UNIT – I

Introduction to Virtual Reality and Augmented Reality – Definition – Introduction to Trajectories and Hybrid Space-Three I's of Virtual Reality – Virtual Reality Vs 3D Computer Graphics – Benefits of Virtual Reality – Components of VR System – Introduction to AR-AR Technologies-Input Devices – 3D Position Trackers – Types of Trackers – Navigation and Manipulation Interfaces – Gesture Interfaces – Types of Gesture Input Devices – Output Devices – Graphics Display – Human Visual System – Personal Graphics Displays – Large Volume Displays – Sound Displays – Human Auditory System.

1.5)INTRODUCTION TO AUGMENTED REALITY (AR):

Augmented Reality (AR) is a technology that overlays digital information, such as images, text, or 3D models, onto the real-world environment, enhancing the user's perception and interaction with the physical surroundings. Unlike Virtual Reality (VR), which immerses users in a completely virtual environment, AR integrates digital elements into the real world, creating a blended or augmented experience.

AR TECHNOLOGIES:

1. Marker-Based AR:

- Marker-based AR relies on the recognition of specific markers or patterns in the real world to trigger the display of digital content. These markers act as reference points for the AR system, enabling the accurate overlay of digital information.

2. Markerless AR:

- Markerless AR, also known as location-based or location-aware AR, uses the device's sensors, such as GPS, compass, and accelerometer, to determine the user's location and orientation. This allows for the placement of digital content in the real world without the need for predefined markers.

3. Projection-Based AR:

- Projection-based AR involves projecting digital information directly onto physical surfaces. This can be achieved using projectors or smart glasses, creating interactive displays on tables, walls, or other surfaces.

4. Recognition-Based AR:

- Recognition-based AR uses computer vision and image recognition algorithms to identify objects or scenes in the real world. Once recognized, the AR system can augment the objects with additional information or interactive elements.

5. Superimposition-Based AR:

- Superimposition-based AR overlays digital content onto the real-world view captured by a device's camera. This is a common approach in AR applications on smartphones and tablets, where digital elements appear seamlessly within the camera feed.

1.5.1)INPUT DEVICES FOR AR:

1. Smartphones and Tablets:

- Smartphones and tablets serve as common AR input devices. Their built-in cameras, sensors, and processing power enable users to experience AR applications by pointing the device at the physical world.

2. AR Glasses and Headsets:

- AR glasses and headsets, such as Microsoft HoloLens, Magic Leap, and Google Glass, provide a hands-free AR experience. They typically incorporate cameras, sensors, and display technology to overlay digital content directly onto the user's field of view.

3. Gesture Recognition:

- Gesture recognition technology allows users to interact with AR content through hand gestures. Cameras or depth sensors capture and interpret the user's hand movements, enabling control and manipulation of virtual objects.

4. Voice Commands:

- Voice input is another intuitive way to interact with AR applications. Users can issue commands, ask questions, or provide input using natural language, enhancing the user experience in hands-free scenarios.

5. Touchscreens and Trackpads:

- Devices with touchscreens or trackpads, such as smartphones, tablets, or touch-enabled AR glasses, enable users to interact directly with digital content by tapping, swiping, or pinching.

6. Wearables:

- Wearable devices, including smartwatches and fitness trackers, can serve as input devices for AR applications. They may offer basic interaction capabilities, such as gesture recognition or notifications.

7. Controllers and Haptic Devices:

- Some AR experiences, especially in gaming and interactive simulations, may use handheld controllers or haptic devices to provide tactile feedback and enhance the sense of touch in virtual interactions.

3D Position Trackers:

3D position trackers are devices or systems that capture and monitor the position and orientation

of objects or users in three-dimensional space. These trackers play a crucial role in applications such as virtual reality (VR), augmented reality (AR), gaming, simulation, and robotics. They enable accurate spatial tracking for navigation and manipulation within virtual environments