Practical –

Aim: To study about computer graphics & multimedia

Introduction

The development of computer graphics has made computers easier to interact with, and better for understanding and interpreting many types of data. Developments in computer graphics have had a profound impact on many types of media and have revolutionized animation, movies and the video game industry.

Although computer graphics is a vast field that encompasses almost any graphical aspect, we are mainly
interested in the generation of images of 3-dimensional scenes. Computer imagery has applications for film special effects, simulation and training, games, medical imagery, flying logos, etc.
Computer graphics relies on an internal *model* of the scene, that is, a mathematical representation suitable for graphical computations (see Chapter II). The model describes the 3D shapes, layout and materials of the scene.
This 3D representation then has to be projected to compute a 2D image from a given viewpoint, this is the *rendering* step (see Chapter III). Rendering involves projecting the objects (perspective), handling
visibility (which parts of objects are hidden) and computing their appearance and lighting interactions.
Finally, for animated sequence, the motion of objects has to be specified. We will not discuss animation in this document.

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.

Overview

The term computer graphics has been used in a broad sense to describe "almost everything on computers that is not text or sound".[1] Typically, the term computer graphics refers to several different things:

the representation and manipulation of image data by a computer
the various technologies used to create and manipulate images
the sub-field of computer science which studies methods for digitally synthesizing and manipulating visual content, see study of computer graphics

Computer graphics is widespread today. Computer imagery is found on television, in newspapers, for example in weather reports, or for example in all kinds of medical investigation and surgical procedures. A well-constructed graph can present complex statistics in a form that is

easier to understand and interpret. In the media "such graphs are used to illustrate papers, reports, thesis", and other presentation material.[2]

Many powerful tools have been developed to visualize data. Computer generated imagery can be categorized into several different types: 2D, 3D, and animated graphics. As technology has improved, 3D computer graphics have become more common, but 2D computer graphics are still widely used. Computer graphics has emerged as a sub-field of computer science which studies methods for digitally synthesizing and manipulating visual content. Over the past decade, other specialized fields have been developed like information visualization, and scientific visualization more concerned with "the visualization of three dimensional phenomena (architectural, meteorological, medical, biological, etc.), where the emphasis is on realistic renderings of volumes, surfaces, illumination sources, and so forth, perhaps with a dynamic (time) component".[3]

Study of computer graphics

The study of computer graphics is a sub-field of computer science which studies methods for digitally synthesizing and manipulating visual content. Although the term often refers to three-dimensional computer graphics, it also encompasses two-dimensional graphics and image processing.

As an academic discipline, computer graphics studies the manipulation of visual and geometric information using computational techniques. It focuses on the mathematical and computational foundations of image generation and processing rather than purely aesthetic issues. Computer graphics is often differentiated from the field of visualization, although the two fields have many similarities.

Applications

Computer graphics may be used in the following areas:

Computational biology
Computational physics
Computer-aided design
Computer simulation
Digital art
Education
Graphic design
Infographics
Information visualization
Rational drug design
Scientific visualization
Video Games
Virtual reality
Web design

Advantages and Disadvantages of Computer Graphics

There are many advantages and disadvantages of computer graphics. The main drawback is the speed at which technology progresses. Since the advent of the digital computer, processing power has advanced according to Moore's Law.
Moore's Law states that the processing power of the average household computer roughly doubles every two years. This means that a person who buys a computer today would have spent only half as much on the same machine two years down the line.
It is more a reference to the number of transistors which one can inexpensively place on a motherboard.
Now that science is approaching the limit of silicon transistor size, there is a need for a transition to carbon nano-tube technology or quantum computing. Compared to console graphics, computers graphics are far superior.
This is not necessarily due to the quality of the graphics card itself but rather the other components as well. Consoles are manufactured for a certain demographics and come with set hardware, which may act as the bottleneck to greater performance.
For example, one sees a better increase in performance with the same graphics card and 8 GB or RAM, compared to 4GB or RAM. It is for this reason customization is a staunch advantage to computer graphics.

In addition, one can overclock their computer, provided they have adequate cooling. This causes the processor to complete more calculations per second and can greatly increase the performance of a computer. Computers are able to put this processing and GPU power towards a great deal of applications, including movies and video games. In terms of video games, many PC games have user modifiable setting that alter the graphics of the game. This allows an individual to strike the perfect balance between graphics and performance based on the specifications of their machine.

Intro to multimedia

Multimedia is media and content and content that uses a combination of different content forms. This contrasts with media that use only rudimentary computer displays such as text-only or traditional forms of printed or hand-produced material. Multimedia includes a combination of text, audio, still images, animation, video, or interactivity content forms.

Multimedia is usually recorded and played, displayed, or accessed by information content processing devices, such as computerized and electronic devices, but can also be part of a live performance. Multimedia devices are electronic media devices used to store and experience multimedia content. Multimedia is distinguished from mixed media in fine art; by including audio, for example, it has a broader scope. The term "rich media" is synonymous for interactive multimedia. Hypermedia can be considered one particular multimedia application.

Major characteristics of multimedia

Multimedia presentations may be viewed by person on stage, projected, transmitted, or played locally with a media player. A broadcast may be a live or recorded multimedia presentation. Broadcasts and recordings can be either analog or digital electronic media technology. Digital online multimedia may be downloaded or streamed. Streaming multimedia may be live or on-demand.

Multimedia games and simulations may be used in a physical environment with special effects, with multiple users in an online network, or locally with an offline computer, game system, or simulator.

The various formats of technological or digital multimedia may be intended to enhance the users' experience, for example to make it easier and faster to convey information. Or in entertainment or art, to transcend everyday experience.
A lasershow is a live multimedia performance.

Enhanced levels of interactivity are made possible by combining multiple forms of media content. Online multimedia is increasingly becoming object-oriented and data-driven, enabling applications with collaborative end-user innovation and personalization on multiple forms of content over time. Examples of these range from multiple forms of content on Web sites like photo galleries with both images (pictures) and title (text) user-updated, to simulations whose co-efficients, events, illustrations, animations or videos are modifiable, allowing the multimedia "experience" to be altered without reprogramming. In addition to seeing and hearing, Haptic technology enables virtual objects to be felt. Emerging technology involving illusions of taste and smell may also enhance the multimedia experience.

Applications

A presentation using Powerpoint. Corporate presentations may combine all forms of media content. Virtual reality uses multimedia content. Applications and delivery platforms of multimedia are virtually limitless.

VVO Multimedia-Terminal in Dresden WTC (Germany)

Multimedia finds its application in various areas including, but not limited to, advertisements, art, education, entertainment, engineering, medicine, mathematics, business, scientific research and spatial temporal applications. Several examples are as follows:
Creative industries

Creative industries use multimedia for a variety of purposes ranging from fine arts, to entertainment, to commercial art, to journalism, to media and software services provided for any of the industries listed below. An individual multimedia designer may cover the spectrum throughout their career. Request for their skills range from technical, to analytical, to creative.
Commercial uses

Much of the electronic old and new media used by commercial artists is multimedia. Exciting presentations are used to grab and keep attention in advertising. Business to business, and interoffice communications are often developed by creative services firms for advanced multimedia presentations beyond simple slide shows to sell ideas or liven-up training. Commercial multimedia developers may be hired to design for governmental services and nonprofit services applications as well.
Entertainment and fine arts

In addition, multimedia is heavily used in the entertainment industry, especially to develop special effects in movies and animations. Multimedia games are a popular pastime and are software programs available either as CD-ROMs or online. Some video games also use multimedia features. Multimedia applications that allow users to actively participate instead of just sitting by as passive recipients of information are called Interactive Multimedia. In the Arts there are multimedia artists, whose minds are able to blend techniques using different media that in some way incorporates interaction with the viewer. One of the most relevant could be Peter Greenaway who is melding Cinema with Opera and all sorts of digital media. Another approach entails the creation of multimedia that can be displayed in a traditional fine arts arena, such as an art gallery. Although multimedia display material may be volatile, the survivability of the content is as strong as any traditional media. Digital recording material may be just as durable and infinitely reproducible with perfect copies every time.

Keyboard

In computing, a keyboard is a typewriter-style device, which uses an arrangement of buttons or keys, to act as mechanical levers or electronic switches. Following the decline of punch cards and paper tape, interaction via teleprinter-style keyboards became the main input device for computers.

A keyboard typically has characters engraved or printed on the keys and each press of a key typically corresponds to a single written symbol. However, to produce some symbols requires pressing and holding several keys simultaneously or in sequence. While most keyboard keys produce letters, numbers or signs (characters), other keys or simultaneous key presses can produce actions or computer commands.

Despite the development of alternative input devices, such as the mouse, touchscreen, pen devices, character recognition and voice recognition, the keyboard remains the most commonly used and most versatile device used for direct (human) input into computers.

In normal usage, the keyboard is used to type text and numbers into a word processor, text editor or other programs. In a modern computer, the interpretation of key presses is generally left to the software. A computer keyboard distinguishes each physical key from every other and reports all key presses to the controlling software. Keyboards are also used for computer gaming, either with regular keyboards or by using keyboards with special gaming features, which can expedite frequently used keystroke combinations. A keyboard is also used to give commands to the operating system of a computer, such as Windows' Control-Alt-Delete combination, which brings up a task window or shuts down the machine. Keyboards are the only way to enter commands on a command-line interface.

Mouse

In computing, a mouse is a pointing device that functions by detecting two-dimensional motion relative to its supporting surface. Physically, a mouse consists of an object held under one of the user's hands, with one or more buttons.

The mouse sometimes features other elements, such as "wheels", which allow the user to perform various system-dependent operations, or extra buttons or features that can add more control or dimensional input. The mouse's motion typically translates into the motion of a pointer on a display, which allows for fine control of a graphical user interface.

Trackball

A trackball is a pointing device consisting of a ball held by a socket containing sensors to detect a rotation of the ball about two axes—like an upside-down mouse with an exposed protruding ball. The user rolls the ball with the thumb, fingers, or the palm of the hand to move a pointer. Compared with a mouse, a trackball has no limits on effective travel; at times, a mouse can reach an edge of its working area while the operator still wishes to move the screen pointer farther. With a trackball, the operator just continues rolling (however, it could be argued that a mouse user could simply increase sensitivity and/or increase mousepad size to avoid this problem) Some trackballs, such as Logitech's optical-pickoff types, have notably low friction, as well as being dense (glass), so they can be spun to make them coast.

Large trackballs are common on CAD workstations for easy precision. Before the advent of the touchpad, small trackballs were common on portable computers, where there may be no desk space on which to run a mouse. Some small thumbballs clip onto the side of the keyboard and have integral buttons with the same function as mouse buttons. The trackball was invented by Tom Cranston and Fred Longstaff as part of the Royal Canadian Navy's DATAR system in 1952,[1] eleven years before the mouse was invented. This first trackball used a Canadian five-pin bowling ball.
The world's first trackball invented by Tom Cranston, Fred Longstaff and Kenyon Taylor working on the Royal Canadian Navy's DATAR project in 1952. It used a standard Canadian five-pin bowling ball.

When mice still used a mechanical design (with slotted 'chopper' wheels interrupting a beam of light to measure rotation), trackballs had the advantage of being in contact with the user's hand, which is generally cleaner than the desk or mousepad and does not drag lint into the chopper wheels. The late 1990s replacement of mouseballs by direct optical tracking put trackballs at a disadvantage and forced them to retreat into niches where their distinctive merits remained more important. Most trackballs now have direct optical tracking which follows dots on the ball.

As with modern mice, most trackballs now have an auxiliary device primarily intended for scrolling. Some have a scroll wheel like most mice, but the most common type is a “scroll ring” which is spun around the ball. Kensington's SlimBlade Trackball similarly tracks the ball itself in three dimensions for scrolling.

Light Pen

A light pen, also called a selector pen, is a computer input device in the form of a light-sensitive wand used in conjunction with a computer's CRT display.

It allows the user to point to displayed objects or draw on the screen in a similar way to a touchscreen but with greater positional accuracy. It was long thought[according to whom?] that a light pen can work with any CRT-based display, but not with LCDs (though Toshiba and Hitachi displayed a similar idea at the "Display 2006" show in Japan[1]) and other display technologies. However, in 2011 Fairlight Instruments released its Fairlight CMI-30A, which uses a 17" LCD monitor with light pen control.