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Assignment 1.

Q.1 Explain the current market rendering engines?

Ans:1 Few of the current market rendering engines are -

Understanding the current market rendering engines.

- 3Delight
- Arion
- Arnold
- Artlantis
- Clarisse
- Corona
- Felix Render
- Fury Ball
- Iguerilla Render
- Iray
- Keyshot
- Blender

1) 3Delight -

- It is a 3D rendering programming that is intended for most extreme similarity with the industry benchmarks as it utilizes the render man shading language.

- It reconciliation into real 3D modelling solutions like Maya makes it well known alternative for feature film impacts.
- This 3D rendering software supports physically based material, different measures incorporate OpenExr & OpenVDB.

4. Arion -
- Arion is an unbiased 3D rendering programming that permits rendering light sources independently for finish adaptability in after creation.
- It delivers the results at high speed because of its help of both CPU & GPU based rendering.

5. Arnold -
- Arnold is a quick CPU based ray tracing renderer that was created for the VFX studio Sony Pictures Image works.
- It is prepared to do continuous rendering, implying that when you do changes amid the rendering they are instantly incorporated into ongoing computations.
- Numerous presets are accessible out of the case and extra nodes are composed by the dynamic client network.

- Its extensive variety of highlights makes Arnold extra-ordin-ary compared to other 3D rendering programming for enhancements.

4) Artlantis -

- Artlantis is a 3D rendering software that has been produced with an eye on the necessibities of planners and fashioners.
- It gives a wide choice of preset like indoor/open air lightening for a fast turn around.
- Artlantis is accessible in a rendition for high-determination 3D renderings; i Visit 360 displays, VR objects.

5) Clarisse -

- The rendering capacities of clarisse are exceptionally best in class.
- Clarisse would already be able to demonstrate various block busters credits for itself, similar to the new star wars films.

6) Corona -

- Corona is an unbiased photorealistic 3D renderer, that has turned out to be mainstream because of convinence.

- Corona is appropriately a profoundly famous 3D renderer software.

7. Felix Renderer -
- Felix Renderer is cloud computing 3D rendering software
- It frees experts who don't have the assets from the limitations of their equipment by giving an interface that permits simple transfer of scene records.

Q.2 Explain AR, VR & MR?

Ans. 2 1. Augmented Reality (AR) -
- Augmented reality is a real world view with additional, computer generated enhancements.
- Augmented reality uses the existing environment & overlays new information on top of it.
- Making Augmented reality encounter is a multi organize process, from the improvement of 3D models to the innovation that powers the image tracking & depth sensing

Application of AR -

1. Medical
2. Military
3. Marketing
4. Navigation
5. Entertainment
6. Education & Training
7. Office

2) Virtual Reality (VR)-

- Virtual reality is an artificial environment that is created with software & presented to the user in such a way that the user suspends belief & accepts it as a real environment.
- The simplest form of virtual reality is a 3D image that can be explored interactively at a personal computer.
- VR application immerse the user in a computer generated environment that simulates reality through the use of interactive device, which send & receive information & are worn as google, headsets, gloves or body suits.
- VR gadgets work comparably
- Unlike traditional interface, VR places the user inside the virtual environment to give an immersive experience.

Application of VR-

1) modeling, designing & planning.
2) Training & education.
3) Telepresence & Teleperation
4) Co-operative working
5) Entertainment.

3) Mixed Reality -

- Mixed reality is a blend of virtual reality & augmented reality
- It is also known as hybrid reality
- Mixed reality gadgets work by making a 3D guide of client's environment & ~~fit~~ filtering the physical condition. so that gadgets knows how & where to put the mechanized content into that space sensibly while enabling the customer to team up with it utilizing movements.
- MR encounters welcome mechanized content into client's ~~condit~~ continuous condition, enabling the client to work together with them.

Applications of MR -

1) Industries.
2) medicine
3) Collaboration
4) Navigation
5) Entertainment.

Q.3 Explain depth mapper & mobile phones &

Ans 3 1. Depth mapper -

- A depth map is an image or image channel that contains information relating to the distance of the surfaces of scene

objects from a viewpoint

- Estimating depth is an important component of understanding geometric relations with a scene
- The term is related to and may be analogous to depth buffer, z-buffer, z-buffering & z-depth.
- The "z" in these letter terms relates to a convention that the central axis of view of a camera is in the direction of the camera's z axis & not to the absolute z axis of a scene.
- (It is use for simulating the effects of uniformly dense semi-transparent media) within a scene such as fog, smoke, or large volumes of water.

Mobile phones -

- The phones are using AR, VR & MR
- Mobile telephone services use a cellular network architecture & therefore mobile telephone are called cellular telephone
- While the earliest generation of mobile phones could only make & receive calls, today's mobile phone do a lot more accommodating web browsers, games, cameras, video players & navigation system.

- The application of mobile phones in AR, VR & MR -
1. It is used for gaming
2. Used to view furniture in home before buying it
3. Simulation for car driving.
4. For seeing menu in plate before ordering.
5. Used to interact with remote users.
6. Used in military for augmentation of a battle field scene

Q.4 Explain Smart glasses & HMD?

Ans 4 1) The Canadian researcher Steven Mann is a inventor of smart glasses.

2) Smart glasses are the wearable computers that add information to what the wearer sees.

3) Smart glasses gathers the information from internal & external sources.

4) Smart glasses include all the features of smart phones.

5) It supports GPS, Bluetooth & Wifi. The activity tracking functionalities like calories burned distance walked etc. are also added in smart glasses.

6) Smart glasses have various display techniques like curved mirror, laster technologies, waive guide or light guide based technologies, Virtual Retinal Displays, Technical Illusions Cast AR.

- Uses of the advantage of smart glasses-

1. It is hands free
2. It is used for personal use
3. It is used to navigation
4. It works like memory assistance
5. It also notifies us about the event
6. It shows the clear sights.
7. It has camera to capture the images & to record the video

- Application of smart glasses-

1) Medical
2) Safety
3) Education
4) Productivity
5) Sports

- Disadvantages of smart glasses -

1) The data inaccuracy
2) Smart glasses are expensive
3) It leads to ~~dock~~ lack of privacy & accidents.
4) lack of availability
5) As battery drains out quickly so needs more charging

Q.5
Ans-5

HMD's -

1) Head mounted Displays (HMD) gadgets are utilized to see the individual data that can give data in a way that no others show can.
2) HMD's are utilized as distant data sources, they showed video can likewise be made receptive to head & body developments, duplicating the manner in which we see explore through & investigate the world.
3) HMD consists of one or more image sources collimating optics & a means to mount the assembly on the head.
4) The current VR HMD's consists of 4 Basic parts-
   a. A display image source
   b. A head mount
   c. An optical system
   d. A position tracker.

- The display image sources are usually liquid Crystal Display (LCD) or Cathode Ray Tube (CRT). These sources presents an image to the viewers.
- The optical system permits to place the screen close to eyes & head for compactness. The image is magnified so that it will appear big & also provide a wide field of view.
- The head mount is the base for mounting the components. The position tracker monitor the head position of user

Q.5 Explain unity engine, multiplatform publishing?

Ans-5 1) Unity editor to create 2D & 3D games, app and experiences.

2) Unity is a cross-platform game engine developed by unity technologies, first announced and released in June 2005 at Apple worldwide developers conference as a mac os x game engine.

3) The engine has since been gradually extended to support a variety of desktop, mobile, console and virtual reality platform.

4) It is particularly popular for ios & Android mobile game development & it is considered easy to use for beginner developers & is popular for Indie game development.

Developers	Unity Technologies.
Stable Release	2021.3.5F1 / June 1 20.22.35 days ago
Preview release	2022.1.4 2022.2.0a16 / June 1, 2022.35 days ago June 8, 2022. 28 days ago

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written in	C++ (runtime) C# (Unity Scripting)	Q.6
Platform	See & Supported	16 Ans. 1
Liscence	proprietary	
Website	Unity.com.	

5) The engine can be used to create three dimensional (3D) & two dimensional (2D) games, as well as interactive simulations & others experience.

6) The engine has been adopted by industries outside video gaming such as film automotive, architecture, engineering, construction & the United states armed forces.

Q.6 Write a short note on

16 2D Graphics -

Ans. 1

- 2D Graphics is the computer based generation of digital images - mostly from two-dimensional models (such as 2D geometric model, text & digital images) & by techniques specific to them
- It may refer to the branch of Computer Science that comprises such techniques or to the models themselves
- 2D Computer graphics are mainly used in applications that were originally developed upon traditional printing & drawing technique technologies such as typography, technical drawing, advertising, etc.
- 2D graphics objects are known as sprites.
- In those applications, the two dimensional image is not just a representation of a real world object, but an independent artifact with added semantic value
- Two dimensional models are therefore preferred ~~for~~ because they give more direct control of the image than 3D computer graphics

2) 2D Physics -

Ans 2. Unity has a seperate physics engine for handling 2D physics so as to make use of optimization ~~to the standard~~ only available with 2D.

- The components correspond to the standard 3D Physics components such as Rigid body, Box Collider & Hinge Joint, but with "2D" appended to the same.
- So sprites can be equipped with Rigidbody 2D, Box Collider 2D & Hinge Joint 2D
- Most 2D ~~graphics~~ physics components are simply "flattened" versions of the 3D equivalents. (eg Box collider 2D is a square while box collider is a cube) but there are few exceptions.

3) Scripting -

Ans 3. Scripts are most widely used by the developers

- Unity allows you to create your own components using scripts.
- These allow you to trigger game events, modify component properties over time & respond to user input in any way you like.
- The behaviours of game objects is controlled by the components that are attached to them.

- Unlike most other assets, Scripts are usually created within Unity directly.
- You can create a new Script from the Create menu at the top left of the project panel or by selecting Assets > Create > C# Scripts from the main menu.
- A Scripts makes its connection with the internal workings of Unity by implementing a class which derives from the built-in ~~the~~ class called MonoBehaviour.
- A Scripting language can be viewed as a domain-specific language for a particular environment; in case of Scripting an application. It is also known as extension language.
- Scripting languages are also sometimes referred to as they sometimes operate at a high level of abstraction, or as control language.

4) Animation -

Ans 4. - In unity we can perform animation on game ~~project~~ object and characters.
- These animations are retargetable & have full control on animation at runtime
- Unity also provides humanoid animation for one character model onto another.

- Unity's animation system is based on Animation clips that contains the change in object position, rotation & other properties over time.
- Animation clips are organized in structured flowchart known as Animator Controller. This Controller acts like a state machine that keeps the track of which clip should currently be playing & when the animations should change or blend together.
- Today, most animations are made with computer generated imagery (CGI)
- Computer animation can be very detailed 3D animation, while 2D computer animation can be used for stylistic reasons, low bandwidth or faster real time renderings.

5) Timeline -

Ans 5 • To create the cinematics, cut scenes and game play sequence use the timeline Editor window.

- Timeline Editor window saves the following -

a) Timeline assets - The tracks and the clips are saved by Timeline assets. The timeline Editor saves the recorded animation as a children of the Timeline asset.

b) Timeline Instance - You cannot directly add the timeline asset to the scene. You have to create an instance to animate the game objects in scene with Timeline asset.
- The timeline editor window gives an automatic method of creating a timeline instance while creating a timeline asset.

c) Reusing timeline assets - Since timeline Assets and timeline instances are seperate it is possible to reuse the same timeline asset with many timeline instance.

d) The timeline window - The timeline window allows to create cinematic content, game-play, sequences, audio sequences, & complex particle effects.

e) Multiplayer & Networking -

Ans-6. There are two kinds of users for the networking feature -

1) Users making a multiplayer game with unity:
These users should start with network Manager or the High level API.

2) Users building network Infrastructure or advanced multiplayer games:
These users should start with the Network Transport API

3) High level Scripting API -

- Unity's networking has a high level scripting API
- Using this means you get access to commands which cover most of the common requirements for multiusers games without needing to worry about the lower level implementation details.

4) Network Manager -

- The Network manager manages networking aspects of multiplayer game. So the network manager should be active in your scene at a time
- There is built in network manager component in unity.
- It manages all the features of multiplayer game.
- You can write your own network manager by using script for your custom requirements.
- The network manager features include : Game state management, Spawn management, Scene management, Debugging information, Matchmaking Customization.

Q. UI -

Ans 7
- The UI system permits us to create user interfaces fast & naturally
- The workflow for designing UI in unity follow a slightly different path than the one we have been going through so far.
- UI elements in Unity are not placed directly onto the scene.
- They are always placed as children of a special Game Object called the Canvas.

Canvas - The Canvas is an area where all the UI elements are inside.

You can create an image in Canvas by clicking on menu Game object > UI > Image.

- UI elements are drawn in the same order they appear in the hierarchy.
- If two elements of UI overlap, the later one will appear on top of the earlier one.
- Components are used to interact with UI system that handles interaction like mouse or touch events & interaction using a keyboard or controller.

Q. Navigation and Path finding -

Ans 8 • Navigation is used to move the character in game world.
• Navigation mesh is created automatically from scene geometry
• In this dynamic obstacle are used to change the navigation of the character & off-mesh link is used to create specific actions like jumping down or opening door.
• The Unity NavMesh contains Nav mesh, Nav mesh Agent, component, off-mesh Link, Nav mesh Obstacle.
• ~~In Unity Nav Mesh contains Nav Mesh, Nav Mesh~~
• In Navigation system you have to define the walkable area for the character, where locations are created & connected to a surface laying on top of the scene geometry called the navigation mesh.
• Surface is stored as convex polygons.
• Then to find the path between to locations map the start & end locations to their nearest polygons.
• To follow the path, logical expression you have the sequence of polygons is called a corridor. Use the logic to avoid obstacle.

Q. Publishing -

Ans 6 HTML 5 games have a huge advantages over native in terms of publishing & distribution. You have the freedom of distribution, promotion and monetization of your game on the web, rather than each version being locked into a single store controlled by one company.

You can benefit from the web being truly multiplatform.

Q.7 How VR & AR works in unity?

Ans.7
- Unity VR lets you target virtual reality devices directly from unity, without any external plugins in projects.
- It provides a base API and feature set with compatibility for multiple devices.
- It has been designed to provide forward compatibility for future devices and software.
- The VR API surface is minimal by design but will expand as VR continues to grow.
- By using the native VR support in unity, you gain stable version of each VR device.
- A single API interface to interact with different VR devices.

- A clean project folder with no external plugin for each device.
- The ability to include and switch between multiple device in your application.
- Increased performance (lower-level Unity engine optimization are feasible for native devices.

* AR work in Unity -
- Unity's AR foundation is a cross platform framework that allows you to write augmented reality experiences once then build for either Android or iOs devices without making & additional changes.
- The framework is available via Unity's AR foundation package.
- AR (ores optional AR core extension for AR foundation package adds additional functionality, enabling you to use features such as cloud Anchors, Camera configuration filters and Recording and playback to your app.

Q8 Explain Scripting tools and event Overview.

Ans 8 Scripting tools -

- A script tool that you create just like a system tool you can open it from the search or ~~editing~~ catalog

window use it in model builder and the python window, and call it from another script you can write messages to the results window and progress dialog box.

- Using built in documentation tools, you can provide documentation.
- When the script is run as a script tool, ~~arcpy~~ Arcpy is fully aware of the application it was called from settings made in the application such as arcpy.env.overwriteOutput & arcpy.env.scratchWorkspace are available ~~from~~ from Arcpy in your ~~tool~~ script tool.
- To create a script tool in a custom toolbox, you need three things:
  A script
  A custom toolbox
  A precise definition of the parameters of your script.

Event Overview-

- The event overview section allows you to see all of the events that have been created, past and present, along with at a glance details of each event.
- From here you can select and edit individual events, find and edit all the attendees or attendees specific to an event, export spreadsheets, mass email attendees & more.

- A event is a computing context is an action or occurence that can be identified by a program & has significance for system hardware or software.

Q 9 Explain XR in detail.

Ans 9 - Extended reality (XR) is a term referring to all real & virtual combined environments and human machine interactions generated by computer technology & wearables.

- It includes representative forms such as augmented reality (AR), mixed reality (MR) & virtual reality (VR) and the areas interpolated among them.
- XR is a superset which includes the entire spectrum from "the complete real" to "the complete virtual" in the concept of reality-virtuality continuum.
- XR is a rapid growing field being applied in a wide range of ways, entertainment, marketing, real-estate, training & remote work.

Q.10
Ans

Q10 Explain VR, ~~AR~~ AR & MR, in XR?

Ans-10- XR encompasses augmented reality (AR), virtual reality (VR) & mixed reality (MR)

- While all three realities share common overlapping features and requirements, each has different purpose and underlying technologies.
- XR is set to play fundamental role in metaverse.
- The next evolution of the internet will converge ~~#~~ real, digital and virtual worlds into new realities, accessed via an arm-powered gateway device such as VR headset or pair of AR smart glasses.
- XR technologies share some fundamental similarities - A core part of all XR ~~web~~ wearable devices is the ability to use visual input methods such as object, gesture and gaze tracking to navigate the world & display context sensitive information.
- Depth perception and mapping are also enabled through the depth and location features.
- However, XR devices vary based on the type of AR, MR & VR experience and the complexity of use case that they are designed to enable.
- Augmented reality enhances our view of real world by overlaying what we see with computer generated information

- Today this technology is prevalent in smartphone AR application that requires the user to hold their phones in front of them.

Q.11 Explain SDK?

Ans.11 - A software development kit (SDK) is a collection of software development tools in one installable package.
- They facilitate the creation of application by having a computer, debugger & sometimes a software framework.
- They are normally specific to hardware platform & operating system combination.
- To create application with advanced functionalities such as advertisements, push notifications etc. most application software developers use specific software development kit (SDK)
- Some SDKs are required for developing a platform specific app.
- For eg-
The development of an android or java platform requires a java development kit for iOS application the iOS SDK is required.
For universal windows platform .NET framework SDK might be used.

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