GALGOTIAS UNIVERSITY

School of Computing Science and Engineering

Program: B.Tech CSE -GG

Course Code: CSGG4021

Course Name: Introduction to Graphics and Animation

Course Outcomes :

CO	Title
CO1	To understand the basics of computer graphics, different graphics systems ,applications of computer graphics and color theory.
CO2	To understand the various algorithms for scan conversion and two dimensional geometric transformations.
CO3	To apply the computer graphics concepts in the development of computer games, information visualization, and business applications and learn the use of OpenGL .
CO4	To implement and understand the basic concept of various open source graphics tools like GIMP and blender etc.
CO5	To evaluate and compare the various image compression techniques and implement basic 3D modeling techniques.

Course Prerequisites/Objective

The objective of this course is to:

- To learn the basic concepts of graphics design. This includes color theory and application of graphics design.
- Be able to discuss the application of computer graphics concepts in the development of computer games, information visualization, and business applications.
- To develop a facility with the relevant mathematics of computer graphics, e.g., 2D/3D rotations using both vector algebra, and transformations and projections using homogeneous coordinates.
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- To learn the principles and commonly used paradigms and techniques of computer graphics, e.g., the graphics pipeline, and Bresenham's algorithm for speedy line and circle generation

Syllabus

Unit-1: Introduction

Graphic Design Overview, Graphic Design as a discipline, evolution of Graphic Design – Emergence of the design industry, Twentieth century design; Applications of Graphic Design, Skills & Design Illustration, Importance of color in graphics, Things to consider while choosing color in layouts – Color theory: Primary color, secondary color, tertiary color, Knowledge of colors – Harmonious colors, Complimentary colors, Color Models: RGB, CMYK, HSV

Unit-2: Overview of Graphics System

Overview of Graphics Systems: Video display devices, Raster-Scan System, Random-Scan, Systems, Graphics monitors and workstations. Input devices: Hard copy devices. Graphics software. Output primitives: Line drawing algorithms, circle generation algorithms. Ellipse Generating Algorithm. Two-dimensional geometric transformations: Basic transformations. Homogeneous coordinates, composite transformations, Other transformations

Unit-3: Concepts of Curves, Typography, Animation and OpenGL

3-D object representation: Curved lines and surfaces, Quadric surfaces: Spheres, Ellipsoid, Blobby objects,Typography Definition & TypesPage Layout - Planning, Grids Vs Templates, Front end Vs Back end; Interface Design, Introduction to animation, design of animation popular animation tools. Computer facial animation Techniques – Morphing, 2D/3D Animation, and Speech Animation. Raster animation, key frames, Game Animation development history and platforms, Goals, genres and player elements, Story and Character development. Tweening, morphing. OPENGL: basic concepts of OPENGL, Opening a window, the first triangle, matrices, a colored cube.

Syllabus

Unit-4: OPEN SOURCE GRAPHIC TOOLS

Introduction to GIMP, Features and capabilities, Basic concepts of GIMP, GIMP user interface, Layer Groups, Introduction to Moviesandbox, Minimum system requirements, Introduction to Blender, Installing Blender, Working with Blender, Blender Interface, Basic Blender Commands

Unit-5: IMAGE COMPRESSION AND 3D MODELING

Introduction to image compression, Lossy Compression, Lossless compression, Methods of Lossy/Lossless compression,. Advanced 3D Modeling techniques, Representation – Solid, Shell/boundary, Modeling Process – Polygonal modeling, Curve modeling, Digital sculpting.

Unit-6: Advanced and Latest Trends

The advances and the latest trends in the course as well as the latest applications of the areas covered in the course.

The latest research conducted in the areas covered in the course.

Discussion of some latest papers published in IEEE transactions and ACM transactions, Web of Science and SCOPUS indexed journals as well as high impact factor conferences as well as symposiums.

Discussion on some of the latest products available in the market based on the areas covered in the course and patents filed in the areas covered in the course

Recommended Books

Text books

1. Graphics and Animation Tools (IBM ICE Publication)
2. "Computer Graphics" D. Hearn & M.P. Baker, PHI Pub

Reference Book

1. "Computer Graphics:Principles and Practice" James D.Foley
2. " Computer Graphics" Z. Xiang & R.A. Plastock, Schaum's Outline Series
3. "OpenGL Programming Guide:The Official Guide to Learning OpenGL" Dave Shreiner
4. "Beginning GIMP:From Novice to Professional"Akkana Peck

Additional online materials

NPTEL link:
https://www.google.com/url?q=https://swayam.gov.in/nd1_noc20_cs90/preview&sa=D&ust=1593627291846000&usg=AFQjCNHuyxnodveSq3UEvJBchyZHxJXUGw

Computer Graphics

Computer graphics are graphics created using computers and, more generally, the representation and manipulation of image data by a computer with help from specialized software and hardware.

Computer Graphics is defined as the combination of various graphical elements, such as text, pictures, sounds, movie etc.

Core Elements of Computer Graphics

- Imaging
- Modeling
- Rendering
- Animation

Types of Computer Graphics

- Interactive computer graphics
- Non-interactive graphics or passive computer graphics

Interactive Computer Graphics

- The computer graphics in which the observer has some control over the image by providing him with an input device so that he can signal his request to computer. **Example: Video games**.
- Interactive computer graphics involves two way communications between computer and user. The user gives signals to computer through the input device and computer can modify the displayed picture accordingly. In this way we maintain conversation or dialogue with the computer.

Non-Interactive Computer Graphics

- The computer graphics in which the observer has no control over the image.

Example: Titles shown on TV.

Applications of Computer Graphics

- Desktop publishing
- Design engineering analysis
- Computer Art
- Entertainment
- Education and Training
- Visualization
- Image Processing
- Graphical User Interface

What is Graphic Design?

" Graphic design is a visual problem solving using text and graphical elements to create something that gets viewer attention and communicates in an easy efficient manner"

Significance

Graphic design form an integral part of any business and occasion. Well designed pieces of graphic design enable its creators(designer) to:

- Seek the attention of target audience
- Increase the customer base
- Boost up sales
- Establishing the name in market
- Earn goodwill
- Maximizing the profitable base
- Increasing ROI (Return on Investment)

Scope

Graphic designing can be found everywhere and in many formats such as:

- Corporate identities
- Websites
- Advertisement
- Posters
- Brochures
- Book Design
- Magazine and Newspaper layout
- Product packaging and many more


Thank You