Week_17Animation

01/14/2026 Computer Animation

Opening Prayer: (From Psalms 32)

Then I acknowledged my sin to you
and did not cover up my iniquity.
I said, "I will confess
my transgressions to the Lord."
And you forgave
the guilt of my sin.
Therefore let all the faithful pray to you
while you may be found;
surely the rising of the mighty waters
will not reach them.
You are my hiding place;
you will protect me from trouble
and surround me with songs of deliverance.

Welcome Students to
Computer Animation - Today we will learn more about animation through Computer Science and more!

First (as a warmup) lets look a little deeper into one of the principals of Animation, And watch a short video.

What is Onion Skinning?

What is the Principal of Timing?

Lets dig deeper into the first Principal of Animation:

Short video:
https1://www.youtube.com/watch?v=NzoL9nLPZyo

Next, we will look at another aspect of
Computer Animation, what is the science behind the software, and who was the inventor of Computer

Animation, lastly we will watch a short video.

What really is Computer Animation?

According to Bratannica.com

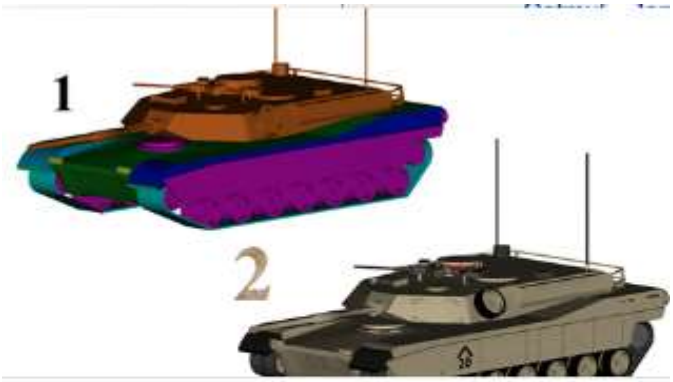
computer animation, also called computer-generated imagery (CGI), form of animated graphics using computers that replaced both “stop-motion”animation of scale-model puppets and hand-drawn animation of drawings. Efforts to lessen the labor and costs of animation have led to simplification and computerization.

Computers can be used in every step of sophisticated animation—for example, to automate the movement of the rostrum camera or to supply the in-between drawings for full animation. When a three-dimensional figure is translated into computer terms (digitized), the computer can generate and display a sequence of images that seem to move or rotate the object through space. Hence, computer animation can simulate highly complex motion for medical and other scientific researchers as well as for feature films.

Next lets think about this, who would like to work in the animation business maybe in the computer graphics, advertising, or film making business?

There is a Computer Scientist with a PHD (Doctoral Degree) from the university of Utah and his Bachelors Degree in both

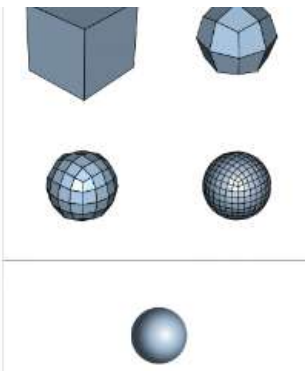
physics and Computer Science. He is known for Texture Mapping, Catmull-Rom spine, and Catmul-Clark subdivision surface; What does that mean?



Texture mapping is a method for mapping a texture on a computer-generated graphic. Texture here can be high frequency detail, surface texture, or color.

In numerical analysis, a **cubic Hermite spline** or **cubic Hermite interpolator** is a spline where each piece is a third-degree polynomial specified in Hermite form, that is, by its values and first derivatives at the end points of the corresponding domain interval.

The **Catmull–Clark** algorithm is a technique used in 3D computer graphics to create curved surfaces by using subdivision surface modeling. It was devised by Edwin Catmull and Jim Clark in 1978 as a generalization of bi-cubic *uniform* B-spline surfaces to arbitrary topology.



Who is this Catmull ?

Edwin Catmull

Catmull in 2015

Born	Edwin Earl Catmull March 31, 1945 (age 79) Parkersburg, West Virginia, U.S.
Alma mater	University of Utah (B.S. Physics and Computer Science; Ph.D. Computer Science)
Known for	Texture mapping Catmull–Rom spline Catmull–Clark subdivision surface[2]
Spouse	Susan Anderson
Children	3
Awards	Academy Award (1993, 1996, 2001, 2008) IEEE John von Neumann Medal (2006) Computer History Museum Fellow (2013) ACM Turing Award (2019)
	Scientific career
Fields	Computer science
Institutions	New York Institute of Technology Pixar Animation Studios Walt Disney Animation Studios
Thesis	*A Subdivision Algorithm for Computer Display of Curved Surfaces* (1974)
Doctoral advisor	Robert E. Stephenson[1]

Creativity, Inc.: Overcoming the Unseen Forces That Stand in the Way of True Inspiration is a 2014 book, written by Edwin Catmull and Amy Wallace, about managing creativity in business.[1]

As a co-founder of Pixar, Catmull discusses the environment and ideals he and his colleagues built at the company that made it so popular and profitable.[2]

Background [edit]

In the book, Catmull describes growing up idolizing Walt Disney, as well as moving to and growing up in Utah as a child.

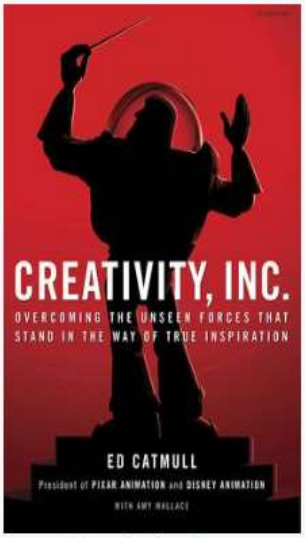
Despite his interests in animation, he pursued studies in math, physics, and computer science in college, as a PhD student at the University of Utah.[3][4]

Eventually, this led him to a graduate degree under Ivan Sutherland, the "father of computer graphics," also at the University of Utah. Many decades before computer animation existed, Catmull began developing the programming to do 2D and 3D computer graphics. During this time, he was recruited to work at Lucasfilm, becoming vice president of Industrial Light and Magic's computer graphics division. In 1986, Steve Jobs bought that division and co-founded Pixar Animation Studios with Catmull and John Lasseter. There, Catmull soon became Chief Technical Officer.[5]

Reception [edit]

The New York Times said, "Catmull's book is quickly becoming the latest bible for the show business crowd." The book has also garnered positive reviews from *The Wall Street Journal*, *Publishers Weekly*, and *Financial Times*.[3][5][6][7]

Creativity, Inc.: Overcoming the Unseen Forces That Stand in the Way of True Inspiration



Paperback edition

Authors	Edwin Catmull and Amy Wallace
Language	English
Genre	Business, economics
Publisher	Transworld Publishers Limited
Publication date	April 8, 2014
Publication place	United States
Media type	Print
Pages	320

Early in his life, Catmull found inspiration in Disney movies, including Peter Pan and Pinocchio, and wanted to be an animator; however, after finishing high school, he had no idea how to get there as there were no animation schools around that time.

Because he also liked math and physics, he chose a scientific career instead. He also made animation using flip-books. Catmull graduated in 1969, with a B.S. in physics and computer science from the University of Utah.

Edwin Catmull's main goal and ambition were to make digitally realistic films. During his time at the university, he made two new fundamental computer-graphics discoveries: texture mapping and bicubic patches; and invented algorithms for spatial anti-aliasing and refining subdivision surfaces. Catmull says the idea for subdivision surfaces came from mathematical structures in his mind when he applied B-splines to non-four sided objects. He also independently discovered Z-buffering,in his PhD thesis.

In 1972, Catmull made his earliest contribution to the film industry: a one-minute animated version of his left hand, titled A Computer Animated Hand, created with Fred Parke at the University of Utah.

This short sequence was eventually picked up by a Hollywood producer and incorporated in the 1976 film Future world, which was the first film to use 3D computer graphics.

In 1974, Catmull earned his doctorate in computer science,and was hired by a company called Applicon. he invented Tween, software for 2D animation that automatically produced frames of motion in between two frames.

Here is a interesting FACT:
Catmull's team lacked the ability to tell a story effectively via film.

Unable to produce a motion picture via a computer. Catmull and his partner,

attempted to reach out to studios to alleviate this issue, but were generally unsuccessful until they attracted the attention of George Lucas at Lucasfilm.

Note: Ed Catmull is the Scientist behind Computer Animation.

He has won several awards & Oscars for his pioneering work in computer graphics, animation and filmmaking.

As students of Computer Animation,
Ed Catmull is a name you should remember.

Catmull is the inventor of much of what we see and the computer tools we use in Computer Animation.

Next lets watch a short video:
https1://www.youtube.com/watch?v=MSkeNmz7v4M