1. Applications of Computer Graphics & Multimedia

Contents

Introduction

Computer Graphics (CG) is the field of visual computing, where one utilizes computers both to generate visual images synthetically and to integrate or alter visual and spatial information sampled from the real world. Computer Graphics is the pictorial representation and manipulation of data by a computer.

Applications of Computer Graphics

Early use of computer graphics are

➢ Data Visualization

– Charts and Graphs

➢ Computer Aided Design (CAD).

Now a days we use in different sectors that are

➢ Virtual Reality

o VR: User interacts and views with a 3D world using "more natural" means

o Best VR

➢ Data Visualization

o Scientific, Engineering, Medical data

o Visualizing millions to billions of data points

o See trends

o Different schemes

➢ Education and Training

o Models of physical, financial, social systems

o Comprehension of complex systems

➢ Computer Art

o Fine and commercial art

- o Performance Art
- o Aesthetic Computing
- o SIGGRAPH (Special Interest Group on Graphics and Interactive Techniques)
- ➢ Games/Movies
- ➢ Image Processing
  - o Manipulating images using efficient algorithm.
- ➢ Graphical User Interfaces (GUIs)
  - o WIMP interface (Windows,Icons,Menus,pointers)
  - o HCI

1.1 Computer graphics in CAD

A major use of computer graphics is in design processes, particularly for engineering and architectural systems. For some design applications; objects are first displayed in a wireframe outline form that shows the overall sham and internal features of objects.

Software packages for CAD applications typically provide the designer with a multi-window environment. Each window can show enlarged sections or different views of objects. Standard shapes for electrical, electronic, and logic circuits are often supplied by the design package. The connections between the components have been mad automatically.

- ➢ Animations are often used in CAD applications.
- ➢ Real-time animations using wire frame displays are useful for testing performance of a vehicle.
- ➢ Wire frame models allow the designer to see the interior parts of the vehicle during motion.
- ➢ When object designs are complete, realistic lighting models and surface rendering are applied.
- ➢ Manufacturing process of object can also be controlled through CAD.
- ➢ Interactive graphics methods are used to layout the buildings.
- ➢ Three-dimensional interior layouts and lighting also provided.
- ➢ With virtual-reality systems, the designers can go for a simulated walk inside the building.

1.2 Presentation Graphics

- ➢ It is used to produce illustrations for reports or to generate 35-mm slides for use with projectors.

- Examples of presentation graphics are bar charts, line graphs, surface graphs, pie charts and displays showing relationships between parameters.
- 3-D graphics can provide more attraction to the presentation.

1.3 Computer Art

- Computer graphics methods are widely used in both fine art and commercial art applications.
- The fineartists use a combination of 3D modeling packages, texture mapping, drawing programs and CAD software.
- Pen plotter with specially designed software can create "automatic art".
- "Mathematical Art" can be produced using mathematical functions, fractal procedures, Mathematica software,injet printers and other systems to create a variety of 2D and 3D shapes and stereoscopic image pairs.
- These methods are also applied in commercial art.
- Photorealistic techniques are used to render images of a product.
- Animations are also used frequently in advertising, and television commercials are produced frame by frame. Film animations require 24 frames for each second in the animation sequence.
- A common graphics method employed in many commercials is morphing, where one object is transformed into another.

1.4 Entertainment

- CG methods are now commonly used in making motion pictures, music videos and television shows.
- Many TV series regularly employ computer graphics methods.
- Graphics objects can be combined with a live action.

1.5 Education And Training

- Computer-generated models of physical, financial and economic systems are often used as educational aids.
- For some training applications, special systems are designed.
- Eg. Training of ship captains, aircraft pilots etc.,
- Some simulators have no video screens, but most simulators provide graphics screen for visual operation. Some of them provide only the control panel.

1.6 <u>Visualization</u>

- ➢ The numerical and scientific data are converted to a visual form for analysis and to study the behavior called visualization.
- ➢ Producing graphical representation for scientific data sets are called scientific visualization.
- ➢ Business visualization is used to represent the data sets related to commerce and industry.
- ➢ The visualization can be either 2D or 3D.

1.7 <u>Image Processing</u>

- ➢ Computer graphics is used to create a picture.
- ➢ Image processing applies techniques to modify or interpret existing pictures.
- ➢ To apply image processing methods, the image must be digitized first.
- ➢ Medical applications also make extensive use of image processing techniques for picture enhancements, simulations of operations, etc.

1.8 <u>Graphical User Interface</u>

- ➢ Nowadays software packages provide graphics user interface (GUI) for the user to work easily.
- ➢ A major component in GUI is a window.
- ➢ Multiple windows can be opened at a time.
- ➢ To activate any one of the window, the user needs just to check on that window.
- ➢ Menus and icons are used for fast selection of processing operations.
- ➢ Icons are used as shortcut to perform functions. Icons take less screen space.Some other interfaces like text box, buttons, and list are also used.

1.9 <u>Concept of Multimedia</u>

- ➢ Multi

    Many, Multiple,

- ➢ Media
    - ▪ Tools that is used to represent or do a certain things, delivery medium, a form of mass communication – newspaper, magazine / tv.
    - ▪ Distribution tool & information presentation – text, graphic, voice, images, music and etc.

➢ Multimedia is a combination of text, graphic, sound, animation, and video that is delivered interactively to the user by electronic or digitally manipulated means.
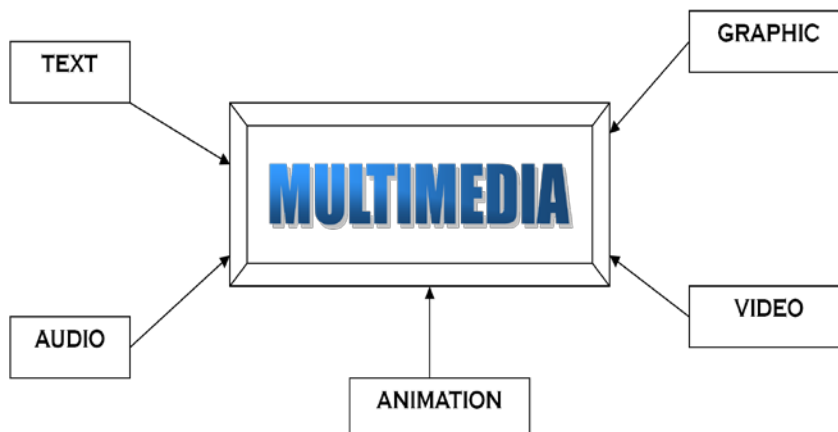

Text

➢ A broad term for something that contains words to express something.
➢ Text is the most basic element of multimedia.
➢ A good choice of words could help convey the intended message to the users (keywords).
➢ Used in contents, menus, navigational buttons.

Graphics

➢ Two-dimensional figure or illustration
➢ Could be produced manually (by drawing, painting, carving, etc.) or by computer graphics technology.
➢ Used in multimedia to show more clearly what a particular information is all about (diagrams, picture)

• Example
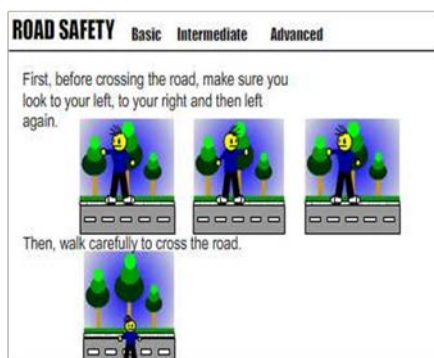
Audio

- ➢ Produced by vibration, as perceived by the sense of hearing.
- ➢ In multimedia, audio could come in the form of speech, sound effects and also music score.

Animation

- ➢ The illusion of motion created by the consecutive display of images of static elements.
- ➢ In multimedia, animation is used to further enhance / enriched the experience of the user to further understand the information conveyed to them.

Video

- ➢ Video is the technology of capturing, recording, processing, transmitting, and reconstructing moving pictures.
- ➢ Video concentrates more on photo realistic image sequence and live recording.
- ➢ Video also takes a lot of storage space.
- ➢ It broadlydivided into two types

  1.Linear

  2.Non-linear