# AMITY SCHOOL OF ENGINEERING AND TECHNOLOGY

# WEEKLY PROGRESS REPORT 3

**Enrollment No.** – A2305222498

**Program** – B.Tech C.S.E

**Batch** – 2022-2026

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**Faculty Guide’s Name** –Dr NEHA TYAGI

# Project Title:

Analysis of Augmented and Virtual Reality

# Target set for the week:

Key contributors and companies in the field for AR and VR Hardware and software of AR and VR

# Progress/Achievements of the week:

Successfully Researched and made report on Key contributors and companies in the field for AR and VR, Hardware and software of AR and VR.

# Future work plans:

applications of AR applications of VR social and ethical impact of AR social and ethical impact of VR Regards

**Atia Naim**

**3-CSE 8X**

**WPR-3**

**Key Contributors In The Field Of :**

**AUGMENTED REALITY**

The field of augmented reality (AR) has seen numerous key contributors who have made significant contributions to its development and advancement. While it is challenging to provide an exhaustive list, here are some prominent individuals and companies that have played influential roles in the field of AR:

* Ivan Sutherland was regarded as the "father of computer graphics". He is known for his groundbreaking work on the Sketchpad system in the year 1960, which laid the formation of AR technologies.
* Steve Mann: A pioneer in wearable computing and AR, Steve Mann has been researching and developing AR systems since the 1980s. He is known for his work on wearable AR displays and the concept of "mediated reality."
* Thad Starner: Thad Starner is a computer scientist and one of the early pioneers of wearable computing and AR. He co-founded the MIT Wearable Computing Project and later became a technical lead for Google Glass.
* Mark Bolas: As a researcher and professor at the University of Southern California, Mark Bolas has contributed significantly to AR and virtual reality (VR). He cofounded the Mixed Reality Lab at USC and has worked on various AR projects.
* Magic Leap: Magic Leap is a prominent company in the AR industry. They have developed an AR headset that blends virtual objects with the real world, providing highly immersive experiences. Rony Abovitz, the co-founder of Magic Leap, has been instrumental in advancing AR technology.
* Microsoft: Microsoft has made significant contributions to AR with its HoloLens headset. Alex Kipman, the inventor of Kinect and a technical fellow at Microsoft, has been instrumental in the development of HoloLens and the company's AR efforts.
* Meta Company: Meta Company, now known as Meta View, was a company that focused on creating AR headsets. Its founder, Meron Gribetz, aimed to create a more natural and intuitive AR interface using hand gestures.
* Apple: Apple has made significant investments in AR technology, introducing ARKit, a development platform for creating AR applications for iOS devices. Apple's CEO, Tim Cook, has expressed a strong interest in AR and considers it a transformative technology.
* Facebook: Facebook: Facebook has been actively engaging in the development of AR through its AR platform, Spark AR. They have offered creators with the necessary tools and frameworks to develop AR experiences on popular platforms such as Messenger and Instagram. Mark Zuckerberg, the CEO of Facebook, has emphasized the potential of AR in social interactions.
* Google: Google has been involved in AR through projects like Google Glass and ARCore, an AR development platform for Android devices. They have also explored AR applications in areas such as navigation and education.

Please note that this list is not exhaustive, and there are numerous other individuals, research groups, and companies that have contributed to the field of AR. The field is rapidly evolving, and new contributors and innovations continue to emerge.

# VIRTUAL REALITY

The field of virtual reality (VR) has been shaped by numerous key contributors who have made significant contributions to its development and advancement. While it is difficult to provide an exhaustive list, here are some prominent individuals and companies that have played influential roles in the field of VR:

* Jaron Lanier: Jaron Lanier is often referred to as the "father of virtual reality." He coined the term "virtual reality" and founded VPL Research, a company that developed some of the earliest commercial VR devices.
* Ivan Sutherland: Ivan Sutherland, mentioned earlier as a key contributor to AR, also made significant contributions to VR. His pioneering work on the Sword of Damocles, an early VR head-mounted display, laid the groundwork for immersive virtual reality experiences.
* Palmer Luckey: Palmer Luckey is the founder of Oculus VR, a company that played a crucial role in popularizing modern VR. Oculus Rift, the company's flagship headset, gained significant attention and was later acquired by Facebook.
* Oculus VR (Facebook Reality Labs): Following the acquisition by Facebook, Oculus VR has continued to contribute to the field of VR under Facebook Reality Labs. They have released subsequent iterations of their VR headsets and invested in VR content development.
* Valve Corporation: Valve Corporation, a prominent video game developer and publisher, collaborated with HTC to create the HTC Vive, a popular VR headset. Valve also developed the SteamVR platform, providing a robust ecosystem for VR games and experiences.
* HTC: HTC, a Taiwanese consumer electronics company, partnered with Valve to develop the HTC Vive. Their collaboration resulted in one of the first high-quality room-scale VR systems available to consumers.
* Sony Interactive Entertainment: Sony's PlayStation VR has played a significant role in bringing VR to the gaming market. The company's expertise in console gaming and their dedicated VR headset for PlayStation have contributed to the growth of VR in the gaming industry.
* Google: Google has made contributions to VR with its Google Cardboard, a low-cost VR viewer that utilizes smartphones as the display. They have also developed the Daydream VR platform and invested in VR content and experiences.
* Michael Abrash: Michael Abrash is a renowned software engineer and researcher who has contributed to the advancement of VR technology. He worked at Valve Corporation and later joined Oculus VR/Facebook Reality Labs, where he continues to be involved in VR research.
* Unity Technologies and Epic Games: These game engine developers, with Unity and Unreal Engine respectively, have provided developers with powerful tools and frameworks for creating VR experiences. Their engines have been widely adopted and have played a significant role in VR content creation.

Please note that this list represents a selection of key contributors and companies in the field of VR, but there are many other individuals, research groups, and companies that have made significant contributions to the advancement of virtual reality technology. The field continues to evolve, and new innovators are constantly emerging.

# Hardware and Software of VR

# Hardware

VR hardware generally comprises a collection of interconnected components that collaborate to deliver a captivating virtual reality encounter. some of the core components of VR are:

* Head-Mounted Display (HMD): The primary constituent of a VR setup is the headmounted display (HMD), it is a wearable device that you wear on your head like a pair of goggles or a helmet. It usually comprises of dual screens, one for each eye, and lenses that project the virtual content to your eyes. Additionally, it may feature integrated sensors to track head movements, facilitating real-time adjustments to the displayed visuals.
* Computing framework: In order to meet the requirements of VR systems, a dedicated VR-ready computer with a high-performance graphics card, sufficient RAM, and a fast processor is often recommended However, an alternative option is to use standalone VR headsets, which have their own built-in computing capabilities, eliminating the need for an external computer altogether.
* Tracking system: A tracking system is essential for accurately detecting your movements within the virtual environment. VR incorporates diverse tracking technologies, such as:

 Inside-Out Tracking: This approach utilizes built-in cameras or sensors on the HMD to accurately track the position and movement of the headset and controllers. By eliminating the requirement for external sensors or cameras, it provides increased flexibility and simplifies the setup process.

 Outside-In Tracking: This method depends on external sensors or cameras strategically positioned in the room to track the HMD and controllers. By capturing precise position and movement data, these sensors enable the VR system to recreate your actions within the virtual world.

* Controllers: VR controllers are portable gadgets that allow users to engage and interact within the virtual environment. These controllers typically feature buttons, triggers, and touch-sensitive surfaces, enabling users to engage with and manipulate virtual objects. Additionally, they have the ability to track hand movements, allowing users to effortlessly grasp, pick up, and manipulate objects within the virtual environment.
* Audio Devices: Immersive audio plays a crucial role in crafting an authentic VR encounter. Numerous VR systems incorporate integrated headphones or speakers within the HMD to deliver spatial audio, heightening the feeling of presence by offering precise audio positioning that corresponds to your head movements.
* Additional Accessories: The availability of supplementary accessories may vary depending on the VR system and its intended purpose. These accessories can encompass haptic feedback devices that offer tactile sensations to amplify immersion

or dedicated peripherals such as VR treadmills or motion platforms that enable more intuitive movement within the virtual realm.

**Software**

Virtual reality (VR) software is essential for the development, distribution, and administration of an immersive virtual reality experience. Some key components of VR software are:

* VR content creation: VR Content Creation involves utilizing VR software tools for the creation of virtual content, including 3D modeling, animation, and audio editing. Some common examples are Unity or Unreal Engine.
* Audio and Spatial Sound: VR software incorporates audio rendering capabilities to craft an enveloping soundscape. It utilizes spatial sound techniques to emulate 3D audio, where sounds radiating from precise locations within the virtual environment.
* VR Simulation and Interactions: VR software offers a broad spectrum of interactive experiences and simulations. Users have the freedom to venture through virtual realms, engage with virtual objects, shape the environment, unravel puzzles, partake in gaming, or immerse themselves in virtual training scenarios. The software facilitates real-time physics simulations, object interactions, and dynamic responses to user input.
* User Interface (UI) and Interaction: VR software provides user interfaces specifically designed for VR environments. These interfaces enable users to traverse, choose preferences, and engage with the virtual realm. Example of UI elements include manual gestures, digital overlays, vocal commands, and controllers.
* Social and Multiplayer Capabilities: VR software offers networking and multiplayer capabilities, enabling users to connect with one another in virtual environments. They can engage in activities, communicate through voice chat, and share virtual spaces for social interactions and participate in multiplayer events.

# Hardware and Software for AR

To overlay the virtual content and enhancing our perception and interaction with the environment both hardware and software components are required.

**Hardware**

* Smartphones and Tablets: Many AR apps are available on smartphones they use built in cameras, sensors, and processing power. They can also display AR content and track the user’s position and orientation.
* AR Glasses: Augmented reality glasses or smart glasses are wearable devices designed especially for AR experience. They include a display that overlays virtual content onto the user's field of view, as well as sensors and cameras for tracking and interaction. Examples of AR glasses include Microsoft HoloLens, Magic Leap One, and Google Glass Enterprise Edition.
* Head-Mounted Displays: Head-Mounted Displays or HMDs are wearable devices that cover the user's entire field of view, immersing them in a virtual environment. Some HMDs, such as the Microsoft HoloLens, also support AR functionality by blending virtual content with the real world.
* AR Headsets: AR headsets are similar to HMDs but are specifically designed for AR experiences. They provide a see-through display that overlays virtual content onto the user's view of the real world. Some examples of AR Headsets include “The Nreal Light” and “The Vuzix Blade”.
* Motion Tracking Systems: These systems use various sensors, such as cameras, accelerometers, gyroscopes, and depth sensors, to track the user's movements and position accurately. They enable accurate alignment of virtual content with the real world, enhancing the AR experience. Some examples of Motion Tracking System include “The Microsoft Kinect” and “The Leap Motion Controller”.

**Software**

* AR Development Platforms: These platforms provide the necessary tools, libraries, and APIs to create AR applications. Some popular AR development platforms include Unity 3D (with AR Foundation), Apple ARKit (for iOS), Google ARCore (for Android), and Microsoft Mixed Reality Toolkit.
* Computer Vision and Tracking: AR software utilizes computer vision algorithms and tracking techniques to identify and track objects and surfaces in the real world. These technologies enable the accurate placement and alignment of virtual content. OpenCV, Vuforia, and ARToolKit are commonly used libraries for computer vision and tracking in AR.
* Content Creation Tools: Software tools like 3D modelling and animation software like Autodesk Maya, Blender etc., are used to create 3D models, animations, and other digital assets for AR experiences.
* AR Applications: These are the actual applications or experiences that run on ARenabled devices. They can range from AR games and entertainment to industrial training and visualization tools.