researchers are constantly making many innovations in internet technology, such as 5G and 6G technology [28].

Infrastructure

There are hardware components that help us to have authentic experiences. In addition to nano and quantum (Nanotechnology can improve the performance of sensors or actuators) components, the technologies to form the metaverse are also in this layer. Content-On this layer, we will have medicine, healthcare, games, and applications that help users immerse themselves in one or more different worlds, for the most vivid experiences. Metaverse-when the lower layers develop to a certain extent, we will have a true Metaverse [29].

Metaverse services can be used without modifications, either to access services in the existing cloud environment, where all services are provided by centralized servers over the internet or to access services hosted in the decentralized edge computing deployments, shown in Fig. 3.

B. *Fundamental Technology*

The metaverse is defined as a virtual space where users can interact with 3D digital objects and 3D virtual avatars of each other in a complex manner that mimics the real world, and hold thing developed using artificial intelligence techniques. Fig. 4 shows the five AI phases in the Metaverse.

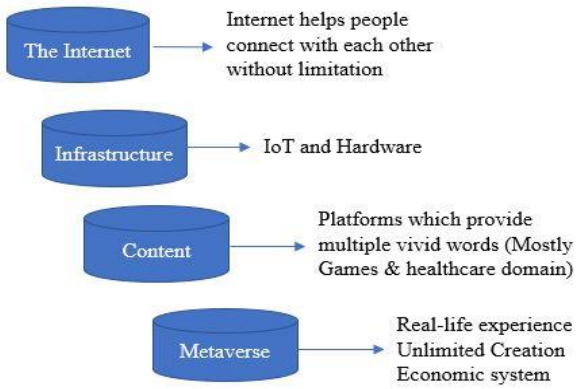

Fig. 2. IoT and internet for metaverse

Fig. 3. Edge computing in the metaverse

Accurate Avatar

Users are at the centre of the metaverse, and the accuracy of your avatar will affect the quality of your and other participants' experiences. An AI engine can evaluate 2D user photos or 3D scans to create a simulated reproduction that is extremely lifelike. To make the avatar more dynamic, it may plot a range of facial expressions, emotions, hairstyles, aging features, and so on.

Digital Humans

Digital humans are 3D versions of chatbots that exist in the metaverse. Digital humans are built entirely using AI tech and are essential to the landscape of the metaverse. From NPCs in gameplay to automated assistants in VR workplaces, there are myriad applications, and companies like Unreal Engine and Soul Machines have already invested in this direction. Multilingual accessibility- AI can help break down natural languages like English, convert them into a machine-readable format, perform analysis, arrive at a response, convert the results back into English and send it to the user.

Fig. 4. Five artificial intelligence use cases in the metaverse

The best part is that, depending on the AI's training, the results might be translated into any language, allowing users from all over the world to access the metaverse. Expansion of VR and AR- With new input, human feedback, and machine learning reinforcement, AI's output will improve with time. AI will be able to complete the task and produce results nearly as good as humans. AI is being trained by companies like NVIDIA to develop complete virtual worlds. This breakthrough will be instrumental in driving scalability for the metaverse, as new worlds can be added without the intervention of humans using AI ensemble VR and AR. Intuitive Interfacing- AI can also assist in human-computer interactions (HCI). When you put on a sophisticated, AI-enabled VR headset, its sensors will be able to read and predict your electrical and muscular patterns to know exactly how you'd want to move inside the metaverse.

Spatio-Temporal Algorithm

Spatio Temporal AI algorithm is a collection of digital tools, models, and methods that can be deployed to increase people's understanding of how, where, and why people locate and move in metaverse virtual cities. It also enables people to develop new virtual procedures for designing and managing the future metaverse virtual city so that it can become more sustainable, equitable, and efficient [30].

Metaverse Security and Privacy

Since the data and avatars of users of the Metaverse platform are located on different servers around the world, Metaverse handles different personal data processing in each country using AI techniques [31].

C. *Virtual Reality Object Connection*

Identity Modelling

Digital identity and personalization in the metaverse are your unique avatar, with the rise of Web 3.0, crypto wallets will also play a role in defining our identity. In a wallet, we might find traces of someone's gaming preferences and love

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