

NS Solutions Corporation

Chuo, Tokyo, Japan



Telecom Solutions Division
Tetsuo Ogawa

The **SEEDroid** Makes High-Speed 5G Robots a Reality

Changing the future with next-generation 5G mobile communication

Since the invention of mobile phones, we have seen the creation of new data transmission functions, first enabling us to use e-mail and the internet, and now making it commonplace to watch videos on your phone (see below). About once every 10 years, a new generation of technology replaces the old one. We currently use 4G technology, and a number of experiments are being conducted with the aim of

Year	Type	Description	Characteristics
1979	1G	Analog	Car phones, but only in urban areas
1993	2G	Digital	E-mail, pagers, and mobile phones
2001	3G	Approx. 14 Mbps* speed	Internet access on mobile phones
2012	3.9G	Ultra-high speeds up to 100 Mbps	High-quality image viewing on smartphones
2017	4G	100 Mbps or more	0.1 s delay, suitable for video conferences and online gaming
2020 (estimated)	5G	10 Gbps	0.001 s delay, compatible with autonomous and remote operation technology

* Mbps: Unit for data transmitted per second. The higher the number, the higher the speed.



Robot writing in sync with the dancer's movements

putting 5G into practical use in 2020.

Entering the 5G Idea Contest held by NTT Docomo was our initial push to become involved with 5G. I used to work at a steel plant under our parent company, where employees wore fire-resistant clothing as they worked in the production floor's harsh environment. The idea of having robot doubles take over this work prompted our decision to develop a remote humanoid robot system.

Finding out about THK products solved our problems

We are currently on our third generation of robots. Our second-generation robots were unable to grasp objects via remote operation, causing us considerable trouble. Another company introduced us to THK, and when we saw their products, we observed 1) a wide operating range comparable to that of a human, 2) any added accessories can work simultaneously with existing mechanisms to make products, and 3) THK products are small, lightweight, and compact, which is exactly what we were looking for. In August 2017, we developed a robot that integrated THK's **SEEDroid**. It only took three months to complete. THK possesses stability and technical expertise you cannot find at any other component manufacturer. I can say that developing this robot would not have been possible without THK technology.

Despite being remotely controlled, the robot mirrors the operator's movements with almost perfect precision thanks to the communication delay of only 0.001 seconds. A head-mounted display allows the operator to see what the robot is seeing, and through VR (virtual reality), the operator can feel the sensation of grasping whatever the robot arm has grasped. This robot presents an array of possibilities for applications, from the difficult work environment described above, to operating a stethoscope at a clinic on a remote island, to acting as a first responder by putting out fires with a fire extinguisher. In February 2018, we presented this technology at the Mobile World Congress in Barcelona, Spain, where it was used for a demonstration of the art of Asian calligraphy.