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**Task: Computer Graphics Cat 2**

1. **DEFINE COMPUTER GRAPHICS AND DESCRIBE FIVE APPLICATION AREAS FOR COMPUTER GRAPHICS**

Computer graphics is the creation manipulation and storage of geometric objects and their images

*Application areas*

* it is used in the entertainment industry in the development of games, animations and cartoons
* in computer aided design whereby it is used in engineering and construction and can thereby be used to model structures to be built
* Education and training whereby graphics has been widely used to create informative content as learning materials that explain certain phenomena
* Presentations, graphics have been widely used in presenting more relatable information in an easier manner, presenting data such as statistics in graphic forms like graphs or pie charts
* Use in biology where molecular biologists can display pictures of molecules and therefore get a better picture of different structures

1. **LIST DOWN FIVE COMPUTER GRAPHICS PRIMITIVES**

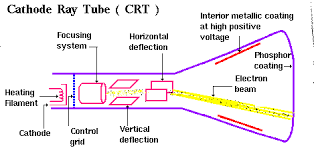
* Pixel – smallest unit of a digital image that can be displayed and represented on a digital display device
* Points and Lines – points are used as the foundations for more complicated shapes while a line is a container for all 2D points(x, y) which satisfy the equation ax + by + d = 0
* Polygon – a closed area of an image bounded by straight or curved lines filled with one solid color
* Display control- controls the view of the image so that the user can view the image from a desired angle
* Frame buffer- video output device which drives a video display from the memory buffer containing a complete set of data

1. **BY USE OF A DIAGRAM EXPLAIN THE MECHANISM OF THE COLOUR CRT MONITOR**

A CRT monitor contains multiple electron guns which are located at the end of the neck (the narrow end) of the monitor. These guns produce millions of tiny red, green and blue phosphor electrons that glow when they are struck by an electron beam that travels across the screen to create a visible image.

The electrons (which are the negative charges), come from an oxide coated element called the cathode, which is the negative terminal. The cathode is heated to produce the required stream of electrons which are then attracted to the positively charged screen.

On the screen of the CRT, the image is created by causing the phosphor coating on the inside of the CRT to glow with different intensities when bombarded by a stream of electrons creating visible images on the screen.



1. **OUTLINE THE GENERAL STRUCTURE OF AN OPENGL PROGRAM AND EXPLAIN THE USE OF VARIOUS OPENGL LIBRARIES**

#include <GL/gl.h>

#include <GL/glut.h>

#include<whatyouneed.h>

#include <GL/glu.h>

#include <iostream>

using namespace std;

void setup()

{

/\* Vertex variables , Vertices coordinates, binding , textures, buffering\*/

}

void display()

{

/\*glClear(---)

/\*These are only statements and no arguments are passed here\*/

/\*glFlush(---)

}

int main(int argc, char \*argv[])

{

glutInit(&argc, argv); //Intilaising the GLUT library

glutInitDisplayMode(GLUT\_RGB | GLUT\_DEPTH | GLUT\_DOUBLE); //decscrbing the type of the window you want

glutInitWindowSize(300, 300); // Initializing the size of the window

glutCreateWindow(" Hello Theredisplay"); // creating a window that matches the display mode you requested in the function

glutInitContextVersion(4, 3);

glutInitContextProfile(GLUT\_CORE\_PROFILE);

setup();

glutDisplayFunc(display);

/\*sets up the display callback, which is the routine GLUT will call when it thinks the contents of the window need to be updated\*/

glutMainLoop();

/\* This is an infinite loop that works with the window and operating systems to process user input

and other operations\*/

}

5. **EXPLAIN THE USE OF VARIOUS OPENGL LIBRARIES NAMELY GL, GLUT GLU GLUI**

1. GL

It is a graphics library used for 2-D and 3-D drawing primitives and operations.

1. GLUT

GLUT Library for writing OpenGL programs and mostly dealing with the user interface. It implements a simple windowing application programming interface (API) for OpenGL and makes it considerably easier to learn about and explore OpenGL Programming.

1. GLU

GLU is a Library which contains a set of functions to create texture mipmaps from a base image, map coordinates between screen and object space, and draw quadric surfaces and NURBS.

1. GLUI

It is window-system independent and it relies on GLUT to handle all system-dependent issues, such as window, keyboard, joystick and mouse management.

1. **USE A DIAGRAM AND EXPLANATIONS TO ILLUSTRATE THE WORKING MECHANISM OF A RASTER SCAN CONTROLLER**

Raster Scan Controllers are a type of graphics monitor which employ CRT.

In a raster scan controller, electron beams sweep across the screen, from top to bottom covering one row at a time. Stored intensity values are restored from frame buffer and painted on screen taking one row at a time. Each screen point is referred to as pixels.

In a raster scan controller refreshing is done at done at a rate of 60-80 frames per second. Refresh rates are also sometimes described in units of cycles per second / Hertz (Hz). At the end of each scan line, electron beam begins to display next scan line after returning to left side of screen. The return to the left of screen after refresh of each scan line is known as *horizontal retrace* of electron beam. At the end of each frame electron beam returns to top left corner and begins the next frame.