

The ARP is a flexible toolkit for avatar system creation. Its purpose is to support our research into avatar technology and its applications. It achieves this by generalising and extending the facilities provided through standard avatar creation tools.

Current work focuses particularly on improving the realism of facial animation through the use of dynamic texturing and through improvements to morph target technology. We are also working on enhancement to real-time performance and realism through improved mesh-processing algorithms and the exploitation of recent developments in graphics card technology.

Avatar Technology and the ARP Avatar Toolkit

An avatar is implemented by first defining a deformable mesh, consisting of a large set of connected triangles, which represents the avatar's body surface, or "skin". Within this skin a connected set of bones is defined, to represent the avatar's virtual skeleton. Then a binding between the skin and the virtual skeleton is established, so that animation software can ensure that each change of skeleton configuration will cause an appropriate change in the appearance of the surface mesh.

Given this apparatus, the avatar can be animated on-screen simply by defining a suitable sequence of virtual skeleton configurations, which causes the matching surface mesh motions to be displayed. This avatar creation process is supported by a variety of 2-D and 3-D modelling tools. The ARP Avatar Toolkit provides a set of software tools which augment and refine these off-the-shelf facilities.

Toolkit unique features:

Feature point discovery

To meet eSign synthetic animation requirements, nearly 400 positions on the avatar's skin need to be mapped. This process is automated using ray tracing techniques from the avatar skeleton.



2D to 3D mapping

For dynamic textures, control points from a 2D shape model are mapped onto the avatar 3D face to provide control of facial animation.



Morph targets

For morph target facial animation, a library of mesh shapes that match phonemes and expressions (visemes) is needed (morph targets). The toolkit provides means for creating these and builds supporting functionality into the avatar.



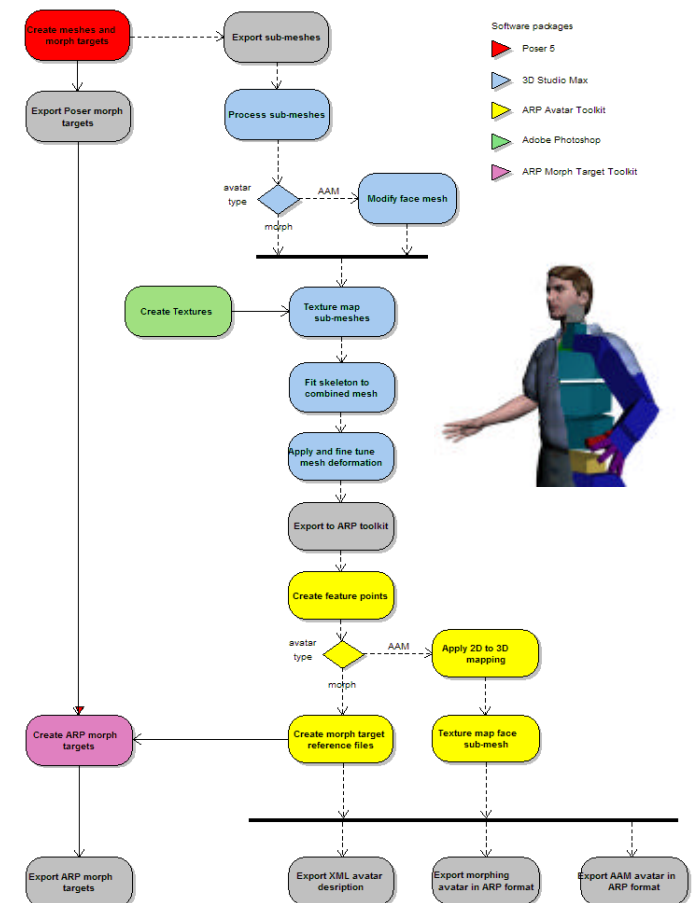
Dynamic textures

The toolkit adds functionality to the avatar for animating the face using data from shape and appearance models.



Avatar creation pipeline

The creation of a functioning avatar system is a highly complex process as the following workflow diagram shows.



For further information:

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