## **Computer Graphics and Multimedia**

Course code – CS3C024 **Experiment – 1**

1. **To Study Introduction of Computer Graphics.**

* **Introduction**

Computer Graphics is defined as any sketch or a drawing or a special network that pictorially represents some meaningful information. Computer Graphics is used where a set of image needs to be manipulated or the creation of the image in the form of pixels and is drawn on the computer. Computer Graphics can be used in digital photography, film, entertainment, electronic gadgets and all other core technologies which are required. It is a vast subject and area in the field of computer science. Computer Graphics can be used in UI design, rendering, geometric object, animation and many more. In most area, computer graphics is an abbreviation of CG. There are several tools used for implementation of Computer Graphics. The basic is the <graphics.h> header file in Turbo-C, Unity for advanced and even OpenGL can be used for it’s Implementation. It was invented in 1960 by great researchers Verne Hudson and William Fetter from Boeing.

**Computer Graphics refers to several things:**

* The manipulation and the representation of the image or the data in a graphical manner.
* Various technology required for the creation and manipulation.
* Digital synthesis and its manipulation.

**Types of Computer Graphics:**

**Raster Graphics**: In raster graphics pixels are used for an image to be drawn. It is also known as a bitmap image in which a sequence of image is into smaller pixels. Basically a bitmap indicates a large number of pixels together.

**Vector Graphics**: In vector graphics, mathematical formulae are used to draw different types of shapes, lines, objects and so on.

* **Applications of Computer Graphics**
* Computer Graphics are used for aided design for engineering and architectural system- These are used in electrical automobile, electro-mechanical, mechanical, electronic devices. For example: gears and bolts.
* Computer Art – MS Paint.
* Presentation Graphics – It is used to summarize financial statistical scientific or economic data. For example- Bar chart, Line chart.
* Entertainment- It is used in motion picture, music video, television gaming.
* Education and training- It is used to understand operations of complex system. It is also used for specialized system such for framing for captains, pilots and so on.
* Visualization- To study trends and patterns.For example- Analyzing satellite photo of earth.
* **Pixels** A pixel is the smallest unit of a digital image or graphic that can be displayed and represented on a digital display device. A pixel is the basic logical unit in digital graphics. Pixels are combined to form a complete image, video, text, or any visible thing on a computer display. A pixel is also known as a picture element (pix = picture, el = element).
* **Refresh rate** The refresh rate is the number of times per second that a raster-based display device displays a new image. This is independent from frame rate, which describes how many images are stored or generated every second by the device driving the display. On cathode ray tube (CRT) displays, higher refresh rates produce less flickering, thereby reducing eye strain. In other technologies such as liquid-crystal displays, the refresh rate affects only how often the image can potentially be updated. Non-raster displays may not have a characteristic refresh rate. Vector displays, for instance, do not trace the entire screen, only the actual lines comprising the displayed image, so refresh speed may differ by the size and complexity of the image data. For computer programs or telemetry, the term is sometimes applied to how frequently a datum is updated with a new external value from another source.
* **Frame Buffer** A framebuffer is a portion of random-access memory containing a bitmap that drives a video display. It is a memory buffer containing data representing all the pixels in a complete video frame. Modern video cards contain framebuffer circuitry in their cores. This circuitry converts an in-memory bitmap into a video signal that can be displayed on a computer monitor. In computing, a screen buffer is a part of computer memory used by a computer application for the representation of the content to be shown on the computer display. The screen buffer may also be called the video buffer, the regeneration buffer, or regen buffer for short. Screen buffers should be distinguished from video memory. To this end, the term off-screen buffer is also used.

* **Resolution** In computers, resolution is the number of pixels (individual points of color) contained on a display monitor, expressed in terms of the number of pixels on the horizontal axis and the number on the vertical axis. The sharpness of the image on a display depends on the resolution and the size of the monitor. The same pixel resolution will be sharper on a smaller monitor and gradually lose sharpness on larger monitors because the same number of pixels are being spread out over a larger number of inches.
* **Persistence** For the phosphors coated on the screen, persistence represents the duration they continue to emit light after the CRT beam is removed. Persistence is defined as the time it takes the emitted light from the screen to decay to one-tenth of its original intensity. Lower-persistence phosphors require higher refresh rates to maintain a picture on the screen without flicker. A phosphor with low persistence is useful for animation; a high-persistence phosphor is useful for displaying highly complex, static pictures. Although some phosphors have a persistence greater than 1 second, graphics monitors are usually constructed with a persistence in the range from 10 to 60 microseconds.
* **Graphic Mode Initialisation** A way of displaying images on a computer screen or other graphics device such that the basic unit is the pixel. Lines and characters on the screen are drawn pixel by pixel. The resolution and complexity of the image depends on how many pixels there are in total, and how many bits are assigned to each pixel. The more bits per pixel, the more different colors or shades of gray. A single graphics device can operate in a number of different graphics modes with different resolutions and color selections.

* **Graphics driver**

A graphics driver is the software that allow your operating system and programs to use your computer’s graphics hardware. If you play PC games, you should keep your computer’s graphics drivers updated to get the best performance out of your hardware. Graphics drivers are the software that runs the graphics cards, connecting them to the operating system. They are different for each graphics card and are most often provided by the manufacturer of the graphics card. It is important to keep these drivers updated in order to have the best computer performance.

* **Graphics Mode** A way of displaying images on a computer screen or other graphics device such that the basic unit is the pixel. Lines and characters on the screen are drawn pixel by pixel. The resolution and complexity of the image depends on how many pixels there are in total, and how many bits are assigned to each pixel. The more bits per pixel, the more different colors or shades of gray. A single graphics device can operate in a number of different graphics modes with different resolutions and color selections. A common mode for a desktop PC would be 1024 by 768 pixels with 256 different colors – chosen from a much larger number – available for each pixel.
* **Path driver**

Path Driver specifies the directory path where init graph looking for graphics driver first. If they are not here init graph search in current directory . If path driver is null the driver file must be in the current directory.

* **Basic functions**
* **setColor();**

Sets the color used for drawing. The color parameter is usually one of the predefined color names from Java: BLACK, BLUE, CYAN, DARK\_GRAY, GRAY, GREEN, LIGHT\_GRAY, MAGENTA, ORANGE, PINK, RED, WHITE, or YELLOW. The case of the individual letters in the color name is ignored, as are spaces and underscores, so that the Java color DARK\_GRAY could be written as "Dark Gray". The color can also be specified as a string in the form "#rrggbb" where rr, gg, and bb are pairs of hexadecimal digits indicating the red, green, and blue components of the color.

Usage : setColor(color);

* **cleardevice();**

The header file graphics.h contains cleardevice() function which clears the screen in graphics mode and sets the current position to (0,0). Clearing the screen consists of filling the screen with current background color.

Syntax : void cleardevice();

* **delay();**

Delay in C: delay function is used to suspend execution of a program for a particular time.

Declaration: void delay(unsigned int);

Here unsigned int is the number of milliseconds (remember 1 second = 1000 milliseconds). To use delay function in your program you should include the "dos.h" header file which is not a part of standard C library.

* **Closegraph();**

The header file graphics.h contains closegraph() function which closes the graphics mode, deallocates all memory allocated by graphics system and restores the screen to the mode it was in before you called initgraph.

Syntax : void closegraph();