United Technical College, Bharatpur, Chitwan

Computer Graphics

Chapter 2: Graphics Hardware [Frame Buffer Organization]

Homework #1

Date Assigned: 2nd Kartik, 2079

Date Due: 15th Kartik 2079

1. Explain the significance of Comp Graphics in the 21st century by highlighting its applications in various fields.
2. Explain frame buffer. Give your opinion on why interactive graphics has been able to gain such an immense amount of popularity in diversified fields like business, engineering, medicine etc.
3. Define resolution & persistence. What are the factors affecting resolution? What is the difference between raster scan display and vector scan display?
4. Consider two raster systems with resolutions of 640 by 840 and 1280 by 1024. How many pixels could be accessed per second in each of these systems by a display controller that refreshes the screen at a rate of 60 frames per second? What is the access time per pixel in each system?
5. Calculate the access time for a pixel and a row for a graphics system having resolution of 1024x640 and frequency of 60 Hz.
6. What are the differences between computer graphics and image processing? Describe how color pixel is displayed in a computer system.
7. Consider a noninterlaced raster monitor with a resolution of n by m (m scan lines and n pixels per scan line), a refresh rate of r frames per second, a horizontal retrace time of $t_{horiz,}$ and a vertical retrace time of t_{vert}. What is the fraction of the total refresh time per frame spent in retrace of the electron beam?
8. How long would it take to load a 640 by 480 frame buffer with 12 bits per pixel, if 10^5 bits can be transferred per second? How long would it take to load a 24-bit per pixel frame buffer with a resolution of 1280 by 1024 using this same transfer rate?
9. Suppose an RGB raster graphics system is to be designed using an 8 inch by 10 inch screen with a resolution of 100 pixels per inch in each direction. If we want to store 12 bits per pixel in the frame buffer, how much storage (in bytes) do we need for the frame buffer?
10. In case of two raster systems with resolutions of 640 by 480 and 1024 by 600, how many pixels could be accessed per second in each of these systems by a display controller that refreshes the screen at a rate of 75 frames per second? What is the access time per pixel in each system?
11. In a true color system having resolution of 1024x768 having the refresh rate of 60fps. Calculate the following:
    a. Size of frame buffer
    b. Access time of one frame
    c. Access time for one pixel
    d. Access time for one row
12. Explain the working principle of LCD and LED.
13. What is Video Controller? Explain the basic video-controller refresh operations with proper block diagram.

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14. Enlist different types of input devices. Describe touch panel as an input device.
15. What are techniques used by colour CRT monitors. Explain shadow mask method using Figure.
16. CAD and CAM are the major applications of computer Graphics. Justify.
17. Why do we need input devices in computer graphics? Explain the working principle of light pen.
18. Write Short Notes on:
    a. Touch screen
    b. Working Principle of different Tablet (Digitizer)
    c. Frame Buffer Organization
    d. Data gloves