



# SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)

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COIMBATORE-641 035, TAMIL NADU



## UNIT I

### Introduction to Computer Graphics

- The term 'Computer Graphics' was coined by Verne Hudson and William Fetter from Boeing who were pioneers in the field. Computer graphics is a dynamic and essential field within computing that involves the creation, manipulation, and rendering of visual content using computers.  
In today's digital era, computer graphics technologies have revolutionized how we perceive and interact with visual information, playing a pivotal role in video games, movies, architectural design, medical imaging, and more. There are several tools used for the implementation of Computer Graphics. The basic is the graphics.h header file in Turbo-C, Unity for advanced, and even OpenGL can be used for its Implementation.  
This article delves into the fundamental concepts of computer graphics, its diverse applications, and the underlying technologies that drive innovation in this field.

### **What is Computer Graphics?**

Computer Graphics including digital images, animations, and interactive graphics used in various sectors such as entertainment, education, scientific visualization, and virtual reality. Computer Graphics can be used in [UI design](#), rendering, geometric objects, animation, and many more. In most areas, computer graphics is an abbreviation of CG.

### **Computer Graphics refers to several things**

- The manipulation and the representation of the image or the data in a graphical manner.
- Various technology is required for the creation and manipulation.
- Digital synthesis and its manipulation.

**Computer graphics** is a wide-ranging topic that covers **rendering, modeling, and visualization techniques**

### Types of Computer Graphics

- **Raster Graphics:** In raster, graphics pixels are used for an image to be drawn. It is also known as a [bitmap image](#) in which a sequence of images is into smaller pixels. Basically, a bitmap indicates a large number of pixels together.
- **Vector Graphics:** In [vector graphics](#) , mathematical formulae are used to draw different types of shapes, lines, objects, and so on.

### Applications of Computer Graphics

**There are many applications of computer graphics discussed below-**

- **Computer Graphics are used for the aided design of systems engineering and architectural systems-** These are used in electrical automobiles and electro-mechanical, and electronic devices. For example gears and bolts.
- **Computer Art – MS Paint.**
- **Presentation Graphics –** It is used to summarize financial statistical scientific or economic data. For example- Bar charts systems and line charts.
- **Entertainment-** It is used in motion pictures, music videos, and television gaming.
- **Education and training-** It is used to understand the operations of complex systems. It is also used for specialized systems such as framing for captains, pilots, and so on.
- **Visualization-** To study trends and patterns. For example- Analyzing satellite photos of earth.
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## Why are Computer Graphics used?

Imagine a car manufacturing company that wants to showcase its vehicle sales over the past decade. Storing and presenting this huge amount of data can be both time-consuming and memory-intensive. Furthermore, it can be difficult for the average person to understand. In such cases, by using graphics can be a more effective solution. By using charts and graphs to visually signify the data, it becomes much easier to understand and analyse the data.

Interactive computer graphics utilize a two-way communication concept between users and computers. The computer receives input signals from the user, and the picture is modified accordingly. When a command is applied, the picture updates promptly.

## Applications of Computer Graphics

**Computer graphics** is the part of computer science that studies methods for manipulating visual content although computer graphics deals with 3D graphics, 2D graphics, and image processing. It also deals with the creation, manipulation, and storage of different types of images and objects. There are some of the applications of computer graphics are described below.:

- **Computer Art:** Using computer graphics we can create fine and commercial art which includes animation packages, and paint packages. These packages provide facilities for designing object shapes and specifying object motion. Cartoon drawings, paintings, and logo designs can also be done.
- **Computer-Aided automobiles Drawing:** Designing buildings, automobiles, and aircraft is done with the help of computer-aided drawing, this helps in providing minute details to the drawing and producing more accurate and sharp drawings with better specifications.
- **Presentation Graphics:** For the preparation of reports or summarising the financial, statistical, mathematical, scientific, and economic data for research reports, and managerial reports, moreover creation of bar graphs, pie charts, and time charts, can be done using the tools present in computer graphics.

- **Entertainment:** Computer graphics find a major part of its utility in the movie industry and game industry. Used for creating motion pictures, music videos, television shows, and cartoon animation films. In the game industry where focus and interactivity are the key players, computer graphics help in efficiently providing such features.
- **Education:** Computer-generated models are extremely useful for teaching huge number of concepts and fundamentals in an easy-to-understand and learn manner. Using computer graphics many educational models can be created through which more interest can be generated among the students regarding the subject.
- **Training:** Specialised systems for training like simulators can be used for training the candidates in a way that can be grasped in a short span of time with better understanding. The creation of training modules using computer graphics is simple and very useful.
- **Visualization:** Today the need of visualize things have increased drastically, the need of visualization can be seen in many advanced technologies, data visualization helps in finding insights into the data, to check and study the behavior of processes around us we need appropriate visualization which can be achieved through proper usage of computer graphics.
- **Image Processing:** Various kinds of photographs or images require editing in order to be used in different places. Processing of existing images into refined ones for better interpretation is one of the many applications of computer graphics.
- **Machine Drawing:** Computer graphics are very frequently used for designing, modifying, and creating various parts of a machine and the whole machine itself, the main reason behind using computer graphics for this purpose is the precision and clarity we get from such drawing is ultimate and extremely desired for the safe manufacturing of machine using these drawings.
- **Graphical User Interface:** The use of pictures, images, icons, pop-up menus, and graphical objects helps in creating a user-friendly environment where working is easy and pleasant, using computer graphics we can create such an atmosphere where

everything can be automated and anyone can get the desired action performed in an easy fashion.

These are some of the applications of computer graphics due to which it's popularity has increased to a huge extent and will keep on increasing with the progress in technology.

Example of Computer Graphics Packages:

- LOGO
- COREL DRAW
- AUTO CAD
- 3D STUDIO
- CORE
- GKS (Graphics Kernel System)
- PHIGS
- CAM (Computer Graphics Metafile)
- CGI (Computer Graphics Interface)