

Industrial Internet of Things: Real-time remote control of smart factory between Korea and Finland

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A researcher of the ETRI is controlling a mobile robot by using 5G technology in smart factory. Credit: Electronics and Telecommunications Research Institute(ETRI)

A research team of the ETRI has revealed a technology which can remotely control one factory simultaneously from home and abroad using 5G technology developed through international joint research and an intercontinental wired network.

The Electronics and Telecommunications Research Institute (ETRI) announced that it has succeeded in demonstrating the Industrial Internet of Things service that controls and monitors smart factory facilities and robots in real-time at home and abroad at the same time.

The core of successfully demonstrating the technology is ultra-low latency communication technology. The communication delay between a distance of over 10,000 km is less than 0.3 seconds. It has been demonstrated that factory facilities in Gyeongsan, Gyeongsangbuk-do can be controlled in real-time seamlessly from the University of Oulu in Finland.

A smart factory refers to an intelligent factory which increases productivity and reduces defect rates to enhance industrial competitiveness by applying information and communication technology (ICT) to the entire manufacturing process. The core is controlling various processes remotely while automating tasks using robots.

To prevent damage due to communication errors, communication delay and data loss should be minimized, although data transmission rate is also important. The longer the communication distance and the more complex the communication network, the higher the delay and data loss. In this case, the [communication technology](#) of low latency and high reliability is required.

Based on this technology, ETRI has connected the smart factory of the Korea Institute of Industrial Technology, located in Hayang-eup, Gyeongsan-si, Gyeongsangbuk-do, to Oulu University using the 5G test

network of Oulu University in Finland and the domestic test network (KOREN²).

This demonstration introduced a new remote manufacturing diversification service which controls one factory at home and abroad independently. It is the world's first attempt to enhance the service scope and availability of smart factories.

The ETRI control center introduced the operation of the remote Manufacturing Execution System and its order, real-time facility control and status-monitoring service through the remote Supervisory Control And Data Acquisition control panel.

The Oulu control center demonstrated remote controlling and status monitoring of mobile manufacturing robots; controlling remote manufacturing process using the [virtual-reality](#) equipment; and monitoring the remote manufacturing process through collecting wireless sensor data based on the narrowband Internet of Things.



A picture that a research team of ETRI are real-time monitoring a process situation. Credit: Electronics and Telecommunications Research Institute (ETRI)

The tests succeeded in demonstrating [real-time remote control](#) and monitoring service of the two-way delay of less than 0.01 seconds in Korea and less than 0.3 seconds in Finland.

With this demonstration, the sharing and cooperation between countries in the manufacturing and production fields are expected to be boosted while increasing the possibility of remote smart [manufacturing](#) services based on stable [communication](#) quality.

As it is possible to effectively utilize idle equipment in each industry through remote control, this is expected to gain momentum in global

resource management and SME's industrial competitiveness.

Il-gyu Kim, head of the Mobile Communications Research Division of ETRI, said, "As it became possible to remotely control smart factories even from abroad as well as in Korea, we now can meet the demand for non-face-to-face activities in the industry caused by the COVID-19 pandemics. Therefore, it is expected to revitalize the stagnant industry."

In the future, the research team plans to perform follow-up research to ensure connectivity and mobility and to implement hyperspatial services. It also plans to work on designing future factories equipped with 6G through continuous cooperation with the 6G flagship program conducted by the University of Oulu.

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