UNIT: 5 - Animation

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The process of creating a sequence of images or frames that simulate motion or change over time, is called animation. It involves designing and manipulating visual elements to produce the illusion of movement, bringing static objects or characters to life. A person who creates animations is called animator.

Animation includes all the visual changes on the screen of display devices

1. Change of shape
2. Change in size
3. Change in color
4. Change in structure
5. Change in angle

Principles of Animation

1) Squash and strech
This principle involves exaggerating the shape and volume of an object to convey weight, flexibility or impact. It helps make animations more dynamic and adds a sense of life and energy to objects or characters

2) Anticipation
This is the situation where the animator will try to create some scenes, and the audience will ~~wait~~ wait for something happening, but nothing will happen

3) Staging

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Staging means the animator should create such types of scenes and characters that the audience is attracted to these scenes. This makes a complete animation more interesting and the audience does not lose their interest.

4) Straight Ahead
This principle describes that all the scenes should be drawn first from the beginning to the ending, the animator should fill the interval scene.

5) Flow through and Overlapping Action
This principle describes about the different speeds of two or more objects in the same scene.

6) Slow In and Slow Out
This principle describe those characters and objects whose more importance is in the between scenes, and they are slow or negligible in the beginning and ending

7) Arc
In animation, each and every object will follow some arc. There should not be any object which will follow a straight line.

8) Secondary Action
This principle describes that one character will have some action, and based on those actions second character will have actions and move in more than one direction.

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9) Timing
This principles defines that if we want to perform each action perfectly then the timing correct. This principle takes a lot of years of hard work to get a better output.

10) Exaggeration
Exaggeration is used to create more realistic scenes to connect the audience more towards reality. It allows animators to convey emotions or convey key actions more effectively.

11) Solid Drawing
To have a more realistic scene, the drawing should be solid and perfect for each object or character. So this principle describes that if we create each character in a 2D shape, then the whole animation will look more realistic.

12) Appeal
This describes that any character animator creates should not be an exact copy of a real person. The character should have similarities to the real world person so that the audience can think about the person.

Types of Animation Systems

Scripting Systems
It involves using programming or scripting languages to control the movement and behavior of animated

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objects or characters. Animators write scripts or code that define specific actions, interactions, or sequences within the animation. Scripting allows for precise control over the animation, and it is often used to create complex and interactive animations in video games or interactive media.

Procedural Animation
It involves generating animation automatically using algorithms or mathematical functions instead of manually keyframing each frame. It relies on rules, parameters, and conditions to define the animation behavior.
It can be used to create natural phenomena, simulations, or repetitive motions. It offers flexibility and efficiency in generating complex and dynamic animations.

Representational Animation
It focuses on accurately representing or mimicking the behavior and movement of real-world objects or characters. It involves capturing and replicating realistic motion, physics and dynamics. It is commonly used in scientific visualization, medical animations, or simulations where accurate depiction is crucial.

Stochastic Animation
It uses to control group of objects such as in particle systems. Example fireworks, fire, waterfalls, etc

Behavioural Animation
It involves animating characters or objects with autonomous behaviors and decision making capabilities using AI techniques

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GKS (Graphical Kernel System)

GKS is a software which is used for 2D graphics. It was adopted as first graphics software standard by ISO.

GKS standard defines a set of functions and procedures for tasks such as drawing lines, circles, polygons, text, and other graphical elements. It also provides mechanisms for defining colors, handling transformations, managing input and output devices and interacting with GUI.

6 output functions of GKS are

1) Polyline

Poly means many. It is a function which has ability to draw one or more straight lines through coordinates which user has given to them.

2) Polymarker

This function is used to draw a symbol at coordin-ate which user has provided. There are 5 types of symbol which is used by this software namely x, +, *, O.

3) Text

This function is used to add text at given coordinates by user.

4) Fill-area

It allows a polygon to be drawn and it can be filled with coordinates which are given. There is variety of fill-areas which includes hollow, solid and there is also variety of hatching and patterns.

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5) Cell-array

In this pattern is defined by user and it outputs in rectangle according to given coordinates by user.

6) Generalized Drawing Primitives

It provides user various kinds of facilities. Mostly all of systems has various kinds of software for arcs of circle or ellipse and also drawing of a smooth curve with set of given points.

GKS Workstation and Metafiles

Workstations refer to output devices where graphical images are rendered.

Metafiles are a way to store and transmit graphical information in a device-independent format for playback or exchange between systems.

GKS uses workstations for input and output. A workstation is a display plus a number of input devices attached to a single line or channel. Workstations have only a single display surface but may have any number of input devices.

There are three type of workstations

INPUT only

OUTPUT only

OUTIN both input & output

The graphics manager will define the workstation types and numbers and provide a list similar to the table below to the GKS users at that installation.

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A mechanism for long term storage of graphical information is the metafile.
In GKS this important type of output device is given a special name - GKSM.
The metafile is looked upon as just being another workstation either INPUT or OUTPUT type.

Different formats for metafile could be defined as different number workstations by the system manager. This could create for metafiles that are not produced by GKS but are common enough to warrant facilities for creation of that format

A GKSM stores type information, data record length information and then the data itself

GKS supports two types of metafiles
GKS-7 metafile format → is a binary format specific to GKS

CGM format → It is widely used and standardized metafile format that is compatible with GKS.

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