

Animation for Games

Labs 13 and 14 – Walk Cycle

Aims:

- Experience the process of animating a walk cycle in 3D Computer animation, using Maya
- Practice the creation of the main poses of a walking biped character, using a rigged character

Using Maya 2018, open the scene named **Animation_Character_AFG.ma**

First, set the project properly in Maya,

Then, check the Animation preferences:

- Activate Auto Key;
- Set framerate to 60 FPS;
- Set tangents to Stepped mode.

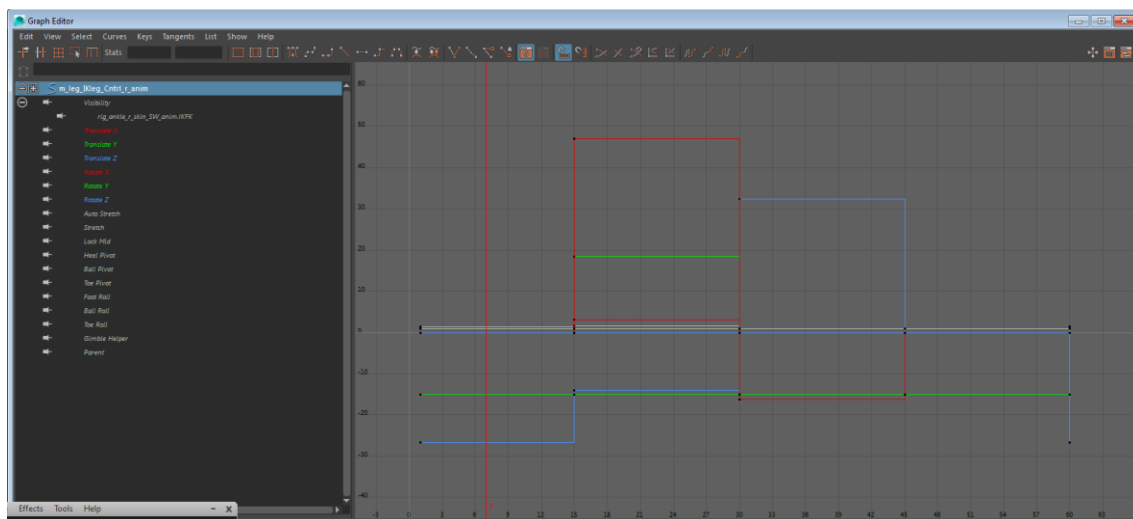


Figure 1- example of *Stepped tangents* mode

Now, considering what was discussed in the previous lecture (7), animate a walk cycle in place, using the provided character.

First thing to do with the character in the T-pose, is to put the arms down, including (very important) the shoulders.

Consider the *Power Centre* concept, to help you define the character's mood and personality.

[These steps should be done even if just for the creation of an idle pose].

Suggested workflow to animate a walk cycle:

- Define the Key Pose, that expresses the particular personality and mood of the character (for a walk cycle, usually it is the Extreme);
- Establish the length of the step (stride). This depends on how fast or slow you want the walk to be;
- Create the main poses for the two steps (Extremes major Breakdowns and secondary Breakdowns) at the corresponding keyframes, on *stepped tangent* mode;
 - Define
 - The feet positions (including the appropriate bending);
 - Upper body up and down motion;
 - Upper body lateral alignment (in the Passing position);
 - Upper body forward and back motion;
 - Tilt of the pelvis and shoulders;
 - Twist of the pelvis and shoulders;
 - Arms and hands/fingers motion.
- Adjust the *timing* of the motion of each body part from one keyframe to the next, using mainly the Graph Editor (adjusting the curves tangent accordingly). Remember that the body parts do not move all at the same time and at the same speed (for example, when walking, the pelvis lateral tilt is led by the engaged leg and the suspended leg is led by the corresponding hip – hip leads the thigh, which leads the leg, which leads the foot – while the shoulders lead the arms, forearms, hands and fingers, and the head is led by the torso);

You need to express that flow of energy through the body – a hierarchy of motion.

In a one second walk cycle (2 steps) for games, I recommend the main poses should to be set at the following keyframes in the timeline:

1, 30 and 60 are the Extremes (or Contact Positions) and

15 and 45 are the major Breakdowns (or Passing Positions);

7, 23, 37 and 52 are secondary Breakdowns.

Start with the Extreme pose, then the Breakdown pose. The two secondary Breakdowns will depend on the two first poses, as they will be placed in between.

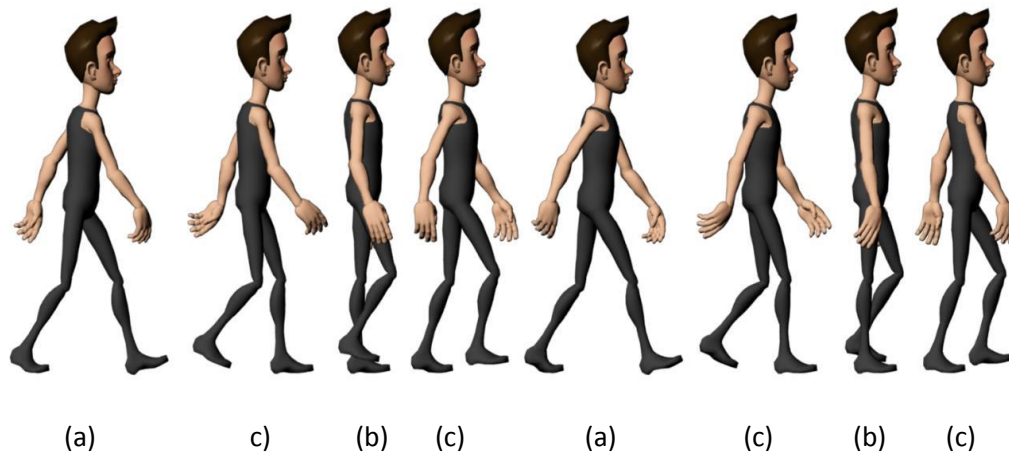


Figure 2 - Walk cycle -- Key Pose/Extremes (a), major Breakdowns (b) and secondary Breakdowns (c).

For the second step, you will replicate these poses but with the limbs in a reversed position, as shown above.

An easy way to determine the position of the secondary Breakdowns is by changing the tangents (in the Graph Editor) of the adjacent Extreme and Breakdown to linear – this interpolates the in-between position and you just need to tweak the attributes and the curve, later, to make sure the movement has the right timing and describes a smooth arc.

The secondary Breakdown with the lifted foot in the back side defines the maximum height of the heel. It also defines the keyframe of the Pelvis lateral tilt (that expresses the flow of force going up from the supporting leg) – this is important because not all parts of the body arrives at the same time to a defined pose (Follow Through and Overlapping Action). For the same reason, the top of the torso shall tilt laterally a few frames after the pelvis tilt.

The secondary Breakdown with the lifted foot in the front side, defines the maximum height of the knee.

As mentioned in the suggested workflow (above), start each pose from the feet, or foot, contacting with the ground and then continue up to the pelvis, top of the torso, neck, head, shoulders, arms, hands and fingers.

Once the foot in front gets in contact with the ground, the foot in the back side gets off the ground, describing a smooth curved path up and forward, simultaneously – an arc.

As soon as the suspended foot touches the ground, it must start moving/sliding backwards at a constant speed.

Immediately after the foot lands completely on the ground, the pelvis must tilt to the opposite side, in response to the weight shift.

Then, a few frames later, the shoulders must tilt to the opposite direction of the pelvis.

The lateral tilt of the pelvis must happen very quickly (in just one frame) because it is forced by the foot touching the ground. Likewise with the tilt of the shoulders.

For the up and down movements of the upper body, you can use the Body Ctrl to keyframe it; and for the forwards and backwards movements of the upper body you can use the Top-of-the-Torso Ctrl

For the lateral tilt and translation of the pelvis, use the Pelvis Ctrl, because it allows you to manipulate that part of the body independently.

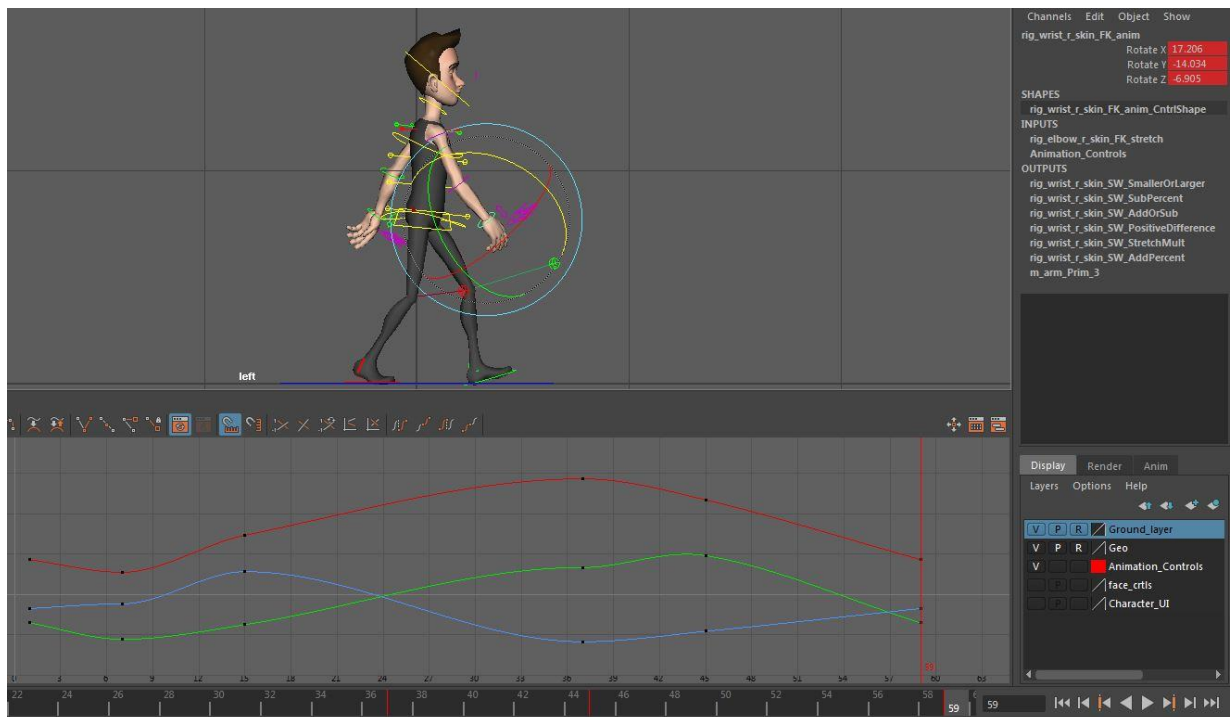
For the twist of the torso (rotation in the Y axis), use the same Pelvis Ctrl and the Top-of-the-Torso Ctrl.

Regarding the head and neck, use the Head Ctrl.

Don't forget to relax and curl the hands, to give it a natural look.

Remember the concepts introduced in the previous lecture – *Contrapposto* and *Serpentine Line*: when walking, a person goes from a *contrapposto* pose (in the passing position) to a *serpentine line* pose (in the contact position), in a continuous cycle.

Refine the poses and adjust the *timing* in the Graph Editor.



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Finally, in order to create a walk cycle with a smooth transition between the last frame and the first one, make sure you select all the controls and set a keyframe at frame 59 and then delete frame 60 (which has the same pose as frame 1 and that repetition would produce a subtle pause/hold) and match the tangents orientation of the last frame with the ones of the first frame, as shown in the image below.

