CMP 4 MR JENOM

# COMPUTER GRAPHICS AND MULTIMEDIA

Computer graphics deals with the science and theory of representing images on a computer

we are going to be seeing how to do graphics on the computer system using algorithms

computer graphics is a rapidly evolving field

pixels: picture elements or small boxes that hold color information. A group of pixels with different color information can be used to replicate a picture.

Our computers can display only pixel based art.

Rendering is the process of converting a model to a pixel format. The way we place colors will create an image

Advantage of computer graphics

* Helps in visualization
* Animations and motion simulations
* Motion dynamics, can be used for weather forecasting thorough simulation of the environment and comparison with past conditions
* Digital signal processing

Regular frame rate is 24fps

Applications of computer graphics

* Engineering, architecture, car manufacturing, medicine, advertisement and entertainment
* Computer aided design/ drafting (CAD/D) -: examples are in Wire framing
* Presentation graphics: in entertainment
* Computer aided learning -: l

Classification of computer graphics

1. Passive or offline computer graphics: they are static images like in screensavers.
2. Interactive computer graphics: they are motion pictures that you can control such as games

Components of interactive computer graphics system

1. Digital memory buffer:
2. Monitor – makes use of CRT
3. Display controller

The purpose of virtual memory is so that a state can be saved where no other place can access it.

Digital memory buffer

This is a place where images and videos are stored as an array matrix of 0 and 1 where 0 is null and 1 is image . a frame buffer is the video ram that is used to hold up or map the images displayed on the screen

Memory n MB = x-resolution x y-resolution x Bits per pixel

8 x 1024x1024

Program counter:

Resolution is the number of vertical pixels and the number of horizontal pictures.

Types of compression

Loss c and loss s

Algorithms that can reduce file size by throwing away excess things.

Vector drawing is scaling while picture is expanding the individual pixels

NPU: numeric processing unit

Refresh rate is how fast your system can go over each frames pictures while displaying them

Computer vision: the way of structuring data in a way that the computer can recognize. Its relation to machine learning is such that the system is trained to be able to identify similar objects.

Image processing: can be done artistically or scientifically.

Steps:

* Importing the image via acquisition
* Analyzing and manipulating the image

High spectral camera: it sees information using the different spectrum of light.

Graphic primitives:

Keyboard: keys are pressed, scanned, saved and outputted

# November 19, 2024

Touch screen:

Rasterizing is the process of converting lines to pixels

With infrared touch panels, light sensors are used to detect touch at any point by detecting the point in which the infrared light stops and the controller detects that the touch sensor is at that position

Digitizer and Graphic tablets

Cathode ray tube

Display adapter: holds color information

Random scan display: vector scan display, it draws pictures one line at a time. E.g. pen plotter.

The system refreshes by going back to the first line command on the list after all the drawing commands have been processed.

When dealing with vectors, we are more concerned about the coordinates of the line connecting 2 points. i.e. the path between the points.

Refresh rate: the frequency the system refreshes the image

Sprite is an individual frame for footages

Raster scan display: front part of the screen is coated with phosphorous. You need to have the binary code for each pixel. It contains a refresh or frame buffer which stores picture definition. Vectors need to be rasterized before display.

Direct view storage tube: uses primary and flood gun to throw and sustain images on the screen respectively the images are maintained by redrawing the screen many times. This is also known as the

Flat panel display: uses a thin panel design

LCD liquid crystal display: Any d

Scan conversion: concept of drawing lines with formula

Digital Differential Analyzer Algorithm

Brenham

# December 3, 2024

Scan conversion continued

Pixel coordinate system: everything starts with the x, y axis. A line is aphanite in nature

Y = mx + c

Slope = tan ∅ = opposite / adjacent

Xinc = ∂x / steps

Where steps = highest slope value = ∂y / ∂X = (y2 – y1) / (x2 – x1)

Anti-aliasing: the problem with drawing pixels is that if you are not drawing a line vertically or horizontal you will have a ladder effect. What this does is to fill adjacent lines with relative coloring to make it appear smoother

When the increment = 1 the movement is said to be absolute

If m = 1 angle = 45

If m < 1 angle < 45 reverse is true

It is very difficult for the computer to handle decimal and floating point mathematics

When in a situation of plotting decimals, always approximate up

Banding in movies is when your bit per pixel is not sufficient for display, you will have a gradient unless your system has the capability to display true colors. what is used to eliminate banding light is called noise. What it does is to add a similar color to the surrounding colors to give it a gradient effect.

Compression

SRGB and adobe RGB most devices are limited to SRGB

Steps:

1. Get the inputs
2. Calculate the difference
3. Identify the number of steps
4. Calculate the x and y increment
5. Plot the pixels on the graph

Vector generation