

# Rotoscoping Techniques for Virtual Characters Exploiting Augmented Reality

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## 1. Introduction

Modellers and animators often rely on real-life references to build and animate 3D characters for games or film production. Observing the real world by photographing or videotaping the subject, or asking someone to pose helps create more believable, precise and expressive character animation. Professional artists use motion capture techniques or other expensive means (such as the Monkey Kinematic Tracker) of acquiring motion data to create an essential initial data set for the final, refined animation.



**Figure 1.** Artists use a human model to draw sketches of human motion.



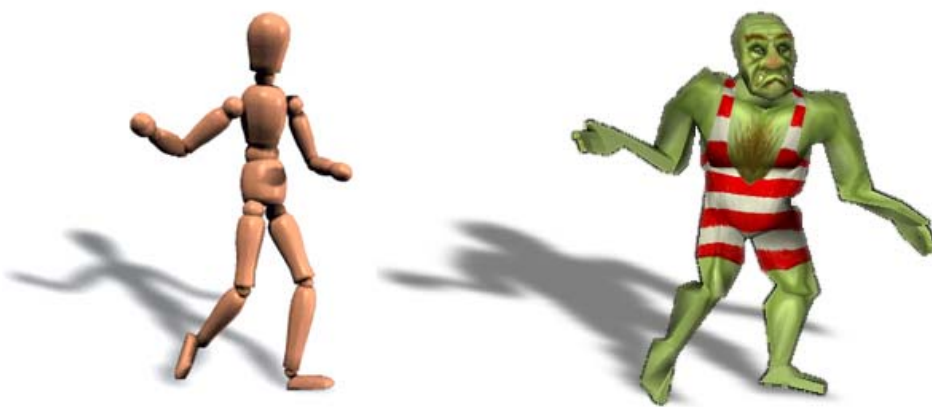
**Figure 2.** Real-life reference for a computer game animation



**Figure 3.** Using a live dog as a reference to animate the dragon in the anime Spirited Away

## 2. Exploiting Augmented Reality

Since physical and virtual objects appear to coexist in an Augmented Reality (AR) environment, new possibilities in character animation open up. The animated virtual model and the real-world reference can be merged into one, interactive modeling tool. The main goal of this project is to develop such a tool using pose-tracked physical objects as input devices to animate skeleton-based virtual 3D models. An important part of the project is to map the real-time pose information to rotation information for the joints of the character skeleton using Inverse Kinematics and motion mapping techniques. AR enables not only a close interaction with the virtual model by using tangible objects but also the creation of complex motions like walking up stairs or lifting a ball, since the animator can use the actual physical models of the stairs or the ball *together* with the character to create the motion.



**Figure 4.** A tangible, pose-tracked wooden mannequin serves as the input device to animate the virtual character. The position and orientation of the mannequin limbs are mapped to rotation values of the virtual character's skeletal joints

By recording sequential character poses as motion keyframes, animation sequences can be created, edited and replayed at any time of the authoring process.

### 3. Software and Hardware Setup

The application is based on the Studierstube (<http://www.studierstube.org>) collaborative AR software framework with an immersive AR setup using a Head-Mounted Display. For character animation the Cal3D (<http://cal3d.sourceforge.net>) open-source skeleton-based character animation library is used. The rotoscoping device is a wooden mannequin the limbs and the head of which are equipped with pose sensors.

### 4. Suggested reading

- 1.) Figure drawing techniques of artists (e.g. <http://www.figuredrawings.com/>)
- 2.) Selected papers on motion capture, keyframing and rotoscoping, motion mapping and motion transfer (to be discussed)
- 3.) Software to look at
  - Monkey Kinematic Tracker (<http://www.didi.com/www/areas/products/monkey2/>)
  - Character modelling tools in your choice of 3D modelling software
    - Character Studio (<http://www4.discreet.com/3dsmax/3dsmax.php?id=871>) or Bones Pro (<http://www.3dlinks.com/shop/ProductDescription.cfm?id=108>) for 3D Studio MAX
    - Maya character animation plugins
    - Poser (<http://www.curiouslabs.com/article/articleview/1156/1/281?sbss=281>)
    - etc.