

XR-based metaverse platform for multi-user collaborations

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Elementary school science classes are being conducted using the multi-user collaboration metaverse platform developed by ETRI. Credit: Electronics and Telecommunications Research Institute(ETRI)

ETRI researchers have developed a metaverse platform that allows for freely collaborating among multi users via various means of communications online and offline. By overcoming existing technical challenges, it is expected to be of great help in the creation of various

new services and its commercialization via realization of a practical metaverse.

Electronics and Telecommunications Research Institute (ETRI) announced that it has succeeded in developing the world's best XR collaboration platform technology that allows multiple remote participants to interact with each other in order to perform various tasks in an extended reality (XR) metaverse space.

With existing technology, real-time collaboration of about five people is possible, but the research team has developed a technology that supports user-to-user interaction and remote collaboration in real time through data synchronization for up to 11 participants. It has doubled the capacity compared to other similar metaverse platforms.

The XR metaverse platform developed by ETRI is a software technology that supports various interactions between users through:

- building and expanding the XR space
- high-precision location recognition (VPS) of large-scale participants by 3D coordinate recognition in the XR space
- individual user's hand-gesture recognition
- real-time synchronization of user-shared data in the metaverse space.

By using this platform, it is possible to implement the extended reality-based metaverse space with the world's best performance. The research team also acquired technology to align and expand the XR space in real time by adding real-time map-learning technology for mobile devices and XR glasses. The accuracy of creating the [virtual space](#) is quite precise, being only 2.85 cm, in terms of difference error between the virtually-created space and the real space.



A research team of the ETRI is demonstrating a metaverse platform for multi-user collaborations. Credit: Electronics and Telecommunications Research Institute(ETRI)

ETRI has optimized the platform so that movements between users are synchronized within 0.1 seconds in latency. It was also adjusted so that the computation speed of the collaboration platform could remain steady even if the number of participants is increased. Delivering a compelling experience via a minimum delay of network connection environment is considered an essential part of metaverse implementation.

It recognizes the user's hand gestures quickly and precisely. This is thanks to the use of a single-layer deep learning inference technique. In

general, the amount of data to be processed and the motion recognition time increases as the number of users increases. The ETRI's XR metaverse platform achieved the world's best performance by recognizing multi hand gestures in 0.01 seconds and maintaining the collaborative operation speed between users at 0.1 seconds. Synchronization speed between multi-participating users was verified through ETRI's own 5G MEC testbed built for this purpose.

The research team's XR metaverse platform enabled collaboration and communication across visual, audio, and tactile senses, which is a green light for the spread of Korea's own-brand of XR based metaverse technology.

In particular, this technology was applied to a science-class education scenario for [elementary school students](#) in Gyeongnam in Korea in December 2021, and its practicality was verified through a remote education pilot service via face/non-face channels. In addition, the research team plans to further enhance the applicability by additional demonstrating the working system for 20 students at another public elementary school in Daejeon, Korea in October this year.

"We will try to promote the commercialization of ETRI's metaverse technology in various fields such as remote collaboration based education, manufacturing, office, and home by utilizing the world's best XR based metaverse collaboration platform," Dr. Son Wook-ho of ETRI's CG/Vision Lab.

In the future, ETRI will make efforts to develop the industrial ecosystem of metaverse by acquiring core metaverse technologies through establishing international standards related to metaverse. In addition, further acquirement of advanced technologies will help to build the ultimate metaverses by XR [metaverse](#) platform's application services.

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