bones.

   c. In the 3D window, de-select everything and go into Edit mode.

   d. Choose one of the bones in the Vertex Groups panel by clicking on it. Then back in the 3D view window, select exactly those vertices you want associated with that bone. Then click the <u>Assign</u> button back in the vertex groups panel. You can confirm that the vertices were indeed assigned, by de-selecting all of the vertices in the 3D window, selecting the bone in the vertex group panel, and clicking "Select" in the vertex group panel.

e. Repeat step (d) for each desired vertex group. You can also remove vertices from groups in this manner.

f. Although it isn't necessary for every vertex group to have a vertex assigned to it, <u>it is important that every vertex be assigned to at least one vertex group</u>. If you have vertices that are not part of any bone vertex group, they may not act properly (or may disappear) during animation. *Here is a hint for ensuring that every vertex is assigned to a bone:*

- select the mesh, and go into Edit mode. <u>De-select all vertices</u>.

- in the "Vertex Groups" panel, select each bone in turn (by name), and for each bone click "Select". Doing this for every bone causes the vertices assigned to bones to highlight in the 3D window.

- In the 3D window, choose **Select → Invert** - this will invert the selection - that is, it will deselect all vertices assigned to a bone and select all vertices not assigned to any bone.

- You can then assign all those vertices to the Master bone.

4. <u>**Pose**</u> **the Skeleton and Observe the Mesh Following It**

a. In the 3D window, go into Object Mode, then select the armature, then go into **Pose Mode.**

b. Select a bone and press **R**, then drag to move it. The mesh vertices should now follow the bone movement.
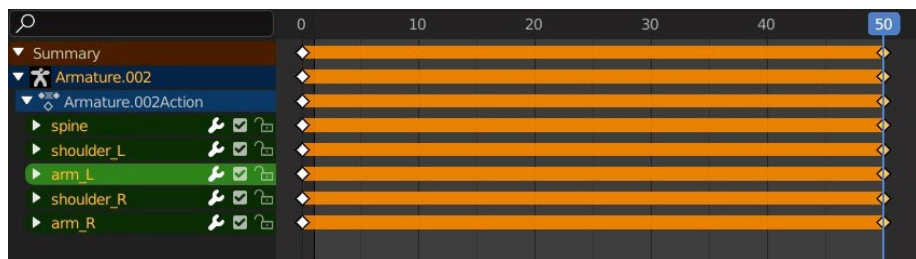
3 -- Keyframing

**1. Set up the "Timeline" and "Dope Sheet"**

a. Drag the bottom left border of the 3D window, and change the newly-opened window to a <u>**timeline**</u>. Note the boxes for *Start* and *End*, and the blue *Current* frame number (probably set to 1).

b. Change the end time to 50, and put the blue bar on time 0.

c. Change the timeline window to a "**Dope Sheet**" using the little clock icon at the upper left of the timeline.

2. Create an Initial Keyframe

a. in the 3D window, in **Object Mode** select the Armature, and go into **Pose Mode**. The bones might not appear in the dopesheet until after you insert at least one keyframe.

b. Pose the model as desired for the start of the animation

c. In the 3D window select <u>*all bones*</u> (**A-key**) ← important!

d. In the 3D window, Press "**I**" to insert a keyframe, choosing the "<u>location and rotation</u>" option. If you intend for the animation to loop, move to the last frame (50), and repeat this step, again making sure all bones are selected. If you did all steps correctly, there should be indicators and bars for every bone

3. Create additional keyframes

a. repeat the steps until all of the desired poses are reflected as keyframes in the dopesheet

b. switch to a "Timeline" window, and press the **PLAY** button in the timeline to Start/Stop the animation.
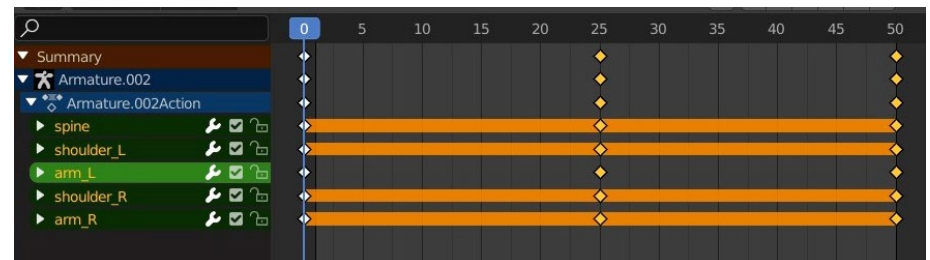
4 -- Making Multiple Animations for a model

1. *Create a model in Blender*

2. *Use steps 1-3 above to create an armature, rig the armature to the vertices, and create the first animation.*

Now, to make additional animations…

3. **Convert the Keyframes into an "Action"**

   a. With the Dopesheet open, switch to an **Action Editor** using the Dope Sheet menu.

   b. The Name box probably shows a name like "armature.action". Change the name to something more descriptive, such as "Legs_walk".

4. **Create a second, different animation**

   a. Assign your existing animation to a "fake user":

      • To the right of the animation name, click the "fake user" button (the little shield)

      • Open the list of animations, and confirm that an "F" is next to the existing animation.

   b. In the Action Editor (DopeSheet) window, click the "new action" button (it is the little button just next to the fake user button) to add a New Action.

   c. Type a descriptive name in the Action Name text box, such as "Arms_wave".

   d. Follow the steps under Part 3, above, under "Keyframing", to define a new animation: Pose the arms, select *all* bones, insert keyframe, create second pose, select all bones, insert keyframe, etc.

   e. While creating all desired animations, remember to save often!

5 -- Exporting the Model/Skeleton/Animations

1. **Install the *RAGE Skeletal Animation* Blender exporter as follows:**

   a. Download/Uncompress the RAGE export tool from Canvas.

   b. Place the "io_scene_rage" folder containing the three scripts into the Blender addons directory. This is usually in: C:/Program Files/Blender Foundation/Blender 3.2/3.2/scripts/addons/

   c. In Blender, select **Edit → Preferences → Add-ons → Install**

   d. Navigate to where you placed the folder, open it, and select each of the three scripts in it. Then click "Install".

   e. In Blender, select Edit → Preferences → Add-ons. Enable the exporters by checking their tick boxes.

2. **To export the MESH and SKELETON (`.rkm` and `.rks` files):**

   a. Your model must have a UV, skeleton, and animations.

   b. in OBJECT mode select the MESH ONLY, then use: **File → Export → RAGE Skeletal Model Mesh**

   c. Select the SKELETON ONLY, then use **File → Export → RAGE Skeletal Model Skelton**

3. **To export ANIMATIONS (`.rka` files):**

   a. In the Action Editor, select an animation to export, then use: **File → Export → RAGE Skeletal Model Animation**

   b. Select the other animation, and repeat the previous step (use different file names for each animation exported)

4. **Place the files in the appropriate assets sub-folders**

5. **See the posted code sample for instructions on loading the model into a TAGE game and playing its animations.**