Technological Roadmap of the Future Trend of Metaverse based on IoT, Blockchain, and AI Techniques in Metaverse Education

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***Abstract*— Metaverse is defined as a collection of technology gadgets and metaverse connected to IoT, Blockchain, Artificial Intelligence, and all the other tech industries including educational. In particular, the big success of the metaverse in the recent era is in the educational sector, metaverse resolved many difficulties in the education domain. Especially, in the situation of covid 19 people continued there all the educational things virtually using metaverse technologies. At this moment it was only a sector that was not hampered by the reason of covid 19, everyone did their educational work online instead of offline. Metaverse uses artificial intelligence and IoT technology to build a digital virtual world where you can safely and freely engage in social and educational activities that transcend the limits of the real world, and the application of these latest technologies will be expedited. In this paper, we are going to introduce the future of the metaverse, including its history, explanation, and shared features. Then, we will describe what technologies the metaverse is using and metaverse potentiality in education, the metaverse in education is clearly defined, and a detailed framework of the metaverse in education is proposed, along with in-depth discussions of its features.**

***Keywords*— Metaverse education, Artificial intelligence, Mixed reality, Metaverse, Virtual Education.**

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I. INTRODUCTION

TECHNOLOGY is rapidly changing the way we interact with the physical world around us. The Metaverse is a virtual shared space that everyone can access. Since the late 1990s PC internet boom that gave birth to eLearning, the education sector has advanced significantly. Microlearning was introduced by the second wave of mobile computing and social media through shorter, video-based learning on demand. Now, according to industry observers, the third computing era has arrived [1]. Metaverse of digital 3D areas where we interact as lifelike avatars will take the place of flat, static pages on PCs and mobile devices. You're never alone in the metaverse, an embodied internet [2]. The metaverse is "always on" and allows for social interactions with peers, unlike a Zoom call that is planned and ends when you're done. This change has significant effects on developing skills and learning. In essence, the metaverse would consolidate disparate virtual worlds into a common and lasting digital place [3]. The metaverse can also be considered a collection of all future virtual and augmented reality experiences as well as the interactions that IoT, AI, and machine learning will enable between the virtual worlds and the physical world. The potential for employing a metaverse for education has been made possible by the steadily developing applications of a metaverse in many fields, including gaming. Before examining the options, it is crucial to comprehend the metaverse's fundamental ideas because they can support instructional applications. The technological possibilities connected to each educational facet of the metaverse can give a clear idea of how the metaverse can alter education. Here is an example of how the metaverse might support learning and education. Firstly, Augmented reality is used in education, secondly, Lifelogging is used in education, thirdly, mirror world and education, and the big one is virtual reality in education [4, 5].

On the other hand, the gateway to the metaverse is virtual reality (VR) headsets. VR headsets completely immerse the senses and provide an unparalleled sense of embodied presence [6]. Users can freely roam around a 3D scene and interact with the environment with their hands, exactly like they would in real life. VR activates the motor center of the

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