Eyes are the most developed sensors of our body; with an image an information can be learned much faster than explaining it verbally. Computer graphics are the best way to transfer information from data to human brain via eyes. Computer generated images are very efficient and widely used in public media, on hospitals and in scientific material. A well-crafted graph can show different statistics in a very efficient way or a 3 dimensional movie of human body can teach a lot of things about biology.

Computer Graphics represents everything on a computer that it is neither text nor sound. Computer graphics includes but not limited to,

* Manipulation of images,
* Creation of animation and images,
* Processing and simulating various scientific experiments.

Oscilloscope

An oscilloscope is a device to reflect electric waves. Electrons which are coming from a cathode tube gets manipulated via magnets to reflect wave on a phosphorus surface. Visualizing electric helps to understand electricity and to develop new electronic components. Besides that oscilloscopes brought the idea of reflecting something via electrical waves. First game created for such devices was a tennis game, and it was played by two person and players could use a knob to control the angle and click a button to hit the ball.

Animation and CGI

3D animation is a process that involves taking fully 3D objects (whether they are physical or digital) and making them animate and move. Most 3D animation today is done using CGI (computer-generated imagery). The first cinema feature movie to make extensive use of solid 3D CGI was Walt Disney's Tron. Although it has been used in films since the 1980s, it wasn’t used in large quantities until 1995, when Pixar Animation Studios released the first all-CGI film ever made, Toy Story.

# **Cgı-Computer Generated Imagery**

CGI  is the application of [computer graphics](https://en.wikipedia.org/wiki/Computer_graphics) to create or contribute to images in art, printed media, video games, films, television programs, commercials, videos, and simulators. The visual scenes may be dynamic or static, and may be two-dimensional (2D), though the term "CGI" is most commonly used to refer to [3D computer graphics](https://en.wikipedia.org/wiki/3D_computer_graphics) used for creating scenes or special effects in films and television.

**3d Anımatıon Softwares**

The 80s saw the appearance of many notable new commercial software products:

* **Autodesk Inc. – 3D Studio**
* **Softimage**
* **Side Effects Software**

Other notable softwares in 1990as and2000s:

* **Autodesk Maya**
* **Blender**
* **Cinama4D**

Some techniques of CGI are:

## **Flocking:**

[Flocking](https://en.wikipedia.org/wiki/Flocking_(behavior)) is computer model of coordinated animal motion such as bird flocks.  The mathematical model of flocking behavior was first simulated on a computer with an artificial life program devoloped by [Craig Reynolds](https://en.wikipedia.org/wiki/Craig_Reynolds_(computer_graphics)) in 1986, and soon started to be used in animation.

**Motion capture:**

[Motion capture](https://en.wikipedia.org/wiki/Motion_capture), or "Mocap", is the technology that enables the process of translating a live performence into a digital performence with collecting data that represents motion. . A performer wears markers near each joint to identify the motion by the positions or angles between the markers. Many different types of markers can be used—lights, reflective markers, LEDs, infra-red, inertial, mechanical, or wireless RF—and may be worn as a form of suit, or attached direct to a performer's body.

**Match moving(motion tracking/camera tracking):**

Match moving ,unlike to motion capture, instead of using special cameras and markers to record the motion, uses pre-existing live-action footage and computer software to track specific points in the scene. Therefore, allows the insertion of CGI elements into the shot with correct position, scale, orientation, and motion relative to the existing material. The technique can be 2D or 3D, and can also include matching for camera movements.

**Virtual studio**

In television, a virtual studio, or virtual set, is a studio that allows the real-time combination of people or other real objects and computer generated environments and objects in a seamless manner.

ImagesImages are data usually captured by a camera or a scanner or created by a computer. Those images has two basic types: vector and raster. Vector type pictures does not have much different formats but raster type images have a lot of different formats that server for different purposes. Therefore, there is no universal image format that is best for all scenarios. Every type of image format has their own advantages and disadvantages. Here is a summation of each image format, their pros and cons, as well as when and where it’s best to use them. Print Graphics: TIFF is the best and only choice for professionals when images are intended for print. Its ability to read CMYK and YcbCr color, plus its ability to store such high pixel intensity makes it the only choice for designers, photographers and publishers.Web Graphics: PNG, JPEG and GIF are the most web friendly image formats there is. JPEG is great for images when you need to keep the size small, such as when you need to upload it online. If you don’t mind compromising the quality of the image a bit, use JPEG. If you want to keep the size small, but still retain the image quality, use PNG. GIF is the worst choice, although file sizes are very small, and they load very fast. Plus, if you want to add animation effects, use GIF.

***What is Image Processing?***

***Image processing*** is a method to convert an image into digital form and perform some mathematical operations on it, in order to get an enhanced image or to extract some useful information from it. It is a type of signal dispensation in which input is image, like video frame or photograph and output may be image or characteristics or parameters associated with that image. Usually ***Image Processing*** system includes treating images as two dimensional signals while applying already set signal processing methods to them.

It is among rapidly growing technologies today, with its applications in various aspects of a business. Image Processing forms core research area within engineering and computer science disciplines too. In computer graphics, images are manually madefrom physical models of objects, environments, and lighting, instead of being acquired (via imaging devices such as cameras) from natural scenes, as in most animated movies. Computer vision, on the other hand, is often considered high-level image processing out of which a machine/computer/software intends to decipher the physical contents of an image or a sequence of images (e.g., videos or 3D full-body magnetic resonance scans).

**Image processing basically includes the following three steps:**

·Importing the image with optical scanner or by digital photography.

·Analyzing and manipulating the image which includes data compression and image enhancement and spotting patterns that are not to human eyes like satellite photographs.

·Output is the last stage in which result can be altered image or report that is based on image analysis.

***Purpose of Image Processing***

The purpose of image processing is divided into 5 groups. They are:

1.Visualization - Observe the objects that are not visible.

2.Image sharpening and restoration - To create a better image.

3.Image retrieval - Seek for the image of interest.

4.Measurement of pattern – Measures various objects in an image.

5.Image Recognition – Distinguish the objects in an image.

Donald Peter Greenberg

In 1971, Greenberg produced an early sophisticated computer graphics movie, Cornell in Perspective, using the General Electric Visual Simulation Laboratory with the assistance of its director, Quill and Dagger classmate Rodney S. Rougelot. Greenberg also co-authored a series of papers on the Cornell Box.

Aaron Marcus From

In 1969-71, he programmed a prototype desktop publishing page-layout application for AT&T Bell Labs. In 1971-73, he claims to have programmed some of the first virtual reality art/design spaces ever created while a faculty member at Princeton University. In the early 1980s, he was a Staff Scientist at Lawrence Berkeley Laboratory in Berkeley, as well as a faculty member of the University of California at Berkeley’s College of Environmental Design.[3] In 1982, he founded Aaron Marcus and Associates, Inc. (AM+A), a user-interface design and consulting company, one of the first such independent, computer-based design firms in the world.

A.Michael Noll

Noll used a digital computer to create artistic patterns and formalized the use of random and algorithmic processes in the creation of visual arts. Noll constructed interactive three-dimensional input devices and displays and a three-dimensional, tactile, forcefeedback ("feelie") device (US patent 3,919,691 "Tactile Man-Machine Communications System" filed May 26, 1971, issued November 1, 1975). This device was the forerunner of today's virtual-reality systems, and Noll suggested its use as a way for the blind to "feel" computer graphics.

Pierre Bézier Pierre Étienne Bézier was a French engineer and one of the founders of the fields of solid, geometric and physical modeling as well as in the field of representing curves, especially in CAD/CAM systems. As an engineer at Renault, he became a leader in the transformation of design and manufacturing, through mathematics and computing tools, into computer-aided design and three-dimensional modeling.

John Carmack Carmack has pioneered or popularized the use of many techniques in computer graphics, including "adaptive tile refresh" for Commander Keen, raycasting for Hovertank 3-D, Catacomb 3-D, and Wolfenstein 3-D, binary space partitioning which Doom became the first game to use, surface caching which he invented for Quake, Carmack's Reverse (formally known as z-fail stencil shadows) which he devised for Doom 3, and MegaTexture technology, first used in Enemy Territory: Quake Wars.Carmack's engines have also been licensed for use in other influential first-person shooters such as Half-Life, Call of Duty and Medal of Honor.