Within an animated short film there are numerous aspects besides the main story line and characters that unite together to create the final product. One of these pieces is that of special effects (SFX). Many times people do not notice the presence of special effects and it is the intent of the artist to integrate the effects smoothly into the surrounding animation sequences. The work I did this summer in collaboration with Professor James Duesing and three other students focused primarily in this area. The film entitled *End of Code* is a completely computer generated animation which uses motion capture as the primary method of character animation. The scene that I worked on dealt directly with these characters and as a result, the FX needed to be developed to a level at which they would hold up during close scrutiny on screen. Alias MAYA, software for 3D modeling, animation and effects, was the program used on this project.

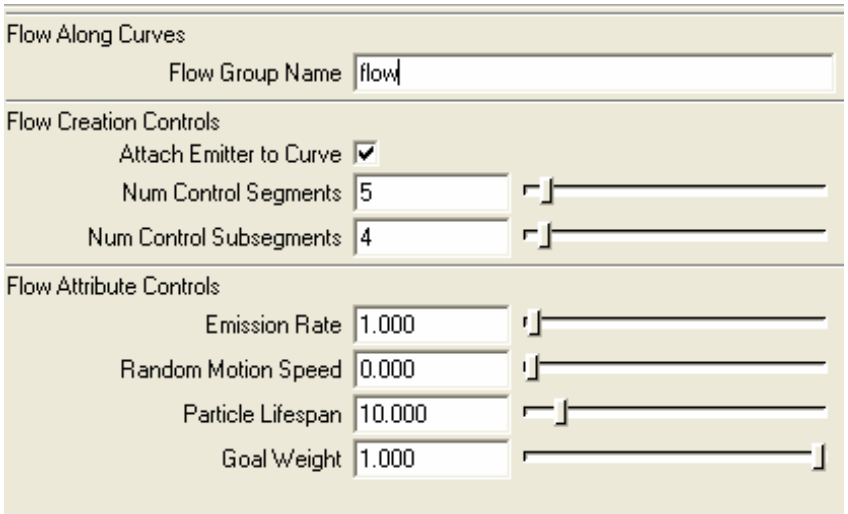
Figure 1.

The scene was entitled "Beautiful place" and depicted a robotic bunny revealing his naivety of life while swirls of flowers and furry woodland creatures flowed around his head. The initial work that needed to be done was to model a few simplistic objects that would then be animated along a path flow. Taking references directly from the script and storyboard I modeled a flower, leaf and chipmunk (Figure 1). As one of the other student's specialties was texture mapping, the textures that I placed on the models were only temporary and intended for visual representation only.

The next step was to use the effect in MAYA called Curve Flow. The basic premise of this effect is that it emits particles along a curve that is created. In dynamics, a point that is displayed as another object is considered a particle.[1] Once a Curve Flow has been created on a curve, there are numerous attributes that can be manipulated to achieve the desired effect. Two important attributes that needed to be adjusted were Num Control Segments and Num Control Subsegments. These elements are what give control of the particle flow once the Curve Flow has been created. It is important to ensure that the value of Subsegments is always Num Control Segments-1. By setting the goal weight to

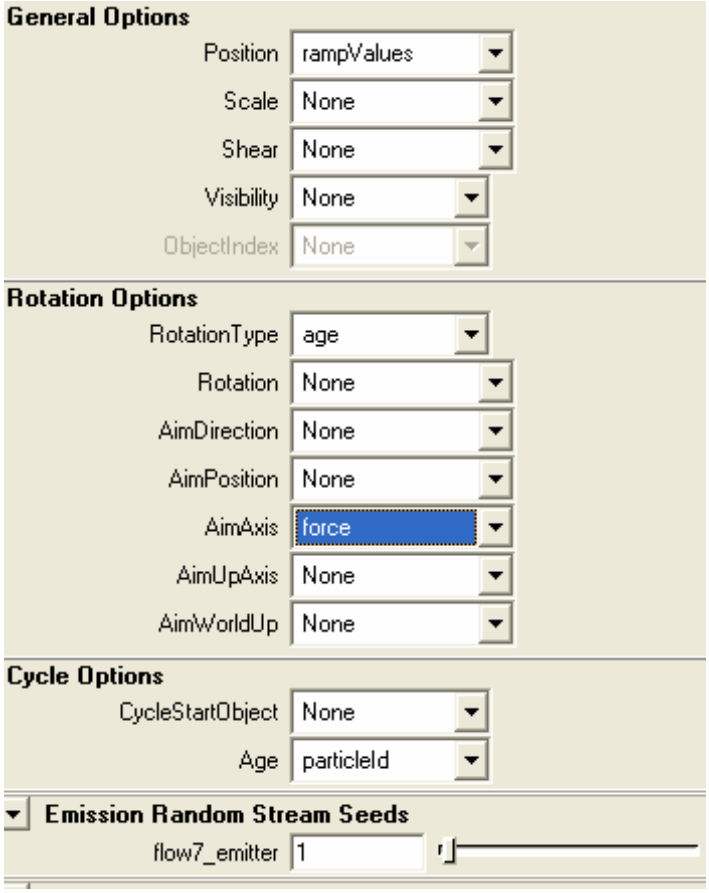
[1] 1997-2005 Alias Systems Corp.

1 the flow of the particles is constrained close to the actual shape of the curve as opposed to allowing their paths to wander beyond the bounds of the intended flow. Below are the final settings for the Curve Flow effect:



Once the Curve Flow has been created, the modeled objects can be applied to the effect. To do this you create what is called an instance. Conveniently more than one piece of geometry can be instanced to a particle and therefore a sequence of emitted objects from the curve can be created. To make certain that the multiple objects are emitted the Cycle attribute of the instancer must be set to "sequential." At that point, the emitted objects can be organized in the preferred order of emission from the curve.

A problem that appeared initially once the geometry was instanced to the particles was that there was a flashing of the objects as they traveled along the path of the curve. It was discovered that this was due to the Cycle Options of the particle flow and by adjusting these parameters the flickering of the objects could be prevented. Also under the particle flow attributes was Lifespan Mode which needed to be set to a constant number of frames. This number should be selected in accordance to the duration of the scene in which the effect is in so that the particles are visible throughout its entirety. Below are the final parameter settings for the particle flow:



Once a single curve is made, it can be duplicated within MAYA to make a series of curves. By altering the order in which the particles were emitted and slightly rotating each curve enough variance is made to create a fuller effect. It was the intention of Professor Duesing to have the entire screen filled with these floating objects. To achieve this, numerous curves were created that began emitting their particles from the same specified point. In order to create the illusion that these objects were radiating from the character, the curves were first grouped together so that they could be manipulated as a whole. From there, the method of keyframing was used to make the curves "grow" from the character. At the first frame of the animation a keyframe was set when the curves were in a constricted position within the character. Another keyframe was set at the point in the animation where the emission of the objects would be the greatest and the curves would be enlarged. When the animation is played back from the beginning, it appears that the curves are slowly extending from the character.

The results of my work will be used in conjunction with the revisions and additions to my models in the final rendered animation. The research I did to better understand the tools

and create a more believable effect will aid the other participants in replicating my work and also make their own work run more smoothly. As production upon *End of Code* has just commenced this summer, the finished product showcasing my effect is a long way off.