



WASEDA
University

Waseda University pushes forward with global academic network

Innovative programs and prioritized funding have propelled Waseda University to record highs in world university rankings, underscoring the university's reputation for openness, dynamism, and diversity.



Shuji
Hashimoto

Located in Tokyo, Waseda University is one of Japan's highest-ranked private universities, according to independent surveys published by the 2017 Quacquarelli Symonds (QS) World University Rankings. "With over 7,000 international students enrolled throughout the year and nearly 800 exchange agreements, and with overseas partners

in 91 countries, Waseda is Japan's top destination for highly motivated international students," says **Shuji Hashimoto, senior executive vice president for academic affairs and university provost**. "Importantly, more than 4,000 students at Waseda travel overseas each year; this is unprecedented in Japan."

This global academic network is an important reason why Waseda University was selected in September 2014 for the highly competitive, multimillion dollar, 10-year, Top Global University (TGU) Project by Japan's Ministry of Education, Culture, Sports, Science and Technology (MEXT). Funding from the TGU Project as well as the university's own financial

support is being targeted for seven key educational and research areas to further enhance Waseda's international standing: (1) Frontier of Embodiment Informatics: Information Communications Technology (ICT) and Robotics; (2) Energy and Nanomaterials; (3) Global Japanese Studies; (4) Multiscale Analysis, Modelling, and Simulation; (5) Positive/Empirical Analysis of Political Economy; (6) Health Promotion: The Joy of Sports and Exercise; and (7) Global Asia Studies. "With over 50,000 students, 5,500 academic staff, and 7 undergraduate and 13 English-based graduate programs, it was imperative to prioritize into key units," says Hashimoto.

The strategy is yielding very favorable results, with 2017 QS World University Rankings data showing Waseda University ranked sixth in Japan overall, and first in sports-related subjects. In world rankings, the university has nine fields of research in the top 100.

"We attribute these results to the international collaboration of our key units and the recruitment of overseas faculty members through the TGU Project," says Hashimoto. "We are on the right track to achieve our goal of creating and sharing knowledge for the betterment of society on a global scale."

Below and in upcoming articles, the coordinators of the seven key units at Waseda University describe their achievements and plans for the future.

Waseda University
www.waseda.jp/top/en

Coexistence of robots and humans —Frontier of Embodiment Informatics: ICT and Robotics

Waseda University created the world's first humanoid in 1973—WABOT-1 (WAseda roBOT-1)—by fusing ideas from mechanical and electrical engineering. Now, **Shigeki Sugano, head of the Frontier of Embodiment Informatics: Information and Communications Technology (ICT) and Robotics Unit**, is leading Waseda's research on robotics by collaborating with researchers in Germany and Singapore. "The day will come when a robot will say, 'Please get out of my way,' to humans it encounters as it moves along a walkway," says Sugano. "Just as cars and humans coexist, robots and humans will share the same space. But we still have many technical and social issues to resolve."

Such symbiosis between robots and humans requires robots to adapt to the unpredictable behavior of humans. Sugano is developing robots with ultraflexible joints to enable them to perform complicated and dynamic movements; for example, rapid twisting and turning actions of robotic arms are required to avoid collisions with people on a busy street.

Recently, Sugano and his group reported on "training" flexible joints of robots to perform complex dynamic tasks using deep learning,¹ which



Shigeki
Sugano

allows a reduction in the number of training iterations required.

But despite growing demand for robots, Sugano highlights their mass production as a major issue for their proliferation. "Manufacturing intelligent robots is very complicated," says Sugano. "There is not one single axis for

robot development. They are like smartphones, but can move!"

Training the next generation of robotics engineers and scientists is Sugano's primary goal. "We must nurture experts by establishing new educational programs with innovative, interdisciplinary curricula and strong interaction with industry."

¹K. Takahashi, T. Ogata, J. Nakanishi, G. Cheng, S. Sugano, *Adv. Rob.* **31**, 1002–1015 (2017), doi: <https://doi.org/10.1080/01691864.2017.1383939>.

Frontier of Embodiment Informatics: ICT and Robotics Unit
www.waseda.jp/inst/sgu/en/unit/ict-robotics