

# Animation

## Breathing Life into Objects

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### The Potential

Fifteen years ago, making a movie like *Jurassic Park* would have required the use of sculptures, engineers, animatronics specialists, puppeteers, loads of man-hours, and hoards of money just to animate the dinosaurs. Luckily for Steven Spielberg, the world of digital animation is upon us.

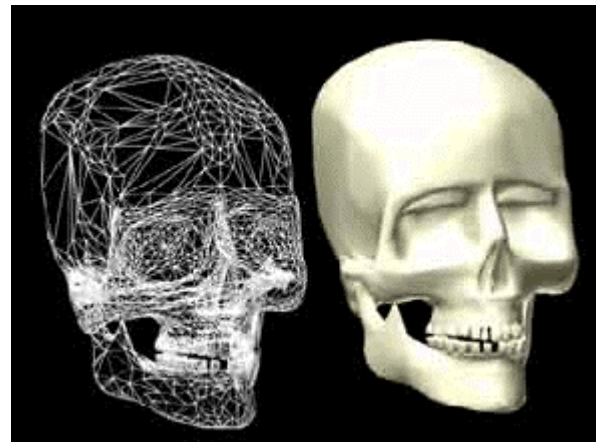
Animation is not a new concept. Cartoon flipbooks are older than photography. With the birth of film it was only natural for flipbooks to progress into *Loony Toons* and *Mickey Mouse*. The increase in the public's desire to see cartoons in the early half of the 20<sup>th</sup> century, led *Disney* to produce the first full-length animated feature films. As time went on, filmmakers and artists began incorporating animation and live footage into movies like *Animators*, where Gene Kelly danced alongside a cartoon mouse. Eventually, pioneers like Steven Spielberg and Jim Henson introduced puppets and animatronics to the world of animation.

Although animation has progressed extensively over the past one hundred years, it should come as no surprise that the digital revolution has changed everything. Today's animation labs are not packed with dozens of cartoonists and ink stains; they are lined with computers running complex graphics software. This software comes in a variety of forms, each configured towards a highly specialized need.

### 3-D Animation

Three-dimensional software is the latest form of digital animation. Slightly older than a decade, this new medium was popularized by the movie *Terminator II: Judgment Day*. These applications are more akin to sculpting than to drawing. An animator begins by creating a 3-D model, aptly called a wire mesh. Lines and vertices within the mesh form the polygonal surfaces, which make up the 3-dimensional object. More than twenty-two thousand polygons make up the surface of the skull<sup>1</sup> in this image. A component software called a *rendering engine* produces the actual image.

Perhaps the most powerful software in the world, rendering engines calculate all the information within the mesh, as well as lighting and camera information, and transform them into the two dimensional image seen on the computer screen.



A variety of 3-D applications are available, ranging in power and cost. *Maya*, the application used to create movies like *Jurassic Park*, is at the super complex, super performance, and super expensive end of the spectrum. Averaging at about \$17,000<sup>2</sup> per station (for a one year lease), *Maya* is designed to provide fluid animation and the ability to create organic models.

Perhaps the most important 3-D modeling application is *AutoCAD*. This highly specialized program is geared toward engineering and architectural development. Originally designed as a two-dimensional drafting tool, *AutoCAD* was one of the first commercial applications to venture into 3-D. It is now used by engineering firms to demonstrate working models, and by architects, as an alternative to expensive hand-made maquettes.

Slightly lower down the scale are applications like *3D Studio Max* and *Lightwave 3D*. These programs are often used to create video games and virtual reality simulators. With a cost of only about \$3,000, programs like these provide high-

powered simulations, without the high cost of *Maya*. As the technology improves, the disparity in strength between these mid-range applications and programs like *Maya* is constantly shrinking. Less expensive programs are available, some for as low as \$100. Unfortunately, much is sacrificed in the name of savings. Many of those programs, like *Infini-D*, have been taken off the market.

### On-line Animation<sup>3</sup>

The world of digital animation is not limited to films and simulators. Like everything else, animation is going on-line. Traditionally web animation was at best highly limited. In order to create an animation a web designer had to build layered images, which require massive download times. With the birth of *Java* things improved. *Java* scripts allowed web designers to create simple interactive animations, but they were still choosing between sacrificing image quality or increased download time.

The answer was vector animation. *Vector* images are based on mathematical equations, rather than pixels. In a *bitmap* image, such as a *JPEG*, each pixel's color information is stored as a separate piece of data. Because vector images do not use pixels, their file sizes are significantly smaller, plus they have the added bonus of being much clearer. Although vector graphics are not new, it was only a few years ago that they began being used in animation software. Once it was possible to animate with vector images, the World Wide Web became its greatest benefactor.



At the forefront of vector animation is *Flash*. Costing less than \$400 it is an inexpensive program, with the ability to create fully interactive animated web pages,

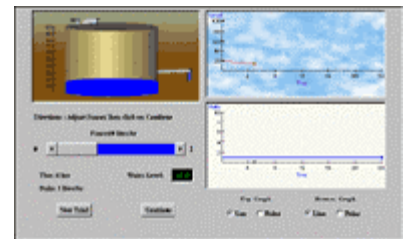
that can take less time to download than a regular HTML page with static images. A good example of a *Flash* website can be found at: <http://www.matinee.co.uk>. The only limitation to vector based web pages, is that they require a plug-in to be viewed. Although most of these plug-ins are free, many people do not want to spend time downloading software. Fortunately, both *Netscape 5.0* and *Explorer 5.0* already include most of the necessary plug-ins, including the *Flash* viewer.

### Applications

As the technology grows the need and uses of animation also grow. Already, animation is being used in fields where only five years ago it would have been considered impractical. Interactive CD-ROMs are used for portfolio presentations. Architectural firms are using 3-D fly-overs as a visual tool for their clients. Engineers also use 3-D animations to demonstrate their own working models. Over the web, animations are used for job training and classroom exercises. The growth of interactive animations is even allowing developers to create on-line laboratory simulators, like the one seen below.

<http://www.public.iastate.edu/~abc/java/budgetsim/budgetsim.html>

Where is animation right now? The increasing number of web animators is producing new enthusiasm towards the World Wide Web; artists are finding a new media; classrooms are using animations to replace expensive laboratories; the military are using animated simulators to train pilots and navigators; and doctors are using interactive animations to rehearse surgery. What does the future hold? The human imagination is the limit.



<sup>1</sup> *3D Skull* model from *3DCafe.com*.

<sup>2</sup> All quoted prices are Standard Retail Prices from November 2000.

<sup>3</sup> Introduction à la Physique Quantique (<http://www.cesam.qc.ca/site-eduweb/c2k/0606/index.htm#>) is an example of the use of animation programs which associate arts to scientific information and capture people's attention.