Chapter 8
A Prelude to Cybersecurity Challenges in the Metaverse

Shashwath Bhaskar
https://orcid.org/0009-0009-7038-8948
VIT Bhopal University, India

Aiesha Kuna
https://orcid.org/0009-0007-6953-3082
VIT Bhopal University, India

Akshaya Jayakumar
https://orcid.org/0009-0004-6606-5939
VIT Bhopal University, India

D. Lakshmi
https://orcid.org/0000-0003-4018-1208
VIT Bhopal University, India

ABSTRACT

The metaverse represents a transformative concept that has amassed substantial attention in recent years, with big corporations vying to gain hegemony over this domain. While revolutionizing the way we interact with and experience our environment, the metaverse unlocks a vast potential for cyber criminals and nation-states to take advantage of the present voids in its security. By analyzing existing literature and emerging trends, the authors delve into the uncharted territory of the metaverse, examining the ways in which users' digital avatars and assets are at risk- including poor security of NFTs, the scope for financial fraud, the dark verse, and social engineering, among other issues. This chapter provides insight into the real-world implications of cyber-attacks in the metaverse and examines the legal and ethical challenges of regulating cyber activity in virtual environments so that Law Enforcement Agencies, planners, and companies can navigate this field to create a safe virtual world for all.

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INTRODUCTION

Widening up the horizons of the world as we know it, Extended Reality (XR) or cross reality is a collective term used to refer to all kinds of immersive technologies that rely on the use of spatial computing which facilitates and optimizes actions in these systems as defined by *Qamar* (2023). Extended Reality allows us to merge the physical and virtual worlds, seamlessly encompassing concepts of technologies like Virtual Reality (VR), Augmented Reality (AR), Mixed Reality (MR) and the Metaverse. As days pass, the use of XR devices is becoming more widespread and ingrained into our day-to-day lives. From the military to e-commerce, XR finds applications in various forms, providing a much more realistic way to interact with the virtual world; conversely even a much less real way to interact with the physical world. Immersive technology first began to be developed around the 1960s, when the first headset was created by a scientist named Ivan Sutherland, as stated by *Marr* (2022). In 1975, Myron Krueger implemented a combination of video cameras and projectors to build a VR world known as a 'Videoplace'. This research then observed rapid development and a variety of XR applications started to become available for iOS, Android, Windows, and Mac operating systems. The term XR then started to be popularized and after 2010 various industries began to establish their XR product lines globally according to *Mordor Intelligence* (2021). Both AR and VR technologies are said to be the backbone of the immersive tech space. Figure 1 shows the development of AR, which began in the 1960s, and Figure 2 shows the events in the innovative space that led to what VR is today.

Notable companies that took a dip into the massive prospects of XR include Facebook, Sony, Samsung and Google. Now standing at the pinnacle of the progression of immersive technologies is the metaverse- a term not unfamiliar to most.

The term "metaverse" was coined by Neil Stevenson for his 1992 cyberpunk novel, 'Snow Crash' *Numaan Huq et. al*. (2022). Stevenson's metaverse was a virtual place where characters could go to escape a dreary totalitarian reality. The protagonist, Hiro, navigates a VR world through an avatar- making

Figure 1. History of research and development in augmented reality