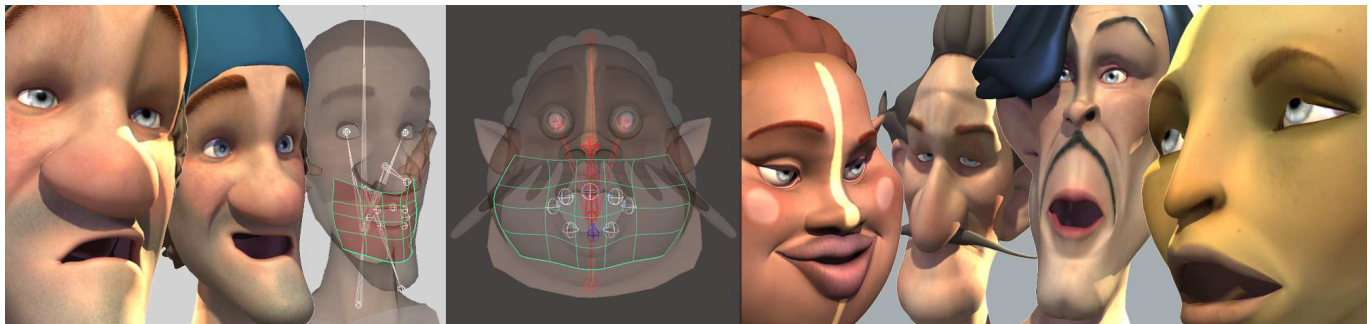


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REUSABLE FACIAL RIGGING AND ANIMATION: CREATE ONCE, USE MANY



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A DISSERTATION

in

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Abstract

Facial animation is a serious bottleneck in any computer generated (CG) production. It is the key element to convey emotion to 3D characters. Speeding up the rigging process remains an unsolved problem, specially for film and videogames, which require high quality results. The character rigging is analogous to setting up the strings that control a puppet. Today, skilled artists manually create the facial rig to ensure the best quality in the animations; but, this is a slow, labor-intensive and costly process.

This thesis presents a portable character rigging system that integrates into current animation production pipelines. It automatically transfers the facial rig and animations created for one character to different characters, independent of their shape and appearance. It enables artists to create more lifelike facial models in less time; about 90-99 percent faster than traditional manual rigging. Characters can display complex expressions and behavior, easier and with decreased artistic effort. As a result, we dramatically reduce the time needed to create high-quality facial animations for the entertainment industry.

We studied techniques from the fields of computer graphics and computer vision, to come up with a solution to the rigging problem. Based on a generic facial rig definition and a new deformation method, our system converts 3D face models into digital puppets that experienced artists can control. The system adapts the skeleton, weights and influence objects (NURBS surfaces, lattice, etc.) from a source rig to individual face models to obtain unique expressions, and enables easy reuse of existing animation scripts. Our work differs from previous morphing and retargeting techniques, because that work was oriented towards transferring animations, while ours aims to transfer the complete facial rig, in addition to animations.

The system was validated with a series of experiments. We used models and rigs from major film and videogame companies: Electronic Arts, Radical, Dygrafilms. The results were supervised by Technical and Art Directors, who approved the quality of our rigs and animations to be used in CG productions, replacing the artist generated ones. Our proposal is: generic (the facial rig can have any type of configuration and models can be created by artists), flexible (the rig has no initial constraints), independent of the shape and appearance of the model, and enhances the freedom of the artists (does not force the use of a predefined rig). Now, motionless and inanimate faces can come to life with the help of our technology.