THE UNIVERSITY OF TOKYO

2021–2022

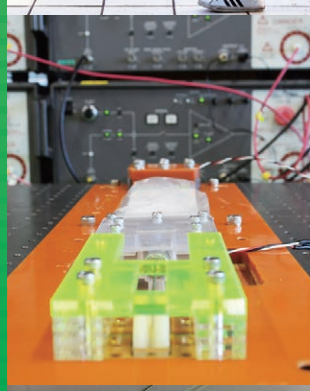
Department of
Human and Engineered Environmental Studies

Graduate School of Frontier Sciences
The University of Tokyo

https://www.h.k.u-tokyo.ac.jp/index_e.html








New Horizon for Bright Future

— Department of Human and Engineered Environmental Studies, envisioning the future beyond the horizon.

Responding to a super-aged nation and achieving a low-carbon society are tasks imposed on Japan today. Japan now faces various complicated and intertwined problems that are difficult to solve through conventional academic frameworks alone.
The Department of Human and Engineered Environmental Studies is working on R&D and system designs for elemental technologies that can help solve the problems related to people and the environment.

INDEX

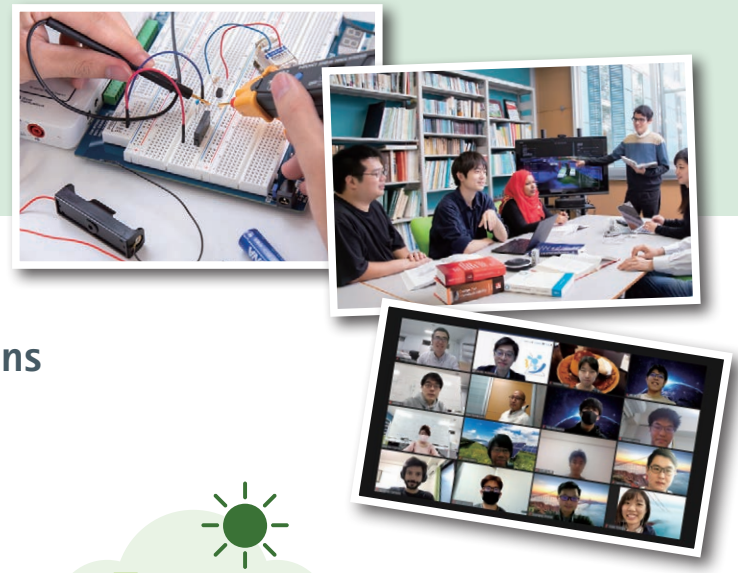
Following the rapid changes in the world, our department focuses on "human beings" and the "environment" surrounding us, and aims to "realize a fruitful life where people and the environment are in harmony." To achieve this purpose, just concentrating on a single discipline is not good enough, and it is essential to introduce the "interdisciplinary education and research" advocated by the Graduate School of Frontier Sciences. In our department, each laboratory's activity is based on elemental technologies such as energy engineering, system engineering, sports science, mechatronics, sensing, information communication and computational engineering. By applying and developing your own strengths in these academic fields, it becomes possible to collaborate with researchers in different fields.

Our campus, Kashiwa campus is filled with opportunities to exchange original ideas from different research fields, together with various research centers, and support facilities being operated by Graduate School of Frontier Sciences. In addition, we have many projects that involve regional cooperation, international cooperation and social demonstration experiment, where you can try to examine your research outputs by using these project.

Now, the strict definition of "human environmental studies" has not been established and I hope to find new solutions together with you in our department. Let's make a new era which is shaped out by our department.

Takeshi MORITA
Head of the Department
Department of Human and Engineered Environmental Studies
Graduate School of Frontier Sciences

Curriculum



Various lectures lead to innovation. The fusion of different disciplines opens the door to the future.

In the Department of Human and Engineered Environmental Studies, we aim to cultivate people who have immense knowledge about human beings and artifacts and to solve various problems in the community by looking at them from the perspective of the environment.
Our curriculum include lectures on energy engineering, system engineering, sports science, mechatronics, sensing, computer science, simulation, etc., which are based on elemental technology and basic theories.
These lectures can be combined in a comprehensive way.

Lecture list

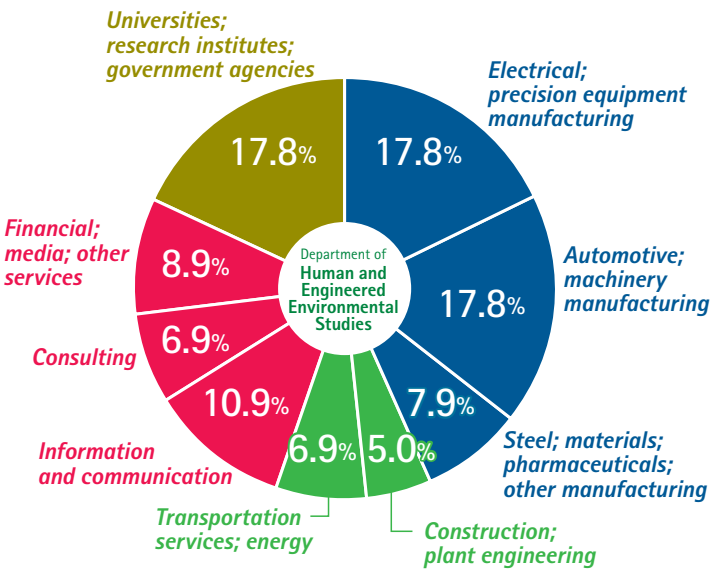
Advanced Lectures on Environmental Energy Systems
Special Lecture on Environmental Information Equipment
Optimal System Design
Mechatronics for Environmental Studies
Special Lectures on Human and Engineered Environments I and II
International Systems Design Workshop
Theory of Elastic Vibration
Knowledge Information Processing
Wearable Sensing for Human and Environmental Information
Environmental Simulation I and II
Assistive Technology
Environment Monitoring Devices
Mechanical and Electrical Design of Flexible Devices

Nanoprocessing and Nanometrology
Advanced Course of Mobility Engineering
Special Lecture on Human Factors
Special Lectures on Human and Engineered Environmental Studies
Proactive Research Commons
Proactive Environmental Studies II
Human and Engineered Environmental Studies (Basic I, Basic II A, Basic II B and Advanced)
Exercises in Human Environmental Design

Career path after graduation

Many of our graduates now have leading positions in major companies and research institutes in Japan.

Employment record by type of industry



Annually, about 50 students complete a master's course and about 10 complete a doctoral course. About 20% of master's course graduates advance to a doctoral course, while others find employment with institutions and companies in a wide range of industries.

Electrical; precision equipment manufacturing	Sony, Hitachi, Toshiba, Mitsubishi Electric, Olympus, Fujitsu, FANUC Yaskawa Electric, Panasonic, Huawei, Canon, etc.
Automotive; machinery manufacturing	Toyota Motor, Denso, Honda R&D, Suzuki, NTN, Mitsubishi Heavy Industries, Daikin Industries, IHI, Yamazaki Mazak, Hitachi-Johnson Controls Air Conditioning, etc.
Steel; materials; pharmaceuticals; other manufacturing	JFE Steel, Nippon Steel, Toray Industries, KOSE, TOTO, Rengo, Hirohama, Sumitomo Electric Industries, Canon Medical Systems, etc.
Construction; plant engineering	Obayashi, JGC Japan, Chiyoda, INPEX, Komatsu, Mitsubishi Chemical, etc.
Transportation services; energy	JR Central, JR Freight, JAL, Central Research Institute of Electric Power Industry, Kyushu Electric Power, Tohoku Electric Power, Chugoku Electric Power, J-POWER, etc.
Information and communication	NTT, NTT Data, NTT Facilities, Softbank, Yahoo Japan, IBM Japan, KDDI, DeNA, etc.
Consulting	Nomura Research Institute, Mizuho Information & Research Institute , Accenture, Simplex Inc., KPMG Consulting, Simon Kucher & Partner, Roland Berger, Pactera Consulting Japan, etc.
Financial; media; other services	Nippon Life Insurance, Mizuho Bank, Morgan Stanley MUFG Securities, Daiwa Securities, NHK, Asahi Shimbun, Recruit Holdings, Konami Amusement, etc.
Universities; research institutes; government agencies	University of Tokyo, Osaka University, National Institute of Advanced Industrial Science and Technology, Ministry of Economy, Trade and Industry, Acquisition, Technology & Logistics Agency, Japan Ground Self-Defense Force, Department of Industrial Promotion, The Ministry of Industry (Government of Thailand), etc.

Examples of employment opportunities in recent years ▲

Messages from graduates

"Studying in the Department of Human and Engineering Environmental Studies will be a sound basis for your future."

Lui YOSHIDA

Associate Professor,
School of Engineering and Center for Research and Development of Higher Education, The University of Tokyo

2010: Graduated from Systems Innovation, Faculty of Engineering
2012: Master's degree in the Department of Human and Engineered Environmental Studies
2015: Doctoral degree in the Department of Human and Engineered Environmental Studies

I am engaged in various activities and research in educational technology, with a strong desire to improve education. I am particularly interested in online education and active learning. I am developing online educational tools and programs, and supporting teachers in their desire to improve their courses. Online education has gained much attention due to the COVID-19 pandemic, so I am busy with a lot of work. My daily life is fulfilling, since I am carrying out work that I enjoy.

I researched biomedical engineering in the Department of Human and Engineered Environmental Studies, which is seemingly unrelated to educational technology. But I believe I gained useful skills, even though I am working in new fields with my research activities in the department. These include developing creative and logical thinking skills, such as "What is the originality of my research, taking into account previous research?" and "What kind of logic is necessary to assert the originality?" and the flexibility and tenacity to try again even after making a mistake.

Studying in the Department of Human and Engineered Environmental Studies will be a sound basis for your future. I hope that all students will enjoy immersing themselves in their research!

"During my studies, I grew tremendously and gained great opportunities for exchange studies in France as a researcher."

Jingyu SUN

Researcher,
NTT Network Innovation Laboratories

2008: Graduated from Beihang University
2013: Master's degree in the Department of Human and Engineered Environmental Studies
2014: Studied at Univeristé Jean Monnet
2016: Doctoral degree in the Department of Human and Engineered Environmental Studies

I am working on IoT-related research at NTT Network Innovation Laboratories. I am encouraged every day by the aim to value information through new sensing technologies, AI, and big data processing.

As a graduate student, I measured and evaluated large, complex 3-D shapes for the manufacturing industry and evaluated processing methods. For shipbuilding companies, I helped to develop an evaluation method for 3-D curved outer plates using 3-D measurement equipment, as well as a generation system for curved outer plates using 3-D shape evaluation for wood-type jigs. In addition, I had the opportunity to study in France for six months as a researcher.

If you plan to go on to graduate school, the experiences you gain during those few years of study will be extremely important for your future career. Please become immersed in research activities and recognize opportunities for growth.

We aim to accumulate and evaluate social experiments and show our solutions to society.

Case 1 ● Innovative technologies for human support systems

Development of a walking assistive system

Human Support Device Laboratory
Takeshi MORITA, Professor

Figure 1)
Walking assistive device with ambientness

Research conducted at the university should focus on innovative technologies that are based on original ideas. That said, such research should not concentrate on highly complex research useful to only a few people, but should be fundamental technologies that change our ways of thinking and that will one day be in school textbooks.

The Department of Human and Engineered Environmental Studies aims not only to pursue pure science, but also to develop technologies that are human friendly and contribute to society. As one example, our laboratory is developing a walking assistive system for elderly people (Figure 1). Differently from conventional walking assistive systems for fall prevention and rehabilitation, our system aims to support elderly people in maintaining their physical condition (frailty prevention). The concept is that people can wear this system daily, without discomfort, so that they can walk with a light step using their own muscle power for as much of their lives as possible.

We cannot achieve our research goals simply by purchasing and assembling commercially available motors, sensors, and batteries. Instead, we need to build an innovative walking assistive system by developing the requisite elemental technologies (Figure 2).

One technology we are developing is an ultrasonic motor (USM). While a conventional electromagnetic motor uses magnetic force, an USM utilizes frictional drive obtained from piezoelectric vibration. Based on this driving principle, the advantages of a USM are its considerable torque, light weight, and small dimensions. To realize a walking assistive system that can be worn in daily life, a light, compact, and high-torque USM has great potential as a key element. This is because it enables the system to be operated without the user being aware they are wearing it. As a research topic, we are developing a USM with a high-efficiency drive mechanism by adding a controllable preload as shown in Figure 3. Another research goal is the development of a phase difference controlling method for the USM's torque adjustment that will power the system by following the user's movements.

For walking assistive systems, it is important to develop not only motors but also a sensing system that detects walking conditions. Similar to the motor, this sensing system must be compact, light, and comfortable to wear. Our walking assistive system is shaped to be attached to users mainly from the waist to the knees. Therefore, it would not be convenient for the users if the sensors were located in a position such as on their shoe tips, separately from the driving motor unit. From this consideration, we propose estimating the toe trajectory while walking by using the output signal of gyro sensors mounted near the thighs. To obtain this trajectory, machine learning methods are utilized. By taking into account that the walking motion is periodic, the sensor output signal is transformed from the time domain to the frequency domain by a Fourier series, and the frequency domain data is applied as machine learning input data for effective estimation (Figure 4).

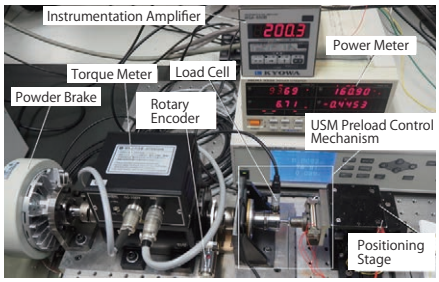


Figure 3 Experiment device of preload controlled ultrasonic motor

Once we complete our walking assistive system, we will be able to utilize this system for various studies. For example, it can clarify how muscle activities are supported by the walking assistive system by analyzing signals from a myoelectric sensor attached to the user. Using this research output, it can easily be known to what degree fatigue can be reduced by the support system. From these studies, longer walking distances and longer walking times are likely to be provided to elderly people. Also, we would like to conduct a study to gain a fundamental understanding concerning safe and stable walking to prevent falling, by observing the changes in walking condition caused by the support provided by our walking assistive system.

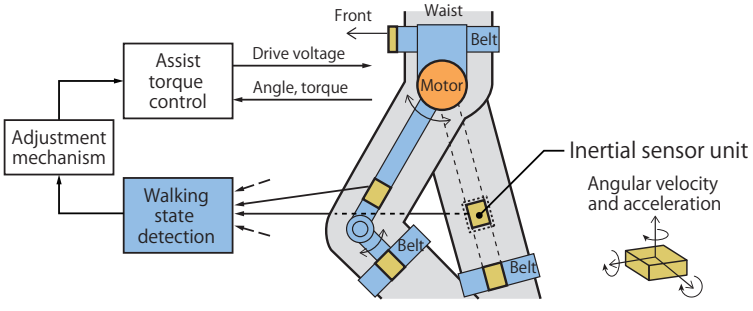


Figure 2) Control method for walking assistance using ultrasonic motor (USM)

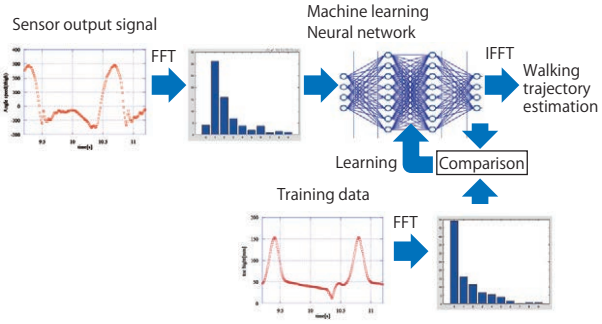


Figure 4) Toe trajectory estimation using system control and machine learning

Case 2 ● Environmental information device leading to Society 5.0

Developing a new learning system close to human emotions by eye-gaze measurement and facial expressions Heartfelt education for both learning and teaching

Innovative Learning Creation Studies
Kayoko KURITA, Project Professor / Satori HACHISUKA, Project Lecturer

About 30 years have passed since the Lifelong Learning Promotion Act was enacted and the terms "lifelong learning" and "lifelong education" began to be widely used. In general, places where people can continue to study while working or after retirement are being provided in many locations, mainly by local governments and private companies, in addition to the primary and secondary education that starts at elementary school, and higher education at universities. Online learning environments using information and communication technology (ICT) have also been developed in recent years. Nowadays, learning "at any time, anywhere, and by anyone" is becoming possible.

In this way, "learning" has become familiar to a wide range of generations and in diverse environments where both learning and teaching are undertaken. There are many forms of teaching, such as books, the internet, and artificial intelligence (AI). In addition, there are people behind those things (the people who wrote the books, who created the internet materials, and on whom AI knowledge is based). This project focuses on both learning and teaching, and aims to clarify the essence of learning and education by understanding not only the superficial know-how, but also the underlying status (emotions) of humans.

This project concentrates on eye-gaze measurement and facial expressions as a way to understand a person's status. Eye-gaze measurementreveals "where, how much, and how" we are looking (Figure 1, Figure 2). If we think about this in the context of learning, we can see how people who are good at learning run their gaze point along a written question, where they focus their attention to understand the question, and how they arrive at the answer. Also, we can understand the learner's emotional and thinking state as they move their gaze point, such as when they have trouble understanding the content, or getting the answer right but not understanding some essential part of it. For teachres' part, a teacher in the classroom can effectively turn the eyes upon learners to accurately grasp the mental state of them, and to improve their motivation and concentration.

Figure 1) Eye-gaze measurement

Figure 2) Heat map for gaze point

Taro had five apples.
He gave two to Hanako.
How many apples does Taro have now?

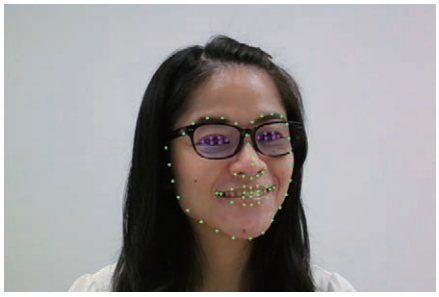


Figure 3) Facial expression features

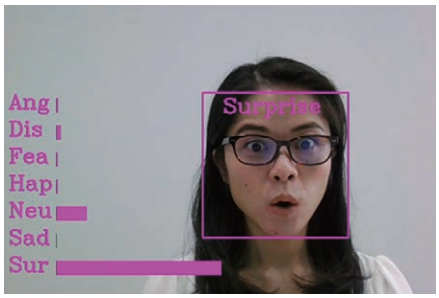


Figure 4) Measurement of emotion from facial expressions

Figure 5) Examination of new teaching method

Sensing facial expressions enables us to understand the mental status of people even more directly than by the gaze point. It is now possible to understand a person's state of emotion or sleepiness by analyzing their facial images and the movement of feature points (Figure 3) on the face (Figure 4). However, unique facial expressions and human states are assumed in a learning environment, and the sensing of these elements requires the extraction of new facial expression features and the building of a database. We are seeking to develop a new teaching method to improve learning by making productive use of the teacher's facial expressions and the learner's mental state (Figure 5).

We would like to establish innovative learning and teaching methods by integrating engineering and pedagogy effectively, and contribute to solving problems such as the use of non-verbal communication, which is considered difficult in today's online learning environment.

LABORATORY INTRODUCTION

The laboratories of the Department of Human and Engineered Environmental Studies are accepting visits and questions. If you are interested in the details of individual research content, please refer to the laboratory home page and feel free to contact faculty members.

Industrial Information Systems and Environment

Kazuo HIEKATA
Associate Professor

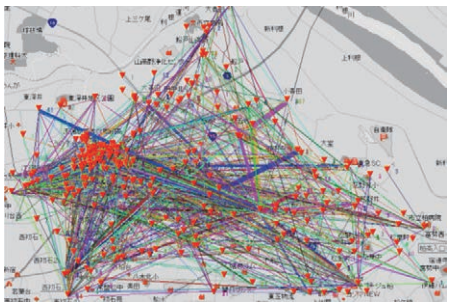
Born in Kanagawa in 1974. Obtained PhD from the Graduate School of Engineering, the University of Tokyo. Professional interests include design engineering and information systems. He supports the use of advanced information technologies in the industrial field. He aims to build a systems design methodology to re-frame complex systems such as the industrial environment and social systems using information technologies.

Transformation of Industry and Society.

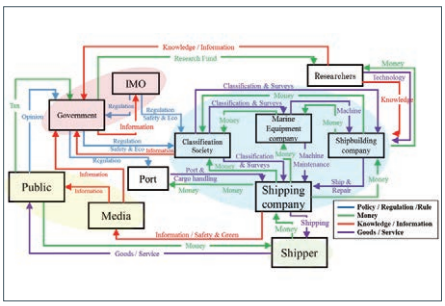
Presently, industries and society work as a complex and large-scale system of systems, which is composed of a combination of various artificial systems. To quickly solve problems in industries and society, it requires the introduction of excellent technologies used in different fields that can deal with changes in external environments, and even a revolution in organizations and processes. Against this background, in our research field of industrial information systems and environment we are working on such subjects as: the establishment of a methodology to describe the purpose, functions, behaviors, and interests of a system, and the relationship between subsystems; the development of a model to simulate behaviors of large-scale and complex systems in society and industries; and the establishment of a teamwork environment to support deep communications and collaborations between experts in different fields.

Specifically, to create unconventional industries, we are examining maritime industries such as shipbuilding and marine logistics, information system industries, and public transportation in an aging society.

website *https://is.edu.k.u-tokyo.ac.jp/*



On-demand bus in the demonstration experiment at Kashiwa



Stakeholder Analysis for System Re-Framing of Marine Industry

Human Support Device

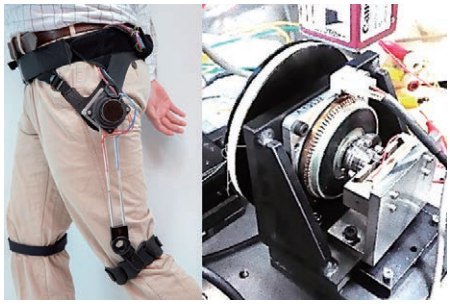
Takeshi MORITA
Professor

Born in Saitama in 1970. Obtained PhD from the Graduate School of Engineering, the University of Tokyo. Professional interest is in applied ferroelectric devices. It can be quite difficult to seriously enjoy your studies; let's do our best to enjoy a fulfilling student life together.

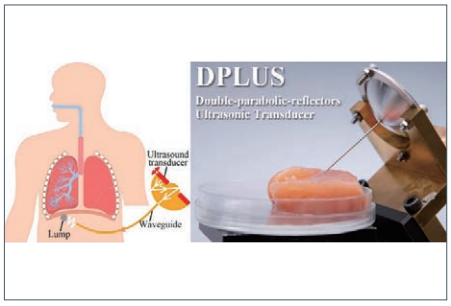
Innovative devices based on original ideas

To realize a sustainable society in which everyone can enjoy a healthy, safe, and secure life, human support device laboratory is trying to contribute a super-aging society. In particular, we research on human related systems, such as a walking support system, a nursing robot, and an internal body monitoring endoscope, mainly for elderly people. For developing these systems, just combining conventional technologies is insufficient; instead, revolutionary researches on elemental devices for actuators and sensors are essential, which are based on the original and new ideas. That is to say, fundamental researches are indispensable, including materials engineering, mechanical engineering, electrical engineering and control engineering. Moreover, in addition to these elemental technologies and systemization, it is important to examine the cooperative relationship between developed systems and humans, and to confirm the effective operation to the human behaviors. From these points, the cross-cutting researches such as human interfaces and biological monitoring are also included in our research topics.

website *http://www.hsd.k.u-tokyo.ac.jp/contents/english/*

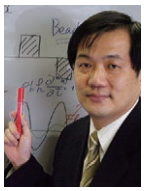


Walking assistance system and new-concept actuator



Next-generation medical device using strong ultrasound

Environmental Information and Microsystems



Hiroshi HOSAKA

Professor

Born in Tokyo in 1956. Obtained PhD from the Graduate School of Engineering, the University of Tokyo. Professional interests include machine dynamics and sensor networks. Futuristic machines can collect surrounding information and adapt themselves to people and the environment. I use dynamics, statistics, and algorithms to achieve this.

Ken SASAKI

Professor

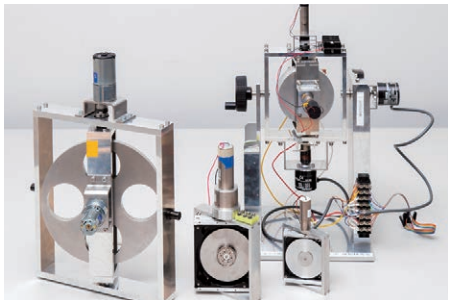
Born in Kanagawa in 1957. Obtained PhD from the Graduate School of Engineering, the University of Tokyo. Professional interests include mechatronics and signal processing. Technology is a knowledge system for the survival and prosperity of mankind. I value popular sentiments and playfulness as well as intellectually inquiring minds.

Mechatronics and dynamics for information sensing

We promote the construction of environmental information networks using ubiquitous information equipment based on information communication, sensing, and mechatronics as foundation technologies. We aim to miniaturize devices as much as possible and diversify input information, making devices wearable on humans and artifacts. A terminal consists of a sensor, an energy source, a CPU, and a wireless device. It has the minimum function of capturing information from the natural world into the network.

Students in this laboratory acquire basic knowledge (e.g., dynamics, mechatronics, biometric measurement, and information processing) and work in the following research areas: 1) Wireless personal area network using the human body as a signal transmission path, 2) Micro-power generation in which minute vibrations of a human body or a natural object are converted to electrical energy, 3) Remote control system on which tactile information is superimposed, 4) Recognition of environmental sound (other than human voices), and 5) Location finding that uses mobile communication network and position data mining.

website *http://www.ems.k.u-tokyo.ac.jp/e/*



Gyroscopic power generator

Wearable devices utilizing human body communication technology

Simulation of Complex Environmental Systems

Hiroshi OKUDA

Professor

Born in Fukui in 1962. Obtained PhD from the Department of Nuclear Engineering, Graduate School of Engineering, the University of Tokyo. Why not create an "artifacts simulator" to quantify the value of artifacts in the relations among people, society, and the environment? We welcome students who can accurately record ideas and research processes, and be optimistic.

Yu CHEN

Professor

Born in Shanghai, China, in 1967. Graduated from the Department of Power Machinery, Shanghai Jiao Tong University. Obtained PhD from the Department of Quantum Engineering and Systems Science, Graduate School of Engineering, the University of Tokyo. My specialty is the modeling and simulation of complex systems. Let's enjoy doing computational studies on physical, biological and socio-economic systems together!

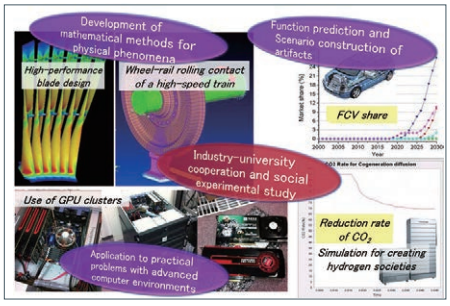
The Multi-Scenario Simulator and Simulation Complex Systems.

Employing frontier computational science and advanced IT technology, we are doing researches on complex systems related to human beings and environments.

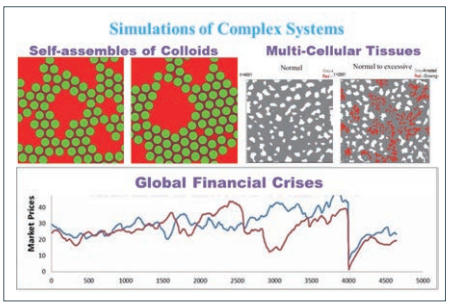
The *Multiscenario Simulation (MS) Laboratory* aims to develop a simulator that can modify and reconstruct the functions of artifacts and introduction-evaluation scenarios. We are conducting research in the following areas to create Green Innovation by performing real simulations on supercomputers: 1) designing an environmental agent for construction of a low-carbon society, 2) developing a parallel finite element analysis system, "FrontISTR," with industrial applications, 3) developing a mathematical method for multiphysics problems, and 4) developing HPC infrastructure for next generation exascale computer systems.

In the *Simulation of Complex System (CS) Laboratory* we are conducting research to construct discrete micromodels and to perform simulations of complex systems. We set three research directions as typical studies on complex systems: 1) analyzing financial markets using multi-agent cooperative evolution games, 2) simulating complex fluids using a model based on the discrete kinetic theory, and 3) cell-based modeling and simulation of aging and cancer genesis.

website *http://www.multi.k.u-tokyo.ac.jp/indexen.php, http://www.scslab.k.u-tokyo.ac.jp/indexE.html*



Multiscenario simulator developed in the *MS laboratory*



Complex system simulation performed in the *CS laboratory*

Human Augmentation

Masaaki MOCHIMARU

Visiting Professor

Born in Kanagawa in 1964. Obtained PhD from the Graduate School at Keio University. Currently, Director of the Human Augmentation Research Center at the AIST. My specialties are ergonomics, biomechanics, and service engineering. I have been conducting research on the measurement of human body and motion, to reproduce them digitally, and to utilize them to manufacturing and services. I will next conduct research on *human augmentation* based on these technologies.

Yoshio MATSUMOTO

Visiting Professor

Born in Saitama in 1970. Obtained PhD from the Graduate School of Engineering, the University of Tokyo. Worked at the Australian National University, Nara Institute of Science and Technology, and Osaka University. Currently, Research Team Leader in the Human Augmentation Research Center at the AIST. I have been conducting research on assistive robotics, social robotics, and robot vision. My research aims to expand life functions through robot technologies.

Akihiko MURAI

Visiting Associate Professor

Born in Nara in 1980. Obtained PhD from the Graduate School of Information Science and Technology, the University of Tokyo. Currently, Senior Research Scientist of the Human Augmentation Research Center at the AIST. My specialties are robotics and biomechanics. I am conducting research to understand the mechanisms of human motion generation and control, and to expand human motor ability and sensibility based on kinetics and cognitive interventions.

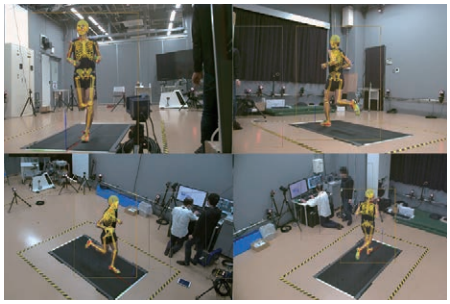
Research on systems to be attached to human, in order to enhance and empower human functions.

In this research field, we conduct development and research on systems that enhance human physical functions by approaching not only people whose functions have deteriorated due to aging and disorder, but also people who are living normally. We think that people can be more active after they feel that their body function is enhanced. Through this research, we aim for improved healthcare and nursing care services, and improved opportunities for working.

Systems enhancing human are composed of wearable sensors, robots, VR devices. For realizing systems that augment human functions, it is also important to conduct basic research to deeply understand human sensation, dynamics and psychological functions, and to represent them with a human model. We will undertake both basic researches to understand humans and to develop application system in order to realize human augmentation. The laboratory is located in the AIST Kashiwa Center in Kashiwa II Campus, and there will be collaborations with AIST researchers on sensors, robots, psychology, service engineering, and design. We place emphasis on the implementation of technologies, and we proceed with research based on projects collaborating with companies.

website *https://unit.aist.go.jp/harc/en/*

Sensing and enhancing human life functions by robotic devices for elderly care.



Motion Measurement by Markerless Mocap and Motor Skill Augmentation by Kinodynamic Intervention

Human and Environment Informatics

Shin'ichi WARISAWA

Professor

Born in Hiroshima in 1966. Obtained PhD from the Graduate School of Engineering, the University of Tokyo. Professional interests include nanomechanics, nano-microprocessing, production systems, medical support systems, and production culture. I believe the desire to make people happy leads to research that can contribute to society.

Rui FUKUI

Associate Professor

Born in Tokyo in 1979. Obtained PhD from the Graduate School of Information Science and Technology, the University of Tokyo. Professional interests include robotics and intelligent sensing systems. I hope to share a feeling of accomplishment for creating new things with students.

Reo KOMETANI

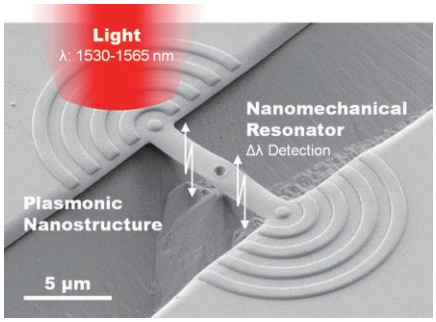
Associate Professor

Born in Hyogo in 1981. Obtained PhD from the Graduate School of Material Science, University of Hyogo. Professional interests include charged particle beam engineering, nano/micro processing, nano measurement, nanomechanics, and NEMS (Nano electro mechanical systems). I care about having "fun!" and I would like to create new technologies that will enrich people's lives and society.

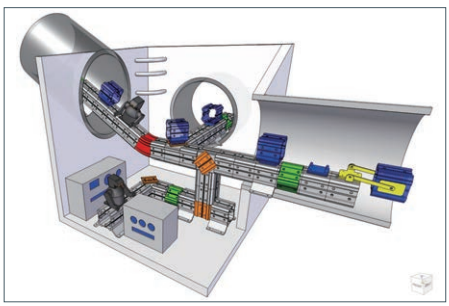
Make human society comfortable, safe and secure by sensing and robot technologies.

It is important to combine sensing, information/communication, robot, and virtual reality (VR) technologies for innovations in living and production environments. We will present the ideal form of an innovative sensor-based information network system and an ideal environment embedded with robot and VR technologies, and we will contribute to the realization of a safe, secure, and comfortable living environment/production site. For this purpose, we are developing nano/microsensing devices with new detection principles that can be incorporated into mobile information terminals and wearable devices. We are also developing environmentally distributed robot systems and VR technologies using multi-modal interactions that observe people and the environment using new sensing technologies. We will also deploy our technologies into human living spaces and production sites, conducting research to acquire and analyze real environmental and human-activity data and to induce humans to more safe and comfortable status eventually.

website *http://www.lhei.k.u-tokyo.ac.jp/*

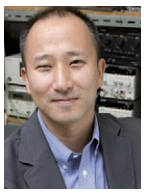


NEMS wavelength sensing device



Distributed robot system for hazardous environments

Ambient Mechatronics



Akio YAMAMOTO

Professor

Born in Tokyo in 1972. Obtained PhD from the Department of Precision Engineering, Graduate School of Engineering, the University of Tokyo. Professional interests include mechatronics and human-computer interaction, such as actuators, sensors, and haptics. I am particularly interested in designing unique machines and motions by unveiling hidden actuating principles.

Shunsuke YOSHIMOTO

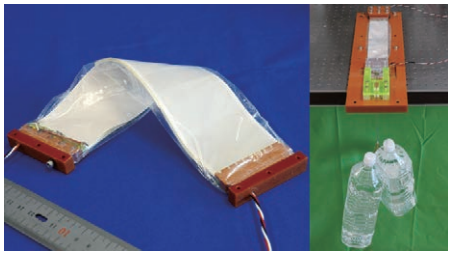
Lecturer

Born in Hyogo in 1986. Obtained PhD from the Graduate School of Engineering Science, Osaka University. Professional interests include biomedical engineering, mechatronics, and electrical sensing. Let's study together to acquire intelligence and skills and to understand the essence of things.

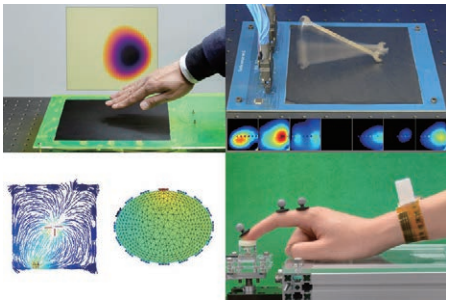
To create innovative human-environment interaction technologies.

Our laboratory in Ambient Mechatronics field is working on new mechatronic technologies and their applications in robotics, interactions, and human support. Specifically, we are developing innovative actuators and sensors, and investigating characteristics of human-environment interaction for developing novel mechatronic environments. Some of our current projects include novel ultra-thin actuators for robotics and interactions, ubiquitous sensors for imaging human body motions and interactions by using electromagnetic control and inverse analysis, smart mechanisms driven by environmental energy, and high-fidelity haptic displays based on human perception.

website *http://www.aml.t.u-tokyo.ac.jp/index_e.html*



Flexible and high power electrostatic film actuator



Various imaging technologies by electromagnetic tomography

Innovative Learning Creation Studies

Kayoko KURITA

Project Professor

Born in Mie, Japan, in 1970. Received the B.S., M.S. and Ph.D. degrees, in Education from the University of Tokyo, in 1993, 1995, 2002, respectively. After working as a visiting scholar at Carnegie Mellon University, National Institution for Academic Degree and University Evaluation, and Center for Research and Development of Higher Education at the University of Tokyo, joined to the current concurrent position. My research themes are quality assurance of higher education, especially educational development. Interested in the development and evaluation of programs of educational development for professors and graduate students. Aiming to contribute to the improvement of the quality of education by exploring the methodology to foster the people who teach.

Satori HACHISUKA

Project Lecturer

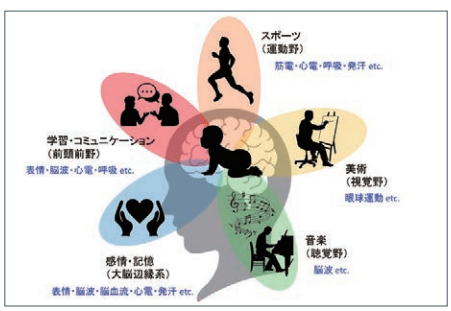
Born in Kanagawa, Japan, in 1979. Received the B.S. degree in Environment and Information Studies from Keio University in 2002, and the M.S. and Ph.D. degrees in Human and Engineered Environmental Studies from The University of Tokyo in 2004 and 2007, respectively. Worked for DENSO CORPORATION from 2007 to 2018. In 2019, joined The University of Tokyo as an Assistant Professor. Research interests are the areas of ergonomics (human factors) and human interface. Aiming to realize a safe, secure, comfortable and inclusive society by clarifying the mechanism of "Learning" from human characteristics.

Realizing an inclusive society by clarifying the mechanism of "Learning".

In this course, we will create an innovative "Learning" aiming to realize an inclusive society where everyone can play active roles in the super smart society (Society 5.0). We will also establish a methodology for developing diverse human resources and explore sharing methods with novel evaluation axes by clarifying the mechanism of human "Learning". Specifically, we will systematize methods for sensing human physiological and psychological condition, effective feedback methods for learning, and multiple evaluation methods by focusing on human "Learning".

Our research areas are based on knowledge of ergonomics (human factors), pedagogics, human interface, and technologies of signal processing, AI, XR and more. Our goal is to combine those knowledge and technologies to develop human-centered learning system. In addition, this course features efficient and speedy research suitable for real world by cooperation with Nagase Brothers Inc.

website *http://www.ilcs.k.u-tokyo.ac.jp/index_e.html*



Clarifying the mechanism of a human "Learning"

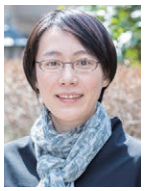
Research for learning place and opportunity creation

Assistive Technology

Motoki SHINO

Associate Professor

Born in Wakayama in 1974. Obtained PhD from the Graduate School of Engineering, Tokyo University of Agriculture and Technology. Professional interests include mechanical dynamics and assistive technology through understanding human adaptability and robotics. I am conducting research on advanced interfaces based on human functions, capabilities, and sensibilities, along with the elucidation of error-generation factors in human interactive scenes. I aim to establish machine designs and technologies that enable comfortable living, safety, and mobility.



Misato NIHEI

Assistant Professor

Born in Miyagi. Obtained PhD from the Graduate School of Advanced Science and Engineering, Waseda University. Professional interests include assistive technology, rehabilitation engineering, and accessible design. To provide truly beneficial assistive devices to people, I elucidate the relationships between living, life, people, and assistive devices from various viewpoints including cognitive science, sociology, and psychology. I aim to propose assistive technologies and gerontechnologies that are useful to people and society.

Practice and scientific approach of practical society useful for society.

In this research field, emphasis is placed on understanding the lives of humans, which change along with social changes (e.g., aging, individualization, advanced technology, and globalization) from the viewpoint of quality of life. We aim to promote academic progress and contribute to society by integrating academic knowledge related to daily life, developing new assistive technologies, building social systems, and making policy recommendations.

Our research covers a wide range of design theory on assistive technologies, analysis and modeling, equipment development, assistive product design, elderly mobility, and social implementation. We aim to conduct field-based practical research through understanding human behavior, exercise, cognition, physiology, psychology, and interaction. We pursue research activities through collaboration with a consortium that includes the Institute of Gerontology, national projects, and various companies. In addition, we interact with overseas research institutes that study assistive technology and gerontechnology.

website *http://www.atl.k.u-tokyo.ac.jp/en/*

Vehicle safety research

Assistive technology research

Organization

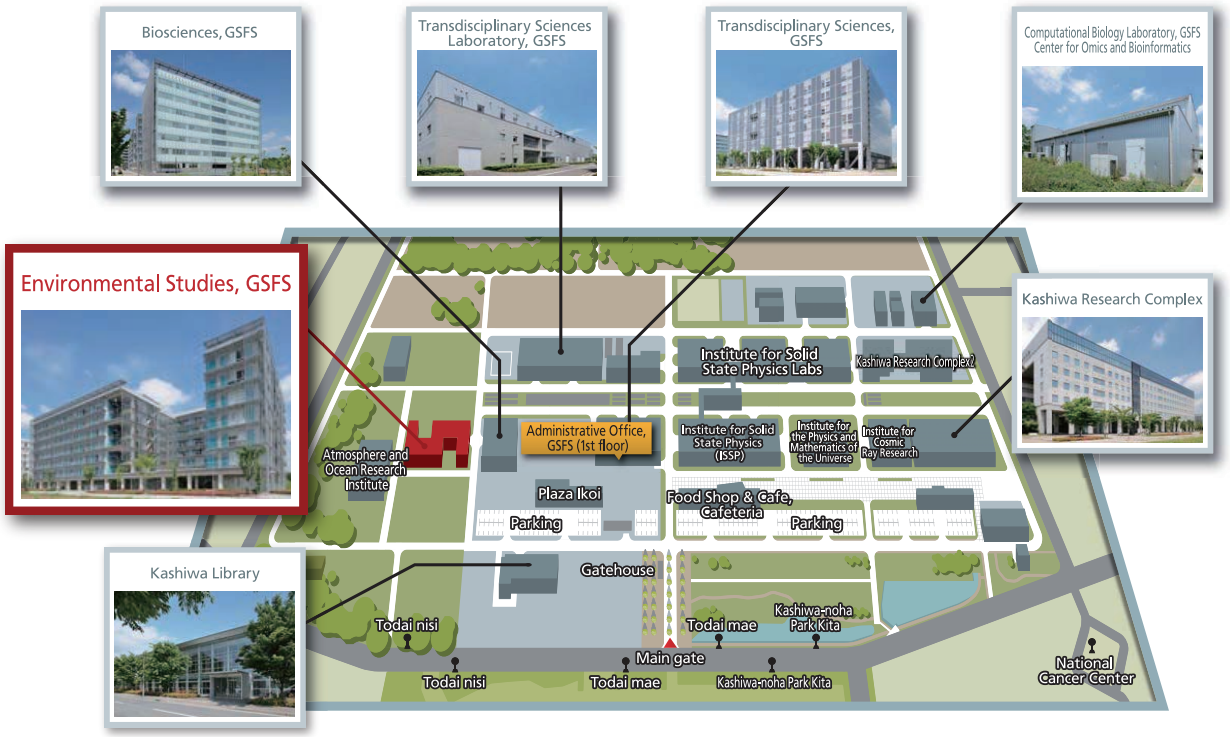
- Graduate School of Frontier Sciences
  - Division of Transdisciplinary Sciences
    - Department of Advanced Materials Science
    - Department of Advanced Energy
    - Department of Complexity Science and Engineering
  - Division of Biosciences
    - Department of Integrated Biosciences
    - Department of Computational Biology and Medical Sciences
  - Division of Environmental Studies
    - Department of Natural Environmental Studies
    - Department of Ocean Technology, Policy, and Environment
    - Department of Environment Systems
    - Department of Human and Engineered Environmental Studies
      - **Industrial Information Systems and Environment** P.9
        Kazuo HIEKATA
      - **Human Support Device** P.9
        Takeshi MORITA
      - **Environmental Information and Microsystems** P.10
        Hiroshi HOSAKA, Ken SASAKI
      - **Simulation of Complex Environmental Systems** P.10
        Hiroshi OKUDA, Yu CHEN
      - **Human Augmentation** P.11
        Masaaki MOCHIMARU, Yoshio MATSUMOTO, Akihiko MURAI
      - **Human and Environment Informatics** P.11
        Shin'ichi WARISAWA, Rui FUKUI, Reo KOMETANI
      - **Ambient Mechatronics** P.12
        Akio YAMAMOTO, Shunsuke YOSHIMOTO
      - **Innovative Learning Creation Studies** P.12
        Kayoko KURITA, Satori HACHISUKA
      - **Assistive Technology** P.13
        Motoki SHINO, Misato NIHEI
    - Department of Socio-Cultural Environmental Studies
    - Department of International Studies
    - Graduate Program in Sustainability
  - Facilities
    - Life Science Data Research Center

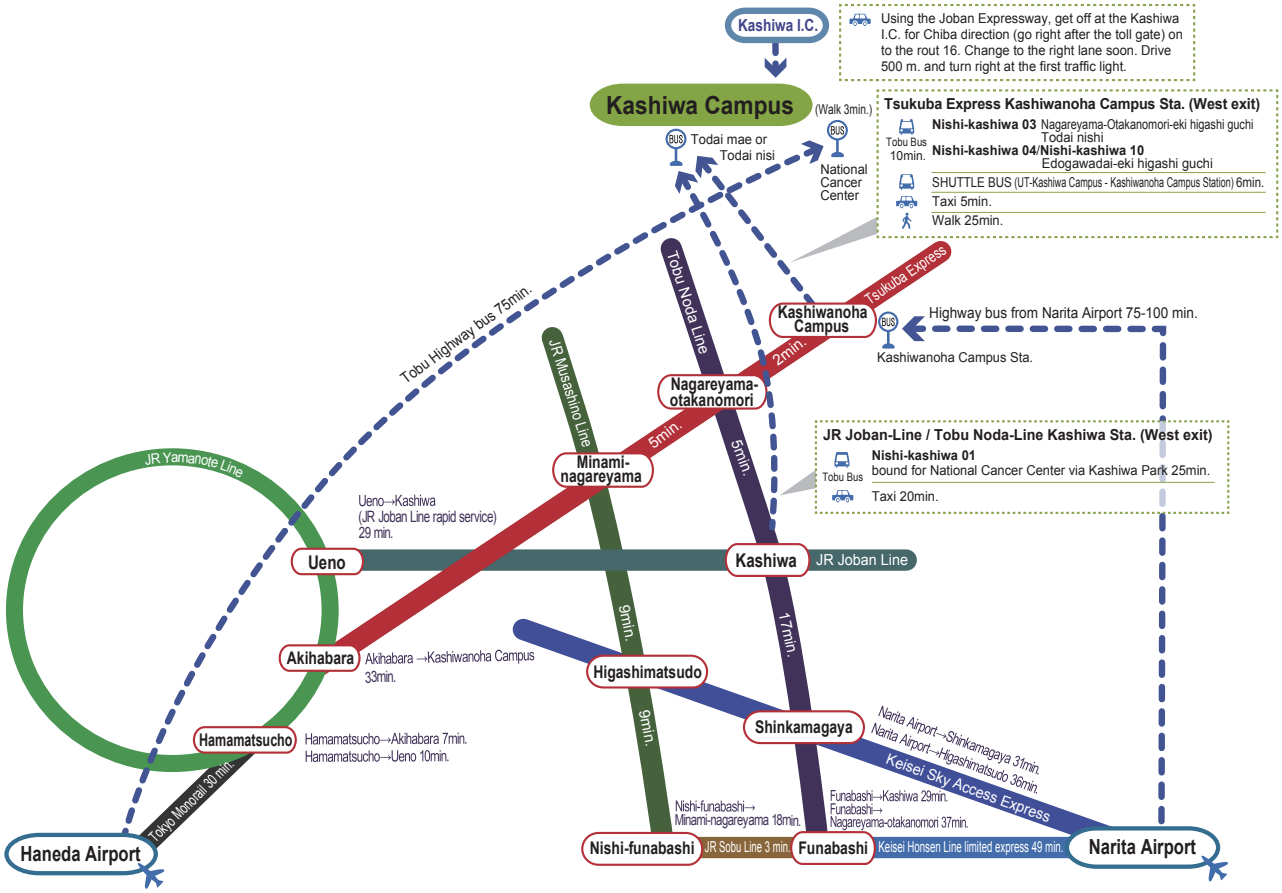
Inquiries concerning the entrance examination

For information about the entrance examination, please refer to the graduate school application guidelines and the entrance examination guide. For details on how to obtain these documents and a detailed schedule of the entrance examination briefing session, visit the website of the Department of Human and Engineered Environmental Studies, Graduate School of Frontier Sciences, the University of Tokyo (https://www.h.k.u-tokyo.ac.jp/index_e.html).

Office of the Department of Human and Engineered Environmental Studies,
Graduate School of Frontier Sciences, the University of Tokyo
5-1-5 Kashiwanoha, Kashiwa, Chiba 277–8563
E-mail: contact@h.k.u-tokyo.ac.jp
(Office hours: 10:00–12: 00, 13:00–16:30, excluding Saturdays, Sundays, and holidays)
Website: https://www.h.k.u-tokyo.ac.jp/index_e.html

Access


Biosciences, GSFS
Transdisciplinary Sciences Laboratory, GSFS
Transdisciplinary Sciences, GSFS
Computational Biology Laboratory, GSFS Center for Omics and Bioinformatics
Environmental Studies, GSFS
Kashiwa Research Complex
Kashiwa Library
Institute for Solid State Physics Labs
Kashiwa Research Complex2
Administrative Office, GSFS (1st floor)
Institute for Solid State Physics (ISSP)
Institute for the Physics and Mathematics of the Universe
Institute for Cosmic Ray Research
Atmosphere and Ocean Research Institute
Plaza Ikoi
Food Shop & Cafe, Cafeteria
Parking
Parking
Gatehouse
Todai nisi
Todai mae
Kashiwa-noha Park Kita
Main gate
National Cancer Center


Kashiwa I.C.
Using the Joban Expressway, get off at the Kashiwa I.C. for Chiba direction (go right after the toll gate) on to the rout 16. Change to the right lane soon. Drive 500 m. and turn right at the first traffic light.
Kashiwa Campus
(Walk 3min.)
Todai mae or Todai nisi
National Cancer Center
Tsukuba Express Kashiwanoha Campus Sta. (West exit)
Tobu Bus 10min.
Nishi-kashiwa 03 Nagareyama-Otakanomori-eki higashi guchi Todai nishi
Nishi-kashiwa 04/Nishi-kashiwa 10 Edogawadai-eki higashi guchi
SHUTTLE BUS (UT-Kashiwa Campus - Kashiwanoha Campus Station) 6min.
Taxi 5min.
Walk 25min.
Tobu Highway bus 75min.
Tobu Noda Line
JR Musashino Line
Tsukuba Express
Kashiwanoha Campus
2min.
Highway bus from Narita Airport 75-100 min.
Kashiwanoha Campus Sta.
Nagareyama-otakanomori
5min.
5min.
JR Joban-Line / Tobu Noda-Line Kashiwa Sta. (West exit)
Tobu Bus
Nishi-kashiwa 01 bound for National Cancer Center via Kashiwa Park 25min.
Taxi 20min.
JR Yamanote Line
Minami-nagareyama
Ueno→Kashiwa (JR Joban Line rapid service) 29 min.
Ueno
Kashiwa
JR Joban Line
9min.
17min.
Akihabara
Akihabara →Kashiwanoha Campus 33min.
Higashimatsudo
9min.
Hamamatsucho
Hamamatsucho→Akihabara 7min.
Hamamatsucho→Ueno 10min.
Shinkamagaya
Narita Airport→Shinkamagaya 31min.
Narita Airport→Higashimatsudo 36min.
Keisei Sky Access Express
Tokyo Monorail 30 min.
Haneda Airport
Nishi-funabashi→ Minami-nagareyama 18min.
Funabashi→Kashiwa 29min.
Funabashi→ Nagareyama-otakanomori 37min.
Nishi-funabashi
JR Sobu Line 3 min.
Funabashi
Keisei Honsen Line limited express 49 min.
Narita Airport

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Graduate School of Frontier Sciences,
The University of Tokyo

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https://www.h.k.u-tokyo.ac.jp/index_e.html

2021.08