



MAYA

# Toy-tastic!

Inspired by the best of Japanese toy design, the characters above are just waiting to entertain you. Bring them to life in suitable style with our guide to the fundamentals of keyframe animation **BY WARREN FEARN AND KATE CORBIN**

**T**o round off our Big In Japan issue, we've created two simple but effective characters inspired by the style of classic Japanese toy design. In this tutorial, we'll be showing you how to bring them to life - and in the process providing a guide to the fundamentals of keyframe animation.

The animation is only five seconds long, so we had to think carefully about how to communicate the moods of the characters. The short narrative sees our sad, blue character, RainBot, suddenly spotting a rainbow and being transformed into a happy, bouncy bot. A small black character, UndergroundTot, wants to know what's happened and eagerly tries to copy RainBot's bounces to find out.

Over the next three pages, we will explore how to recreate UndergroundTot's movements. His shape suggested that he'd move quite slowly, so that was a given; but by animating his antennae, we could also give him a suitably inquisitive look.

Supporting material for the tutorial can be found in the Stop Press section of the 3D World website ([www.3dworldmag.com](http://www.3dworldmag.com)). In addition to full-sized versions of the screenshots, we have

supplied scene files including rigged, pre-built versions of UndergroundTot, so there's no need to waste time setting things up - just dive in and start animating.

For the purposes of the walkthrough, we're going to assume that you understand how keyframe animation works, and have some familiarity with the Maya interface, but nothing more. We'll be showing you where to set keys, how to use the Graph Editor to manipulate animation curves, and how to set up secondary motion: the way that other parts of the character wag and jiggle as he bounces up and down. As a finale, we'll explore how to animate RainBot's antennae using Bend deformers, and how to keyframe shaders as a quick way of animating a character's eyes. Scene files corresponding to each stage of the walkthrough can be found online: if you get stuck, load the next one in and start from there.

**Warren Fearn and Kate Corbin are the creative directors of the Doncaster-based 3D animation company WAK Studios Ltd. Warren also lectures at St John's University, York [www.wakstudios.co.uk](http://www.wakstudios.co.uk)**

## FACTFILE

### FOR

Maya 7

### DIFFICULTY

Elementary

### TIME TAKEN

2 hours

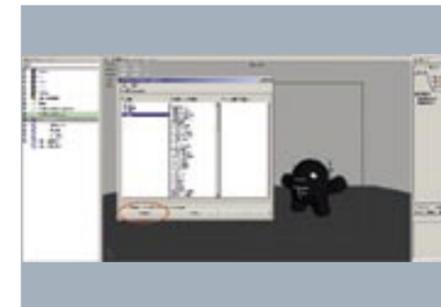
### ON THE WEB

- Full-size screenshots
- Scene files
- Final animation

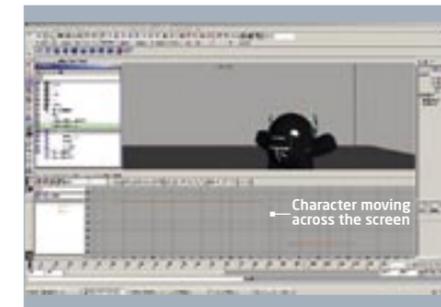
### ALSO REQUIRED

N/A

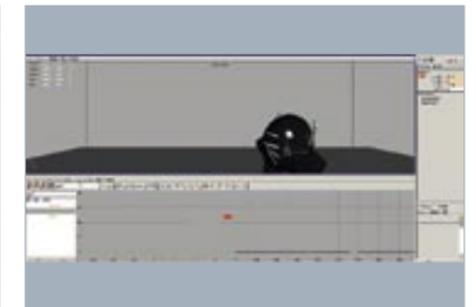
## STAGE ONE | Animating the pelvis



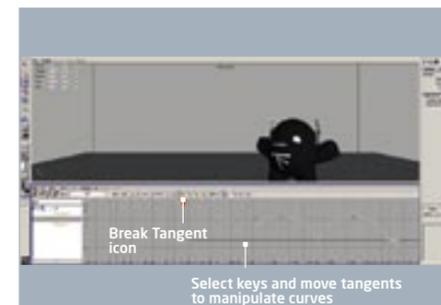
**01** Begin by loading in Tot\_Start.mb. This contains the pre-built character. To make things less confusing, we've hidden some of the channel controls so that they're non-keyable. This is done via Maya's Channel Control dialogue, and ensures you won't key anything unnecessary by mistake! If you want to make something keyable again, just move the relevant control back into the Keyable channel.



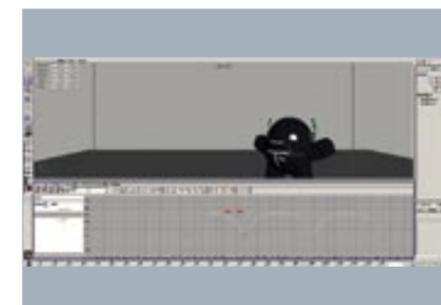
**02** First, select 'pelvis1' in the Outliner and open up the Channel Box. We're going to concentrate on Translate X. This configures the way the character moves across the screen. Set a keyframe for frames 1 and 75, each time setting Translate X to 49.007. The character is static at this point. At frames 90 and 123, change Translate X to 20.45. This will animate the character moving left.



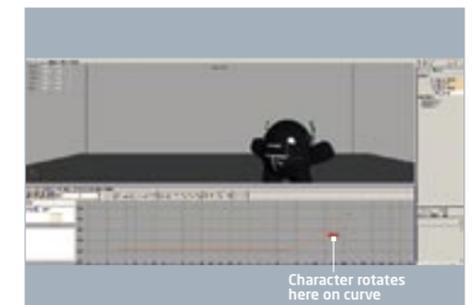
**03** Now let's concentrate on Translate Y. This controls the bot's vertical movements. Select this in the Channel Box and set a keyframe for frames 1 and 95 at a value of 0. The character has no movement at this point. Now we're going to animate the character moving up and down. Begin by setting further keyframes for 'down points' at frames 103, 113 and 123, again with a value of 0.



**04** Now go to frames 98, 108 and 118 and set a value of 16.716. This will move the character upwards at each point. Open the Graph Editor and take a look at the tangent curves. They'll be spline tangents. Select the keyframes 95, 103, 113 and 123 and click on the Break Tangent icon. By selecting the Move tool and choosing a tangent, you can now alter the curve.

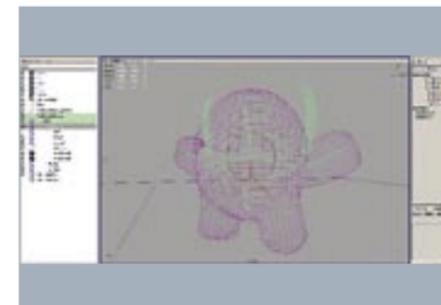


**05** First off, make sure a tangent is highlighted. Now move the tangent gently left and right. See how this manipulates the curve? You need to move each tangent so that it's arch-shaped, as shown. This ensures that the bot's bounce is more dynamic. It increases the force as he comes downwards and extends his time spent in the air.



**06** Finally, the character will rotate as he jumps up and down. We need to animate the Rotate X value for this. Set a keyframe for frame 1 and 90 at a value of -48.82. The character will be static between these points. At frame 123, set a keyframe at -15.162. This means that from frame 90 onwards, the bot will rotate to look at the screen.

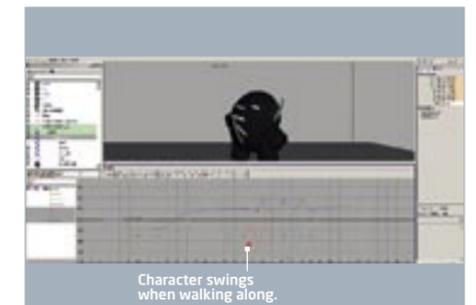
## STAGE TWO | Animating the upper body



**07** Animating the 'upper\_body' joint node will help the character to appear to have weight. An up-and-down motion, combined with rotations, can add extra dynamism and credibility to your character's walking and jumping motion.

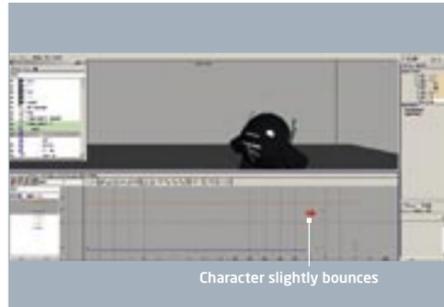


**08** The first set of rotations make our bot look at the blue RainBot. Select the 'upper\_body' joint in the Outliner. Set the Rotate X, Y and Z keys for frame 1 to 0. At frame 20, set X to -15.25, Y to 0.61, Z to 2.31; frame 30, set X to -15.25, Y to -2.36, Z to -8.98; frame 45, set X to -15.25, Y to -0.27, Z to 6.01; frame 67, set X to -15.25, Y to 9.717 and Z to 9.99. Now to give our bot a slight swagger...



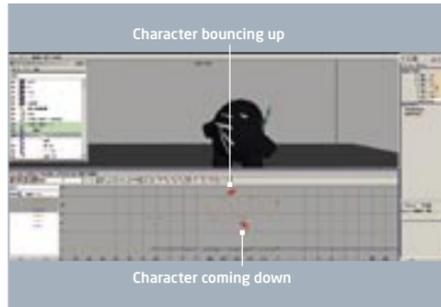
**09** At frame 77, set Rotate X to -8.88, Y to 9.32, Z to 9.99. At frame 79, set X to -3.80, Y to 8.50, Z to 9.99; frame 85, set X to -25.52, Y to 9.92, Z to 18.74; frame 90, set X to -15.25, Y to 6.40, Z to 5.62; frame 96, set X to 15.25, Y to 13.01, Z to 17.80; frame 102, set X to -15.25, Y to 4.9, Z to 9.39; frame 105, set X to -15.25, Y to 11.97, Z to 18.48; frame 110, set X to -15.25, Y to 1.51 and Z to 8.92.

STAGE TWO (Continued) | Animating the upper body



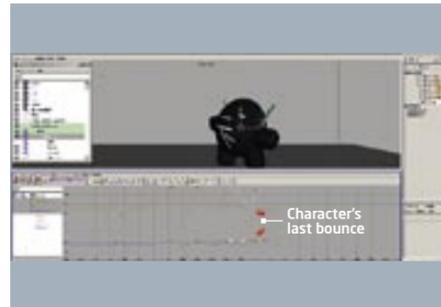
Character slightly bounces

**10** To complete the motion in Step 09, select frame 125 and set Rotate X to -15.25, Y to -0.26, Z to 12.24. Now to set the upper body translations to give the character secondary motion. At frame 1, set Translate X to 7.21, Y to 0, Z to -0.28. Then, at frame 79, set Y to 0.14 and X to 5.74. At frame 82, set X to 7.21. At frame 90, set X to 7.21, Y to 0.48, Z to -0.28. These keyframes give the character a slight bounce as he walks.



Character coming down

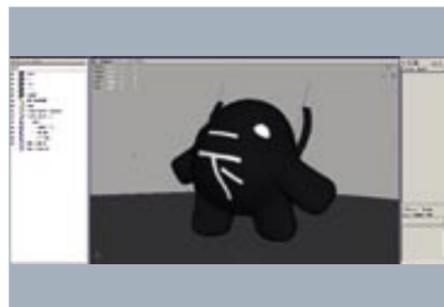
**11** To make our bot bounce as he jumps, use the following settings: at frame 96, set Translate X to 11.52, Y to 0.47, Z to 0.33; frame 102, set X to 6.76, Y to 0.47 and Z to -0.33. At frame 105, set X to 11.50, Y to 0.16, Z to 0.04. At frame 110, set X to 7.15, Y to 0.28 and Z to -0.31. At frame 113, set X to 7.15, Y to 0.28, Z to -0.31. Then, at frame 115, set X to 11.92, Y to 0.38 and Z to 0.09.



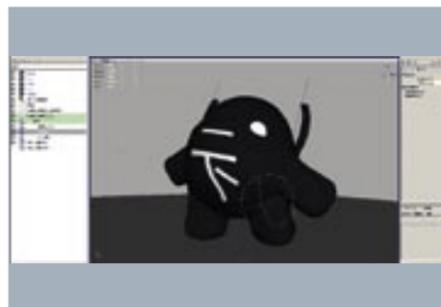
Character's last bounce

**12** Finally, for the character to finish his bounce, set the 'upper\_body' joint's Translate X value at frame 124 to 7.15, Y to 0.28 and Z to -0.31. This defines our bot's very last bounce. Now congratulate yourself for getting through the last few steps without making any typing errors!

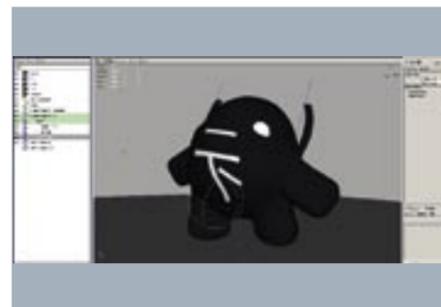
STAGE THREE | Animating the legs and arms



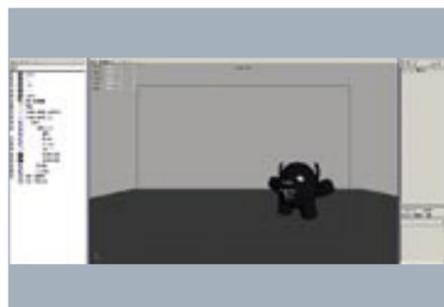
**13** Look at the bot more closely. See how his legs are straight and chunky? See his cute proportions? The animation we create should reflect this quirky aspect of the design. To make the movements stylised, we're only keyframing Rotate Y in the Channel Box for the legs to animate simply using one joint.



**14** In the Outliner, select 'left\_leg'. Go to frames 75 and 76 and set Rotate Y to 0. Scroll through the timeline to frames 78 and 80, and set Rotate Y to -28.344. Go to frames 83 and 85 and set Rotate Y to 19.805. Now go to frames 87 and 89 and set Rotate Y to -27.556. Finally, go to frame 90 and set Rotate Y to 0.



**15** In the Outliner, select 'right\_leg'. We're still only going to animate the Rotate Y axis. At frames 75 and 76, set a keyframe at 0. Go to frames 78 and 80, set Rotate Y to 18.814. Go to frames 83 and 85 and set Rotate Y to -28.685. Go to frames 87 and 88 and set Rotate Y to 19.602. Finally, go to frame 90 and set Rotate Y to 0.



**16** To animate the arms, we're going to use the values of Rotate X, Y and Z. But for the first two seconds, when our bot is wondering what the other character's doing, we're not going to move them at all.

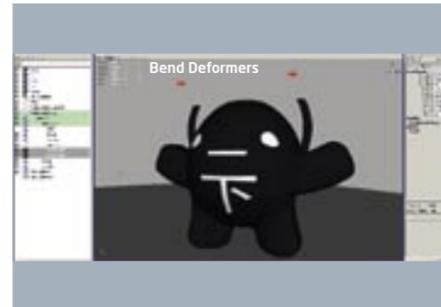


**17** Select 'left\_arm' in the Outliner (as shown above). At frame 50, set a keyframe for Rotate X, Y and Z at 0. At frames 65, 97, 105, 117 and 125, set the values of Rotate X to -14.227, Rotate Y to 4.362 and Rotate Z to -44.772. Now set keys at frames 100, 112 and 121 for Rotate Y to -4.362 and Rotate Z to -16.627.



**18** Select 'right\_arm' in the Outliner. At frame 50, set a keyframe for Rotate X, Y and Z at 0. At frames 60, 95, 106, 115 and 125, set the values of Rotate X to 21.88, Rotate Y to 8.607 and Rotate Z to -55.961. Now set keyframes at 101, 111 and 121 for Rotate Y to -8.549 and Rotate Z to -15.232. These last parameters will move the bot's arm as he jumps up and down.

STAGE FOUR | Animating the antennae

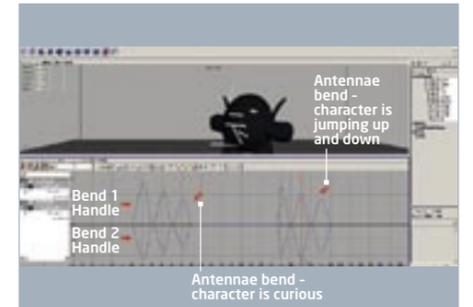


Bend Deformers

**19** To help animate the bot's antennae, we've attached a Bend deformer to its geometry. The deformer has been placed so that it bends in a certain direction. This gives quick and effective results and is particularly suited to this kind of task. The antennae will naturally flex as the character moves and jumps around.



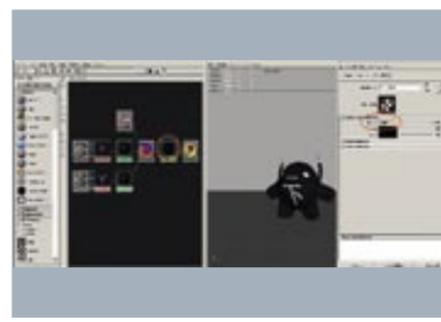
**20** Select the 'bend1Handle' in the Outliner. Under INPUTS in the Channel Box, select bend1 and a new set of options will appear. Select Curvature and change the parameters to bend the geometry (antenna). It's set to 0 by default. We'll animate the first antenna to express our bot's insatiable curiosity. At frame 25, right-click on Curvature and set a keyframe at 0...



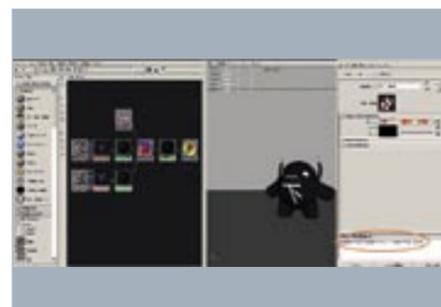
Antennae bend - character is jumping up and down

**21** Repeat for frames 35, 45 and 55. Next, set a keyframe at frame 31 to 1.4, then frame 41 to 1.082 and frame 51 to 0.876. To make the antennae flexing as the bot jumps, set a keyframe at 0 for frames 98, 105, 115 and 125. Next, set a keyframe at frame 100 to 1.245, frame 110 to 0.958 and frame 120 to 0.828. Repeat with negative values for the other antenna, 'bend2Handle'.

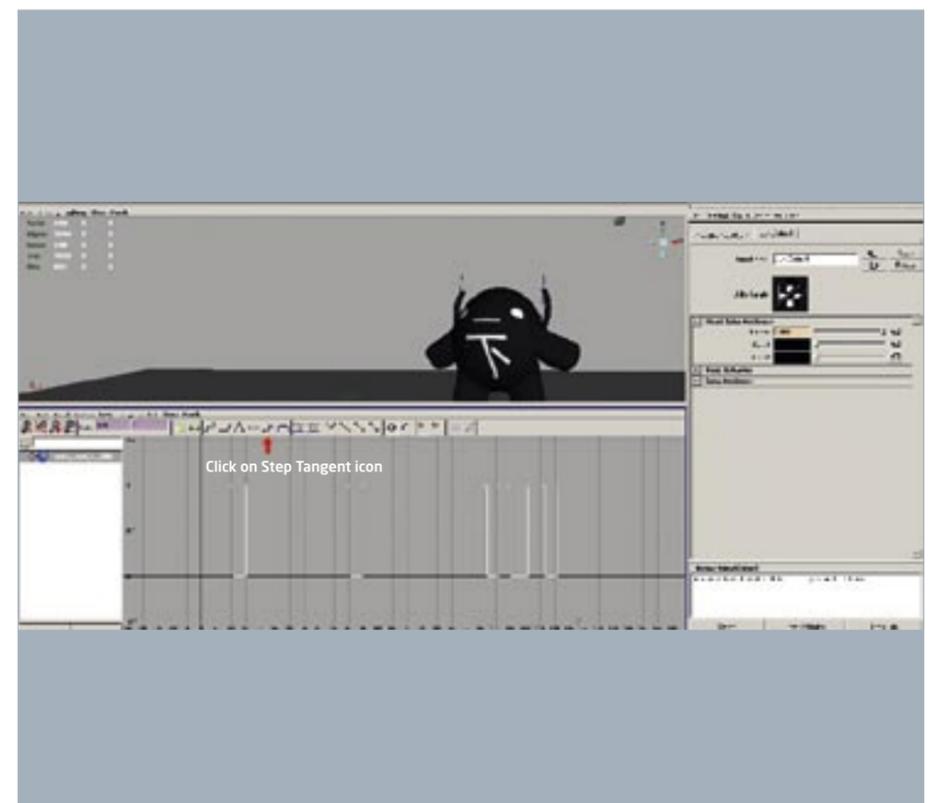
STAGE FIVE | Animating the blinking eyes



**22** Finally, we'll animate the bot's facial expressions. We'll do this using animated textures, so load Tot\_eyes\_STAGE6.mb from the CD, which already has textures set up. Open the Hypershade. Double-click on the shader named 'underground\_tot\_blink'. Import the file textures 'tot\_blink1' and 'tot\_eyes\_open1'. Under Hardware Texturing, change the texture resolution to High (128x128).



**23** Click on the arrow next to Color. This will open a 'blendColors1' node. The Blender attribute is the key to animating the eyes opening and shutting. Move the slider from 0 to 1 to see the transition. When the Blender is set to 1, the bot's eyes are open; when it's set to 0, its eyes are closed. Right-click over the Blender attribute to set a keyframe. Under Notes, the file explains what to animate.



Click on Step Tangent icon

**24** Open the Graph Editor and you'll see the curves have spline tangents on them. Select all the keys and change the tangents to step tangents. The textures will now switch from one to another without fading in between. By stepping the curves, the eyes switch instantly from 0 or 1 (open or closed). This simple technique creates quick and effective results, bringing our bot to life. In fact,

in previous WAK Studios projects, we've specifically asked clients for texture sheets of various expressions, then applied them to our characters. Note that it pays to pay attention to the face. Richard Williams, the celebrated animation director of *Who Framed Roger Rabbit*, recommends that if you're short on time for an animation, spend it on the eyes. This is always what people look at first. ●