

Professor Jung Won Yoon, <Machine/Equipment/ Robot Field> selected for R&D Excellence

- Development of drug delivery nanoparticle imaging equipment with domestic technology and application to nanorobot navigation technology for brain disease treatment
- Research conducted by Prof. Jung Won Yoon, selected by the Ministry of Industry, <Machine Equipment Robot Field> Excellent R&D achievements



▲ Professor Jung Won Yoon, Director of Research for the project selected for R&D excellence in the field of machinery, equipment, and robots by the Ministry of Trade, Industry and Energy

GIST (Gwangju Institute of Science and Technology, Acting President Raekil Park) School of Integrated Technology Professor Jung Won Yoon (Director of Brain Nanorobot Research Center) conducted research that was selected as an excellent R&D achievement by the Ministry of Trade, Industry and Energy.

"Development of drug-loaded micro-nano robot navigation system technology for brain disease treatment" (2019.04.-2022.12.), which was conducted by the Ministry of Industry, was participated by Hanmi Techwin Co., Ltd., Hwasun Chonnam National University Hospital, and Yonsei University achieved remarkable research results with 21 SCI-level international papers, 14 patent applications, and 3 patent registrations.

The research team developed a source technology for nanorobot brain navigation using a magnetic particle imaging (MPI) device that can measure the three-dimensional position and concentration of magnetic nanoparticles carrying drugs in real time and succeeded in applying magnetic field drug targeting technology to brain tumor and stroke disease models.

This study has been developed only for small animals by some companies in the US and Germany, and commercialized equipment has been sold for billions of won.) was developed with domestic technology, and its achievements were recognized.

This research is a domestic proprietary technology that enables magnetic particle imaging devices, which have been developed only for small animals by some companies in the US and Germany, and commercialized equipment sold for billions of won, to be applied to medium animals (dog, cat, rabbit, etc.) with the same resolution as small animal MPI.

In addition, through the developed MPI device, intuitive user operation using a joystick and robot navigation technology of nanoparticles were applied to enable nanoparticle feedback-based drug targeting technology within the human body.

In the medical field where automatic control for targeting in the human body is difficult, integration with next-generation imaging systems is expected to contribute to the development of new brain drug targeting system medical devices.

Professor Jung Won Yoon said, "It is a technology that enables nanoparticles loaded with drugs to treat brain diseases to reach the treatment area of the brain, and it has been confirmed that Korea can go beyond advanced countries in medical technology and target the original technology market."

Professor Yoon also said, "In order to commercialize a drug delivery system capable of navigating a brain part robot and occupy an unrivaled position in the drug market that is comparable to the automobile market in the future, we are focusing on improving the level of completeness of the magnetic particle imaging device and drug delivery technology to the level that can be applied to the human body. Additional research is underway to verify actual clinical application using human scale MPI, which combines superconducting magnet technology and magnetic particle imaging device."

The Ministry of Trade, Industry and Energy recently published a collection of cases titled 'Excellent Research and Development (R&D) Designs' by analyzing quantitative (sales, patents, papers) and qualitative (survey, etc.) within the past five years (17-21) to inform the public of the excellent performance of R&D tasks in the field of machinery, equipment and robots.