The Making of an Oktapodi

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1 Introduction

In making a 3D animated short film where the central character is an octopus, two problems stand out: how to create an appealing character, particularly as octopi are not considered “lovable” creatures, and how to execute a model and rig that allows the animators to bring the character to life in a short production cycle.

2 Design & Modeling

The primary challenge is how to design an octopus that can emote and be appealing. It is an animal that is by nature slimy, with suction cups, and a strangely shaped body. It is often portrayed as a sea monster or alien and raises no immediate empathy. As the mouth is not visible, the function of the eyes becomes critical. Because our octopus is small in size compared to the world of our story, we enlarge its eyes and bring them to the center of the face so that they are easily readable. This combined with expressive eyelids, eyebrow ridges, and gills results in an appealing design that is true to the animal yet allows the character to emote.

In designing the body, we need to determine how many arms and suction cups are enough. This is similar to the problem that the artists at Disney faced during the production of 101 Dalmations. Even though we do not have to draw the arms and suction cups for each individual frame, we need to consider the time required to animate them and create appealing silhouettes. We find that with six arms and 24 suction cups each we can achieve a design that reads as an octopus and allows the creation of a 3D character that animators can work with.

3 Rigging & Animation

The next problem is how to build a rig for our main character that allows it to perform a variety of actions with its six arms. It has to be able to use them as real arms and legs, to walk or climb walls, both of which require contact points. In addition, it has to have the ability to perform more broad movements, particularly to swim and fly through the air. Furthermore, our octopus has to be able to curl both the tip and the entire arm, fold its arm along the central axis, and be stretchable. Regardless of what action is performed, the arms have to appear to be joint-less.

To accomplish this, we use a triple chain of 32 joints layered on top of each other for each arm, with additional joints coming off of this chain for the suction cups. The main chain is controlled using two separate ik-splines, one for what we consider the hand or foot portion, and another for the remainder of the arm. Because we need to maintain contact points to walk and hold onto objects, we are not able to use a simple stretchable ik-spline. Instead, we create a 1st degree curve for the ik-spline, which enables us to stretch it and maintain a contact point, and we control it with a 3rd degree curve using a wire deformer. This system gives us the capability to use a method similar to the reverse foot lock for walking and climbing, yet is flexible enough to allow the arm to bend at any point and appear joint-less when needed.

4 Rendering

Our goal in rendering is to make the final image of the octopi as appealing as possible. We use pastel-colored textures and a healthy amount of subsurface scattering to achieve a soft translucent look in our main characters, which emphasizes their fragile nature. This, combined with our efforts in the design and animation process, gives rise to an octopus that is, contrary to preconceived notions, not only “cute” but almost cuddly.