Scene from "The Abyss"
- 1989

Honors 208W
Fall 2011

Some of the History of Research and Digital Images

Computer-Generated Images

Much of what we see of computer-generated images are in television shows and movies.

There is a rich history of research that has allowed this technology to advance to the point it has, but there is still a great amount of room to grow.

As processing power has become more affordable, some of this research has migrated to our desktop and laptop computers.

1972) 3D Hand

Graduate students Edwin Catmull and Frederic Parke created a 3D computer animation of a hand (it ended up worked into “Futureworld” in 1976).

http://vimeo.com/16292363

Catmull went on to be the first CTO of Pixar.

1974) Artificial Faces

Fred Parke went on to work on artificial facial animations as well.

http://www.youtube.com/watch?v=SPMFhcC4SvQ

1978) Battlestar Galactica

Computers were quite costly, and real-time displays generally unimpressive by today's standards…

Battlestar Galactica
1978

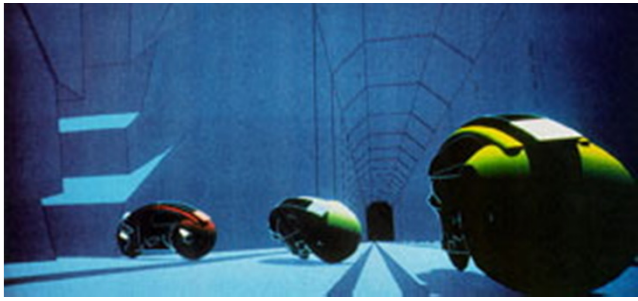
1982) Star Trek: The Wrath of Khan

Though "Futureworld" used some 3D computer-generated, the computer-generated simulation of the Genesis Effect on a planet in "Star Trek: The Wrath of Khan" from the early-80s is typically attributed as the first major use of 3D CGI in a motion picture.

http://www.youtube.com/watch?v=Qe9qSLYK5q4

Some of the research behind work done on this effect was published in journals such as the ACM's "Transactions on Graphics".

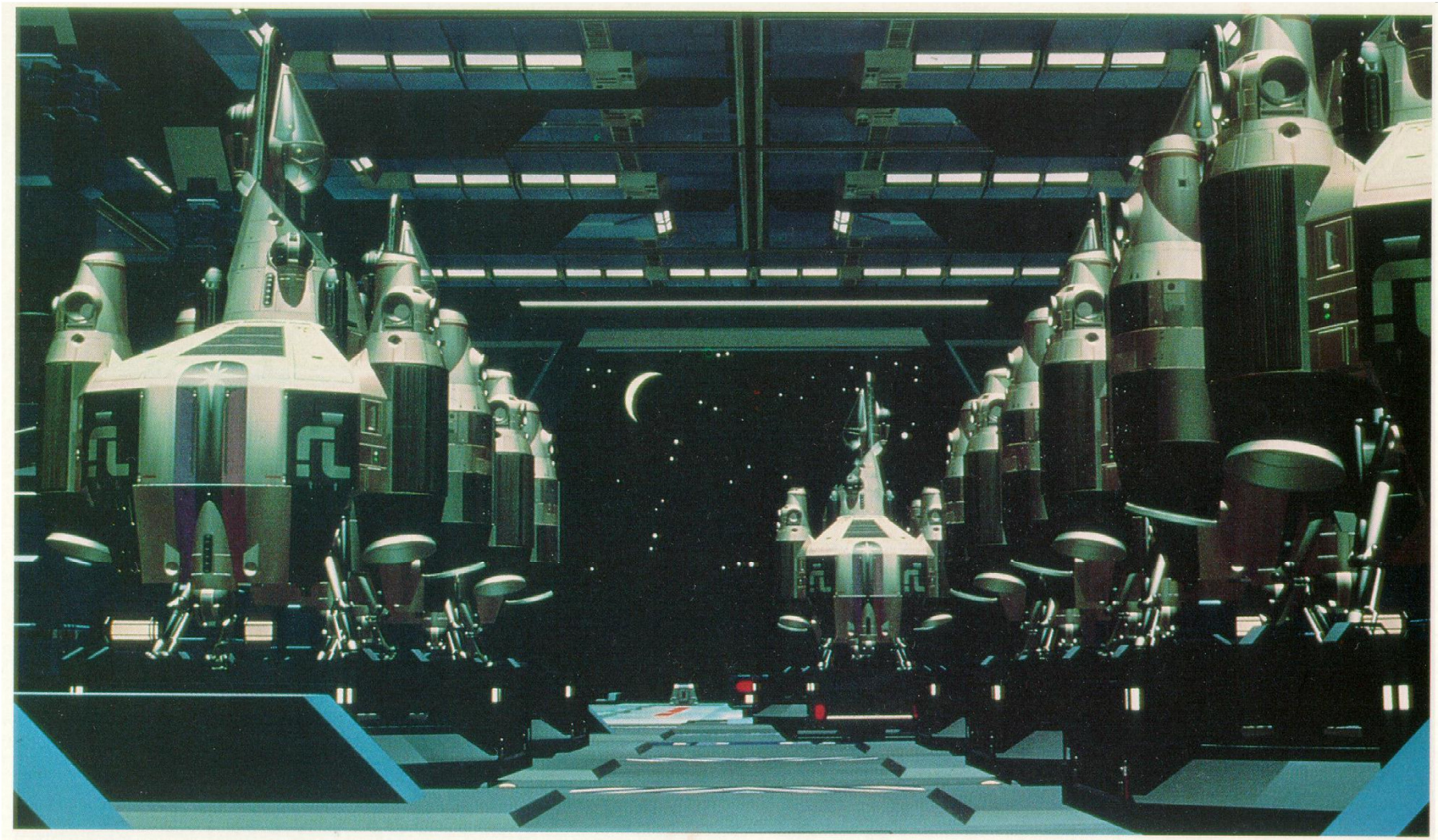
1982) Tron



"Tron" is another 1982 film with CG, though it mixed significant computer-generated material with live-action. http://www.youtube.com/watch?v=-3ODe9mqoDE

1984) The Last Starfighter

"The Last Starfighter" also relied on a significant amount of computer-generated material.

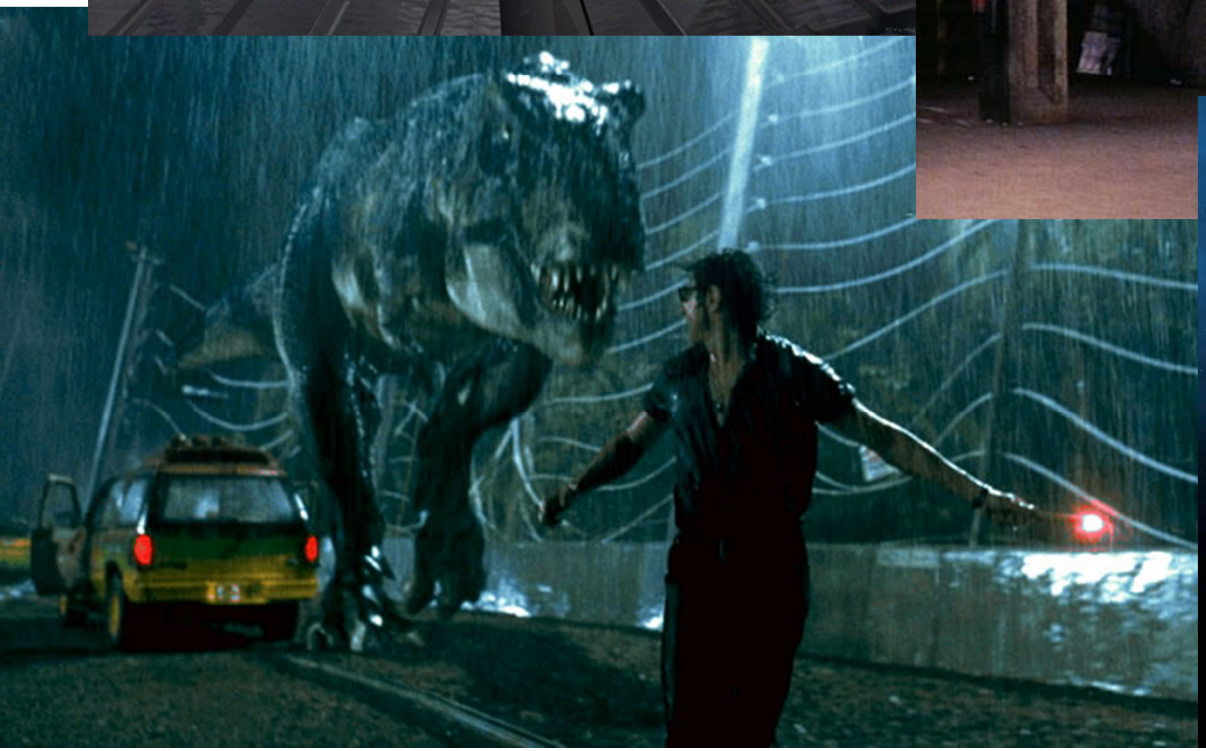


1985) Young Sherlock Holmes

Fictional creatures give some “wiggle room” on what is considered realistic appearance.

http://www.dailymotion.com/video/xa1wun_young-sherlock-holmes-stained-glass_shortfilms

Things got bolder and better…



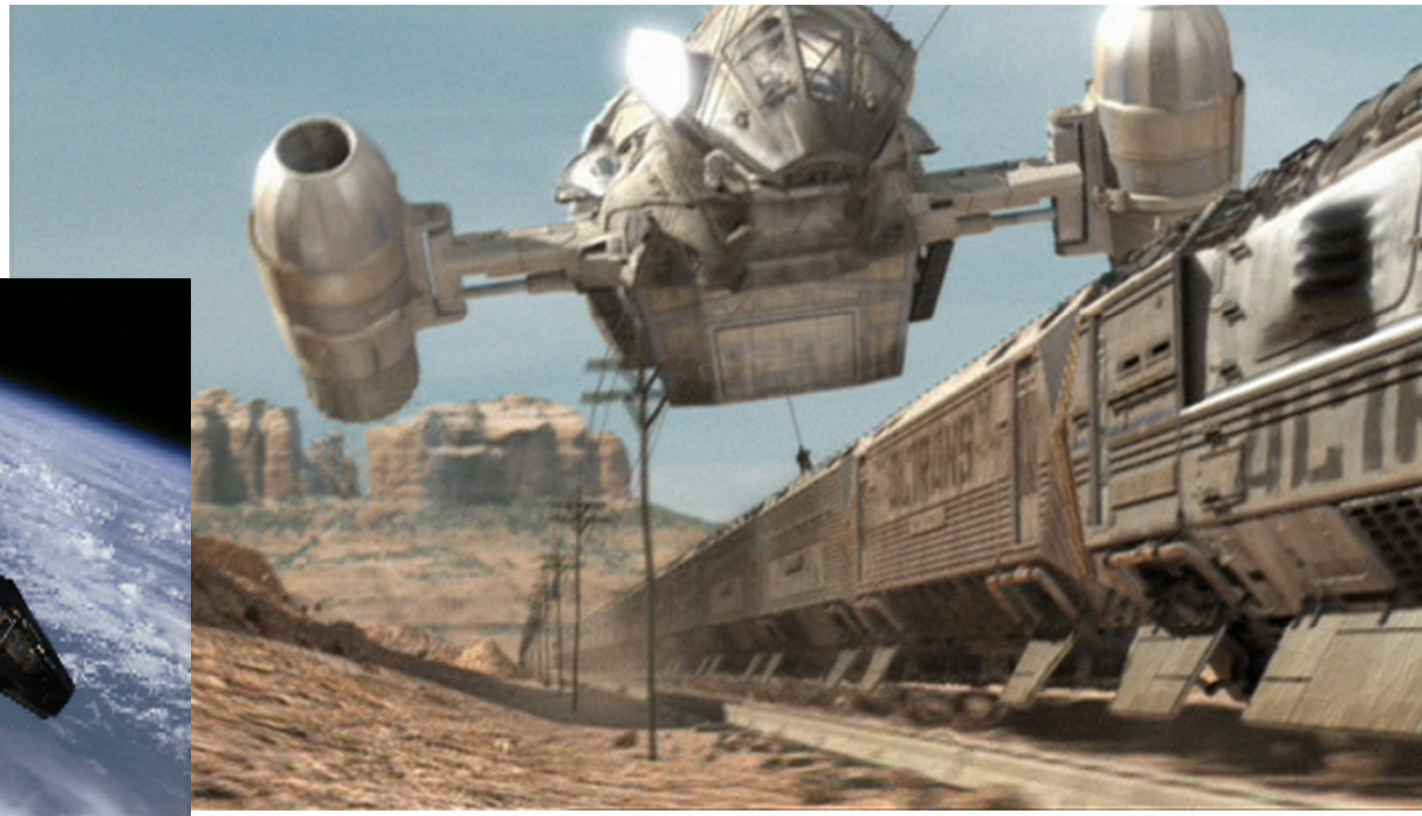
Things got bolder and better…

CG use in movies moved from an expectation of things looking like good computer generated imagery to the desire for it to look like it was done with models or was real.

Computer graphics have taken a much greater role in special effects, going to the point of replacing most models, and even some actors…

2002) Firefly

Planets and spaceships created with CG. Realistic motion blur and zoom effects helped make things feel more real.



2009) Avatar

Performance capture technology allowed humans to act and then be replaced with computer-generated characters based on them.

Fire and Water

Two effects that often proved to be a challenge were that of fire and water. Why do you think this was the case?

http://www.youtube.com/watch?v=Ci6wuvA-z2Y

http://www.youtube.com/watch?v=leQWKkIiJMI

Automated Modifications

Tools such as Photoshop and GIMP have a variety of tools to alter an image (artistic styles, distortions, addition of effects, etc).

- Digital manipulations that we have available in low-cost (or free) tools today required hours, days, weeks, months with the algorithms and processing powers available twenty years ago.

One area of research that seems like it could have promise is gaze-based editing. The computer can use cameras to track where you are looking within an image, and adjust the automated modifications within that context.

Gaze Example: Original Photo

Gaze Example: Automated Abstraction

Too little abstracted out…

Too much abstracted out…

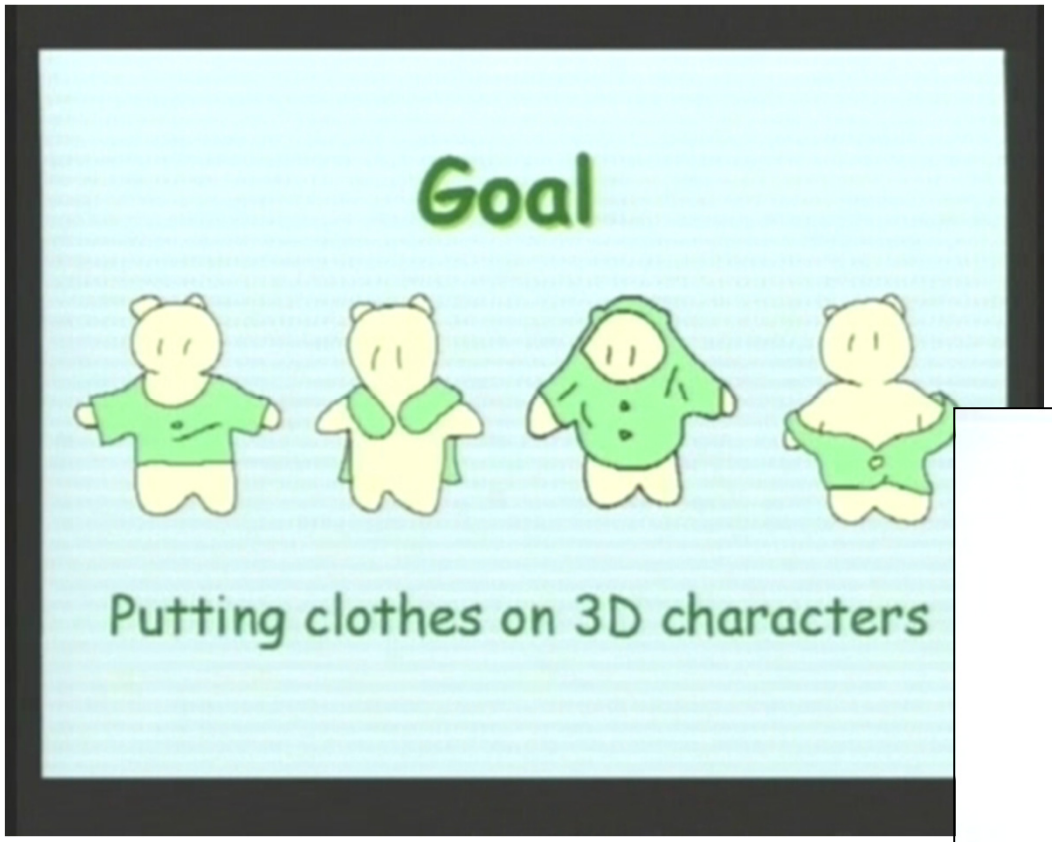
Gaze Example: With Eye Tracking

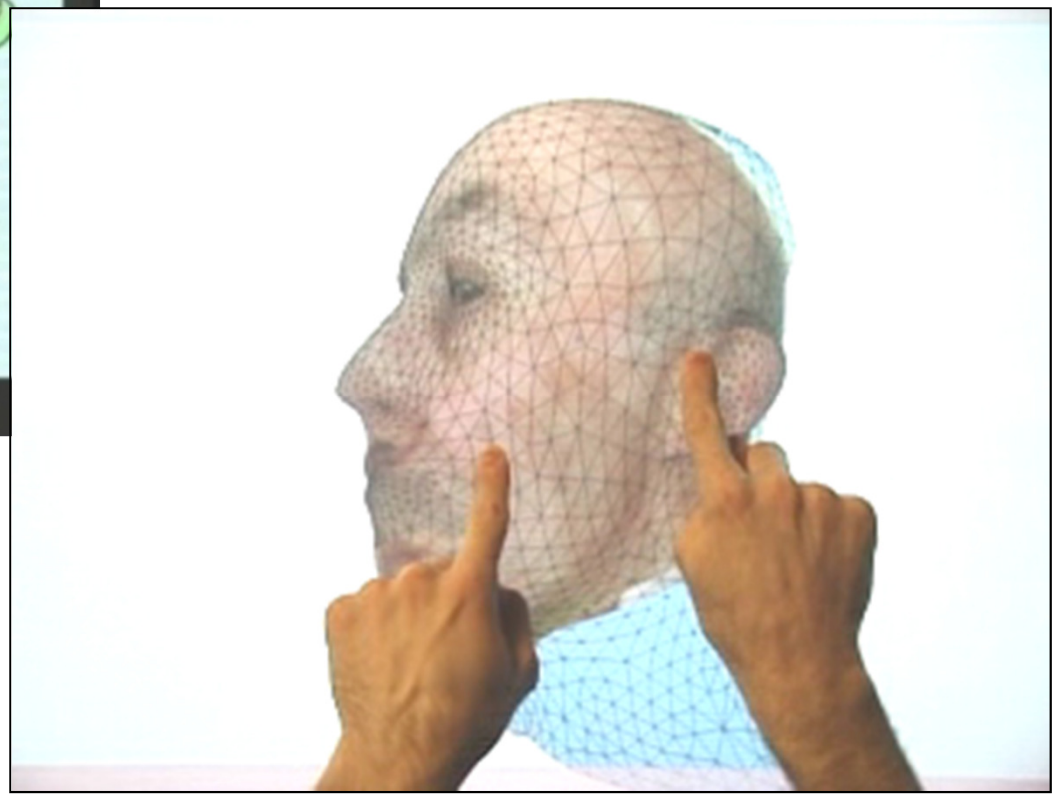
Can a computer help you paint?

- "Projector-Guided Painting" by Matthew Flagg and James M. Rehg - Georgia Institute of Technology

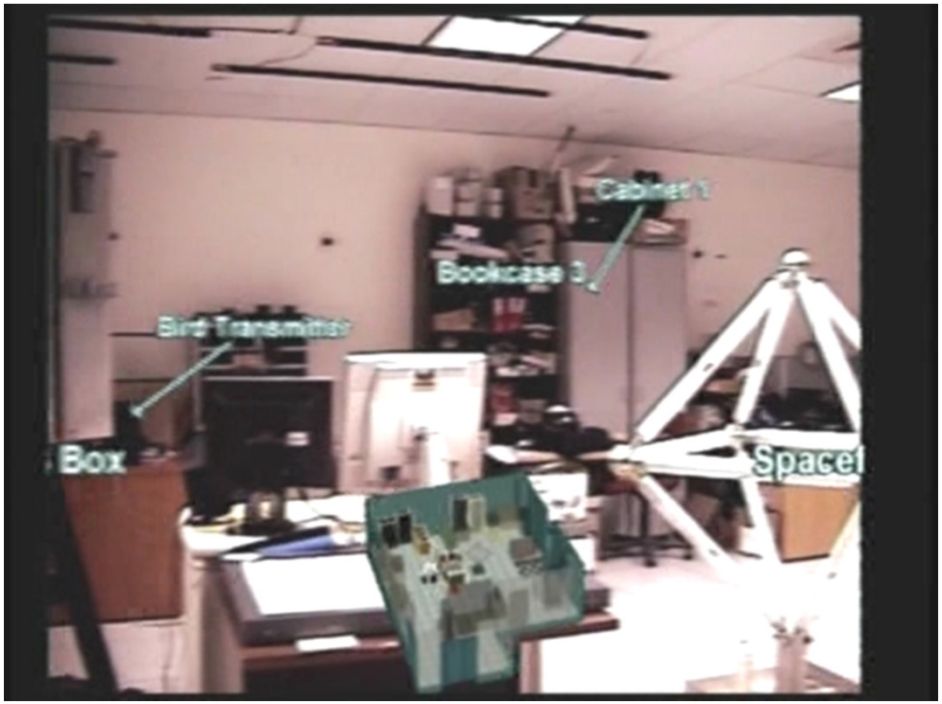
Video on YouTube: http://youtube.com/watch?v=B0g7Q_wCLXU

Real-Time 3D Manipulations





Real-Time Augmented Reality



Some resources:

http://accad.osu.edu/~waynec/history/lesson6.html
http://portal.acm.org/citation.cfm?doid=357318.357320
http://athos.rutgers.edu/~decarlo/abstract.html
http://vis.berkeley.edu/papers/cropping/
http://portal.acm.org/toc.cfm?id=571985
http://portal.acm.org/toc.cfm?id=1124772
http://portal.acm.org/toc.cfm?id=1166253