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COMPUTER GRAPHICS AND MULTIMEDIA

By:
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COMPUTER GRAPHICS AND MULTIMEDIA

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Sample Preview of the Solved Sample Question Papers

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QUESTION PAPER

(June – 2017)

(Solved)

COMPUTER GRAPHICS AND MULTIMEDIA

Time: 3 Hours] ***[Maximum Marks : 100***

Note: *Question number **1** is **compulsory**. Attempt any three questions from the rest.*

Q. 1. ***(a)*** **Define Scan conversion. Differentiate between Raster and Random Scanning.**

Ans. Scan Conversion the process of representing continuous graphics object as a collection of discrete pixels is called Scan Conversion. For e.g a line is defined by its two end pts & the line equation, where as a circle is defined by its radius, center position & circle equation.

Scan conversion or scan converting rate is a video processing technique for changing the vertical / horizontal scan frequency of video signal for different purposes and applications. The device which performs this conversion is called a scan converter.

Difference between Raster Scan System and Random Scan System.

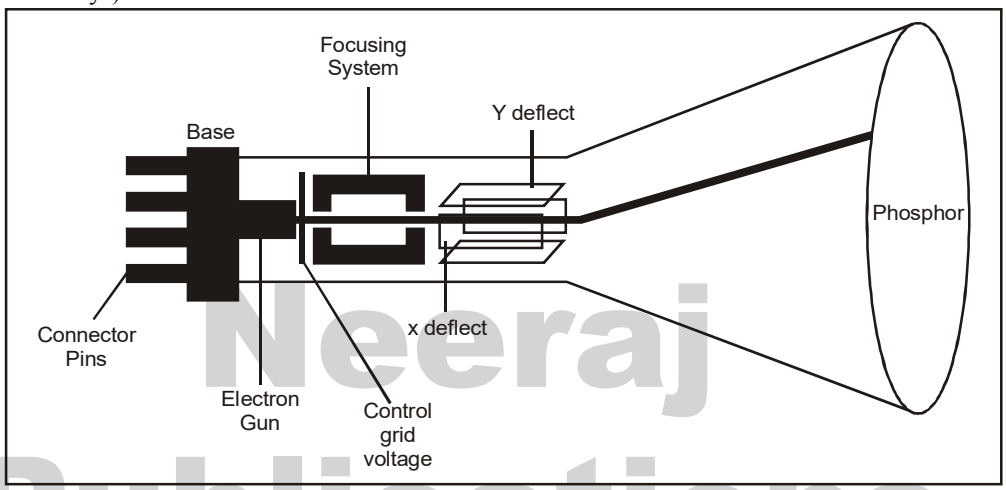
	Raster Scan System	Random Scan System
Resolution	It has poor or less Resolution because picture definition is stored as a intensity value.	It has High Resolution because it stores picture definition as a set of line commands.
Electron-Beam	Electron Beam is directed from top to bottom and one row at a time on screen, but electron beam is directed to whole screen.	Electron Beam is directed to only that part of screen where picture is required to be drawn, one line at a time so also called Vector Display.
Cost	It is less expensive than Random Scan System.	It is Costlier than Raster Scan System.
Refresh Rate	Refresh rate is 60 to 80 frame per second.	Refresh Rate depends on the number of lines to be displayed i.e 30 to 60 times per second.
Picture Definition	It Stores picture definition in Refresh Buffer also called Frame Buffer.	It Stores picture definition as a set of line commandscalled Refresh Display File.
Line Drawing	Zig – Zag line is produced because plotted value are discrete.	Smooth line is produced because directly the line path is followed by electron beam.
Realism in display	It contains shadow, advance shading and hidden surface technique so gives the realistic display of scenes.	It does not contain shadow and hidden surface technique so it can not give realistic display of scenes.
Image Drawing	It uses Pixels along scan lines for drawing an image.	It is designed for line drawing applications and uses various mathematical function to draw.

***(b)* With the help of a diagram, explain the working of CRT. Why is refreshing needed in CRT ?**

Ans. Cathode Ray Tube: The primary output device in a graphical system is the video monitor. The main element of a video monitor is the Cathode Ray Tube (CRT), shown in the following illustration.

The operation of CRT is very simple:

- The electron gun emits a beam of electrons (cathode rays).
- The electron beam passes through focusing and deflection systems that direct it towards specified positions on the phosphor-coated screen.
- When the beam hits the screen, the phosphor emits a small spot of light at each position contacted by the electron beam.
- It redraws the picture by directing the electron beam back over the same screen points quickly.



There are two ways (Random scan and Raster scan) by which we can display an object on the screen.

The refresh rate (most commonly the "vertical refresh rate", "vertical scan rate" for cathode ray tubes) is the number of times in a second that a display hardware updates its buffer. This is distinct from the measure of frame rate in that the refresh rate includes the repeated drawing of identical frames, while frame rate measures how often a video source can feed an entire frame of new data to a display.

For example, most movie projectors advance from one frame to the next one 24 times each second. But each frame is illuminated two or three times before the next frame is projected using a shutter in front of its lamp. As a result, the movie projector runs at 24 frames per second, but has a 48 or 72 Hz refresh rate.

On cathode ray tube (CRT) displays, increasing the refresh rate decreases flickering, thereby reducing eye strain. However, if a refresh rate is specified that is beyond what is recommended for the display, damage to the display can occur.

***(c)* What do you mean by composite transformation ? Prove that two successive reflections about either of the co-ordinate axes is equivalent to a single rotation about the co-ordinate origin.**

Ans. Composite Transformation: If a transformation of the plane T1 is followed by a second plane transformation T2, then the result itself may be represented by a single transformation T which is the composition of T1 and T2 taken in that order. This is written as T = T1.T2.

Composite transformation can be achieved by concatenation of transformation matrices to obtain a combined transformation matrix.

A combined matrix :

[T][X] = [X] [T1] [T2] [T3] [T4] …. [Tn]

Where [Ti] is any combination of

- Translation
- Scaling
- Shearing
- Rotation
- Reflection

Sample Preview of The Chapter

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COMPUTER GRAPHICS AND MULTIMEDIA

RASTER GRAPHICS AND CLIPPING

Introduction to Computer Graphics

1

INTRODUCTION

In earlier days, hundreds or thousands of years ago, instead of writing epics of those days, paintings were used as a medium of communication that depicts the era of those days. In other words, we can say that 'a picture is worth than a thousand of words' or in the computer age today, we can say that 'a computer is worth a millions of pictures,' so one can estimate the power of computer as a communication system.

Now, with the advance in the computer hardware and software, graphics has come a full circle and more and more people are teaching and learning through the medium of computer graphics. By **graphics**, we understand any sketch, drawing, special artwork or other material that pictorially represent an object or a process or otherwise conveys information. Basically, graphics referred to an engineering drawings of buildings, bridges, machine parts etc. and scientific drawings such as x-y curves, network and process flowcharts. Now-a-days, graphics has wide domain of applications that includes industrial design, advertising and many artistic works such as paintings and fabric design. Now-a-days, computer graphics has entered in our life, so that one can utilize it in many ways such as newspapers, periodicals, business presentations, training materials, statistic display of business data, etc.

In this chapter, we concentrate on the graphics capabilities and potential of the digital computer as well as we discuss the meaning of term graphics and its types. In addition to this, we also discuss the hardware used for practical application of graphics in different ways of life.

CHAPTER AT A GLANCE

WHAT IS COMPUTER GRAPHICS?

The term computer graphics include almost everything on computers that is not text or sound. Today, almost every computer can do graphics and people even expect to control their computer through icons and pictures rather than just by typing.

By graphic programs, we think of computer graphics as drawing pictures on computers also called as rendering. The pictures can be photographs, drawings, movies or simulations — pictures of things which do not yet exist and may could never exist, or they may be pictures from places we can see directly, such as medical images from inside your body.

We spend much of our time improving the way computer pictures can simulate the real world scenes. We want images on computers to look more realistic in their colors, and in the way different materials appear in real life. We call this work realistic image synthesis and the following series of pictures will show some of our techniques in stages from very simple pictures through very realistic ones.

Computer graphics can be broadly divided into the following classes:

- **Business Graphics:** Graphics are commonly used in business and economics to create financial charts and tables. The term Business Graphics came into use in the late 1970s, when personal computers became capable of drawing graphs and charts instead of using a tabular format. Business Graphics can be used to highlight changes over a period of time.
- **Scientific Graphics:** Scientific visualization graphics is an interdisciplinary branch of science, primarily concerned with the visualization of three dimensional phenomena such as architectural, meteoro-logical medical, and biological systems. The emphasis is on realistic rendering of volumes, surfaces, illumination sources, and perhaps with a dynamic (time) component.
  Scientific visualization focuses on the use of computer graphics to create visual images which aid in understanding of complex often massive numerical representation of scientific concepts or results.
- **Scaled Drawings:** Scaled drawings, such as architectural presentations, drawings of buildings, bridges, and machines.
- **Cartoons and artwork,** including advertisements.
- **Graphical User Interfaces (GUIs)** which are the images that appear on almost all computer screens these days, designed to help the user utilize the software without having to refer to manuals or read a lot of text on the monitor.

The most familiar and useful class of computer graphics involves movies and video games. Movies generally need graphics that are different and unique from physical reality, whereas video games need graphics that can be generated quickly to be perceived as smooth motion. In global terms, computer graphics can be categorized in two ways:

Interactive Computer Graphics which is interactively used by users e.g., games.

Passive Computer Graphics which has no option for users to interact or use computer graphics e.g., movies.

APPLICATIONS

Computer graphics has broad range of applications including both photorealistic and non-photorealistic image synthesis, image-based modeling and rendering and other multi-resolution methods, curve and surface design, range scanning, surface reconstruction and modeling, motion capture, motion editing, physics based modeling, animation, interactive 3D user interfaces, image editing and color reproduction. The other applications include computer vision and image processing of both 2D and 3D images.

Graphic design applications are broken down into many areas on the basis of some considerations such as, "Is your project for web or print." If it is, for web, than it is monitor based publishing, which means we can see our project on monitor. Web based are applicable in many fields such as: Web site development, presentation software, video editing, DVD production, animation and interactive graphics. There are many applications in the market and most of them are expensive. Some of the applications that are influenced by the computer graphics are:

- Presentation Graphics
- Painting and Drawing
- Photo editing
- Scientific Visualization
- Image Processing
- Education, Training, and Entertainment
- Simulation
- Animation and Games

Let us discuss each of them one by one.

Presentation Graphics

Presentation Graphics are the graphics in the form of slides i.e., which gives information in the form of text, charts, graphs, etc.

Presentation Graphics software is a software which shows the information in the form of a slide show.

A type of business software that enables users to create highly stylised images for slide shows and reports. The software includes functions for creating various types of charts and graphs and for inserting text in a variety of fonts. Most systems enable you to import data from a spreadsheet application to create the charts and graphs. Presentation graphics is often called as business graphics.

The program that help users to create presentations such as visual aids, handouts, and overhead slides to process artwork, graphics, and text and to produce a

series of slides – which helps speakers to convey their messages across are called as presentation graphic softwares.

Some examples are: Apple Keynote, OpenOffice's Impress, Microsoft Powerpoint (for multimedia presentations, incorporating moving pictures and sounds) and Macromedia director. Custom graphics can also be created in some other programs such as Adobe Photoshop or Adobe Illustrator. With the growth of Video and Digital photography, many programs that handles these types of media also include presentation functions for displaying them in presentation format or as slide shows.

Some programming extensions for an operating system or web browser or plug-ins for presentation programs are used to enhance their capabilities. For example, we can use expert power point presentation or flash animation or PDF document.

Now we discuss resolution which is an important topic for graphics designers and programmers that import images for their presentations. The questions that can be asked are:

- What resolution should be used?
- Which file format is the best?
- The techniques used for keeping the file size low?

Resolution

Graphics are of two types:

- Vector Graphics and
- Bitmap Graphics

We can find out which format is better when we import some images from software the power point or keynote or Impress. Vectors are objects that are defined by anchor points and paths, whereas bitmap graphics are digital images composed of pixels. The advantage of using vector graphics is that they are size independent, meaning that they can be resized with no loss at all. Bitmap graphics on the other hand, provides a richer depth of colour but are size dependent and appear at the stated 72 dpi size.

File Format

- A right file format that will allow us to create a transparent background in keynote presentation. Keynote could import all the common file formats such as GIF, JPG and BMP. There is another format that will work well is PSD (photoshop format) in which we are able to easily place a transparent image.
- The choice of file format is hidden in the software that we are using.

The right file format that will allow us to create a transparent background in power point. The power point can import all common file formats such as GIF, JPG, BMP, and there are two other file formats that works very well with power point: TIFF (Tagged-Image File Format) or PNG (portable Network Graphic). We can quickly remove unwanted background in Power Point and this feature is not available with other file formats.

Painting and Drawings

With graphics, we mean pictures and pictures can either be illustrations or photographs. We can embed graphics into a web page or multimedia presentations. We can either create them in some kind of graphics application by drawing or painting them there in the application, or bringing them in the application through a digital camera or scanner and then editing and saving them in a form suitable to your medium.

Drawing: A drawing in a software application uses tools to create objects such as square, circles, lines or text which the program treats as discrete chapters. We can draw any drawing objects in power point presentation and we can resize them by clicking them and dropping them and which can be edited by translations, rotations and scaling operations on these shapes.

Painting: The painting function is used to create objects. Unlike drawing function, a paint function changes the colour of individual pixels based on the tools which can be used. We can use paint function to create some additional effect such as changing the background colours, effects for light, shading in the picture, etc.

There are some difference between painting and drawing:

- Many word processors like word offer simple drawing functions. They are not so powerful, but they can be used for basic illustration made up of simple shapes to clarify a point in the presentation.
- Some programs are used only for graphics purpose, some programs may be used for many purpose, like KidPix, which has both drawing and painting functions. KidPix is targeted only for children; it has only simple interface.

Other programs, like Adobe Photoshop, specializes in painting functions and also include some drawing functions.

Other graphics programs such as Adobe Illustrator, specializes in drawing for professional artists and designers. AutoCad is used only for specialized engineering drawing.

- Page layout, presentation, multimedia authoring and web development programs usually contains a variety of graphics functions ranging from simple to the complex, but their main purpose is combination and not creation or editing.
- For publishing works like magazine, news paper, book or may be a menu of a restaurant, we need a page layout program.
  (a) Quark Express,
  (b) Page Maker (Adobe),
  (c) Indesign (Adobe),
  (d) Publisher (Microsoft),

To create some desktop publishing for many general purpose graphics objects we can use Adobe Illustrator.

CHECK YOUR PROGRESS

Q. 1. What are the application areas of Computer Graphics? Write short notes on each.

Ans. Graphics are visual elements often used to point readers and viewers to particular information. They are also used to supplement text in an effort to aid readers in their understanding of a particular concept or make the concept more clear or interesting. Popular magazines, such as TIME, Wired and Newsweek, usually contain graphic material in abundance to attract readers, unlike the majority of scholarly journals. In computing, they are used to create a graphical interface for the user and graphics are one of the five key elements of multimedia technology. Graphics are among the primary ways of advertising the sale of goods or services.

Business: Graphics are commonly used in business and economics to create financial charts and tables. The term Business Graphics came into use in the late 1970s, when personal computers became capable of drawing graphs and charts instead of using a tabular format. Business Graphics can be used to highlight changes over a period of time.

Advertising: Advertising is one of the most profitable uses of graphics. Artists often do advertising work or take advertising potential into account when creating art, to increase the chances of selling the artwork.

Political: The use of graphics for overtly political purposes—cartoons, graffiti, poster art, flag design, etc.—is a centuries old practice which thrives today in every part of the world. The Northern Irish murals are one such example.

Education: Graphics are widely used in textbooks, especially those concerning subjects such as geography, science, and mathematics, in order to illustrate theories and concepts, such as the human anatomy. Diagrams are also used to label photographs and pictures.

Educational animation is an important emerging field of graphics. Animated graphics have obvious advantages over static graphics when explaining subject matter that changes over time.

The Oxford Illustrated Dictionary uses graphics and technical illustrations to make reading material more interesting and easier to understand. In an encyclopedia, graphics are used to illustrate concepts and show examples of the particular topic being discussed.

In order for a graphic to function effectively as an educational aid, the learner must be able to interpret it successfully. This interpretative capacity is one aspect of graphicacy.

Film and Animation: Computer graphics are often used in the majority of new feature films, especially those with a large budget. Films that heavily use computer graphics include Lord of the Rings trilogy, the Harry Potter films, Spider-Man and War of the Worlds.

Q. 2. What are the file formats available for Presentation Graphics?

Ans. The files are:

PPT - Power Point Presentation
PDF - Portable Document File
GIF - Graphics Interchange Format
JPG - Joint Photographic Group
BMP - Windows Bitmap Format
PSD - Adobe Photoshop
PIC - Lotus PIC Graphics Format
PIC - Micrografx Draw! Graphics Format
PIC - Pegasus Imaging Corporation Format
PIC - Video Show Graphics Format
PS - PostScript