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The National Institute of Informatics is one of four institutes operating under the auspices of the Research Organization of Information and Systems (ROIS), which itself is one of four Inter-University Research Institute Corporations. It is these “corporations” that make it possible for Japan’s universities to share the utilization of facilities for every field of study, including larger types of leading-edge equipment that individual institutions would have a hard time installing and maintaining on their own. While promoting original, collaborative research that exceeds the purview of individual universities, the corporations provide, as a service to researchers nationwide, volumes of scientific data, access to valuable materials, plus recommended analytical methods.

At present, a total of 19 research institutes like NII are set up under the four corporations, which include ROIS. The aim of ROIS is to carry out integrative studies beyond the boundaries of traditional disciplines by framing complex phenomena concerning life, Earth, the natural environment, and human society in the 21st century from the information and systems perspective.
Our multidisciplinary approach to research makes the National Institute of Informatics unique in Japanese academia. Beginning with basic research valued from the long-term view, NII is pushing ahead with practical studies aimed at resolving current social problems. At the same time, operations developed by this inter-university research institute—such as providing state-of-the-art information infrastructures, content systems, and related services—have become vital to the conduct of research and instructional activities throughout the academic community.

The Science Information Network (SINET) is one project that underscores NII’s efforts to have research and operations act in tandem. It has supported Japan’s academic infrastructure since its start in 1992. In 2007, the network was upgraded to SINET3 with a world-leading communications speed of 40 Gbps. SINET4, which came online in 2011, demonstrated enhanced operations reliability and durability by withstanding the Great East Japan Earthquake. The transition to SINET5 in April 2016 heralded the arrival of 100-Gbps connectivity between Japan’s prefectures and the augmentation of links with the United States. From either a regional or global perspective, SINET is a powerful network. Clearly its construction over the past 25 years has been extremely significant for Japan’s academic community.

Big Data is a term often tossed around these days. Environments that enable casual exchanges of lots of data are indispensable for scientific projects to keep their edge. Amid demands by Big Science for computer resources that can deal with voluminous amounts of experimental data, cooperation on data exchanges across borders and regions is becoming commonplace. For that reason, the 100-Gbps SINET5 has received a triple endorsement from the Japan Association of National Universities, the Japan Association of Municipal and Prefectural Colleges and Universities, and the Federation of Japanese Private Colleges and Universities Associations. We are grateful for their backing and for the support received from many others, including the recommendation of the Science Council of Japan.

The shift to SINET5 will play a big part in cloud computing at universities. A surge in off-site communications traffic will accompany cloud computing supported by 100-Gbps SINET5s. The huge cost savings likely through cloud-enhanced consolidation of university computing resources are expected to accelerate the currents favoring remote examinations. The application of SINET at actual healthcare sites is evolving along with advanced utilization of academic information.

The focus of NII is open science. The unfolding of the informatics field is influencing science and technology research. Traditionally scientific expertise was passed along in articles and books, but responsibility for this task is shifting in this era of open science involving collective ownership of research data itself. With their gaze fixed on the changing times, a number of universities are aiming to construct infrastructures for sharing research data, utilizing SINET5, a remarkable, high-speed network. Data sharing takes a variety of forms. Access to data may be open to the general public or limited to designated researchers and organizations. Refinements to the technology of data sharing come out in GakuNin Cloud, the inter-university authentication service provided by NII. In a similar vein, the idea behind the Research Center for Open Science and Data Platform, established in April 2017, is to promote the use and application of research data among universities and institutions in Japan. GakuNin Cloud is adding to the future development of open science by serving as the gateway that connects universities and research institutions with research data and with cloud-driven research infrastructures.

In fiscal 2015, NII opened the Center for Cloud Research and Development. American university projects at the time were beginning not only to take over cloud resources from cloud vendors but also to do research on cloud computing itself. It could be said that cloud research had entered a new stage. Our intention has been to spur next-generation cloud research that is completely different. So, in fiscal 2016, NII opened the Center for Cybersecurity Research and Development “to protect the security of academic networks.” We feel duty-bound to provide cybersecurity-related information and technical support to universities and research institutions. We also strive to build the training infrastructures needed to prepare talented prospects for the responsibilities of managing cybersecurity.

As NII puts much effort into encouraging academic-industrial collaboration, in February 2016 we established the Research Center for Financial Smart Data. Until recently it was unheard of anywhere for an information systems research facility to engage in the financial sphere. After processing and analyzing finance-related Big Data, NII takes up the challenge of converting “financial smart data” into useful knowledge. Those efforts have enabled us to answer requests to clarify complex economic and social phenomena. The research center is the first that NII has established with private sector funding of research activities and operations. Another facility that deals with real-world issues is the Cognitive Innovation Center, which was established to foster innovation that brings reforms to Japanese society and industry. In the new stage of artificial intelligence (AI), which is leveraged by deep learning, we are working together with enterprises toward development of diverse solutions.

In addition to operations like SINET, NII conducts basic research in the AI-inclusive field of informatics as well as concurrent applied research aimed at implementing beneficial developments in society. Moreover, it is one of the few institutions in the world performing feedback on such research. In recent years the tendency has been to stress only the “by IT” aspect of IT. We prefer the balanced “of IT” approach, emphasizing the strength of flexible research systems.

The Fifth Science and Technology Basic Plan approved by the Japanese government highlights the role of IT in describing the new vision for “Society 5.0.” As basic research on IT steadily advances, NII’s intention with regard to the realization of Society 5.0 is to work on IT-related solutions to social problems and to contribute to data-sharing platforms. Of course, all development won’t happen at NII. The idea is to push ahead with various academic institutions, thinking and creating together.

Finally a word about education. The National Institute of Informatics considers this field so important that it offers informatics-related courses leading to doctoral programs at the Graduate University for Advanced Studies. NII coordinates with a number of universities and graduate schools. “Making full use of IT education and IT” in Japan reflects our policy commitment to having more and more students master the foundations of IT. We are delighted that discussion has begun in Japan, as it has in Britain, on teaching computer programming starting in elementary school. After all, do not education and the elucidation of life’s mysteries go hand in hand with IT?

Take a look at the descriptions of the research activities and operations that engage NII and feel free to share your thoughts with us. We appreciate your continued support.

Masaru Kitsuregawa
Director General
National Institute of Informatics
Inter-University Research Institute Corporation / Research Organization of Information Systems
The National Institute of Informatics (NII) is an inter-university research institute corporation and a research "create future value" in the new academic field of informatics. From the basic methodology of informatics to cutting-edge themes such as artificial intelligence, Big Data, the Internet of Things (IoT), and information security, NII advances the research and education information infrastructures for Japan's academic community, including the SINET5 and online service platforms. Mutual feedback on the expertise gained through operations as well as from state-of-the-art technology. NII uses these activities in its efforts to train talent and contribute to society at large, in addition to our connections with foreign/domestic universities and research institutions.

**Integrated Research from Basic Methodology to State of the Art**

"Informatics" combines not only technologies like computer science and information/communications engineering but also the humanities, social sciences, and the life sciences. This new academic domain involves every aspect of culture and economics. NII has established four basic Research Divisions—namely, Principles of Informatics, Information Systems Architecture Science, Digital Content and Media Sciences, and Information and Society—plus 13 Research Centers charged with systematically accomplishing specific tasks. From the basic methodology of informatics to the state-of-the-art in artificial intelligence, Big Data, the Internet of Things (IoT), and information security, NII advances the integration of research and development. Furthermore, our informatics research is directed toward spurring international study activities and collaboration with industry, government, and academia.

**Services to Support Research Infrastructure and Education**

As an inter-university research institute, NII coordinates with academic institutions and the research community. For starters, it built and now operates the Science Information NETwork (SINET5), the world’s most-advanced, high-speed network linked to domestic and international sites. NII further the development of cloud systems and, in its push for open access and open science, drives the development of academic information infrastructures as well as practical ways to utilize them. NII also collaborates with national universities to promote the education of cybersecurity personnel through its unique capacity to detect serious cyber attacks, supply defensive information, and sponsor in-service training. Our aim is to enable national universities to respond quickly to security incidents. In addition, NII strives to contribute to improving the international competitiveness of education research, accelerating studies on leading-edge topics, developing interdisciplinary programs, promoting more efficient research, and enhancing the functions of universities.

**Fostering New Leaders of the Advanced Information-Communication Society**

The National Institute of Informatics graduate education involves (1) participation in courses at the Graduate University for Advanced Studies, (2) cooperation with other graduate schools, or (3) acceptance of special joint research fellows. The Graduate University for Advanced Studies (a national university corporation) is Japan’s first graduate university. It was established to push original, world-class scholarly research beyond the borders of conventional disciplines and to open up new paths of scientific inquiry. For its part, the National Institute of Informatics has set up a graduate department of multidisciplinary science and informatics to offer a five-year doctoral program as well as a post-doctorate program. Six areas of instruction are covered: fundamentals of information science, information infrastructure science, software science, information media science, intelligent systems science, and information environment science. These areas break out into more than 70 class subjects. The department is pleased to accept talented people from overseas into the many English-language lectures. Working adults account for around 30 percent of registered students.

**Collaboration with Industry, Government, and Academia**

While engaged in pragmatic research and development aimed at resolving social problems, NII promotes collaboration with industrial, governmental, and academic entities to find ways of implementing the fruits of research. Public appeals go out to universities, private-sector institutions and municipalities for investigative partnerships. NII’s efforts include cultivating cybersecurity talent, sponsoring programs that train top-level systems engineers, and supporting cooperative supplementary schools that encourage the collaborative approach by providing information gathered on the frontiers of research. Our research facilities were set up with the objective of returning accomplishments to society through industry-academia collaboration.

**International Exchange**

Beginning with the dissemination of research results, our global contributions to the study of informatics include the formation of research centers that foster international collaboration and aggressive exchanges of researchers and students. The world’s top researchers gather together for the NII Shonan Meeting, which consists of intense, training-camp-style discussions of issues affecting the informatics field. The conclusion of MOU agreements that NII actively seeks out with foreign universities and research institutes leads to researcher-student exchanges for international collaborative investigations, study exchange assistance, and internship programs.
Make things perform as we desire: control theory opens the door to a new world

We now live in the world of the Internet of Things (IoT), where things communicate through the Internet. IoT takes convenience to a whole new level and generates new values in our lives. In this world of IoT, control over the communication network is essential to achieving the desired performance of a system. An issue here is, however, the limited availability of resources such as communications, computations, and powers that are needed for control. Thus, it is very important to reduce the usage of these resources.

Becoming a control theorist was not her childhood dream. When she was a child, she read a story of Dr. Hideki Yukawa (Nobel laureate in Physics), became fascinated with his life and physics, and dreamed of being an elementary particle physicist. So, it was natural that she started undergrad in physics. However, this all changed one day when she happened to attend a lecture on controls. She recalls that, “as a physics major, I was taking classes that were filled with mathematical equations and formulas. In the controls class, however, I met block diagrams that visualize how elements of a system are connected and how they work together along with mathematics. I was surprised how a complicated system could be represented in an intuitive and easy-to-understand way. I became interested in using block diagrams.” Since then, she has been studying control theory where she can apply her strength in mathematics.

Control is a “strategy designed for a system to achieve a desired performance,” and control theory deals with a wide variety of systems that exhibit dynamical behavior. This nature of the field has allowed her to work on various kinds of problems as she moved from one lab to another around the world.

Her academic life with controls started in the summer of her junior year when she moved to the U.S. and started studying at the University of Michigan, Ann Arbor. Among the many departments in which control is studied, she chose aerospace engineering to electrical engineering. While her research topics in using block diagrams.” Since then, she has been studying control theory where she can apply her strength in mathematics.

Her research interests lie in the wide area of control theory and optimization. In the past, she has worked on problems in tissue engineering, biochemical networks, statistics, acoustic signal processing, and matrix analysis. Her current research focuses on the development of theories and algorithms in networked control, where control is performed over the communication network.

After receiving a Ph.D. from the University of Illinois at Urbana-Champaign, she held a post-doc position at the same university and a Visiting Scholar position at the Massachusetts Institute of Technology. She also worked as a Project Researcher, and later as an Assistant Professor at the University of Tokyo, as a Lecturer at the University of Canterbury, Christchurch, New Zealand, and as a Humboldt Research Fellow at the Otto-von-Guericke University Magdeburg, Germany. Since 2019, she has been an Associate Professor at the National Institute of Informatics (NII). Her research interests lie in the wide area of control theory and optimization. In the past, she has worked on problems in tissue engineering, biochemical networks, statistics, and machine learning. Her current research focuses on the development of theories and algorithms in networked control, where control is performed over the communication network.
Close-Up on Researchers

Principles of Informatics
Research Division

Professor Ken Satoh

After earning a Doctor of Science (Dr.Sc.) degree from the Department of Information Science, University of Tokyo, he accepted a position at Fujitsu Laboratories in 1981. From 1987 to 1993, he was an assignment to the Institute for New Generation Computer Technology (COCO) where he worked on the “5th Generation Computer Project” promoted by the (then) Ministry of International Trade and Industry. He completed a doctoral dissertation in science at the University of Tokyo in 1993. He served first on the Faculty of Engineering at Hokkaido University as an Associate Professor, then took a position as full professor at the National Institute of Informatics (NII) in 2001. He completed work at Tokyo University Graduate School of Law in 2009, and the University of Tsukuba Law School in 2016. He has for many years investigated the logical basis of artificial intelligence, and more recently come to advocate a new discipline of juris-informatics, that integrates informatics and law.

With his primary research interest in deductive systems that are capable of making reasonable judgments even if some information is lacking or missing. Most events in real life are not monotonic like mathematical axioms. In many cases, decisions must be made on the basis of incomplete information, and conclusions may have to be revised later as additional information becomes available. The typical case is that of a trial: plaintiff and defendant give testimony, and the judge renders a verdict. However, if new evidence becomes available, the initial verdict may be set aside or overturned on appeal. In cases where a decision is reversed, the judge may have gassed wrong based on incorrect assumptions to complement uncertainty. He is currently trying to develop Artificial Intelligence (AI) that makes a rational conclusion even under incomplete information.

He began this quest long ago when he chanced to see the “Integrated Narrative Generation System” on display at Osaka Expo world’s fair back in 1970. Thinking back on it now, it was really a very simple program, but he was in sixth grade at the time. The ability to generate an integrated narrative seemed almost miraculous and inspired dreams of full-blown artificial intelligence.” He has been drawn to artificial intelligence.”

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Juris-informatics: amalgamating informatics and law

Information Systems Architecture Science Research Division

Associate Professor Megumi Kaneko

She obtained her Ph.D. in Engineering from Aalborg University in Denmark, and her HDR degree (French Doctoral Habilitation for Directing Researches at Professor position) from Paris-Sud University, France. She was a JSPS Post-Doc Fellow and then Assistant Professor at the Graduate School of Informatics, Kyoto University. She joined the National Institute of Informatics (NII) in April 2016 as an Associate Professor. Primary research interests are next-generation mobile communications, IoT/M2M communication systems, radio resource allocation, and wireless signal processing. A key research motivation is to design new wireless communication systems that make the best use of scarce wireless resources. She received the 2009 Ericsson Young Scientist Award, the IEEE Globecom 2009 Best Paper Award, the 2011 Furui Young Researcher’s Award, the WPMAC 2011 Best Paper Award, the 2012 Telecom System Technology Award and the 2016 Inemori Foundation Research Grant.

Design of efficient wireless communication systems for the IoT era based on creativity fostered by the arts

With 50 billion IoT devices foreseen for the 2020s, an exponential growth of the amount of mobile data traffic is expected. However, current wireless communication systems are already facing severe spectrum deficits. Thus, improving spectrum efficiency becomes a critical issue. In addition, future 5G/IoT systems are required to provide not only higher data rates, but also better fairness among users, lower latencies, and higher energy efficiency.

For example, if we only focused on maximizing system throughput, users close to a base station would get most of wireless resources, to the detriment of users who are farther from the base station. It would be hardly fair that a large portion of several hundred users within a base station’s coverage receive unsatisfactory service just because their channel qualities are poor. “I am particularly interested in how we can provide the best trade-off among conflicting objectives such as system throughput, fairness among users and individual quality of service (QoS) levels.”

This calls for groundbreaking new solutions if we are to balance such contradictory requirements. So far, she has designed novel wireless communication methods based on recent theoretical advances, among which a contention-based channel state feedback method, or a wireless access protocol based on compressed-sensing.

She wasn’t much interested in mathematics until her mid-teens. She grew up in France, and as a child loved reading and was absorbed in playing the piano and dancing ballet. As a young girl her goal was to become a pianist, but in her sophomore year at high school she had a change of heart. In the French system, if you deviate from the mathematical course, you cannot go on to pursue scientific studies in the elite Grandes Écoles of engineering. At that point, her parents advised her to keep her options open, so she decided in favor of maths and science. In the event, this opened up a whole new world as she was captivated by maths and physics.

At her Grande Ecole of engineering, she focused on wireless communications for her master’s degree. She enjoyed the balance between theory and applied research. She came to Japan because study abroad was a requirement for obtaining her Ph.D. degree. She joined NII in 2016. NII has an international outlook that makes it easier to interact with scientists and researchers from other countries and other disciplines, and she personally feels drawn to environments that are conducive to performing “avant-garde” academic research. A number of collaborative international projects are now ready to begin. She leads a full and busy life, but still tries to make time for dancing and piano “Experiences performing as a soloist in piano concerts in the concert halls and churches of Paris was certainly useful for inspiring research creativity.” Creativity fostered by the arts will continue to nourish new breakthroughs in the field of wireless communications in the years ahead.
Upgrading SINET: implementation of an effective system that meets community needs

“I think we may be on the cusp of a new era and a new style of work where people can work from anywhere they desire, such as from a resort on a south sea island.” This kind of idyllic life style has been in the back of his mind for 20 years as he pursued work on network technology that would make such a life style possible. Currently at NII, he is working on the Science Information Network (SINET) that interconnects universities and research institutes throughout Japan. When SINET 5 was rolled out and became operational in April 2016, he was put in charge of network migration from SINET 4 to SINET 5 and all institutional subscriber lines have to be accommodated to SINET5. Basically, the work involved a physical migration of rewiring all institutional subscriber devices connected to 50 SINET routers scattered around the country, and a logical migration of setting the parameters of each institutional subscriber by remote control from the central office, and the task wasn’t completed until both of these changes worked in perfect alignment. By focusing on the switching method and procedure, we were able to migrate approximately 850 universities and institutions to SINETs within just two months’ time, an extraordinary accomplishment. Regarding the impact of this migration work, the network has exceeded all expectations, with communication downtime of only a couple of minutes for the entire time since the network has been up and running.

We are now in the process of upgrading SINET with Network Functions Virtualization (NFV) capability. This will enable us to virtualize services, or implement services using software on generic servers, that are now carried out by proprietary hardware. “SINET was developed specifically for universities and research institutions, so it must be capable of transmitting and receiving vast quantities of experimental data. NII deals with both academic research and development sectors, so naturally it was the logical choice for SINETs within just two months’ time, an extraordinary accomplishment. Regarding the impact of this migration work, the network has exceeded all expectations, with communication downtime of only a couple of minutes for the entire time since the network has been up and running.

After completing a M.A. in Engineering at the Tokyo Institute of Technology and completing coursework toward a Ph.D. at Keio University, he worked for NTT Institute of Technology and completing coursework in network deployment, the Science Information Network (SINET), and other big projects. He is a member of the IEICE and the IEEE.

Information Systems Architecture Science Research Division
Associate Professor
Takashi Kurimoto

As a young boy he was into rock and roll, and before long found himself playing drums in a band. As he continued to perform the music, he noticed that the way the microphone was positioned and the audio equipment set up made a huge difference in how the audience heard the music. This made him wonder: what could be done to optimize the sound impression or deliver better quality sound to people in general? His research is still strongly motivated by sound, and currently “focuses on speech synthesis using deep learning. He thinks we are now more than one or two years away from the ability to produce a natural-sounding computer-synthesized voice that is indistinguishable from human speech, and can generate a voice that perfectly imitates a person’s speech.”

The flexibility made possible with computers will have an enormous impact on the design of teaching materials and games. Experiments have shown that selecting optimum voice characteristics to deliver audio instructions may keep children engaged in learning longer and help children learn faster. “It made me realize again the amazing potential of one-dimensional voice signals.” Those who could benefit from speech synthesis are people who, due to a medical condition or an accident, may lose the ability to speak. There may be circumstances where a person’s original healthy voice is not digitally recorded in a good enough condition without noise or reverberation. If the person’s voice has been lost, then it is not possible to create a new recording. “We have nevertheless developed an algorithm for cloning a person’s voice even if the speech recording is impaired by noise and/or reverberation. Now with the availability of deep learning, we have made a significant step toward the ultimate goal of being able to easily create anyone’s actual voice.”

Up until 2015, we used a probabilistic method called the hidden Markov model. Replacing the technology certainly wasn’t easy, but we have achieved dramatic improvement in the quality and the utility of speech. We should also mention that this technology could be misused for spoofing and identity theft. “Indeed, voice authentication systems have already been hacked using computer-generated synthesized speech, so great efforts are now underway to find a secure and reliable way of distinguishing human speech from computer-generated speech.”

How best to nurture seeds of research that will successfully flourish and grow? “To begin with, NII provides an excellent environment where researchers can really focus on their work. A large pool of exceptional researchers has been brought together who are free to discuss ideas with all other NII researchers and staff since there is no compartmentalization or barriers within the organization. There are also plenty of avenues for cooperation with other institutions both within Japan and abroad.”

Finally, he would highlight the enormous progress that has been made in recent years the world over in the field of speech synthesis.

Evolving interest in sound changes future speech technology: Creating human voice signals through deep learning

Associate Professor
Junichiro Yamagishi

He holds a B.Eng. and a Ph.D. in Information Processing from Tokyo Institute of Technology for research on speaker adaptation technologies for speech synthesis. He was a Research Fellow at the School of Informatics, University of Edinburgh until 2013, at which time he took a position as Associate Professor of the Digital Content and Media Science Research Division at the National Institute of Informatics (NII). He has presented a series of groundbreaking papers on speaker adaptation technologies for speech synthesis and has established a novel methodology in the speech synthesis field. Building on speaker adaptation technologies, he successfully demonstrated a new speech translation system that can use personalized voices even in foreign languages and features a novel communication device that produces the original personalized voice of individuals with speech disabilities. He has also lead the methodology for improving intelligibility of speech in noisy environments. He has received numerous prizes and awards including the Itakura Prize for Innovative Young Researchers from the Acoustical Society of Japan, the Kiyose Special Industrial Achievement Award from the Information Processing Society of Japan, the Young Scientist’s Prize from the Minister of Education, Culture, Sports, Science and Technology, and the JSPS Prize from the Japan Society for the Promotion of Science.

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He holds a B.Eng. and a Ph.D. in Information Processing from Tokyo Institute of Technology for research on speaker adaptation technologies for speech synthesis. He was a Research Fellow at the School of Informatics, University of Edinburgh until 2013, at which time he took a position as Associate Professor of the Digital Content and Media Science Research Division at the National Institute of Informatics (NII). He has presented a series of groundbreaking papers on speaker adaptation technologies for speech synthesis and has established a novel methodology in the speech synthesis field. Building on speaker adaptation technologies, he successfully demonstrated a new speech translation system that can use personalized voices even in foreign languages and features a novel communication device that produces the original personalized voice of individuals with speech disabilities. He has also lead the methodology for improving intelligibility of speech in noisy environments. He has received numerous prizes and awards including the Itakura Prize for Innovative Young Researchers from the Acoustical Society of Japan, the Kiyose Special Industrial Achievement Award from the Information Processing Society of Japan, the Young Scientist’s Prize from the Minister of Education, Culture, Sports, Science and Technology, and the JSPS Prize from the Japan Society for the Promotion of Science.

Creating human voice signals through deep learning
Close-Up on Researchers

People and AI exploiting their respective strengths: moving toward a society of cooperation and problem solving

As an elementary school student he loved making plastic models, and in middle school and high school he was a great fan of Mr. Spock, the science officer on board the USS Enterprise in Star Trek. He liked building radios and working with electrical circuits, and this naturally led him to the Department of Control Engineering at university. In short, he has always been a science guy. In graduate school, he was exposed to then state-of-the-art AI expert systems technology, and explored automatic learning of inference rules.

"Processing becomes ever faster through learning, much the same as the way an athlete becomes more efficient through training. Looking back, this was pretty exciting stuff!" Now he is President of the Society for Artificial Intelligence, but still feels the same driving force and sense of elation that inspired him to pursue AI research.

His research is focused on AI-human cooperation. "First I would note that AI is not complete in and of itself. AI must be subject to trial and error under human management and control, and subject to periodic intervention and modification. By implementing a somewhat equal division of labor with people doing what they are good at and AI doing what it's good at, this can effectively drive down costs while boosting performance." He thinks that this kind of cooperation can be achieved by pursuing two essential strategies: human-agent interaction (HAI) and intelligent interactive systems (IIS).

HAI is an experimental study that clarifies the sense of unease we feel when interacting with anthropomorphic agents—robots, and CG characters, and so on—and has led to genetic algorithms and design methods that can be broadly applied. It was found, for example, that a generic beeping sound from a mechanical robot is more intuitive for making people aware of a machine's malfunction than having a cuddly dog shaped robot make some sort of sad gesture. Through experiments with a wide range of five action, animate, and other kinds of anthropomorphic agents, we also found that when making onscreen recommendations of products, that the degree of intelligence and friendliness exhibited by the agent had a huge influence on the rate of purchases. IIS are studies of true AI and human interaction and cooperation in which humans are able to intervene and make corrections when images and other data are misclassified by systems that automatically classify such data. Basically, this research is trying to determine if human intervention can effectively enhance results derived by AI using a wide range of approaches including algorithms and interaction designs. The goal is to develop intelligent systems that are human-friendly yet also human adaptable. "NII is an environment giving researchers full rein to pursue any kind of basic research, while also encouraging a wide range of collaborative projects. In this environment, our objective is to implement intelligent, human-adaptable systems and practical applications by integrating component technologies."

Building on cosmic-ray analysis and research skill: contributing to more efficient research activity

He obtained Doctor of Science (D.Sc.) degree in physics from Konan University Graduate School of Natural Science (Kochi), served as researcher at the Institute of Cosmic Ray Research, University of Tokyo, and is now investigating the "solar magnetic field using the cosmic-ray shadow of the sun" as a COE postdoctoral fellow. In 1995, he was put in charge of investigating research trends at the National Center for Science Information Systems (NACSIS), the organizational predecessor of the NII, and was instrumental in drafting "International Comparison of Informatics Research" and other studies laying out the direction of research in this area. He was the lead author of several influential studies of scienceometrics including "Tracing the history of successful research," "Survey of the relevance of keyword analysis to research," "Study of the characteristics and contribution of each university’s international competitiveness," and "Quantitative study of media coverage of academic research." Based on press releases from various universities, he seeks to first identify the origin of results based on the relationship between research yielding breakthrough results and support/infusion of funding, then analyze factors derived from the correlation between research-related press releases and coverage in newspapers. "Based on this work, we are trying to determine the optimal timing and most effective method for funding research. More specifically, we’re trying to discover the factors and most effective method of dissemination through newspaper and media coverage." His first area of expertise was cosmic ray physics, and he was long involved in observing and conducting cosmic ray experiments. He is still very much absorbed in this work, and recently came to a better understanding and ability to explain solar magnetic fields. One might assume there is no connection between cosmic rays and the analysis of data pertaining to academia. "Yet I’ve found that the skills honed in statistical processing and analysis of vast amounts of cosmic-ray related data is directly applicable to scientometric measurement and analysis. The energy distribution of cosmic rays and the frequency distribution of papers is remarkably similar, and a big change in distribution usually indicates that a different factor is at work in both cases." What sort of factor might be involved? He would like to figure out exactly what this something is, and unravel the background. There is surprisingly little difference in the underlying motivation behind cosmic ray research and academic data analysis. He started to become interested in press releases and newspaper coverage of academic research when he noticed that groundbreaking physics results written up in the most authoritative scientific journals in the world were barely mentioned or not covered at all in ordinary newspapers. His research began with the obvious question of why this was so, or what factor might be involved?

His spirit of inquiry and sense of curiosity derives from the place he was born and raised, Wakayama prefecture on the Kii Peninsula in the Kansai region. Coming from Wakayama, he has a special affinity for rocks and minerals and mining and clear dark skies and bright stars. In college he was much taken with astronomy, and wondered about the structure of stars as he took photos of nebula and the Milky Way. It seems perfectly natural that he aspired to become a researcher, and NII was the perfect setting to satisfy that ambition. "Statistics demands well-ordered, precise data. Raw data contains a great deal of noise, and the effort to produce clean data can be extremely arduous, but I am happy to report that NII has a vast amount of reliable and trustworthy data." The study of research trends does not contribute to the development of new products or directly serve the needs of society at large. But it is nevertheless important. Exploring the ways in which people become aware of the importance and implications of research makes a valuable contribution to the research enterprise as a whole. Driven by his characteristic curiosity and inquiring mind, he is quite prepared to work behind the scenes to serve those needs of society.
Close-Up on Researchers

Responding to the needs of the society: the future of higher education in the digital age

Miho Funamori

Information and Society Research Division

Received a Master of Science (M.Sc.) at the Department of Earth and Planetary Sciences, School of Science, the University of Tokyo Graduate School of Science. Took up a job as a researcher at Mitsubishi Research Institute in 1993. Served as a researcher at the Office for International Cooperation, International Affairs Division, Ministry of Education, Culture, Sports, Science and Technology, and became Associate Professor at the Center for Study of International Development Strategies, National Graduate Institute for Policy Studies. Served as an Associate Professor at the central administration of the University of Tokyo until taking up her present position in April 2016. At the University of Tokyo, she served as an institutional researcher in the Planning Office of the Division of International Relations, Evaluation Support Office, and Educational Planning Office. She played a key role in drafting the “The Internationalization of Todai 2010-2020: Initiatives and Targets.” She investigated the collaborative learning and Massive Open Online Courses (MOOCs) trend for the university’s comprehensive educational reform. As an authority on university management, her “Thorough Analysis of School Basic Survey” is widely read amongst higher education researchers. Now at NII, she follows the latest developments in Open Science and research data management.

Miho Funamori is a pioneer of university institutional research (IR) in Japan. As the first institutional researcher at the University of Tokyo, she supported the decision making of the administration through gathering information on the world’s higher education latest trends and analyzing that information to draft the strategies of the university. Now at the National Institute of Informatics (NII), she is envisioning the future of higher education in the digital age and advises on the scholarly communication services NII is providing.

The digital age, sometimes also called the Fourth Industrial Revolution, is said to fundamentally change the human society by unleashing the time and space constraints of the phenomena. She believes that “university’s strategies need to be based on and extrapolate the individual university’s characteristics.” Based on this idea, she is working on the idea of Institutional Research Support System for Japanese Universities (IRSSJU) which will extract and visualize the information linkages and data analysis. However, such digitization also incurs the danger of over-standardization. Nowadays, the quantitative indices such as the publication and citation number control the researcher’s evaluation rather than qualitative assessment. On the other hand, careful data analysis also can extract the characteristics of the phenomena. She believes that “university’s strategies need to be based on and extrapolate the individual university’s characteristics.” Based on this idea, she is working on the idea of Institutional Research Support System for Japanese Universities (IRSSJU) which will extract and visualize the characteristics of the individual Japanese universities.

“Part of the appeal of working at NII is that you can transform your idea into practice.” She grew up in Germany in her childhood. Growing up with parents who loved music, she studied violin and piano from a young age, and it was always assumed that one day she would become a musician. She won music competitions and showed talent, but doubts set in just before she took the entrance exams for a music school. “It was not sure anymore if I liked making music or if I just enjoyed the praises I received.” After careful deliberation, she decided she would attend a regular university.

At university, she majored in earth and planetary physics and sought to unravel the mystery of the geomagnetic reversals which occur every several hundred thousand years. She worked on the idea that the glacial – interglacial period would trigger the geomagnetic reversals. This idea was praised in the academic community. Still, the truth will never be unveiled in her lifetime as the next geomagnetic reversal would only occur after another several hundred thousand years. She decided she wanted to do something more tangible meeting the needs of the society and took a job with a private think tank. From there, she was seconded to MEXT (the Ministry of Education, Culture, Sports, Science and Technology) and became involved in university management problem-solving. Part of her work in university institutional research became more than 1,200 papers reports such as “Internationalization of the World’s Leading Universities” and a “White Paper on Internationalization of Todai.”

“Aside from eating and sleeping, virtually all of my time today is taken up with work.” She continues to play the violin to be relaxed. She also works tirelessly to arrange concerts for her great violin teacher Hirokazu Hasegawa who brings the mellow tones of his genuine Gasparo da Salo violin (feciit anno 1600) to the greatest possible audiences. She desires to devote most of her energy for the benefit of others.
Research

Research Divisions

NII advances research in the wide-ranging discipline of informatics through four core research divisions, which are the Principles of Informatics Research Division, the Information Systems Architecture Science Research Division, the Digital Content and Media Sciences Research Division and the Information and Society Research Division. Each conducts research ranging from basic to applied in its particular area.

Principles of Informatics Research Division
Senior Researcher: Takeaki Uno
Explores new principles and theories relevant to informatics, including algorithms and complexity theory, artificial intelligence, robotics, and quantum computing, and conducts research aimed at opening up new fields of study and developing new technologies that will support society in the future.

Fields of Research
- Algorithms, artificial intelligence, machine learning, deep learning, big-data analysis, data mining, mathematical modeling, numerical analysis, computing science, Web informatics, neuroscience, quantum information, and leading-edge research with potential to discover new principles and theories at the frontiers of these areas or to create new applications.

Information Systems Architecture Science Research Division
Senior Researcher: Zhenjiang Hu
Conducts research on software and hardware architecture ranging from establishing innovative technologies to implementing practical systems, with the aim of improving the performance, quality, and sophistication of the computers and networks that form the basic components of IT.

Fields of Research
- Post Internet, cyber-security infrastructure, software/hardware architecture, distributed cloud computing, programming languages, system performance and log analysis infrastructure, dependable systems, Internet of Things (IoT), and network/cloud visualization research.

Digital Content and Media Sciences Research Division
Senior Researcher: Atsuhiro Takasu
Conducts research on the analysis and creation of content and media, including code media and pattern media, basic technology for storing, retrieving, and organizing content, and the analysis of social media and interaction focusing on people and information.

Fields of Research
- R&D related to natural language processing, computer vision, image processing, acoustical information processing, computer graphics, databases, human interaction, Web mining, social media, community analysis, media clone generation/recognition, machine learning, deep learning applications, etc.

Information and Society Research Division
Senior Researcher: Isao Echizen
Conducts interdisciplinary research combining information and systems technology with human and social sciences for logical decision making based on scientific data in a “cyber-physical integrated society”, where the information world is integrated and linked with the real world.

Fields of Research
- R&D related to protection and use of privacy information, next-generation anonymization, data governance, next-generation IT infrastructure theory, data policy theory, data use personnel development theory, digital communities, IT healthcare, data reliability evaluation, crowd sourcing, sharing economy, digital education, and open innovation platforms, and research in humanities and social sciences related to these topics.

Research Centers

To respond quickly to important social issues, NII has removed boundaries in our research system and established 13 research centers, building a system that enables focused research in specific fields with collaboration across fields.

Services and Operations

Research and Development for Academic Networks
Director: Kae Nemoto, Professor, Principles of Informatics Research Division

Research and Development for Global Research Centers
Director: Hiroki Takakura, Professor, Information Systems Architecture Science Research Division

Research Center for Knowledge Media and Content Science
Director: Akihiko Yasui, MI Deputy Director General/Professor, Digital Content and Media Sciences Research Division

Center for Global Research in Advanced Software Science and Engineering
Senior Researcher: Isao Echizen

Center for Research in Cyber-Physical Systems
Director: Kazutsuna Yamaji, Associate Professor, Digital Content and Media Sciences Research Division

Center for Quantum Information Science
Director: Ken Nomura, Professor, Principles of Informatics Research Division

Center for Big Data Mathematics
Director: Ken-ichi Kawashabapuri, Professor, Principles of Informatics Research Division

Center for Financial Smart Data
Director: Masayoshi Kitanogori, MI Director General

Research Center for Next Generation Information Science
Director: Taro Yuzawa, Principle Researcher, Global Research Center for Cyber-Physical Systems

Research Center for Big Data, Social Network Analysis, and Cyber Security
Director: Akira Hara, NII Deputy Director General/Professor, Digital Content and Media Sciences Research Division

Research Center for Cyber-Physical Systems
Director: Katsuhiro Takamori, Professor, Information Systems Architecture Science Research Division

Research Center for Knowledge Media and Content Science
Director: Akihiko Yasui, MI Deputy Director General/Professor, Digital Content and Media Sciences Research Division

Center for Medium-to-Long-term Strategic Research
Director: Yuta Kuroda, NII Deputy Director General/Professor, Digital Content and Media Sciences Research Division

Research Center for Cyber-Physical Systems
Director: Katsuhiro Takamori, Professor, Information Systems Architecture Science Research Division

Research Center for Open Science and Data Platform
Director: Keizo Oyama, Professor, Digital Content and Media Sciences Research Division

Research Center for Academic Networks
Director: Mitsuru Ishizuka, Project Professor, NII

Big Research Projects

Global Research Center for Quantum Information Science
As an international hub for advanced research on quantum information science and technology, this center promotes quantum information science and explores the potential of quantum information technologies. Also cultivates international personnel who will lead medium-to-long-term research focused on specific goals.

Global Research Center for Big Data Mathematics
Research basis for the JST ERATO Kawashapuri Large Dig Graph Project. This world-class hub for research on big data mathematics, with a central focus on developing high-speed algorithms, conducts advanced research and professional development.

Global Research Center for Cyber-Physical Systems
Conducts research and development focused on cyber-physical systems (CPS) aimed at creating new value and addressing social issues by linking the real world with the cyber world.

Global Research Center for Open Science and Data Platform
This center conducts research to create and deliver an open knowledge platform, promoting Open Science, a paradigm shift in research styles.

Industry-Academia Collaborations

Research Center for Financial Smart Data
This center pursues the development of technology for financial information analysis by turning big data into “smart data”, and through statistical analysis and modeling of economic and social phenomena, to enable more precise predictions of the future, natural language processing, and machine learning.

Cognitive Innovation Center
This center strives to generate innovations in the field of art cognitive technologies incorporating artificial intelligence technologies to new businesses and services in society and industry. It also works at raising awareness to promote social implementation of such technologies.

Center for Knowledge Media and Content Science
This center promotes research on the analysis and extraction of knowledge from academic papers and other academic content, as well as empirical R&D for promoting the distribution of academic knowledge.

Center for Community Knowledge
This center conducts practical R&D promoting test-generation information sharing, including activities focusing and analyzing processes that form shared knowledge between people and other people or machines, and that disseminate research results.

Center for Dataset Sharing and Collaborative Research
This center develops useful datasets for informatics research and makes them available to researchers. In addition, it conducts R&D on the creation of data services and on systems for their utilization, and promotes joint usage and research in informatics.

Center for Next-Generation Information Technology
Centers for open research and development, with the aim of improving the performance, quality, and sophistication of the computers and networks that form the basic components of IT.

Center for Medium-to-Long-term Strategic Research
Centers for research and development focused on cyber-physical systems (CPS) aimed at creating new value and addressing social issues by linking the real world with the cyber world.

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Center for Knowledge Media and Content Science
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Center for Medium-to-Long-term Strategic Research
Centers for research and development focused on cyber-physical systems (CPS) aimed at creating new value and addressing social issues by linking the real world with the cyber world.
List of Researchers

Principles of Informatics Research Division

Mathematical Informatics

Assistant Professor: Yoshiki Iwata
Ph.D. (Information Science and Technology)
Specialties: General control theory and related topics
Research Themes: General control theory
Specialties: Optimization and numerical linear algebra
Research Themes: Development of algorithms for solving large-scale linear equations; Design of efficient algorithms for analyzing large-scale data

Professor: Takeaki Uno
Ph.D. (Science)
Specialties: Development of algorithms for large-scale computer and networked data mining and storage optimization
Research Themes: Algorithms for large-scale data mining; Development of algorithms for analyzing large-scale data

Mathematical Logic

Assistant Professor: Yu Yokoi
Ph.D. (Information Science and Technology)
Specialties: Distributed algorithms; Combinatorial optimization; Matching theory
Research Themes: Matching theory

Assistant Professor: Yuichi Yoshida
Ph.D. (Informatics)
Specialties: Constraint satisfaction problems; Discrete optimization
Research Themes: Theory and application of algorithms for solving large-scale data quickly; Focus on theoretical guarantees of solving large-scale data quickly

Mathematical Informatics

Associate Professor: Makoto Kanazawa
Ph.D.
Specialties: Lambda calculus and type theory; Logical semantics of natural language processing
Research Themes: Logical treatment of natural languages

Quantum Information

Professor: Kae Nemoto
Ph.D. (Science)
Specialties: Quantum information and computation; Quantum optics; Theoretical physics
Research Themes: Quantum information and computation

Intelligent Informatics

Associate Professor: Nobutaka Ono
Ph.D. (Engineering)
Specialties: Blind signal separation; Acoustical signal processing
Research Themes: Development of algorithms for solving large-scale data problems using iterative methods; Focused on developing algorithms for solving large-scale data problems

Associate Professor: Ryutaro Ichise
Ph.D. (Engineering)
Specialties: Machine learning; Knowledge systems; Data mining
Research Themes: Knowledge processing technology combining various types of information to discover useful knowledge within it"
Software Infrastructure

Professor: Zhenjiang Hu (Ph.D. (Engineering))

Specialties: Principles of programming; Functional programming and program design; Software engineering; Dependable software construction; Information systems and software development.

Research Themes: Building a theory of program computation (operation) to facilitate efficient design of parallel programs. Also, various parallel and distributed computing platforms and algorithms.

Information Network

Professor: Shigeo Ushishidani (Ph.D. (Engineering))

Specialties: Dynamics resource optimization techniques for distributed systems; Evolutionary system architecture; Dynamic resource and service control and management technology with the goal of realization on SINET; Developing original NII functionality in collaboration with system vendors.

Research Themes: Developing various services such as the world’s first L1 on-demand services.

Software Engineering

Professor: Nobukazu Yoshikawa (Ph.D. (Information Science))

Specialties: Security software engineering; Privacy engineering; Software engineering; Dependable software construction; Dependable systems; Large-scale parallel computing.

Research Themes: Supporting self-adapting systems with mathematical methods (formal methods) for program generation and verification technologies to realize self-adaptation that is guaranteed to be correct.

Information Systems Architecture Science Research Division

List of Researchers

Network Architecture

Associate Professor: Shunji Abe (Ph.D. (Engineering))

Specialties: Information systems architecture.

Research Themes: Developing methods for constructing communication systems that are efficient and resist communication networks and are capable of reducing energy consumption and environmental impact.

Information Network

Professor: Yusheng Ji (Ph.D. (Engineering))

Specialties: Network architecture; Radio resource management; Communication services and quality control.

Research Themes: Construction of technology-optimized and stable networks while reducing costs. Also, realizing safe and high-speed networks in collaboration with SINET.

Software Infrastructure

Professor: Kazuaki Sakamoto (Ph.D. (Engineering))

Specialties: Software testing; Source code analysis and optimization; Programming languages; Programming education.

Research Themes: The unrelenting search for optimal software development and management methods.

Information Systems Architecture Science Research Division

List of Researchers

Network Architecture

Associate Professor: Megumi Kaneko (Ph.D. (Engineering))

Specialties: Wireless communciation engineering.

Research Themes: Data collection and analysis of radio resources and information about the environment for 5G mobile communication systems and next-generation wireless access networks.

Information Network

Professor: Hiroki Takakura (Ph.D. (Engineering))

Specialties: Cyber security; High-reliability networks; Anomaly detection.

Research Themes: Security mechanisms to protect information from cyberattacks, which become more dangerous each year. In addition to preventing damage from these threats, it is also important to take measures to detect and counteract attacks.

Software Infrastructure

Professor: Kenji Tei (Ph.D. (Engineering))

Specialties: Software architecture; Self-adaptive systems; Models@run.time.


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Network Architecture

Associate Professor: Takashi Kuriimoto (Ph.D. (Engineering))

Specialties: Network system architecture; Network protocols.

Research Themes: Networks; New network services using WiFi, SDN, and other technologies with the goal of increasing reliability and stability while reducing costs. Also, realizing safe and high-speed networks in cooperation with SINET.

Information Network

Professor: Kento Aida (Ph.D. (Engineering))

Specialties: Parallel and distributed computing; Cloud computing; Grid computing.

Research Themes: Parallel and distributed computing platforms and algorithms that can be used as a single resource. Prioritizing use in consolidating advanced information platforms such as clusters, grids, and clouds.

Software Infrastructure

Professor: Hiroshi Hashizume (Ph.D. (Engineering))

Specialties: Digital signal processing; Image recognition; Visible light communication.

Research Themes: The need for special technologies, besides GPS, to increase information where GPS signals cannot reach. Focus on new positioning technologies using sound waves, light and radio waves, and their applications for use in smartphones.

Information Systems Architecture Science Research Division

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Network Architecture

Associate Professor: Masahiro Goshima (Ph.D. (Information))

Specialties: Processing-in-network; Security.

Research Themes: The unifying aspect of computers as a foundation for management of the information society. Even in the past ten years, clock speeds have remained relatively stable, but effective speeds have increased by a factor of ten. Ongoing research to extend this trend for another ten or twenty years.

Information Network

Professor: Atsuko Takefusa (Ph.D. (Information))

Specialties: Parallel and distributed processing; Cloud infrastructure technologies; Internet technologies.

Research Themes: Building a new information platform that will seamlessly integrate the Cloud, SINET, and on-demand academic networks internationally. Enabling creation of new applications using said, broadband networks, and the Cloud.

Software Infrastructure

Professor: Kenichi Hashimoto (Ph.D. (Information))

Specialties: Signal processing; Information technology; Visible light communication.

Research Themes: The need for special technologies, besides GPS, to increase information where GPS signals cannot reach. Focus on new positioning technologies using sound waves, light and radio waves, and their applications for use in smartphones.

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Professor: Kenichi Hashimoto (Ph.D. (Information))

Specialties: Signal processing; Information technology; Visible light communication.

Research Themes: The need for special technologies, besides GPS, to increase information where GPS signals cannot reach. Focus on new positioning technologies using sound waves, light and radio waves, and their applications for use in smartphones.
List of Researchers

Digital Content and Media Sciences Research Division

Foundations of Content Management

Associate Professor: Fuyuki Ishikawa (Ph.D. (Engineering); B.Sc. (Science))
Specialties: Description and validation of linked and quality in the integration of Web and real-world information; quality of verification and specifications on information management; building information management systems and architectures using enterprises, large amounts of video data. Focuses on grid and Hadoop as key technologies, and developing databases and algorithms for them.

Associate Professor: Norio Katayama (Ph.D. (Engineering))
Specialties: Data management technology for video corpus analysis
Research Themes: High-speed, efficient analysis of multimedia data; developing large-scale databases and algorithms for them.

Associate Professor: Hiroyuki Kato (Ph.D. (Engineering))
Specialties: Optimization for coarse-grained databases; Fundamental issues on optimizing vision using XML database systems
Research Themes: The huge information space formed with the proliferation of the Internet. Mechanisms are needed to extract the required information from databases in many varied forms in order to utilize them adequately. Advancing research on the query language, XQuery, to improve usability.

Assistant Professor: Junichi Yamagishi (Ph.D. (Engineering))
Specialties: Speech information processing; Speech-based human-machine interaction; Speech-based assistive technology
Research Themes: Development of speech synthesis that is smart; speech processing and corresponding system of voice conversion. Providing new ideas and returning useful technologies to society.

Assistant Professor: Yinqiang Zheng (Ph.D. (Engineering))
Specialties: 3D reconstruction; Photometric computer vision; Hyperspectral imaging
Research Themes: Developing new computation methods for retaining the inherent dynamics to implement beautiful computer graphics. Producing new algorithms that can handle sparse and partially visible data, and building mathematical models for describing such natural phenomena with simple mathematical formulae. Particularly investigation visual and mathematical beauty.

Assistant Professor: Satoshi Ohno (Ph.D. (Information Science and Technology))
Specialties: Computer vision; Computer graphics
Research Themes: Developing novel computer vision and computer graphics technologies for future bio-imagery that display images in preferred locations. Reproducing realistic and other material qualities under different lighting environments. Optimal correction techniques for projections.

Assistant Professor: Kazuya Kodama (Ph.D. (Engineering))
Specialties: A study on structure of multi-dimensional information and communication systems of distributed shared image environment with real-time quality control
Research Themes: Extracting information from body and hand gestures; imaging technologies for future bio-imagery that display images in preferred locations. Reproducing realistic and other material qualities under different lighting environments. Optimal correction techniques for projections.

Assistant Professor: Takanori Nishiyama (Ph.D. (Information Science))
Specialties: Explainable machine learning, natural language processing, and automatic reasoning
Research Themes: Building a world-leading data management infrastructure service using SINET, for long-term storage and sharing of research data from universities and research facilities in Japan.

Text and Language Media

Professor: Kazutaka Yamaji (Ph.D. (Pharmaceuticals))
Specialties: Digital content and media sciences research
Research Themes: Designing a platform for developing search technologies for objects and events establishing search technologies for objects and events.

Associate Professor: Kohei Ozawa (Ph.D. (Engineering))
Specialties: Data analysis of web user behavior and improvement of access to information

Professor: Keiko Oyama (Ph.D. (Engineering))
Specialties: Data analysis of web user behavior and improvement of access to information

Assistant Professor: Tadashi Tanaka (Ph.D. (Engineering))
Specialties: Text and sensor data mining
Research Themes: Consolidation of the open science platform for long-term storage and sharing of research data from universities and research facilities in Japan.

Professor: Atsushi Takasu (Ph.D. (Engineering))
Specialties: Text and sensor data mining; Structural pattern modeling; Open-text-based data systems
Research Themes: Supporting search for highly relevant information on the "MyBadge" platform, an intelligent digital information space utilizing suggestion functionality. At the same time, building an information service that will be public intellectual property to expand ways of thinking and promote deeper thought.

Professor: Akihiko Takano (Ph.D. (Science))
Specialties: Informatics of association; Algebra of programming
Research Themes: Supporting research for highly relevant information on the "MyBadge" platform, an intelligent digital information space utilizing suggestion functionality. At the same time, building an information service that will be public intellectual property to expand ways of thinking and promote deeper thought.

Professor: Yusuke Komiyama (Ph.D. (Science))
Specialties: Linked Data; Bioinformatics
Research Themes: Affordable basis systems matching; Cyber-physical data mining; Structural pattern recognition and verification of functions and quality for long-term storage and sharing of research data from universities and research facilities in Japan.

Assistant Professor: Kazuya Komiyama (Ph.D. (Science))
Specialties: Linked Data; Bioinformatics
Research Themes: Affordable basis systems matching; Cyber-physical data mining; Structural pattern recognition and verification of functions and quality for long-term storage and sharing of research data from universities and research facilities in Japan.

Associate Professor: Yusuke Miyao (Ph.D. (Engineering))
Specialties: XQuery; to improve usability.
Research Themes: Implementing practical 3D reconstruction technology that can be used in many fields such as geography, construction, medicine and entertainment.

Assistant Professor: Satoshi Takayama (Ph.D. (Engineering))
Specialties: Computer vision; Computer graphics
Research Themes: Developing novel computer vision and computer graphics technologies for future bio-imagery that display images in preferred locations. Reproducing realistic and other material qualities under different lighting environments. Optimal correction techniques for projections.

Assistant Professor: Kashi Takayama (Ph.D. (Engineering))
Specialties: Computer graphics; Geometric modeling
Research Themes: Designing a platform for developing search technologies for objects and events establishing search technologies for objects and events.

Associate Professor: Imari Sato (Ph.D. (Interdisciplinary Information))
Specialties: Physics-based object shape and environment modeling. Creation of spatially immersive displays for human-computer interaction
Research Themes: Extracting information from body and hand gestures; imaging technologies for future bio-imagery that display images in preferred locations. Reproducing realistic and other material qualities under different lighting environments. Optimal correction techniques for projections.
# List of Researchers

## Digital Content and Media Sciences Research Division

### Human and Knowledge Media

<table>
<thead>
<tr>
<th>Associate Professor</th>
<th>Kenro Aihara</th>
<th>Ph.D. (Engineering)</th>
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</thead>
<tbody>
<tr>
<td><strong>Specialties:</strong></td>
<td>Content analysis for cyber-physical systems; Planning support for making learning materials for humanities</td>
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<tr>
<td><strong>Research Themes:</strong></td>
<td>Concept estimation platform technology through collective and analysis of behavior logs. Search for ways to support human creativity. R&amp;D on learning systems utilizing intellectual resources such as culture and the arts. Dynamic understanding from tourism data.</td>
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<thead>
<tr>
<th>Associate Professor</th>
<th>Frederic Andries</th>
<th>Ph.D. (NII)</th>
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</thead>
<tbody>
<tr>
<td><strong>Specialties:</strong></td>
<td>MindTune; Open mining; Agricultural management based on collective intelligence; Image learning ontology; Social robotic management; Social project management platform</td>
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</tr>
<tr>
<td><strong>Research Themes:</strong></td>
<td>A distributed semantic service and social project platform for collective intelligence applications. Providing image learning ontology and stress ontology management services, which are core research technologies.</td>
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<thead>
<tr>
<th>Professor</th>
<th>Shin Nakajima</th>
<th>Ph.D.</th>
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<tbody>
<tr>
<td><strong>Specialties:</strong></td>
<td>Software dependency formalism; Formal methods; Automatic verification</td>
<td></td>
</tr>
<tr>
<td><strong>Research Themes:</strong></td>
<td>Formal method for developing highly reliable software utilizing mathematics. With the advent of the IoT age and with software permeating social infrastructure, the ability to ensure reliability, based on uncertainty, is essential for safety in society.</td>
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<tr>
<th>Associate Professor</th>
<th>Ildiko Omhukai</th>
<th>Ph.D. (Information)</th>
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</thead>
<tbody>
<tr>
<td><strong>Specialties:</strong></td>
<td>Construction and use of semantic Web and Linked Open Data; Data sharing in academic information distribution</td>
<td></td>
</tr>
<tr>
<td><strong>Research Themes:</strong></td>
<td>The spread of the semantic Web and Linked Open Data as technological infrastructure for Open data and Open science and development of various support tools. Also closely involved in development and operation of ONI, the academic information service provided by NII.</td>
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<tr>
<th>Associate Professor</th>
<th>Mayumi Bono</th>
<th>Ph.D.</th>
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<tbody>
<tr>
<td><strong>Specialties:</strong></td>
<td>Understanding multilingual and multilingual understanding; Conversational structures in multi-party interaction</td>
<td></td>
</tr>
<tr>
<td><strong>Research Themes:</strong></td>
<td>Creating a data set for recording, analyzing and researching the diverse express of sign language. Rewecknowledgment of communication theories, which it has been created to deal with spoken language, by looking at the interactive behaviors of sign language, which has strong in-group and group meaning by providing an image of the phenomenon within the scenario.</td>
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<tr>
<th>Associate Professor</th>
<th>Seiji Yamada</th>
<th>Ph.D. (Engineering)</th>
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<tbody>
<tr>
<td><strong>Specialties:</strong></td>
<td>Human – agent interaction; Intelligent interactive systems</td>
<td></td>
</tr>
<tr>
<td><strong>Research Themes:</strong></td>
<td>Many AI agents do not operate independently, without human assistance. Development of systems with close cooperation between humans and AI agents. Interaction design technology incorporating GIS design and human cognitive models.</td>
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<tr>
<th>Professor</th>
<th>Hiroyuki Funamori</th>
<th>M.A. (Science)</th>
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<tbody>
<tr>
<td><strong>Specialties:</strong></td>
<td>University IR systems; Open science; Research data management</td>
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<tr>
<td><strong>Research Themes:</strong></td>
<td>AI framework and analysis methods to support university management, and development of models. Consideration of the nature of scholarship in the digital age, including Open Science, and contributes to transition in Japan’s academic institutions.</td>
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<tr>
<th>Assistant Professor</th>
<th>Yi Yu</th>
<th>Ph.D. (Information Science)</th>
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<tbody>
<tr>
<td><strong>Specialties:</strong></td>
<td>Multi-media data mining and recommendations using multi-modal analysis with large scale multimedia</td>
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<tr>
<td><strong>Research Themes:</strong></td>
<td>Multimedia analysis of videos, photographs, music and comments uploaded to the Web from users/devices. Finding and recommending content suitable for individuals’ preferences. Mining social trends through participatory authoring.</td>
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### Information and Society Research Division

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<tr>
<th>Professor</th>
<th>Noriko Arai</th>
<th>Ph.D. (NII)</th>
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<tbody>
<tr>
<td><strong>Specialties:</strong></td>
<td>Information sharing, cooperative systems R&amp;D; Artificial intelligence; Mobile robotic systems</td>
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<tr>
<td><strong>Research Themes:</strong></td>
<td>Social project management platform and knowledge to be shared smoothly. Research on the potential use of artificial intelligence in research with the question, “What if a robot were to be admitted to the University of Tokyo?” Also, issuing skills needed for the 21st century from an education-oriented scientific research laboratory.</td>
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<tr>
<th>Assistant Professor</th>
<th>Koushiro Ueki</th>
<th>M.A. (Science)</th>
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<tbody>
<tr>
<td><strong>Specialties:</strong></td>
<td>Development of next-generation information systems</td>
<td></td>
</tr>
<tr>
<td><strong>Research Themes:</strong></td>
<td>Methods for feasible information processing. Specifically working on neural networks and genetic algorithms. The starting point for research is what we have learned about computers and primates at university and graduate school.</td>
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<tr>
<th>Professor</th>
<th>Takayuki Mizuno</th>
<th>Ph.D. (Science)</th>
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<tbody>
<tr>
<td><strong>Specialties:</strong></td>
<td>Statistical analysis, modeling, prediction, and control of socioeconomic phenomena based on big data: Econophysics</td>
<td></td>
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<tr>
<td><strong>Research Themes:</strong></td>
<td>Analysis of Big Data using methods from physics and using econophysics to explain phenomena in economics and society. Aim to derive a universal equation for “booms” from this perspective. There is also potential logistic future bubble crashes and price slumps and to control these.</td>
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<tr>
<th>Associate Professor</th>
<th>Masako Furukawa</th>
<th>Ph.D.</th>
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<tbody>
<tr>
<td><strong>Specialties:</strong></td>
<td>Development of flexible information processing.</td>
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<tr>
<td><strong>Research Themes:</strong></td>
<td>Methods for next-generation information systems; Similarity search for displays; Acoustic rendering</td>
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<tr>
<th>Professor</th>
<th>Ichiro Satoh</th>
<th>Ph.D. (Engineering)</th>
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<tbody>
<tr>
<td><strong>Specialties:</strong></td>
<td>OS and middleware for distributed systems including cloud computing and IoT</td>
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<tr>
<td><strong>Research Themes:</strong></td>
<td>Next network technologies and applications using mobile agent software, which can run processes while moving freely between computers. Mobile phone software development tools that are being used by major manufacturers.</td>
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<tr>
<th>Professor</th>
<th>Noriko Kando</th>
<th>Ph.D. (Economics)</th>
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<tbody>
<tr>
<td><strong>Specialties:</strong></td>
<td>Evaluation of information access technology; Exploratory search and user interface; Cognitive research for exploratory searching; Extracting topics from texts</td>
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</tr>
<tr>
<td><strong>Research Themes:</strong></td>
<td>Modeling, to recognize and draw objects using computers. Establishing a matching technology able to find new objects that are similar visually for, example, comparing 3D data from objects in photographs.</td>
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<tr>
<th>Associate Professor</th>
<th>Hirokazu Gotoda</th>
<th>Ph.D. (Science)</th>
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<tbody>
<tr>
<td><strong>Specialties:</strong></td>
<td>Stereoscopic display technology; Acoustic rendering systems; Similarity search for 3D models</td>
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</tr>
<tr>
<td><strong>Research Themes:</strong></td>
<td>Modeling, to recognize and draw objects using computers. Establishing a matching technology able to find new objects that are similar visually for, example, comparing 3D data from objects in photographs.</td>
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<tr>
<th>Assistant Professor</th>
<th>Masaki Nishizawa</th>
<th>Ph.D. (Science)</th>
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<tbody>
<tr>
<td><strong>Specialties:</strong></td>
<td>Quantitative investigation of academic research findings in media reports; Investigation study on an research structure of information science related research and its trends; Empirical analysis on academic classification system for networkology – digitality – government – university cooperation in Japan</td>
<td></td>
</tr>
<tr>
<td><strong>Research Themes:</strong></td>
<td>Search for the starting point of research that produce excellent results. Specifically, study the research progression and what support was received in the past from databases of research papers. The objective is to be able to invest appropriately in R&amp;D that has potential.</td>
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<tr>
<th>Associate Professor</th>
<th>Hirotaka Okada</th>
<th>Ph.D. (International Public Policy)</th>
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<tbody>
<tr>
<td><strong>Specialties:</strong></td>
<td>Critical growth factors of e-commerce and e-money: University information security Policy Fund (SIGMA)</td>
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</tr>
<tr>
<td><strong>Research Themes:</strong></td>
<td>Establishment of privacy and security protection technologies that define the boundary between cyber space and real space. Contribution to increasing information security in real society through research on biological information protection technology and technology for generating and recognizing media objects.</td>
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<tr>
<th>Professor</th>
<th>Isao Echizen</th>
<th>Ph.D. (Engineering)</th>
</tr>
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<tbody>
<tr>
<td><strong>Specialties:</strong></td>
<td>Information security; Media security; Privacy protection technology</td>
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</tr>
<tr>
<td><strong>Research Themes:</strong></td>
<td>Establishing technology and privacy protection technologies that define the boundary between cyber space and real space.</td>
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<tr>
<th>Assistant Professor</th>
<th>Masaaki Yamada</th>
<th>Ph.D. (Science)</th>
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<tbody>
<tr>
<td><strong>Specialties:</strong></td>
<td>Learning analytics and personalization; Development and evaluation of MOOC and online learning materials</td>
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</tr>
<tr>
<td><strong>Research Themes:</strong></td>
<td>Building a system platform for collecting and analyzing learning data, which contain learning behavior history data from universities and other online learning sites and MOOCs, providing feedback to students, instructors and educational institutions, and otherwise providing effective educational support using learning logs.</td>
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<tr>
<th>Assistant Professor</th>
<th>Hitoshi Okada</th>
<th>Ph.D. (International Public Policy)</th>
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<tbody>
<tr>
<td><strong>Specialties:</strong></td>
<td>Intelligent virtual agents; Application of virtual reality technology</td>
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</tr>
<tr>
<td><strong>Research Themes:</strong></td>
<td>Development of virtual reality technology that supports multi-dimensional virtual simulations, can be applied in wide ranging scenarios for transactions on the Internet. Building systems to demonstrate operating potential and performing validation tests. Scholarly analysis of issues such as legal systems, and demonstration of application in the economy and society.</td>
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Large-scale Project Involvement

JST ERATO

Japan Science and Technology Agency (JST), Exploratory Research for Advanced Technology (ERATO) project. The objectives of this program are to promote seminal and exploratory research through excellent leaders, to produce scientific and technical innovation that will bring reform to society and the economy, and to produce the seeds of innovative technologies based on new scientific knowledge.

- **KAWARABAYASHI Large Graph Project**
  - Research Director: Professor Ken-ichi Kawarabayashi, Principles of Informatics Research Division
  - Large networks, such as the Internet web structure, and social network services like Facebook and Twitter, are used by more than a billion people every day, and the volume of information is growing faster than the hardware is evolving. There is therefore an urgent need to develop algorithms capable of analyzing at practical speeds the vast amount of information that swells around in ever-expanding large networks.
  - The objective of this project is to build the mathematical infrastructure to begin to unravel solutions to various social issues accompanying analysis of this vast amount of information. Considering ever-expanding networks as large graphs (data structures) consisting of nodes connected by edges, the project makes use of advanced mathematical theories in areas such as theoretical computer science, discrete mathematics, optimization, and machine learning, to develop high-speed algorithms useful for solving various problems, while also adapting to the rapidly increasing amount of information. This research activity brings the usefulness of fundamental research in mathematics to the attention of society and the project gathers together excellent young researchers from all over Japan, developing them into personnel with the basic skills to allow them to play active roles in various fields. As part of this, on-going combined “Informatics Winter Festa” workshops are held with the approval of several large projects in fundamental informatics fields, providing a venue where researchers can meet and encourage each another.

- **HASUO Metamathematics for Systems Design Project**
  - Research Director: Associate Professor Hiroshi Hasu, Information Systems Architecture Science Research Division
  - ICT is changing the landscape of manufacturing with pervasive automation and computer support in design and production processes. Our project aims to leverage techniques from software science—specifically the body of mathematical techniques called formal methods—in manufacturing, eventually leading to software tools that support various stages of design processes. In doing so we face the challenge of extending formal methods so that they encompass features of industry products like continuous dynamics and quantitative concerns. Probability, time, etc. We take a unique meta-theoretical approach in which we formulate and study, in mathematically rigorous terms, the process of extending (object-level theories of) formal methods to new areas of concern. This way we achieve rapid and comprehensive extension of formal methods from software to industry products. Our results will be applied to real-world problems, especially in the automotive industry.

JST CREST

Core Research for Evolutionary Science and Technology (CREST). This program promotes original basic research to a high, international standard, toward achieving certain national strategic goals, and team-based research oriented to producing excellent results that will contribute greatly to scientific and technical innovation in the future.

- **Advanced Core Technologies for Big Data Integration**
  - Research Supervisor: Masao Kikumoto, NID Director General, Research Area Advisor: Specially Appointed Professor Mitamura Isao
  - As ICT permeates society, the amount and diversity of data in various fields is increasing exponentially. To realize integrated analysis of big data spanning these fields, and to create, enhance and systematize next-generation infrastructure technologies, two JST researchers are representing work on their respective research issues under guidance from Research Supervisor and NID Director General Masao Kikumoto, and Domain Advisor, Specially Appointed Professor Mitamura Isao.

- **Data Partitionization for Next Generation Data Mining**
  - Research Director: Professor Takahiro Unoki, Principles of Informatics Research Division
  - With the advent of the Big Data age, it has become possible to use various data from the physical and social sciences, economics and other fields. Analyzing diverse and noisy-featured data to find missing information and hidden properties can lead to new scientific discoveries, more detailed understanding of social structures, and development of new products and customer services. What is important is to extract the part of the data related to the meaning or property of interest. Data mining is the technology for finding this part of the data, but it is difficult to find the appropriate structures at an appropriate computational cost. In this project, we have defined this partial data using a structure called a cluster, and developed a technology called data polishing, which can extract meaning from the data relatively easily. Innovatory technologies that are faster and more accurate than before will enable various types of Big Data applications. We have already applied these technologies to matchmaking data used in many enterprises, including Internet advertising, newspaper articles, purchase data and industrial bacteria data, and produced a range of knowledge.

Research on Application-centric overlay cloud technology utilizing inter-cloud

As the performance of supercomputers, clouds and the networks that connect them has increased, the inter-cloud, which connects multiple clouds through high-speed networks, is being built, making it possible to use them for large-scale data processing. However, with current technology, users must configure computers and networks individually to build a computing platform for processing data, and this creates significant technical and time barriers. The objective of this research is to develop infrastructure technology for quickly and automatically building large-scale data processing platforms optimized for each application utilizing multiple clouds connected by networks. The results of this research will enable high-performance, easy processing of large-scale data using clouds. We intend to collaborate with researchers in the fields of genome analysis and fluid-acoustic analysis to develop applications in these fields, and also to build and operate infrastructure together with researchers in information infrastructure centers in universities and other institutions. This research is being done in collaboration with research groups at Hokkaido University, the National Institute of Genetics, the Tokyo Institute of Technology, and Kyoto University.

- **Development and Integration of Artificial Intelligence Technologies for Innovation Acceleration**
  - Research Director: Shinni Sato, Professor, Digital Content and Media Sciences Research Division
  - The ways that people access information have changed in recent years, with SNS such as Twitter and Instagram becoming major sources of information in addition to broadcast television and other conventional media. These are being used by an increasing number of people when forming opinions and purchasing behavior. Many people are also recording and publishing their own activities using SNS and lifelogging. It has thus become possible to observe the experience and behavior of these media consumers through appropriate analysis of media such as broadcast video, SNS, and Lifelogs. This research will first establish an unknown target retrieval and recognition platform to detect significant changes and major trends in dynamically changing media such as broadcast television, SNS, and Lifelogs. Based on the technology suite, we will build a framework to sense how people obtain information from broadcast videos and SNS and how people read following the obtained information. The framework enables early detection of new trends such as brand new products, analysis of effective marketing strategies raising buying behavior, analysis of mechanism driving people for humanitarian behavior, and so on.
**Research**

**Large-scale Project Involvement**

**ImPACT**

Impulsing Paradigm Change through Disruptive Technologies Program (ImPACT) is a program from the Cabinet Office Council for Science, Technology and Innovation (CTSI). It promotes high-risk, high-impact, challenging R&D that will produce revolutionary scientific and technological innovation that, if realized, will bring major changes to industry and society.

**Advanced Information Society Infrastructure Linking Quantum Artificial Brains in Quantum Network**

Project with NII researchers participating: Quantum Artificial Brains

Influential enterprises around the world are actively working to develop so-called “non-Neumann” computers which specialize in solving combinatorial optimization problems in the NP-Hard and NP-Complete classes, which are difficult to solve for conventional computers. Neural and quantum computers are at the center of these R&D efforts. The goal of this program is to develop a quantum computer specialized to solve these combinatorial optimization problems, and it is advancing research on a quantum artificial brain connected to a quantum network (a quantum neural network). NII is developing a quantum model that simulates the hardware of a quantum neural network and developing algorithms for mapping real problems onto it. The hardware is being developed by NTT and Stanford University, and NII is collaborating with them. In FY2016, collaborating with the groups from NTT and Stanford, we demonstrated the first quantum neural network able to solve the NP-Hard Ising problem, and two papers describing the results of this research appeared in the American scientific journal “Science.”

**Innovative Visualization Technology to Lead to Creation of a New Growth Industry**

Project with NII researchers participating: Demonstration of value

With the arrival of super-aging society, there is increasing demand for technical support to enable people to continue working while preserving their health and beauty. NII has participated in ImPACT to realize an early diagnosis of disease, and inspection of the internal structure, with advances in photo-acoustic imaging, which performs real-time 3D visualization of changes in properties and functions inside human bodies and substances, non-invasively and non-destructively. The photo-acoustic system is a promising new technology that integrates state-of-the-art laser and ultrasound technologies, where 3D structures of objects can be reconstructed by sensing emitted ultrasound from the objects that absorb near-infrared radiation. It enables to image the state of the human body and objects whose insides are not visible, non-invasively and non-destructively. In this research, we develop computer-vision technologies to obtain clear images and extract bio-image features to support a diagnosis. For example, we proposed a registration method to generate high-quality 3D volumes in which vessels become clearly visible by aligning shot volumes that are misaligned by body motions. We are also developing a technology that automatically models vascular structures, which helps in understanding blood vessel conditions strongly related to illnesses.

**Tough robotics challenge**

Project with NII researchers participating: Increasing precision of blind sound source separation in flexible robot acoustic sensing

The goal of the tough robotics challenge (TfRC) is to realize “tough” robots that will perceive and be effective in disasters and other extreme environments by making current robots more robust and flexible. This research is being conducted as an extreme acoustics project of TfRC in collaboration with Professor Hiroshi Sarawatani (University of Tokyo) and Professor Shig Makino (University of Tsukuba). Considering a specific situation in which a flexible robot finds disaster victims buried in debris, we aim to establish extreme acoustic sensing technology that will enable them to call for help to be detected by suppressing the noise caused by the robot’s own movements and background noise by using the robot’s multi-channel microphones.

**Infrastructure Maintenance, Renovation and Management**

Research Topic for NII: R&D of Integrated Data Management Platform for Civil Infrastructure Sensing

NII has been collaborating with universities and industry to conduct researches on Cyber-Physical Systems (CPS) on a societal scale since 2011. CPS link and integrate physical systems functioning in the real world with information (cyber) systems that collect and analyze data obtained from the real world through various sensors. Based on the analysis, a decision will be made to resolve various issues in the real world. By this active cycle of data collection, analysis and intelligent feedback, CPS is expected to contribute to create new value as well as to the efficiency of social systems. With this CPS concept, NII has been working since 2014 in a SIP program titled “Infrastructure Maintenance, Renovation and Management.” Our aim is to improve existing infrastructure maintenance process through information technology by designing an integrated data management platform for sensing bridges and other types of infrastructures.
Industry-Government-Academia Collaboration

NII conducts research in the field of informatics and engages in information infrastructure projects with the aim of furthering practical R&D that will help solve various problems facing society. Collaborations between industry, government, and academia are vital in achieving these goals. In order to further strengthen such collaborations, NII promotes activities that help ensure that we meet the requirements of companies, local authorities, and others.

**NII’s industry — government — academia collaborative activities**

- **NII Shonan Meetings**
  - Proposal of seminar theme by corporate organizer
- **Industry—government—academia networking events**
  - Networking/exchange of views based on advanced research themes
- **Industry—government—academia collaboration cram school**
  - Fostering a collaborative mindset through introduction of cutting-edge research
- **Academic guidance (consulting) by researchers**
  - Developing top-level IT personnel
- **Commissioned research**
  - Providing findings from research commissioned by corporations and others
- **TopSE Education Program**
  - Developing top-level IT personnel

**Research launch preparation/assessment**

- To keep abreast of world-leading research and technology trends, and information of related companies, research institutions and researchers based on those trends
- To determine preparation for launching the research and launch timing
- To organize exchange of research personnel who will supplement the system for promoting the research. To make use of external research capabilities for research skills and know-how that cannot be covered within the company
- To be involved in multidisciplinary cooperation regarding research challenges faced in the broad and diverse field of informatics

**Outsourcing to promote research**

- To organize exchange of research personnel who will supplement the system for promoting the research. To make use of external research capabilities for research skills and know-how that cannot be covered within the company

**Development of research personnel**

- To develop future research personnel and acquire new research skills
- To develop person who contribute to business
  - To acquire advanced technical skills required in future projects and address personnel shortages in driving business

**Decision-making support at research conception stage**

- To keep abreast of world-leading research and technology trends, and information of related companies, research institutions and researchers based on those trends

**Research launch preparation/assessment**

- To determine preparation for launching the research and launch timing
- To organize exchange of research personnel who will supplement the system for promoting the research. To make use of external research capabilities for research skills and know-how that cannot be covered within the company

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**Academic guidance (consulting) by researchers**

- Developing top-level IT personnel

**NII open collaborative research**

- Searching for appropriate partners in academia according to research theme

**Comprehensive collaborative research**

- Problem solving through technical guidance and advice

**Collaborative research (including hosting of researchers)**

- Providing information on advanced findings

**TopSE Education Program**

- Developing top-level IT personnel

**Examples of Academic Guidance**

**Researchers’ knowledge**

- Advice by way of lectures and group meetings
- Guidance on policymaking under short-term contracts
- Group guidance by multiple staff in different fields is also available

**Case 1**

- Professor Seiji Yamada
  - NII Digital Content and Media Sciences Research Division
- Advertising planning production company

Advice on setting development policy to expand services through artificial intelligence, as a plan for initiating content business projects.

**Case 2**

- Professor Shin’ichi Satoh
  - NII Digital Content and Media Sciences Research Division
- IT system development enterprise

Advice on technical issues with object recognition systems using video.

**Contact Information for Academic Guidance**

We will ask you about the business issues on which you seek guidance, or discuss researchers whose research subjects relate to those issues, and coordinate the consulting. For details, please direct inquiries to the address below.

National Institute of Informatics, Planning Division,
Office for Social Collaboration, Collaboration Support Team

E-mail: kaken@nii.ac.jp
Research

Collaborative Research Promotion

NII is actively conducting research in collaboration with private facilities and utilizing external funding through means such as contracted research. Also, in order to produce real value for people and society as never before with new theories and methodologies, and expanded applications (future value), as is demanded of informationists, we are promoting collaborative research by seeking and performing public collaborative research and cultivating research through collaboration with other academic fields.

Various joint research performed with enterprises of different types

Joint research with private facilities

NII faculty performed the following joint research, receiving research staff and expenses from private and other external facilities.

- Receiving funding only
  - We receive funding required for collaborative research from private institutions and other external bodies. Cooperative researchers then work from their respective locations.
  - Taking on researchers
    - We take on researchers from private institutions and other external bodies to carry out collaborative research at NII while continuing with their regular jobs. Essential overheads are covered under our research costs up to a certain limit.
  - Taking on researchers and receiving funding
    - We take on engineers and researchers from private institutions and other external bodies, and providing graduate level instruction

Cooperative researchers

NII faculty performed the following joint research, receiving research staff and expenses from private and other external facilities. In principle, projects last one year, but there are also multiple-year contracts.

- Receiving funding only
  - We receive funding required for collaborative research from private institutions and other external bodies. Cooperative researchers then work from their respective locations.
  - Taking on researchers
    - We take on researchers from private institutions and other external bodies to carry out collaborative research at NII while continuing with their regular jobs. Essential overheads are covered under our research costs up to a certain limit.
  - Taking on researchers and receiving funding
    - We take on engineers and researchers from private institutions and other external bodies, and providing graduate level instruction

Researchers affiliated with a wide range of domestic institutions are eligible to apply for open collaborative research and they can then work from their respective locations.

We receive funding required for cooperative research from private institutions and other external bodies. In principle, projects last one year, but there are also multiple-year contracts.

Taking up engineers and researchers from private institutions and other external bodies, and providing graduate level instruction

We take engineers and researchers currently working for private institutions and other external bodies, providing that they have graduated from university or are deemed to have achieved an equivalent academic level. Essential overheads are covered under our research costs up to a certain limit. Research periods up to one year, but can be extended to the following fiscal year and beyond if deemed necessary.

Ongoing international collaborative research

NII open collaborative research

We accept proposals for collaborative research, with NII staff acting in a liaison capacity. We accept proposals every year for the following three types of open collaborative research.

- Strategic research proposals based on strategic themes set out by NII
  - Proposals for research planning meetings aimed at planning the way for new collaboration or further existing research, through meetings at International Seminar House for Advanced Studies in Karuizawa.
  - Open subject proposals in which the applicant is free to set their own research subject.

Researchers affiliated with a wide range of domestic institutions are eligible to apply for open collaborative research. This includes the option for staff members and graduate students to become collaborative researchers, as well as staff from private companies, universities, and technical colleges (although the applicant may not be a graduate student). We are particularly interested in proposals for research planning meetings, so please collaborate with us in taking things to the next level.

International Exchange (Contributing to Internationalization of Informatics)

Overview

NII established its Global Liaison Office (GLO) in order to actively promote international exchange activities with prominent overseas institutes. The GLO concludes International Exchange Agreements (MOU) and implements a variety of measures to promote the exchange of researchers and students, including the NII International Internship Program and MOU Grants/Non-MOU Grants.

Research exchange with universities and institutions

- NII International Internship Program: 120 students from 23 countries
- MOU Grants/Non-MOU Grants: 5 people to 5 countries, 39 people from 18 countries

Acceptance of foreign researchers

- Japan Society for the Promotion of Science (JSPS): 2
- MOU Grants/Non-MOU Grants (international, western countries): 2
- Invitation fellowships for researchers in Japan: 1
- Other researchers (including researchers and visiting professors): 6

International Exchange Agreements (MOU)

Country / Region Affiliation

<table>
<thead>
<tr>
<th>Country / Region</th>
<th>Affiliation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brazil</td>
<td>Brazil's Ministry of Education and Culture, Federal University of Santa Catarina (UFSC)</td>
</tr>
<tr>
<td>Canada</td>
<td>Canada's Ministry of Innovation Science and Economic Development, University of British Columbia (UBC)</td>
</tr>
<tr>
<td>United States</td>
<td>United States National Science Foundation, National Institute of Health (NIH)</td>
</tr>
<tr>
<td>Commonwealth of Australia</td>
<td>Australia's Department of Innovation, Science, Research and Economic Development, Queensland University of Technology (QUT)</td>
</tr>
<tr>
<td>United States of America</td>
<td>United States Department of Energy, National Renewable Energy Laboratory (NREL)</td>
</tr>
<tr>
<td>France</td>
<td>France's Ministry of Higher Education and Research, University of Nice - Sophia Antipolis (UNSA)</td>
</tr>
<tr>
<td>German Republic</td>
<td>Germany's Federal Ministry of Education and Research, Technische Universität Braunschweig (TU Braunschweig)</td>
</tr>
<tr>
<td>Italian Republic</td>
<td>Italian Republic's Ministry of Education, University of Pavia</td>
</tr>
<tr>
<td>Republic of Korea</td>
<td>Republic of Korea's Ministry of Science and Technology, Korea Institute of Science and Technology Information (KISTI)</td>
</tr>
<tr>
<td>Singapore</td>
<td>Singapore's National University of Singapore (NUS)</td>
</tr>
<tr>
<td>Thailand</td>
<td>Thailand's Office of the Higher Education Commission, Institute of Information Systems, German Research Center for Artificial Intelligence (DFKI)</td>
</tr>
<tr>
<td>Portugal</td>
<td>Portugal's Ministry of Education and Science, University of Aveiro (UA)</td>
</tr>
<tr>
<td>Nederland</td>
<td>Nederland's Ministry of Education and Science, University of Twente (UT)</td>
</tr>
<tr>
<td>Finland</td>
<td>Finland's Ministry of Education and Culture, University of Helsinki (UH)</td>
</tr>
<tr>
<td>German Republic</td>
<td>Germany's Federal Ministry of Education and Research, Technische Universität München (TUM)</td>
</tr>
<tr>
<td>Italy</td>
<td>Italy's Ministry of Education, University of Rome Treviso (URV)</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>United Kingdom's Ministry of Education, University College London (UCL)</td>
</tr>
<tr>
<td>Japan</td>
<td>Japan's Ministry of Education, Science, Sports, Culture, and Tourism, University of Tokyo (UTokyo)</td>
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Please note that the above list is not exhaustive and the number of foreign researchers varies each year.

Paving the way for wide-ranging collaboration with researchers and conducting research aimed at creating value

NII open collaborative research

We accept proposals for collaborative research, with NII staff acting in a liaison capacity. We accept proposals every year for the following three types of open collaborative research.

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Selection status

<table>
<thead>
<tr>
<th>Selection status</th>
<th>(FY2014)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategic research applications</td>
<td>29</td>
</tr>
<tr>
<td>Research planning meeting applications</td>
<td>10</td>
</tr>
<tr>
<td>Open in short applications</td>
<td>36</td>
</tr>
<tr>
<td>Total</td>
<td>71</td>
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</table>
The Recent Topics of the NII Shonan Meetings

1. Current Trends in Combinatorial Optimization, April 11 - 14, 2016, 35 participants
2. Controlled Adaptation of Self-Adaptive Systems (CASaS), April 25 - 28, 2016, 31 participants
3. Theory and Applications of Geometric Optimization, May 30 - June 2, 2016, 32 participants
4. Recent Advances in Randomized Numerical Linear Algebra, July 25 - 28, 2016, 23 participants
5. Dynamic Network Visualization: Approaches to facilitate visual analysis of complex and dynamic network data, August 1 - 4, 2016, 28 participants
6. Bidirectional Transformations, September 26 - 29, 2016, 28 participants
7. Molecular Graphics, September 5 - 8, 2016, 28 participants
8. Algorithmic and Structural Biology, November 21 - 24, 2016, 28 participants
9. Perception in Augmented Reality, November 14 - 18, 2016, 31 participants
10. Implicit and Explicit Semantics Integration in Proof Based Developments of Discrete Systems, November 22 - 25, 2016, 30 participants
11. Algorithms for Beyond Planar Graphs, November 28 - December 1, 2016, 26 participants
13. Mining Software Repositories: Accomplishments, Challenges and Future Trends, March 6 - 10, 2017, 29 participants
Education Services for Developing Top-Level IT Personnel

TopSE

The GRACE Center offers the TopSE education program for working adults in order to develop world-class IT personnel capable of contributing to the field with specialized IT knowledge, the ability to put their knowledge into practice, and the foresight to deal with a changing society. Built on the idea of "intellectual manufacturing education based on science", TopSE is a practical education program for young engineers and researchers in industry, composed mainly of hands-on education to acquire advanced development techniques.

The educational program provides:

• The TopSE course, specialized to provide software engineering fundamental technologies and to acquire technologies that will survive into the future.
• The Advanced TopSE course, which trains in the latest advanced technologies that will lead industry, specialized in analyzing and solving real-world problems.
• Advanced programming seminars in topics such as IoT, artificial intelligence, and cloud technologies.

For practical education, (1) lecture and practice environments suitable for group work, (2) an education cloud, and (3) archived lecture videos are available.

Lecture/seminar environment suitable for group exercises

The lecture room is equipped with numerous projectors and a whiteboard wall for group exercises. There is also a terminal pre-installed with the software required for the lecture, as well as a server for recording and distributing lectures. Students can watch lecture videos at home or at work, and can remotely access the same terminal environment as the lecture room.

Educational Cloud

Facilitates building cloud-based systems and study of operations using NII’s cloud built using open source software.

Lecture video distribution

TopSE lectures and software technology-related seminars are distributed using the “devshin-chi.jp” website. Lecture content, with synchronized lecture slides and lecture can be viewed free-of-charge by anyone.

TopSE aims to develop skills that can be used in international projects. Every year since FY2011, joint training sessions have been held with University College London (UCL). In the sixth instance held Oct. 31 to Nov. 4, 2016 in London, we provided project management and development leadership in a practical course attended by four UCL students, a five-person team and eight technologists from the sponsoring company, in which participants built an application on a virtual machine (VM) and automatically deployed it on Amazon Web Services (AWS).

Establishing Academic Information Infrastructure

As an inter-university research institute, NII is working with universities and research institutes to realize Science Information NETWORK (SINET5), a communication network with high-speed performance that rivals that of networks worldwide. It is also developing cloud infrastructure and establishing academic information infrastructure to contribute to the advancement of open access and open science, as well as improving the sophistication of its utilization. In addition, NII is working to improve the early detection and response capabilities of all universities against cyberattacks of ever-growing sophistication while jointly training human resources in cybersecurity with universities and companies. It is striving to contribute to improving the international competitiveness of universities’ education and research, accelerating leading-edge research, expanding academic research and increasing research efficiency, and strengthening functions in universities.
The Science Information NETwork (SINET) is an information communication network built and operated by NII as academic information infrastructure for universities and research institutions throughout Japan. The network has nodes (network connection points) nationwide, and it provides universities and research institutions with an advanced network that supports the formation of communities among the many people involved in education/research and encourages the circulation of a wide range of academic information. SINET is also interconnected with many overseas research networks, such as Internet2 in the U.S. and GÉANT in Europe, to facilitate the circulation of research information across borders, which is essential in advanced international research projects.

The previous SINET4 was upgraded to SINET5, and full-scale operation of the upgraded network began in April 2016. SINET5 connects all areas of Japan in an organic way at 100 Gbps, and provides more than 800 universities and research institutions with high-level academic information infrastructure, including cloud computing, security, and academic content.

SINET5 Services
SINET5 provides ultrahigh-speed interfaces, such as 100GE and 40GE. Along with expanding the network service features, more user-focused services such as virtual university LAN and L2 on-demand are being added to the service menu to allow secure, advanced research environments to be built in universities and research institutions.
Support for Cloud Utilization by Universities and Research Institutes

With the aim of establishing an academic information infrastructure, NII supports cloud use for a variety of applications. This support includes a service to support adoption and procurement of cloud services (GakuNin cloud adoption support), services to support cloud use (SINET cloud connection service, Cloud gateway, and On-demand cloud configuration).

GakuNin Cloud Adoption Support
NII’s GakuNin Cloud Adoption Support is a service for preparing, distributing, and sharing information about the required standards when a university or research institute adopts cloud services. Its main contribution is supporting cloud service adoption by organizing a checklist of items that must be addressed when a university or research institute introduces the cloud, analyzing the results of the responses by cloud service providers to this checklist, and providing the results to universities and research institutes. For universities and research institutes, they can not only understand the areas they should focus on when introducing the cloud, but also compare multiple cloud services using the same indicators. This makes it possible for them to choose the cloud service that meets their needs. In addition, NII conducts individual consultations of cloud adoption, holds seminar series on cloud services for universities and research institutes, and provides cloud start-up guides.

Cloud Gateway
NII provides Cloud Gateway, a portal for one-stop access to cloud services needed for research and education. Users at universities and research institutes can browse the services contracted by the organizations by simply logging into Cloud Gateway.

Universities and research institutes can customize the displayed list of services to guide users to services provided through the contract and recommended services. Also, research groups can add specific services for members.

NII is preparing to provide functions to configure cloud environments that are connected to the high-speed and secure network provided by SINET. These functions will make it easier for university and research institute users to install and configure software on clouds. In addition, an intercloud environment consisting of a cloud environment and multiple computers connected to the high-speed and secure network provided by SINET can be built on-demand and used for research, education, and IT system operation.

SINET Cloud Connection Service
NII has prepared a framework in which providers offering cloud services (e-mail, storage, remote access, etc.) can directly connect to SINET. SINET users can build private clouds and use these services.

https://www.sinet.ad.jp/
Establishment of Authentication Infrastructure

Academic Access Management Federation in Japan “GakuNin”

Aiming to improve usability and to cut the operation cost of internal systems, many universities are now switching to cloud services. The Academic Access Management Federation “GakuNin” is a structure that allows the use of a university’s authentication infrastructure not only for internal services but also for other collaborating universities and commercial services including the cloud, thus facilitating the safe and secure use of academic services on the Internet by identifying individuals and organizations. With Single Sign-On, users can seamlessly and automatically log into multiple internal and external services with a single logarithm procedure. For universities, building an authentication infrastructure compatible with GakuNin raises the baseline of security measures and reduces the cost of ID management.

Features

- Only one ID/password to remember
- Single Sign-On (SSO)
- Accessible from anywhere in the world (remote access)
- No need for other software than a web browser
- Supports client certificate authentication and multi-factor authentication (Integrated management of security level)

GakuNin strives to maintain reliability by annual assessment of the IdPs operated by universities and institutions. GakuNin also provides LoA1 (Level of Assurance 1) certification services specified in the trust framework of the Federal Identity, Credential, and Access Management (FICAM) in the United States. Universities that have been certified for this high level of authentication infrastructure are able to use the US government services, including the databases of the National Institutes of Health (NIH).

Digital certificates: UPKI Digital Certificate Issuance Service

NII started the UPKI Digital Certificate Issuance Service, a business issuing digital certificates aimed at universities and research institutions, in January 2015. In addition to the server certificates issued before, NII now also issues client certificates and code signing certificates. As before, the server certificates issued by NII are highly secure and conform to the unified international Web Trust for CA (WTSC) standard. The use of server certificates improves web security by proving that the provider of a web server (domain name and organization name) is legitimate and, for example, making it easy to distinguish from phishing websites.

NII also issues client certificates to members of institutions for authentication and signing emails, and these can be used for purposes such as multi-factor authentication and preventing identity theft. Additionally, signing software using code signing certificates confirms the existence of a developer and guarantees that the software is not fake. This gives users peace of mind when using the software.

By providing these certificates at a low price and having them put into use, the UPKI Digital Certificate Issuance Service will improve the security of universities and research institutions across the board.

Support of Inter-University Collaboration-based Information Security Framework

NII is building a framework in collaboration with national universities that increases resistance against cyberattacks and can respond quickly to damages in case of a cyberattack. The framework uses information obtained by a system installed on SINET that monitors, detects, and analyzes cyberattacks and information shared by institutions inside and outside Japan. At the same time, NII is supporting the training of personnel in national universities who act as intermediaries through practical training to respond to cyberattacks. Furthermore, it is moving forward with preparations to provide an environment that promotes cybersecurity research.

Operation of HPCI Authentication Infrastructure and Network Infrastructure

High Performance Computing Infrastructure (HPCI) implements a computing environment that meets the needs of various users, including the industrial sector, by linking the K computer in Kobe and other supercomputers installed at universities and research institutions in Japan. It began service in the second term of fiscal year 2017. HPCI has a single sign-on authentication mechanism that allows users to gain access to any computing resources by using a common login account to improve usability. As the first-stage project, NII is continuing to construct and operate the authentication system, including the certificate authority and a certificate issuing system, which are the core of this single sign-on authentication mechanism, in collaboration with the K computer and universities. The authentication system uses a highly secure framework of certificates for HPCI users to ensure security in communication and data. It also provides a single sign-on environment that enables users to seamlessly use HPCI’s computing resources.

eduroam: International Academic Wireless LAN Roaming Platform

eduroam is an international wireless LAN roaming platform developed by Europe’s GSANT (formerly TERENA). It realizes wireless LAN then is mutually interoperable between the campuses of universities and research institutes. In 2006, eduroam was introduced in Japan as part of NII’s nationwide Common University Authentication Platform Construction Project. eduroam JP is being jointly operated, supported, and developed in Japan by NII and Tohoku University. Based on the IEEE802.1X industrial standard, eduroam provides a secure and highly convenient wireless LAN environment.
Publishing and Communicating Academic Information

NiI accumulates and structures the education and research results produced at universities and research institutions, and provides access through a user-friendly interface.

CiNii

This is a database service that can be exhaustively searched for academic information such as articles, books, journals, and doctoral dissertations. NiI is expanding the pool of data available and improving text hit rates by linking various database services. In addition, NiI is promoting intersystem links with university libraries and other facilities by providing search APIs (application program interfaces) such as OpenSearch. The service also offers a dedicated smartphone display so that the database can be searched with ease using a smartphone.

CiNii Articles: Searching for Japanese research papers

Contains more than 19 million information items on Japanese academic articles including academic society publications, research bulletins, and the Japanese Periodicals Index of the National Diet Library.

CiNii Books: Searching for books in university libraries

This service allows searching of information on books and journals held by university libraries in Japan. Contains more than approximately 11 million bibliographic records of books and authors held by university libraries nationwide and accumulated through the Catalog Information Service (NACSIS-CAT) operated by NiI. Available to anyone free of charge.

CiNii Dissertations: Searching for Japanese doctoral dissertations

Allows comprehensive, centralized searching of Japanese doctoral dissertations. In addition to dissertation texts digitized by the National Diet Library, it is also possible to search and view dissertation texts published in the institutional repositories of universities and research institutes. Available to anyone free of charge.

Support for Construction and Linkage of Institutional Repositories (JAIRO Cloud)

To contribute to the establishment of next-generation academic content platforms, NiI supports the construction and linkage of institutional repositories to communicate university education/research results and promotes open access. NiI has so far supported content enrichment, system linkage, and community formation at academic institutions in Japan, and institutional repositories have been built and are in operation at more than 680 institutions.

JAIRO Cloud (shared repository service)

For institutions that find it difficult to independently build and operate their own repositories, NiI provides a shared repository system environment in the form of a cloud service based on our institutional repository software WEKO (http://weko.at.nii.ac.jp/).

Crossover Searches of Academic Information Accumulated in Institutional Repositories in Japan

This portal enables crossover searches of education/research results of university and research institution (journal articles, dissertations, research bulletins, research papers, teaching materials, etc.) accumulated in institutional repositories in Japan. Users are able to access full texts available in each institutional repository, as well as linking to CiNii.

Education and Training Programs

NiI provides the following range of education and training programs to develop human resources at universities supporting Japan's academic information infrastructure:

- Training sessions (NACSIS-CAT/ILL self-learning)
- Advanced training (for staff responsible for cataloging and staff responsible for institutional repositories)
- Comprehensive training (comprehensive themes involving academic information infrastructure for developing core human resources)
Database of Grants-in-Aid for Scientific Research

KAKEN (Database of Grants-in-Aid for Scientific Research)  
https://kaken.nii.ac.jp/

This database allows users to browse adopted projects and research results (reports, summaries, etc.) funded by Grants-in-Aid for Scientific Research from the Ministry of Education, Culture, Sports, Science and Technology and the Japan Society for the Promotion of Science. It provides access to the latest research information in Japan in a wide variety of fields. The system developed by KAKEN is also used in the JST Project Database (https://projectdb.jst.go.jp/), which contains research projects funded by the Japan Science and Technology Agency (JST).

Collection status  
| Number of adopted projects | 790,000 |

Catalog Information Service  
http://www.nii.ac.jp/CAT-ILL/

The Catalog Information Service consists of the Cataloging System (NACSIS-CAT) and the Interlibrary Loan System (NACSIS-ILL).

Cataloging System (NACSIS-CAT)  
NACSIS-CAT is a system for building comprehensive catalog databases designed to provide at-a-glance information on academic literature (books, journals) archived at university libraries and other such institutions throughout Japan. To improve efficiency, the system provides the capability to refer to standard cataloging data (MARC), and university libraries and other institutions nationwide share the work of inputting records online.

| Number of NACSIS-CAT participating institutions | 1,321 |
| Cumulative no. of registered records | 130,370,000 |
| Number of NACSIS-ILL participating institutions | 1,895 |
| Number of NACSIS-ILL records | 526,000 |
| Number of NACSIS-ILL loans | 89,000 |

Interlibrary Loan System (NACSIS-ILL)  
NACSIS-ILL makes use of the comprehensive catalog databases constructed using NACSIS-CAT to support the exchange of books and journal articles between libraries and so facilitate the provision of academic literature to researchers at universities and other institutions. As well as supporting interlibrary loan services with university libraries overseas by linking to systems such as OCLC in the US and KERIS in South Korea, NACSIS-ILL promotes the efficiency of library work through an offsetting service for ILL document copying and other charges.

Electronic Resources Data Sharing Service  
ERDB-JP (Electronic Resources Database-JAPAN)  
https://erdb-jp.nii.ac.jp/

ERDB-JP is a service that develops and shares knowledge databases of electronic resources, such as e-journals and e-books, published in Japan. It is operated by NII and the "Electronic Resources Data Sharing Task Force," made up of staff responsible for managing e-resources at each university. Content metadata are collected and updated by partners consisting of universities, publishers, and knowledgebase vendors.

The accumulated metadata of contents are provided under the CCO license. They can be exported and used for creating lists of e-resource titles, for OPAC provided by universities, and for discovery services.

International Scholarly Communication Initiative  
SPARC Japan  
SPARC Japan was launched in FY2003 based on cooperation with academic societies and university libraries, and in collaboration with SPARC (USA) and SPARC Europe. The aim is to promote further dissemination of the results of Japanese research, as well as to promote the digitization and international distribution of academic journals published by Japanese academic societies and to contribute to improvements in the international infrastructure for the distribution of academic information. The SPARC Japan Seminars provide an opportunity for interaction between stakeholders in academic information, and the latest topics in information distribution are discussed.

The basic policy in phase 5 (FY2016–2018) is to "implement open access under a framework of international collaboration, to promote the distribution of academic information, and to strengthen the ability to disseminate information." As well as promoting collaboration with university libraries and researchers, the project aims to understand the issues around open access and to study the measures that universities should adopt.

Collaboration with University Libraries  
Council for Promotion of Cooperation Between University Libraries and the National Institute of Informatics  
NII entered into an agreement with the Japanese Coordinating Committee for University Libraries in order to promote projects in cooperation with university libraries. Based on this agreement, NII established the Council for Promotion of Cooperation Between University Libraries and the National Institute of Informatics. This Council and the committees established beneath it (including the Japan Alliance of University Library Consortia for E-Resources and Future Scholarly Information Systems Committee) promote collaborative projects concerning electronic materials and institutional repositories.

Japan Alliance of University Library Consortia for E-Resources  
JUSTICE: Japan Alliance of University Library Consortria for E-Resources  
Aiming to implement a range of activities to provide stable and continuous access to academic information, including e-journals, JUSTICE is one of the world’s largest consortia with over 500 participating national, public, and private university libraries. To support the activities of JUSTICE, NII has established the Library Liaison Office, which functions as the JUSTICE secretariat and is staffed from university libraries.

Open Access Repository Promotion Association  
JPCOAR: Japan Consortium for Open Access Repository  
JPCOAR is a community of institutional repositories formed as a place for Japanese universities and research institutes to work more effectively to advance efforts to spread research results and increase the meaning of building and operating institutional repositories. JPCOAR is engaged in improving distribution of academic information, including open science, and in operating the institutional repository system platform (JAPRO Cloud). NII and university libraries support this activity.

Summary of Collection Status (as of the end of March 2017)  
<table>
<thead>
<tr>
<th>Partner participation</th>
<th>Universities (national)</th>
<th>Universities (municipal)</th>
<th>Universities (private)</th>
<th>Inter-university research institutes</th>
<th>Publishing companies</th>
<th>Others</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partner A</td>
<td>19</td>
<td>2</td>
<td>8</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>37</td>
</tr>
<tr>
<td>Partner B</td>
<td>2</td>
<td>0</td>
<td>6</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Total</td>
<td>21</td>
<td>2</td>
<td>14</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>47</td>
</tr>
</tbody>
</table>

Data registrations (as of end of March 2017)  
<table>
<thead>
<tr>
<th>Number registered</th>
<th>Number of new registrations (FY2016)</th>
<th>Number of updates (FY2016)</th>
</tr>
</thead>
<tbody>
<tr>
<td>13,202</td>
<td>1,480</td>
<td>5,664</td>
</tr>
</tbody>
</table>
Electronic Archives

NII carries out the following activities to store and provide electronic academic information on a permanent basis.

NI-REO (NII Electronic Resource Archives)

Back issues of international electronic journals (approx. 3.9 million records) and an electronic collection of humanities and social science materials (approx. 490,000 items) are stored on NII servers and provided to universities in Japan. Electronic resources archived in NI-REO are maintained in collaboration with JUSTICE.

Archived contents

<table>
<thead>
<tr>
<th>Title of the Journal/Collection</th>
<th>Archived Years</th>
<th>Number of items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spiegel Online Journal Archive</td>
<td>1834-1999</td>
<td>Titled: Approx. 1,300 items; Number of records: Approx. 1 million</td>
</tr>
<tr>
<td>Spiegel Lecture Notes in Computer Science</td>
<td>1979-1999</td>
<td>Titled: Approx. 500 items</td>
</tr>
<tr>
<td>Oxford Journal Archive Collection</td>
<td>1849-2003</td>
<td>Titled: 511 items; Number of records: Approx. 440,000</td>
</tr>
<tr>
<td>Flower Online</td>
<td>1997-2000</td>
<td>Titled: Approx. 800 items; Number of records: Approx. 250,000</td>
</tr>
<tr>
<td>SAA Computer Society Digital Library (CSDL)</td>
<td>1966-2011</td>
<td>Titled: 26 items; Number of records: Approx. 265,000</td>
</tr>
<tr>
<td>Eighteenth Century House of Commons Parliamentary Papers (18c HCPP)</td>
<td>1701-1800</td>
<td>Number of records: Approx. 41,000</td>
</tr>
<tr>
<td>Nineteenth / Twentieth Century House of Commons Parliamentary Papers (19C HCPP &amp; 20c HCPP)</td>
<td>1801-2004</td>
<td>Number of records: Approx. 186,000</td>
</tr>
<tr>
<td>Eighteenth Century Collections Online</td>
<td>1851-1914</td>
<td>Number of records: Approx. 5,000</td>
</tr>
<tr>
<td>Eighteenth Century House of Commons Parliamentary Papers (18c HCPP)</td>
<td>1851-1914</td>
<td>Number of records: Approx. 5,000</td>
</tr>
<tr>
<td>The Making of the Modern World: Goldsmiths’-Kress Library of Economic Literature (GOMW)</td>
<td>1450-1999</td>
<td>Number of records: Approx. 51,000 books, 445 journals</td>
</tr>
</tbody>
</table>

Open Science

Development of Research Data Platform

Open Science, which promotes open access and sharing of research outputs over the Internet with the general public, is gaining traction as a new way to conduct research. It is expected that Open Science will lead to enhanced research efficiency and productivity as well as research quality and transparency.

NII will provide an e-infrastructure for sharing research data by expanding the functionality of the existing cloud-based institutional repository system named “JAPO Cloud,” which is a research publication platform. In addition, NII will provide “CiNii Research,” a discovery service platform, enabling researchers to search scholarly contents stored in various databases including institutional repositories across Japanese universities. In order to make research discovery more efficient, CiNii Research automatically creates in its backend a large-scale knowledge base by connecting the research data generated by individual researchers will be stored right from the beginning of a research project on the “GakuNin RDM,” a research data management platform provided also by NII. The system allows researchers to transfer their research data and any other related materials into the repository by swift one-click action, facilitating them to join to the Open Science world.

These three platforms supporting the researcher throughout the research cycle will contribute to the research strength of Japanese academic institutions and promote Open Science in Japan.

Educational Activities

Graduate Education

The National Institute of Informatics makes use of its unique, comprehensive informatics research structure and its practical environments in which academic information services and research and development are combined to provide graduate education. Aiming to develop researchers equipped with a broad outlook, high level of expertise, leadership abilities, and real problem-solving abilities, the National Institute of Informatics provides education to graduate students in three ways: (1) participation in SOKENDAI (The Graduate University for Advanced Studies), (2) cooperation with other graduate schools, and (3) special collaboration with research students.

http://www.nii.ac.jp/graduate/
Greetings from Chair of Department
Zhenjiang Hu, Chair, Department of Informatics

The Department of Informatics consists of six fields: Foundations of Informatics, Information Infrastructure Science, Software Science, Multimedia Information Science, Intelligent Systems Science, and Information Environment Science. These are new disciplines that are based on the traditional fields of computer science and information engineering, while covering a wide range of the social sciences, humanities, and life sciences. Our department carries out various phases of research and education: basic, applied, and practical. As well as training researchers, we aim to develop highly skilled professionals and leaders in the field of informatics. Instruction is tailored to individual student’s ambitions, interests, and academic research plans through a system of personal guidance and a Ph.D. mentorship program by top-level researchers at the National Institute of Informatics. We employ a sub-advisor system whereby students can obtain advice from staff in different research fields, or with different areas of specialization within the same field of research, who can provide a variety of perspectives. In the five-year doctoral program, graduates can tackle specific topics thoroughly, while in the three-year doctoral program, master's graduates can concentrate on a topic that they were researching before entering the department. As well as being SOKENDAI students, students of the Department of Informatics are members of the National Institute of Informatics, and as such are able to study in an international collaborative environment, participate in various research projects, and gain experience as international researchers through exchange programs with overseas partner universities and research institutions. Roughly half of our Japanese student population are company employees who wish to systematically reorganize the job that they have been doing and learn about the latest technology. The fact that we have a high percentage of foreign students is also an important feature of our department. Many of the lectures are in English, as are many seminars. There is a great deal of cross-cultural communication between students, and this environment is valuable for students envisioning an international career. Collaborations with other departments in SOKENDAI and their founding institutes further extend the sphere of exchange, and students can participate in a valuable network of students, teachers, and researchers.

About the Department of Informatics

Establishment of graduate school
The National Institute of Informatics joined SOKENDAI (The Graduate University for Advanced Studies) and opened the Department of Informatics (three-year doctoral program) in April 2002, seeing its first students graduate in March 2005. A five-year doctoral program was launched in 2006. The first graduate university in Japan, SOKENDAI was founded with the aim of promoting original, international research that goes beyond the boundaries of conventional academic disciplines, and opening up advanced scientific fields that create new streams of science.

Content and structure
The Department of Informatics aims to develop young IT researchers and engineers who will play key roles on an international level in the 21st century. Students are able to study in an international collaborative environment, participate in various research projects, and gain experience as international researchers through exchange programs with overseas partner universities and research institutions. Roughly half of our Japanese student population are company employees who wish to systematically reorganize the job that they have been doing and learn about the latest technology. The fact that we have a high percentage of foreign students is also an important feature of our department.

Feature of the Dept
The Department of Informatics welcomes students from overseas and is a place of lively cross-cultural communication between students. There are also many working students; in fact, they account for around 30% of all the department’s students.

Message from a Current Student
WANG, Xin
2015: Graduated from a master’s course at the University of Science and Technology of China
2015: Enrolled in the three-year doctoral program, Department of Informatics, SOKENDAI Main supervisor: Associate Professor Junchi Yamaguchi

My research topic is on text-to-speech synthesis, a technology that enables the machine to read aloud in human-like voices. One approach of text-to-speech is to use various machine learning methods to figure out the mapping from the text to speech. Although the synthesized speech from this approach is natural sounding, its quality is still imperfect. Possible reasons may be the various inappropriate assumptions researchers made on the statistical models. My work is to find better statistical models and revise those assumptions. With the improved model and thus synthetic speech, I hope that text-to-speech technology can better serve the society, particularly during the next Olympic Games in Tokyo.

Major online journals and databases
- ACM Digital Library
- Association for Computing Machinery
- IEEE Online
- Institute of Electrical and Electronics Engineers
- Springer
- ScienceDirect
- Wiley Online Library
- Institute of Electrical and Electronics Engineers
- Information Processing Society of Japan

Facilities and equipment

Service Reading room Stack room
Area 140m² 277m²
Swear

Other equipment
- Automatic scanning and retuning machine
- Microfiche reader
- Copier

Number of students in Department of Informatics
das of April 2017 (1*) indicates foreign students

<table>
<thead>
<tr>
<th>Field</th>
<th>Five-year program</th>
<th>Three-year program</th>
<th>Research students</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japanese</td>
<td>16,521</td>
<td>10,055</td>
<td>191</td>
<td></td>
</tr>
<tr>
<td>Foreign</td>
<td>13,681</td>
<td>8,313</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>30,202</td>
<td>18,368</td>
<td>201</td>
<td></td>
</tr>
</tbody>
</table>

Number of books / journal titles
(as of the end of March 2017)

Service Document type Book Board journal Journal (Full text)
Japanese | 16,521 | 10,055 | 191 |
| Foreign | 13,681 | 8,313 | 10 |
| Total | 30,202 | 18,368 | 201 |

The NII Library
The NII Library holds online journals, books, and periodicals on informatics as part of its role as an informatics research/education center. The library collaborates with the nearby Meiji University Library to provide access to academic materials for students of SOKENDAI.
The Department of Informatics provides research instruction and guidance to top-level researchers within the advanced environment and international atmosphere of the National Institute of Informatics.

A broad range of academic fields are offered from fundamental disciplines such as mathematics, to the basics of computer architecture and networks, and extending to software and media engineering, artificial intelligence, informatics, and communications. Since its establishment, lectures and research guidance have been given in small groups, meaning that the system of education is flexible to suit the individual students. Advanced research instruction and guidance are given on a daily basis to develop people capable of working at the forefront of informatics. The academic year consists of two semesters: the first semester runs from April to September and the second semester runs from October to March.

In order to complete the course, students are required to acquire a certain number of credits, to carry out research under appropriate guidance, and to pass the doctoral dissertation review of their research results. The minimum number of credits required is 10 for the three-year doctoral program and 40 for the five-year doctoral program. The duration of the program is flexible and may be shortened for students with excellent research results. Also, if a student enrolled in the five-year doctoral program has to withdraw before graduation, they may be awarded a master’s degree as long as certain requirements are met.

Special Subjects of the School of Informatics

Foundations of Informatics
- Logic in Computer Science (TATSUTA Makoto)
- Theory of Numerical Methods (HIYAMA Katsufumi)
- Basics of Information Processing in Life Sciences (AOKI Tadao)
- Mathematical Linguistics (YANKAINA Makoto)
- Logic for Knowledge Discovery (NAKAMURA Keiichi)
- Mathematical Logic (KEITARO Sasaki)
- Quantum Information Systems (FUKUDA Kenji)
- Quantum Computing (ATSUSHI Kajii)
- Modern Cryptography and Computational Neuronal Science (YOSHIDA Yutarou)
- Sublinear Algorithms (YOSHIDA Yutaka)
- Optimization Theory (KISHIDA Masao, Graph Algorithms (FUWA Yozo))
- Algorithmic Market Design (YODA Yu)

Information Infrastructure Science
- Computer System Design (YONEDA Tomotomo)
- Information and Communication Systems (Y. Fushan, ABE Shin)
- KYUKUBA Kenya (KANEKO Magumi)

Software Science
- Distributed Systems (SATOH Tatsuo) / Data Engineering (TAKASU Akishin) / Software Engineering (YAMAKAWA Shin)
- Signal processor (HASHIZUMI Hiroshi) / Probabilistic Models in Informatics (KITAMOTO Kanzae)
- Content Programming / Service-Oriented Computing (SHIRAIWA Fuyuki) / WAKA Database (NAKA Toshiyuki) / Database Programming Languages / Mathematical Structures in Programming (Hiro ZHENG)
- Software Development Process (TD Kenji) / Fundamentals of Web Application Development (SAKAMOTO Katsuro)

Multimedia Information Science
- Digital media infrastructure (ICHIDEN Issa, KATAYAMA Naoko, ANDO Yuichi)
- AI and knowledge (ANNO Yuki, YAMAGUCHI Akira)
- Fundamentals of Media Processing (SATOH Shin'ichi, KODAMA Kenya, MOSHI Hiroshi)
- Multimedia Processing (SUGIYAMA Mahito)

Intelligent Systems Science
- Logic: Foundations of Artificial Intelligence (HOUK Katsunori)
- Reasoning Science (SATOH Ken) / Knowledge Sharing System on a Fair and Open Platform (YOKOMO Hitoshi)
- Human-Agent Interaction (YAMADA Sei) / Cluster Analysis (HOUK Eikichi)
- Machine Learning / Knowledge Discovery (YAMAMOTO Kunihiro)
- Intelligent Robotics (INAHARA Tsutomu)
- Natural Language Processing (REMIKAFU Masaaki)
- Intelligent User Interfaces (YOSHIDA Masayoshi)
- Intelligent Web Systems (YAMANAKA Kumi)
- Communication Environments (BOCY MAO)
- Symbolic Logic and Conceptual Learning (TANAKA Kiyoharu)
- Knowledge Discovery (SUGIYAMA Masayoshi)

Information Environment Science
- ICI-related Business (OKADA Hitoshi) / Information Economics / Record Management / Introduction to Statistical Methods in Bibliometrics (ISA Kyo) / Information Technology

Common Specialized Subjects of the School of Multidisciplinary Sciences

Introduce to Mathematical Logic (TATSUTA Makoto)
- Introduction to Algorithms (UNO Takeaki)
- Quantum Information and Computation (NEDOMO M.)
- High-Performance Computing (AIDA Ken, KOBUCHI Michio)
- TSEIYAKU Akira)
- Information Sharing System Architecture (URUSHIDAI Shigeo, TAKAKURA Hiroshi)
- Knowledge Management (NAKAMURA Takanori)
- Internet and User Interfaces (YOSHIDA Masayoshi)
- Knowledge Discovery (BOCY MAO)
- Symbolic Logic and Conceptual Learning (TANAKA Kiyoharu)

Program, PhD students are called "Doctoral Research Students".

Career path of students after completion of doctoral program

<table>
<thead>
<tr>
<th>Year of completed</th>
<th>University</th>
<th>Company</th>
<th>Underemployed</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY2016</td>
<td>9 (2)</td>
<td>6 (4)</td>
<td>3 (0)</td>
<td>18 (2)</td>
</tr>
<tr>
<td>FY2015</td>
<td>0 (0)</td>
<td>5 (3)</td>
<td>0 (0)</td>
<td>14 (3)</td>
</tr>
<tr>
<td>FY2014</td>
<td>5 (3)</td>
<td>4 (3)</td>
<td>2 (2)</td>
<td>11 (8)</td>
</tr>
</tbody>
</table>

Special Collaboration with Research Students

As an inter-university research institute, the National Institute of Informatics accepts graduate students from other universities in Japan and overseas as research students in special collaborative projects. These students benefit from research guidance using the National Institute of Informatics’s academic information databases and communications infrastructure and from instruction by our staff appropriate to their research subject.

Universities to which research students for special collaboration belong

- Onko University
  - Edo Nohwa College of Economics
- University of Tsukuba
  - Edo College
- The University of Tokyo
  - University of Soft Naito
- Keio University
  - University of Osaka
- Tokyo Institute of Technology
  - Kangh Institute of Technology
- Waseda University
  - National Institute of Applied Sciences of Rosen
- Chiba University
  - National Institute of Applied Sciences
- Tokyo University of Science
  - National University of Science and Technology
- Aalto University
  - National College of Science and Engineering
- KTH (Royal Institute of Technology)
  - Interdisciplinary Graduate School of Science and Engineering
- Ecole Polytechnique
  - Graduate School of Communication
- Ecole Normale Superieure de Cachan
  - Graduate School of Educational Science
- Ecole Normale Superieure Rennes
  - Graduate School of Information Science
- Universite Paris-Est
  - Graduate School of Advanced Science and Engineering
- Universite Paris-Est Marne la Vallee
  - Graduate School of Advanced Science and Technology
- Ecole Normale Superieure ENS Rennes
  - Graduate School of Fundamental Science and Technology
- Ecole Normale Superieure de Cachan
  - Graduate School of Information Systems
- The Hong Kong University of Science and Technology
  - Graduate School of Information Science
- Shanghai Jiao Tong University
  - Graduate School of Information Science
- University of California
  - Graduate School of Information Science
- University of Victoria
  - Graduate School of Information Science

Number of students accepted through both systems of collaboration with graduate schools and research students

<table>
<thead>
<tr>
<th>University</th>
<th>Master’s program</th>
<th>Doctoral program</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>59</td>
<td>46</td>
<td>105</td>
<td></td>
</tr>
</tbody>
</table>

Cooperation with Graduate Schools

The National Institute of Informatics actively cooperates with graduate students at the University of Tokyo, Tokyo Institute of Technology, Waseda University, Japan Advanced Institute of Science and Technology (JAIST), Kyushu Institute of Technology, the University of Electro-Communications, and Tokyo University of Science. We conduct lectures in partnership with these institutions and accept graduate students for research guidance.
Executive:
Masaru Kitsuregawa, Director General
Akiho Aizawa, Deputy Director

Budget:
National Center for Science Information Systems

Advisor Board:
Director Yukio Yanagihashi
Director Niro Kanomata
Head Ikki Ohmukai
Director Hiromi Iwata
Director Masako Suzuki
Director Wataru Ono
Head Sawako Kojin
Director Shunji Abe

Deputy Director:

Professors Emeriti:
Kimio Ohno
Asahito Shikano
Hiroshi Inoue

List of Japanese patents owned:

National Institute for Informatics

List of registered trademark:

Intellectual Property:
Nil creates, acquires, and manages intellectual property, and promotes the use of this intellectual property in industry-academia-government collaborations that contribute to society.

Number of Invention Reports, Applications for Patents, and Registrations (total number since FY2004)

List of Invention Reports:

List of Applications:

List of Registrations:

Advisory Board:

Staff Numbers:

Administrative Council:

Discusses important matters concerning the management and operation of NII. These matters include the selection of candidates for the post of Director General, as well as academic personnel, joint research plans, and matters concerning NII in the mid-term targets and plans of the Research Organization of Information Systems (ROIS).

Advisory Board:

Consists of Japanese and overseas experts who are external to NII and have extensive, advanced knowledge of academic information. The Board responds to inquiries from the Director General regarding issues involving informatics research, the development and establishment of infrastructure for distributing academic information, and so on.

Professors Emeriti:

National Center for Science Information Systems (RASIS)

National Institute of Informatics (NII)
Delivering NII’s Research and Services to the Wider Society

NII holds public lectures and publishes information with the aim of sharing its latest research findings on informatics widely with the general public, researchers, and Ph.D. candidates. Besides “NII Research 100,” a program where ten NII researchers each introduce ten research studies for a total of 100 research presentations at “NII Research 100,” several activities are held annually to introduce its research findings, and society at large and deepening understanding of its services. NII also delivers timely information via digital media such as the NII website, Twitter, and other social media.

Public Lectures

The National Institute of Informatics holds free public lectures from time to time. “The Forefront of Informatics” is a free lecture series that introduces researchers at the National Institute of Informatics and explains various subjects at the forefront of informatics-related fields to the general public. There are generally six lectures per year held at the National Center of Sciences (Hibarigaoka, Chiyoda Ward, Tokyo). Images, materials, and Q&As from past lectures are available on the Institute’s website.

Exhibitions

NII participates in various exhibitions to introduce its research findings, operations, and services. In FY2016, NII had exhibits at CEATEC JAPAN 2016. It also made its debut exhibition at the international telecommunication operations, and services. In FY2016, NII had exhibitions at CEATEC JAPAN 2016. It also made its debut exhibition at the international telecom-

Publications

- **NII Series**
  - A new commercially available publication (Maruzen Library) that introduces and explains the contents of NII’s research to the general public in an easy-to-understand way using familiar topics. The newest edition, Infrastructure That Reflect the Timing: The Network and the Future, was released in October 2016.

- **Public Information magazines**
  - NII Today (Japanese/English)
  - Catalog of NII’s National Institute of Informatics (Japanese/English)
  - Report of Annual Activities of NII
  - NII SEEDs
  - Getting to Know NII with Dog ‘B-chan’

Digital Media

- **NII website**
  - Visit the NII website for details about events and publications.

- **NII YouTube Channel**
  - Watch videos of NII lectures and research presentations.

- **Email newsletter**
  - Register to receive the NII newsletter.

- **Twitter**
  - Official NII account (@jyouhouken)

- **Facebook**
  - Like us on Facebook.

Introducing Social Cyber-Physical Society (SCPS) with main representative speeches “Let’s Visit!” at CEATEC JAPAN 2016 (October 2016 at Makuhari Messe, conventional hall)

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**Notes**:
- “Kazu’s Journal” is a routine column for preserving nautical exercises of informatics, introduced at CeBIT 2017 (March 2017)

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The National Center of Sciences was established as a center for research in fields such as informatics, academic exchange, dissemination of scientific information, and social collaboration, with the aim of improving and strengthening Japan’s academic research infrastructure. Construction was completed in December 1999. The high-rise wing consists primarily of three organizations: NII, Hitotsubashi University Graduate School of International Corporate Strategy, and the National Institute for Special Needs Education. The Center aims to provide an advanced base for interdisciplinary creativity through comprehensive application of the academic functions of each institute. Conference facilities such as Hitotsubashi Hall are located in the low-rise wing, and these accommodate activities such as international conferences, lectures, and academic meetings organized by national university corporations and other institutions.

The National Center of Sciences Bldg.
2-1-2 Hitotsubashi, Chiyoda-ward, Tokyo 101-8430
Tel: +81-3-4212-2000 (exchange)

High-rise wing Emergency helipad

National Institute of Informatics
National Institute for Special Needs Education
National Institute for School Teachers and Staff Development

Site area: 6,842 m² (occupied by NII: 3,036 m²)
Floor space: 1,782 m²

Chiba Annex is a building that houses the computer systems and networking equipment used to operate academic information systems and provide academic information services. It was built in November 1994.

Chiba Annex
1-8 Yayoi-cho, Image-ward, Chiba-shi, Chiba 263-0022
Tel: +81-43-285-4911 (exchange)

Chiba Annex

Exterior of Chiba Annex

International Seminar House for Advanced Studies (Karuizawa, Nagano Prefecture)

Exterior of Seminar House

The International Seminar House for Advanced Studies (Inose Lodge) was built on land donated by Dr. Hiroshi Inose, the first director general of NII. His idea was to create an ideal place for interdisciplinary and international discussions.

Uses
1) Domestic and international academic conferences, seminars, etc.
2) Public lectures, social gatherings, etc.
3) Research and training of NII researchers and staff.
<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>May 1976</td>
<td>Research Center for Library and Information Science (RLIS) is established at the University of Tokyo.</td>
</tr>
<tr>
<td>April 1983</td>
<td>The Center for Bibliographic Information is established at the University of Tokyo, with the reorganization of the Research Center for Library and Information Science.</td>
</tr>
<tr>
<td>December 1984</td>
<td>The NACSIS-CAT catalog information service is launched.</td>
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<tr>
<td>April 1986</td>
<td>The National Center for Science Information Systems (NACSIS) is established, with the reorganization of the Center for Bibliographic Information, University of Tokyo.</td>
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<tr>
<td>April 1987</td>
<td>The Science Information Network (SINET) is launched.</td>
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<tr>
<td>April 1989</td>
<td>The NACSIS-IR information search service is launched.</td>
</tr>
<tr>
<td>January 1990</td>
<td>Research Center for Library and Information Science (RCLIS) is established at the University of Tokyo.</td>
</tr>
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<td>April 1992</td>
<td>The Center for Bibliographic Information is established at the University of Tokyo, with the reorganization of the Research Center for Library and Information Science.</td>
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<td>April 1993</td>
<td>The NACSIS-CAT catalog information service is launched.</td>
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<tr>
<td>April 1994</td>
<td>The Net Library (NetLib) System is launched.</td>
</tr>
<tr>
<td>April 1995</td>
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</tr>
<tr>
<td>April 1996</td>
<td>The NACSIS-IR information search service is launched.</td>
</tr>
<tr>
<td>March 1997</td>
<td>International connection between SINET and US (National Science Foundation: NSF) is established.</td>
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<tr>
<td>January 1998</td>
<td>International connection between SINET and the UK (British Library: BL) is established.</td>
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<tr>
<td>April 1999</td>
<td>The Inter-Library Loan (ILL) System is launched.</td>
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<tr>
<td>April 2000</td>
<td>The Internet backbone (SINET) is launched.</td>
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<tr>
<td>March 2001</td>
<td>Start of mutual access to databases through gateways with the Japan Information Center of Science and Technology (JICST).</td>
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<tr>
<td>April 2002</td>
<td>Start of ILL service with the British Library Document Supply Centre (BLDSC).</td>
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<tr>
<td>November 2003</td>
<td>Start of ILL service with the National Diet Library.</td>
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<tr>
<td>December 2004</td>
<td>Start of ILL service with the National Diet Library.</td>
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<tr>
<td>March 2005</td>
<td>Start of ILL service with the National Diet Library.</td>
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<tr>
<td>April 2006</td>
<td>Start of ILL service with the National Diet Library.</td>
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<tr>
<td>July 2007</td>
<td>Electronic Library Service is launched.</td>
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<tr>
<td>January 2008</td>
<td>Start of ILL service with the National Diet Library.</td>
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<tr>
<td>March 2009</td>
<td>Start of ILL service with the National Diet Library.</td>
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<tr>
<td>April 2010</td>
<td>Start of ILL service with the National Diet Library.</td>
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<tr>
<td>July 2011</td>
<td>Start of ILL service with the National Diet Library.</td>
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<tr>
<td>August 2012</td>
<td>Start of ILL service with the National Diet Library.</td>
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<tr>
<td>September 2013</td>
<td>Start of ILL service with the National Diet Library.</td>
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<tr>
<td>October 2014</td>
<td>Start of ILL service with the National Diet Library.</td>
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<tr>
<td>November 2015</td>
<td>Start of ILL service with the National Diet Library.</td>
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