



# Chapter 7

## Augmented Reality Applications and Usage Examples in the Metaverse Age

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### ABSTRACT

*The aim of this chapter is to identify and introduce the most preferred applications by analyzing augmented reality applications used in master's theses and doctoral dissertations in Turkey. In order to achieve this aim, first of all, the concepts related to the Metaverse, which constituted the conceptual framework of the chapter, were explained by supporting them with the research findings obtained from the literature. Then, the AR development platforms, AR software development kits, AR applications, and the devices on which AR applications were run were examined in thesis studies within the scope of augmented reality accessed from the Council of Higher Education Thesis Archive. At the end of this chapter, Vuforia, ARCore, and Artivive Bridge software development kits are briefly introduced as the first three most frequently used AR software development kits in thesis studies accessed from the National Thesis Center Archive of the Council of Higher Education of Turkey.*

### INTRODUCTION

In this chapter, augmented reality applications used in master's theses and doctoral dissertations in Turkey were examined, and the programs and software used in the development of augmented reality applications were introduced. In the first part, concepts related to Metaverse (augmented reality, virtual reality, mixed reality, Web 3.0, blockchain, NFT, 5G) were explained by supporting the research findings from the literature.

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In the second part of the chapter, the method of the research to be carried out in order to realize the purpose of the chapter were given. In the method section, the research model and the methods used in determining the researches included in the study were included. In this section, master's theses and doctoral dissertations carried out within the scope of augmented reality accessed from the Higher Education Council Thesis Archive were examined.

In the third part of the chapter, the findings obtained as a result of the research carrying out, software, programs and mobile tools that develop augmented reality applications used in theses were introduced briefly in tables. Augmented reality applications used in master's theses and doctoral dissertations in Turkey were introduced through screenshots.

In the conclusion part of the chapter, augmented reality technologies, one of the three-dimensional technology components of the Metaverse concept with the research results obtained from the master's theses and doctoral dissertations were briefly mentioned.

## **CONCEPTS ASSOCIATED WITH THE METAVERSE ECOSYSTEM**

In the 21st century, with the increase in mobile technology ownership and the intensive use of web technologies internationally for communication purposes, individuals started to use digital environments to communicate. With the COVID-19 pandemic, interest in digital environments increased, it was seen that digital environments are a great necessity, and the effects of digital transformation began to be felt in social life. Digital transformation has facilitated the adoption of virtual environments in individual and community life. When virtual environments are used for educational purposes, they are transformed into virtual learning environments. Virtual learning environments are computer-designed environments where learners interact with the instructor, other learners or 3D virtual objects simultaneously through their avatars (Mroz, 2012).

The metaverse is an umbrella concept for the virtual environments that individuals use today for education, health, entertainment, shopping, marketing and communication purposes and can be defined as a fictional virtual reality universe (Yıldırım, 2021). In order to make sense of the metaverse, it is necessary to have knowledge about the concepts and technologies related to the metaverse. In the literature, 3D technologies can be associated with the metaverse. In this section, three-dimensional technologies such as augmented, virtual and mixed reality, blockchain, NFT, 5G and Web 3.0 technologies were mentioned.

### **Three Dimensional (3D) Technologies**

As a result of the enrichment and widespread use of 3D technologies over time, the reduction of necessary hardware and software costs, and the increase in access to mobile technologies, the number of applications that will run 3D technologies and users who will use these technologies has increased (Broll et al., 2008). In this section, augmented reality (AR), virtual reality (VR) and mixed reality (MR) technologies as 3D technologies were mentioned in the following headings, supported by the findings obtained from the literature.

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