Technology & Intellectual Property HQ

Approaches for Strengthening Our Core Technologies to Realize a New Normal in Society

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OMRON's Core Technologies: Sensing & Control + Think

OMRON has worked to strengthen the idea for its core technologies, Sensing & Control + Think, in the course of VG2020. "Sensing" technology refers to the extraction of necessary on-site data. Based on the information obtained through sensing, "Control" technology provides appropriate solutions, while "Think" adds the element of human wisdom. OMRON uses these together to create value for solving social issues. In 2018, we established OMRON SINIC X Corporation (OSX) to harness advances in technologies such as AI, IoT, and robotics, and to further evolve our core technologies. In addition to our Keihanna Technology Innovation Center, which is the main base for our R&D activities, the Technology & Intellectual Property HQ also has a development base on the west coast of the United States and another in Tokyo, all of which contribute to strengthening OMRON's corporate R&D capabilities.

Creating Value and Strengthening Our Business through Core Technologies

The Technology & Intellectual Property HQ and OSX engage in R&D to devise innovative products for our existing businesses and for new business development. In our R&D activities to strengthen existing businesses, we worked to downsize PV inverters (a key part of solar power generation systems) and develop small 3D vision sensors that can be mounted on robot arms to help compensate for labor shortages at manufacturing sites. For new business development, we have overhauled our theme-planning process and established our Integrated Innovation Process together with the Innovation Exploring Initiative HQ (IXI) to realize near-future innovation driven by social needs. This approach allows us to set themes with a great impact on both society and technology in order to realize a world where people can flourish even more. Examples would include sensing technology such as vision sensors that enable machines to better understand people and control technology enabling robots to be flexibly and easily handled. We are also working on the development of AI technologies that support human work by "reading" human intentions from large amounts of data. These highly evaluated research results have been presented at various conferences, published in a journal and adopted by IROS,* the world's premier academic society for robots. OMRON is also globally engaged in intellectual property creation activities such as intellectual property education for engineers and has an internal reward system for inventions, which has enhanced the company's patent-application abilities. These efforts have garnered high praise from other organizations. OMRON was selected as one of Clarivate's Top 100 Global Innovators 2021, which is given to the most innovative business and research organizations around the world. It marks the fifth consecutive year OMRON was named as a top innovator by Clarivate.
As society moves toward a new normal, robot and AI technologies will continue to advance, not only in manufacturing but also for medical care, food, office work, and R&D. OMRON is moving forward with advanced development of technologies that embody the integration of robotics and AI, such as smart equipment that can make on-site decisions without requiring humans to spend time providing instructions and machines that harmonize their actions with the humans who working with them. In terms of co-creative activities through open innovation, the knowledge and know-how of external business, startups and research institutes in combination with OMRON's core technologies will create an organic reaction that drives innovation.

*International Conference on Intelligence Robots and Systems

Case 1

A High-Speed Sensing Technology for Robot Arms

As labor shortages at manufacturing sites become more serious, there is a need to automate the picking of randomly postured parts of various shapes during the product assembly process. OMRON therefore developed its own sensing technology in a form of small and lightweight 3D vision sensors that greatly shortens imaging times with a special detailed projection pattern, making it possible to measure and recognize objects at high speed. The sensor can be mounted on the robot arm, allowing the robot to assess parts like a human would. This sensor technology is installed in the FH-SMD Series 3D Vision System launched by Industrial Automation Business (IAB) in March 2021 and is contributing to the automation of manufacturing lines.

Case 2

Development of a Circuit Design Technology to Suppress Noise from Electromagnetic Interference

For photovoltaic power generation, storage needs are diversifying—for example, as part of using and selling power, or as a backup during a power outage or disaster. Conventionally, we had to build a customized system according to purposes, and adding functions afterwards was costly. OMRON therefore leveraged its many years of know-how in power electronics technology to develop a multi-purpose inverter for household energy storage systems that supports additional functions simply by adding option units. This compact and large-capacity system is not limited by installation environment or available space. This inverter technology is part of our「Multi-Energy Storage Platform KPBP-A」released by Social Systems Business (SSB) in October 2020 and contributes to creating a sustainable society through the spread of renewable energy.

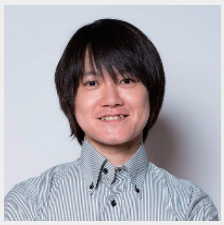
Accelerating Social Implementation of Technology with the World's Cutting-Edge Minds

OSX recruits world-class human resources in AI and robotics technology, carrying out co-creative projects with research institutes and companies around the globe while creating near-future designs that originate from innovative technologies. By placing AI, robotics, and sensing technology at the center of our current R&D and to embody harmony between humans and machines, we are working on innovative approaches to human-machine communication and the handling of diverse data, and evolving the physical manifestations of machines. OSX has steadily built a reputation since its establishment in 2018, with papers accepted at world-class international conferences such as CVPR[*1], ICML[*2], and ICRA[*3], and is attracting excellent interns and researchers from all over the world. To develop the technological seeds produced by OSX into new businesses, OMRON discusses ideas with researchers inside and outside the company and is accelerating the social implementation of innovative technologies.

*1 Conference on Computer Vision and Pattern Recognition
*2 International Conference on Machine Learning
*3 International Conference on Robotics and Automation

Research Themes

If humans and machines can interact via words, they will be able to learn in a coordinated manner, as if two humans were communicating. People can then focus on more creative activities. To that end, we are engaged in the area of vision and language research. This research involves machines expressing in natural language the surrounding conditions they have captured, and searching or generating images from natural language.
Focusing on the field of informatics, I hope to revive the research and technology paradise. OSX has the potential to be at the heart of that paradise. The AI and robotics researchers gathered at OSX will continue to advance collaborations, both internally and by involving surrounding companies and universities.



Principle Investigator
OMRON SINIC X Corporation
Yoshitaka Ushiku

An important challenge for AI technologies, especially for products and services that use deep learning, is how to get a machine to use as small a data set as possible to efficiently learn to a practical level. OSX is tackling this challenge by applying the results learned in one specific environment for learning in another environment without sharing the data itself, which enables efficient learning even with only small amounts of data dispersed in various locations.
OSX has been advancing our highly original approaches by bringing together the cutting-edge AI research and the current and future needs of the real world. Going forward, we will continue to work closely with people inside and outside the company to create high-impact and universal achievements.

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