

AY2027 Admission Guide

Department of Mechano-Informatics

Graduate School of Information Science and Technology The University of Tokyo

Master's Program

Doctoral Program

Contact: Department Administration Office
Engineering Bldg. 2, 3rd Floor, 7-3-1 Hongo, Bunkyo-ku, Tokyo 113-8656, JAPAN
Department Team (Mechano-Informatics), Graduate School of Engineering / Information
Science and Technology Academic Affairs Division, The University of Tokyo.
TEL: 03-5841-6302 E-mail: kyoumu@office.mech.t.u-tokyo.ac.jp

Under “Prospective Students” on
https://www.i.u-tokyo.ac.jp/index_e.shtml
click on “Admissions” → “Departments and Faculty”
→ “Mechano-Informatics” → “Admissions”

In addition to this brochure, be sure to refer to “Admission Guide: Graduate School of
Information Science and Technology, The University of Tokyo.”

(I) Master's Program

(1) Applicants should refer to the “AY2027 Admission Guide: Master's Program, Graduate School of Information Science and Technology, The University of Tokyo”.

(2) Preference Card and supervising professor

In the “Preference Card”, indicate your preferences for the field of interest and research plan, etc., and submit the card together with your other application documents. Check “Faculty and Labs in Department of Mechano-Informatics” at the end of this booklet and select your first to tenth choices of supervising professors in the field “Your selection of Lab” of the Web application system. If the professor of your choice cannot be assigned, any other professor available may be assigned.

(3) Expertise Assessment Card

Submit the “Expertise Assessment Card” (a two-page document) to demonstrate your expertise based on your research activities, creative work carried out in university classes or practicum, and extracurricular activities.

(4) Examination Schedules

a. Document screening

Document screening will be conducted based on the submitted documents. Regarding the notification of the screening, refer to the “AY2027 Admission Guide: Master's Program, Graduate School of Information Science and Technology, The University of Tokyo.”

b. General education subjects

Mathematics examination will be conducted. Refer to the “AY2027 Admission Guide: Master's Program, Graduate School of Information Science and Technology, The University of Tokyo” for details.

c. Foreign language (English)

TOEFL scores will be used to evaluate the applicants' English skills. For details, refer to “Guidelines for Submission of TOEFL Scores (for AY2027 Entrance Examinations).”

d. Specialized subjects and oral examination

The examination will be conducted only for applicants who have passed the document screening, taken the general education subject (mathematics) examination, and whose TOEFL score submitted has been considered valid. The oral examination will be held online.

Examination date	Examination times	Examination subjects	Examination content	Notes
From August 24 (Mon) to August 28 (Fri), 2026 [Reserve day: August 31 (Mon)]	From 9:00 a.m. JST	Mechano-Informatics	English presentation of expertise, field of study and research plan (7 minutes) will be examined orally. Topics related to mechanics-related fields (mechanical dynamics, control, mechatronics, robotics, etc.) and information-related fields (fundamentals of information science, digital circuits, computers, software, etc.) might be asked during examination.	The URL of online examination will be announced by August 21 (Fri), 2026.

Notes

- i) The applicant must prepare a Windows or Mac PC with an external web camera and connect to Zoom for the online oral examination.
- ii) The applicant must prepare slides for the presentation in advance and share the screen during the oral examination.
- iii) For other notes, carefully read the “Notes for Examinees of the Oral Examination” section of this guide.
- iv) Be sure to check the department webpage for admission, where more detailed information may be posted whenever necessary.

(II) Doctoral Program

(1) Applicants should refer to the “AY2027 Admission Guide: Doctoral Program, Graduate School of Information Science and Technology, The University of Tokyo”, and must receive guidance from their prospective thesis advisor before submitting their applications.

(2) Preference Card and prospective supervisor

After consulting with your prospective supervisor, indicate your preferences for the field of interest and research plan, etc., on the “Preference Card”, and submit the card together with your other application documents. Select the name of your prospective supervisor in the field of “Supervising professor of your choice” of the Web application system.

(3) Expertise Assessment Card

Submit the “Expertise Assessment Card” (a two-page document) to demonstrate your expertise based on your research activities, creative activities in university lectures or practicums, and extracurricular activities.

(4) Progress Report on Master's Thesis or Equivalent Research Work (Japanese or English)

Two A4-sized pages, free format, but must include both of the following items:

- i) Title and keywords of the research currently being conducted or previously completed in the Master’s program.
- ii) Progress of the research currently being conducted or previously completed in the Master’s program.

(5) Doctoral Research Proposal (Research Plan for the Doctoral Program) (Japanese or English)

Two A4-sized pages, free format, but must include items i) through iii):

- i) Research title, objectives, methodology, and content of the research plan for the Doctoral program. (Include the study’s positioning in academic literature, backgrounds such as the current status and challenges of the related field, and the rationale that led to the conception of this research plan.)
- ii) Research schedule, including what is to be clarified and to what extent.
- iii) Distinctive and original features of the research (Include comparisons with previous studies, expected impact upon completion of the research, prospects, etc.)

(6) Other Supporting Materials (Optional)

- i) List of research achievements (journal papers, conference presentations, awards, etc.)

For journal papers: authors, title, journal name, volume/issue, pages, year of publication, and whether it is peer-reviewed or not.

For conference presentations: authors, title, conference name, location, month/year, and presentation type (oral or poster).

- ii) Offprints of published papers, or the Master’s thesis itself (if already submitted).

(7) Application Period

Note that different application periods are scheduled for Summer and Winter Examinations. For details on the application periods, refer to the “AY2027 Admission Guide: Doctoral Program, Graduate School of Information Science and Technology, The University of Tokyo”.

(8) Examination Schedules

a. Summer Examinations

i) Document evaluation

Document evaluation will be conducted based on the submitted documents.

ii) Foreign language (English)

TOEFL scores will be used to evaluate the applicants’ English skills. For details, refer to “Guidelines for Submission of TOEFL Scores (for AY2027 Entrance Examinations).”
Applicants who have completed (or are expected to complete) a Master's program at the University of Tokyo are not required to submit TOEFL scores.

iii) Specialized subjects and oral examination

The examination will be conducted only for applicants whose submitted TOEFL score has been considered valid, or who are not required to submit it. The oral examination will be held online.

Examination date	Examination times	Examination subjects	Examination content	Notes
From August 24 (Mon) to August 28 (Fri) 2026	From 9:00 a.m. JST	Mechano-Informatics	Mechano-Informatics (Oral Examination) Topics related to mechanics-related fields (mechanical dynamics, control, mechatronics, robotics, etc.) and information-related fields (fundamentals of information science, digital circuits, computers, software, etc.) might be asked during the examination.	The URL of online examination will be announced by August 21 (Fri), 2026.

Notes:

- i) Oral Examinations will focus on the content and progress of the applicant's Master’s thesis or an equivalent research project, as well as concepts and plans for the prospective doctoral research theme, and related knowledge in the Mechano-Informatics field. Applicants must prepare slides for the presentation in advance and share the screen during the oral examination, and will be required to answer questions.
- ii) Applicants must prepare a Windows PC or Mac with an external web camera and connect to the Zoom for the online oral examination.
- iii) For other notes, carefully read the “Notes for Specialized subjects and oral examination” section of this guide.

b. Winter Examinations

Winter Examinations will be held between late January and early February, 2027. Details on examination methods, schedules, and locations will be posted on the following webpage in October:
https://www.i.u-tokyo.ac.jp/edu/course/m-i/admission_e.shtml

(9) Applicants for the Special Selection for Professionals (社会人特別選抜) must contact the Department Administration Office before submitting their applications. These applicants must include in the “Application Documents” specified in “AY2027 Admission Guide: Doctoral Program [Special Selection for Professionals], Graduate School of Information Science and Technology, The University of Tokyo” the following materials describing their research and achievements in the field of Mechano-Informatics. No specific form is provided.

i) The list of research achievements (written in Japanese or English)

Provide a list of academic papers, patents, products, and other evidence of the applicant's achievements accomplished as a part of the applicant's professional work. In the case of collaborative achievements with several persons, clearly indicate the applicant's contributions.

ii) Abstracts of Major Achievements (written in Japanese or English)

Select up to three major achievements from the list above, and provide the outlines of these achievements in approximately five A4-sized pages.

iii) The research plan for the doctoral program (written in Japanese or English) in approximately two A4-sized pages.

iv) Recommendation letters from two persons who are familiar with the applicant's research achievements (including Master's supervisor) (written in Japanese or English).

*Refer to the admission webpage of the Graduate School for submission instructions and submit them separately.

v) A copy of a Master's thesis or an equivalent research report.

vi) The abstract of v. (written in Japanese or English)

vii) Other documents

Any document useful to evaluate the applicant's ability, e.g., copies of published papers, patent specifications or brochures of products by the applicant, etc.: one original copy each.

Be sure to check the department webpage for admission, where more detailed information may be posted whenever necessary.

**AY2027 Notes for Specialized subjects and oral examination of
Department of Mechano-Informatics (Master's and Doctoral Programs)
Graduate School of Information Science and Technology, The University of Tokyo**

1. Examination dates and times

Please refer to the “Examination schedules” listed in this Guide.

2. Examination locations

The oral examination will be held online.

The URL for the online system that should be accessed by each person will be notified later.

3. What to prepare

- (1) Print out your examination admission card.
- (2) Prepare a Windows or Mac with camera for the online oral examination.
- (3) Prepare slides (e.g. PowerPoint) for the presentation in advance and share the screen during the oral examination.
- (4) Prepare a quiet environment with no one else around, and ensure an internet connection of sufficient quality.
- (5) Prepare notebooks of A4 size or larger, sketchbooks, or a whiteboard for showing your answers to the camera, along with a thick pen that can be clearly seen remotely

4. Items to keep in mind during examinations

- (1) Online examination is always being recorded.
- (2) Examinees will not be allowed to leave the examination room until the end of the scheduled examination time. Temporarily leaving the room during the examination is also prohibited in principle. If you feel sick and/or need to use the bathroom, notify the examination proctor.
- (3) Be alone in a closed room during the online examination.
- (4) Turn on the camera during the online examination and do not use the virtual background.
- (5) Do not use headphones or earphones. Do not wear a hat or cap.
- (6) Presentation tools and paper scripts during the presentation are acceptable, but do not refer to them in a question and answer session.
- (7) Reference textbooks, the internet, notes, etc. are not allowed without permission.
- (8) The presentation time is managed in the examination room. However, a clock without any of the following functions can be used: dictionary function, calculator function, or Internet/PC connection function.
- (9) Print out your examination admission card beforehand and place it on your desk during the examination.
- (10) Only the following items can be placed on the desk: examination admission card, PC, web camera, monitor, keyboard, mouse, A4 or above notes, sketchbooks or a whiteboard, and a thick pen.
- (11) The use of wearable devices, including smart glasses and smartwatches, is prohibited.
- (12) Sit in an ordinary chair with legs during the exam. Beds, sofas, and floor chairs are not allowed.
- (13) If there is a bookshelf in front of or beside the desk, cover it with a curtain or sheet.
- (14) Before and during the examination, you will need to move the camera to show the proctor your desk and the entire room (360 degrees). Any privacy concerns should be dealt with in advance.
- (15) No food or drinks are allowed in principle. You may bring a bottle of water for hydration. Ask a proctor for permission and place it somewhere nearby such as on the floor.
- (16) Do not record the examination details. Do not disclose any details of the examination.
- (17) In the unlikely event that misconduct is discovered, the examination will be invalidated retroactively.
- (18) After the oral examination, leave the online examination room according to the instructions from the examiner.

Follow the instructions by the Graduate School for what to bring and location information for the written examination for the general education subject (Mathematics).

[Preference card (for Master's Program and Doctoral Program)]

Department of Mechano-Informatics, Graduate School of Information Science and Technology,
The University of Tokyo

Examinee's name	
Field of interest and research plan (Please describe in as much detail as possible)	

- ◆ Submit this form along with your application.
- ◆ Use a computer to prepare this card.
- ◆ Do not extend to the next page. The font size should be 12pt or larger.
- ◆ For doctoral program applicants, note that different application periods are scheduled for the Summer and Winter Examinations. Application documents received outside of the respective application periods shall be deemed invalid.

[Expertise Assessment Card (for Master's Program and Doctoral Program)]

Department of Mechano-Informatics,
Graduate School of Information Science and Technology, The University of Tokyo

Examinee's name :

- ◆ Write down the examinee's name.
- ◆ Use these two A4-sized pages to describe your expertise. No additional pages are allowed.
- ◆ Use a computer to prepare this card.
- ◆ The font size should be 12pt or larger. Images and diagrams are permitted.

This document is a translation from the official Japanese version.
In the event of any conflict, the Japanese version shall prevail and be conclusive.



Department-specific Conditions on Submitted Documents (Mechano-Informatics)

For other conditions on submitted documents common to all the departments, check the Admission Guide of the Graduate School.

List of Department-specific Documents

Required Documents (Department of Mechano-Informatics)				
	Summer Examination		Winter Examination	
	Documents to be Submitted	Who Must Submit	Documents to be Submitted	Who Must Submit
Master's Program	(1) Preference Card (2) Expertise Assessment Card	All applicants	/	
Doctoral Program	(1) Preference Card (2) Expertise Assessment Card (3) Progress report on Master's thesis or equivalent research work (written in Japanese or English, 2pages in A4-size) (4) Doctoral research proposal (written in Japanese or English, 2 pages in A4-size) (5) Other Supporting Materials (Optional)	All applicants	(1) Preference Card (2) Expertise Assessment Card (3) Progress report on Master's thesis or equivalent research work (written in Japanese or English, 2pages in A4-size) (4) Doctoral research proposal (written in Japanese or English, 2 pages in A4-size) (5) Other Supporting Materials (Optional)	All applicants
Doctoral Program (Special Selection for Professionals) (社会人特別選抜)	Preference Card	All applicants	Preference Card	All applicants
	(1) A list of research achievements (written in Japanese or English) (2) The abstract of the major achievements (written in Japanese or English, approximately 5 pages in A4-size) (3) Research plan in the doctoral program (written in Japanese or English, approximately 2 pages in A4-size) (4) Recommendation letters (from 2 persons, written in Japanese or English) *Refer to the admission webpage of the Graduate School for submission instructions and submit it separately. (5) A copy of a master's thesis or an equivalent research report (6) The abstract of (5) (written in Japanese or English, 2 pages in A4-size) (7) Other documents (e.g. published papers, patent specifications or brochures of products by the applicant)	All applicants	(1) A list of research achievements (written in Japanese or English) (2) The abstract of the major achievements (written in Japanese or English, approximately 5 pages in A4-size) (3) Research plan in the doctoral program (written in Japanese or English, approximately 2 pages in A4-size) (4) Recommendation letters (from 2 persons, written in Japanese or English) *Refer to the admission webpage of the Graduate School for submission instructions and submit it separately. (5) A copy of a master's thesis or an equivalent research report (6) The abstract of (5) (written in Japanese or English, 2 pages in A4-size) (7) Other documents (e.g. published papers, patent specifications or brochures of products by the applicant)	All applicants

Department-specific Conditions on TOEFL Scores

	Summer Examination	Winter Examination
Master's Course	All applicants	/
Doctoral Course	All applicants except those who have completed (or are expected to complete) a Master's program at the University of Tokyo	All applicants except those who have completed (or are expected to complete) a Master's program at the University of Tokyo
Doctoral Course (Special Selection for Professionals)	All applicants except those who have completed a Master's program at the University of Tokyo	All applicants except those who have completed a Master's program at the University of Tokyo

Faculty and Laboratories of Department of Mechano-Informatics

Caution: Professors marked with ※ are not accepting new students for the academic year.

Prof. Yinqiang Zheng is not accepting Doctoral students, and is not accepting Master's students for October 2028 enrollment.

[RCAST] denotes the professors of Research Center for Advanced Science and Technology holding adjunct professorship at Graduate School of Information Science and Technology.

[AI center] denotes the professors of AI Center (*1) holding adjunct professorship at Graduate School of Information Science and Technology.

*1 Next Generation Artificial Intelligence Research Division, Center for Education and Research in Information Science and Technology (CERIST), and Next Generation Artificial Intelligence Research Center, The University of Tokyo.

[IW center] denotes the professors of IW Center (*2) holding adjunct professorship at Graduate School of Information Science and Technology.

*2 Creation of Intelligent World Division, Center for Education and Research in Information Science and Technology (CERIST), and Center for Creation of Intelligent World, The University of Tokyo.

Professor
Kei OKADA



Faculty of Eng. Bldg. 2,
Room 73A2

e-mail:
k-okada@jsk.t.u-tokyo.ac.jp

Senior Assistant Professor
Kunio KOJIMA



Faculty of Eng. Bldg. 8,
Room 330

e-mail:
k-kojima@jsk.imi.i.u-
tokyo.ac.jp

Senior Assistant Professor
Kento KAWAHARAZUKA
[AI Center]



Faculty of Eng. Bldg. 2,
Room 73B1

e-mail:
kawaharazuka@jsk.imi.i.u-
tokyo.ac.jp

JSK Robotics Laboratory (Jouhou System Kougaku Laboratory)

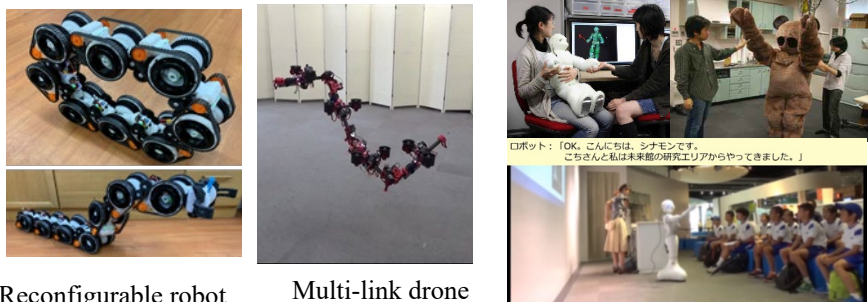
URL: <http://www.jsk.t.u-tokyo.ac.jp/>

Research in this laboratory is focusing on the fundamental functions and systems necessary for future intelligent robots that will live and work in the daily life field and human society. The members are challenging something new through their own integrated robot systems and learning how to build sustainable systems for the future with each other.

- (1) **Daily life support humanoid platform** : recognition of situations in human life environments, using tools, dishes, tablewares, and appliances, learning from humans, conversation with humans, etc.
- (2) **Mechatronic tendon-driven robot** : humanlike body with many joints and redundant sensors, autonomous development of complex sensory-motor system, etc.
- (3) **Dynamics whole body control humanoid** : integrating high-torque, high-speed motor drive circuit, high-speed 3D recognition system, dynamics whole-body.
- (4) **Transform robotics system**: Variable body structure, modularisation, compact and lightweight embedded processors, in-body communication and power systems.
- (5) **Multi DoF Flying robots**: Motion, work, services in the air and on the ground according to environment and task. Visual sensors for outdoor flying
- (6) **Robot Open Software System** : design and development of open-source type intelligent robot for mobile manipulation robot.
- (7) **IRT (Information and Robot Technology) to support human and aging society**: through fusing IT and RT systems, personal mobility robots, affectionate watching appliance are conducted for supporting the future life society



Daily Assistive HRP2-JSK humanoids Mechatronic tendon-driven robot



Reconfigurable robot Multi-link drone Robot-social interaction



Dynamic whole-body control humanoid Open software robot : PR2

※ Yasuo KUNIYOSHI
Professor



Office:
Room 82D3, Engr. Bldg. 2
e-mail:
kuniyosh@isi.imi.i.u-tokyo.ac.jp

Kohei NAKAJIMA
Associate Professor



Office:
Room 82D4, Engr. Bldg. 2
e-mail: k-nakajima@isi.imi.i.u-tokyo.ac.jp

※ Tatsuya DAIKOKU
Associate Professor
[AI Center]



Office:
Room 335-1, Engr. Bldg. 8
e-mail: daikoku@isi.imi.i.u-tokyo.ac.jp

Laboratory for Intelligent Systems and Informatics (ISI)

<http://www.isi.imi.i.u-tokyo.ac.jp/>

Breakthroughs Towards Truly Intelligent Systems in the Real World:

Towards truly intelligent behavior in the complex and uncertain real world, we reveal the principles of human intelligence and develop next generation AI, with applications to real world tasks.

1. Next Generation AI & Robotics Intelligence

Deep reinforcement imitation learning, multi-agent collaborative learning, dynamical systems/chaos/reservoir computing, spiking neural networks, free energy principle/predictive coding, dual-arm robotic manipulation, behavior emergence/immediate adaptation, autonomus systems, intention understanding, AI ethics

2. Elucidating/Modeling Human Intelligence, Origin of Intelligence

Whole brain simulation, Embodied cognition/behavior, Emotion/Feeling Model, Fetus/neonate embodied brain development simulation, Acquisition of concepts/language, Self-other/social cognition, Emergence of consciousness, Brain science and modeling of moral/value/intention/motivation/creativity/aesthetic/music

3. Bio-inspired Robots & Adaptive/Learning Control

Musculo-skeletal robots, Soft robots, Dynamic motor skills, “Knacks & Focuses”, Thin&flexible tactile sensors, Adaptive/learning control, Physical reservoir computing, Next gen. neuromorphic devices

4. AI Tech for Medical/Welfare/Handicapped & Global Issues

Monitoring & risk prediction of behavior/health, Clinical applications, Interactive elderly care robots, Understanding developmental disorders and alleviative technology for their sufferings, Agile-legal tech.

Brain sim.
Fetus embodied development simulation

Embodied Emotion-Cognition Model

Tuning readout (Reservoir computing)
chaotic recurrent neural network
differential equation $\tau \dot{x}(t) = -x(t) + \tanh(Jx(t) + u_{\text{res}}(s))$
High-dimensional chaotic system
complicated dynamics
Symbol transition
A, B, C, ...
multiple behaviors (quasi-attractors)
Linear models (Readout)

High dim. chaos autonomous learning & control

Octopus robot

Deep learning of human skills

Musculo-skeletal robot

Baby Robot

The diagram on the right shows a complex biological model with components like: Noradrenaline to many brain regions, Emotion signal, Locus coeruleus, Mechanical baroreceptors, Pulmonary stretch & blood pressure, Medulla respiratory CPG, CO2 receptor, Driving signals for respiration muscles, Sympathetic nerve, Parasympathetic nerve, Noradrenaline to the cardiac tissue, and Acetylcholine to the cardiac tissue. It also includes a human skeleton and a fetus image.

※Hideaki KUZUOKA
Professor



Eng. Bldg. 2 Rm. 83D4
e-mail: kuzuoka@cyber.t.u-tokyo.ac.jp
URL: <http://www.cyber.t.u-tokyo.ac.jp/>

Kuzuoka-Narumi-Tanikawa Laboratory

<http://www.cyber.t.u-tokyo.ac.jp>

Research on Cybernetic Interface aims to study interfaces that unite human and computer seamlessly. Our particular interest is in exploring Cybernetic Interface on the basis of Virtual Reality (VR) and Computer Supported Cooperative Work (CSCW) technologies. We focus not only on system development, but also on exploring innovative contents in application areas, and studying the impact of human-computer interaction on psychological and social science research. Specifically, we are conducting research on multi-modal/cross-modal interfaces including tactile, olfactory, and gustatory senses, human augmentation technologies to enhance human physical and cognitive abilities, social robots, and educational systems using virtual and augmented reality.

Virtual Reality / Mixed Reality

Multi-modal and Cross-modal Interfaces
Redirected Walking / Redirected Hand Interaction Techniques
Human Augmentation with Virtual and Augmented Reality
Ghost Engineering (Augmenting Perception/Cognition with Embodied Avatars)



Multi-modal / Cross-modal interfaces



Haptic display and Human Augmentation

Takuji NARUMI
Professor



Eng. Bldg. 2 Rm. 83D3
e-mail: narumi@cyber.t.u-tokyo.ac.jp
URL: <http://www.cyber.t.u-tokyo.ac.jp/>



Redirected walking using visuo-haptic interaction



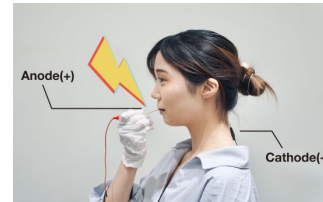
Manipulation of weight perception through body transformation with avatars

Computer Supported Cooperative Work (CSCW) / Human-Computer Interaction

Telepresence Systems for Enhancing Remote Communication
Behavior Elicitation & Emotion Evacuation Interfaces
Virtual Reality-Based Education, Rehabilitation, Consultation
Social Robot, Human-Robot Interaction, and social media
Electrical Stimulation for Presenting Sensations



“Cloning” technique for mediated group work



Presenting spiciness through electrical stimulation

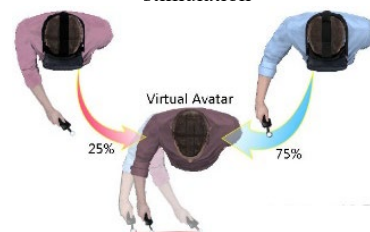
※Tomohiro TANIKAWA
Professor
[SICT Center]



Eng. Bldg. 2 Rm. 92D4
e-mail: tani@cyber.t.u-tokyo.ac.jp
URL: <http://www.cyber.t.u-tokyo.ac.jp/>



Social robots in museum



Co-embodiment for skill transfer



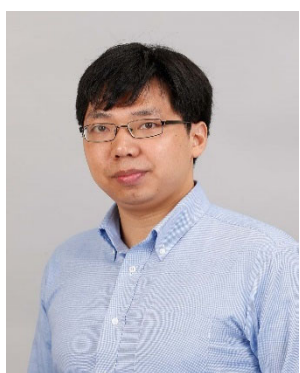
Takanori Fukao
Professor

Office:82D2 Eng2 Bldg.
phone: 03-5841-6379
e-mail: fukao@i.u-tokyo.
ac.jp



Takuzumi Nishio
Senior Assistant
Professor

Office:82D1 Eng2 Bldg.
phone: 03-5841-6378 e-
mail:
nishio-
takuzumi@ynl.t.u-
tokyo.ac.jp



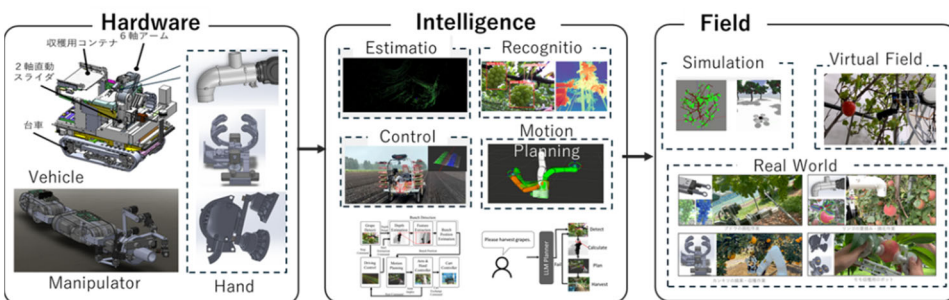
Yinqiang Zheng
Professor

[AI Center]
Office:81A2 Eng2 Bldg.
phone: 03-5841-1509
e-mail: yqzheng@ai.u-
tokyo.ac.jp

Dynamics and Control Systems Laboratory

<http://www.ynl.t.u-tokyo.ac.jp/>

- (1) Highly Robust Autonomous Driving Systems of Cars and Trucks
- (2) AI-based Autonomous Harvest/Transport Systems for Vegetables and Fruits
- (3) Development and Control Systems for Aerospace Robots
- (4) Design and Intelligent System Development for General Purpose Humanoids Operating in the Real World
- (5) Advanced Optical Sensing and Image Understanding



Tatsuya HARADA
Professor
[RCAST]



RCAST 4th bldg.
room 427

e-mail:
harada@mi.t.u-tokyo.ac.jp

Yusuke MUKUTA
Senior Assistant
Professor
[RCAST]



RCAST 4th bldg.
room 426

e-mail:
mukuta@mi.t.u-tokyo.ac.jp

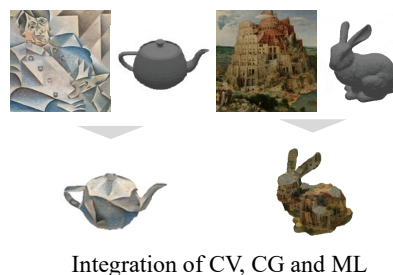
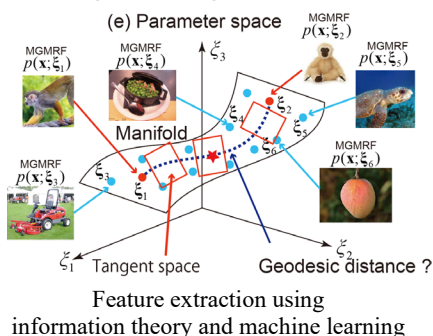
Machine Intelligence



Realizing advanced intelligent systems for understanding real world, generating content, and discovering knowledge

We aim to construct advanced intelligent systems capable of understanding the real world, generating content, and discovering knowledge by extracting valuable information from the natural environment and combining it with vast amounts of data and powerful computing resources in cyberspace. To tackle this challenge, we utilize computer science, including mathematical foundations and robotics.

- 1. Mathematical foundations:** Information theory, machine learning, deep learning, data mining, pattern recognition, probability and statistics theory, time series analysis, causal analysis, learning theory, feature extraction theory.
- 2. Recognition, understanding, and thinking:** Computer vision, image recognition and search, 3D information processing, behavior recognition, multimodal recognition, emotion understanding, intention estimation, natural language processing, speech and music information processing, medical information processing, big data
- 3. Content generation:** Natural language description of images and videos, image generation from natural language, conversational systems capable of chatting with humans, discovery of interesting phenomena in the real world and article generation
- 4. Intelligent robots:** Reinforcement learning, imitation learning, meta-learning, trajectory optimization, motion planning, task planning, continual learning, sim-to-real, fast inference, SLAM, 3D reconstruction, learning at the edge, interaction with humans



A silver car parked in a residential street. A brown horse standing in a lush green field.

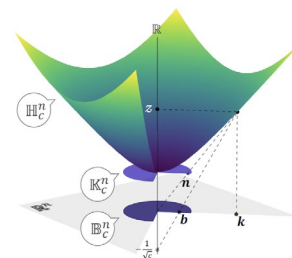
Automatic sentence generation by recognizing images



Generation of realistic novel object images



Controlling robots with natural language



Shoji TAKEUCHI
Professor



Eng. Bldg. 2, Rm. 83D1

e-mail:
takeuchi@hybrid.t.u-tokyo.ac.jp

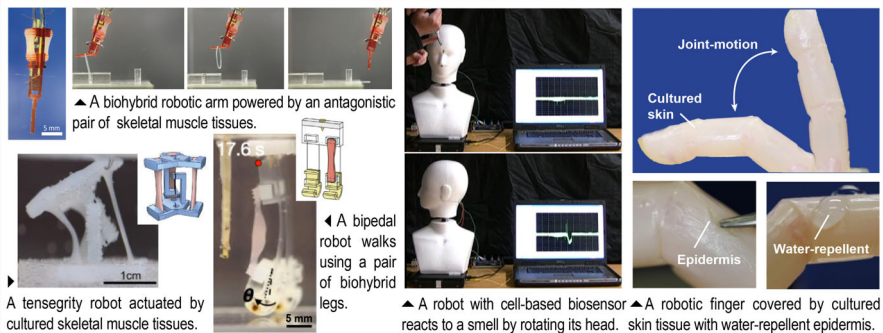
URL:
<http://www.hybrid.t.u-tokyo.ac.jp/>

Biohybrid Systems Lab.
<http://www.hybrid.t.u-tokyo.ac.jp/>

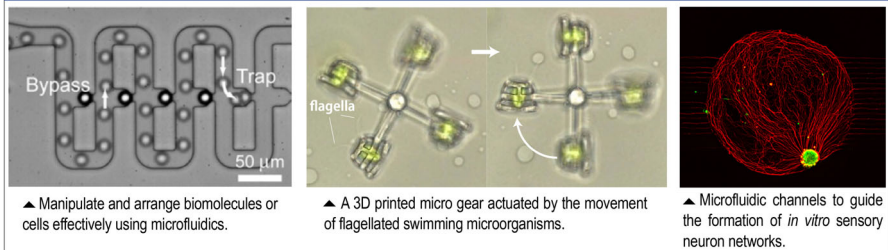
Our research group aim to develop biohybrid systems that integrate functional biomaterials with artificial devices, such as biohybrid robots powered by skeletal muscle tissues that works flexibly and quietly, covered by living skin tissue with human-like appearance and function, and enabled by sensor cells that can detect target materials with high sensitivity and selectivity. Our approach involves various disciplines, including mechanics, informatics, micro/nano technology, bioengineering, and material sciences. Personnel interested in multidisciplinary research, with any of these abovementioned backgrounds, are warmly welcomed to join us.

Cyborg technology

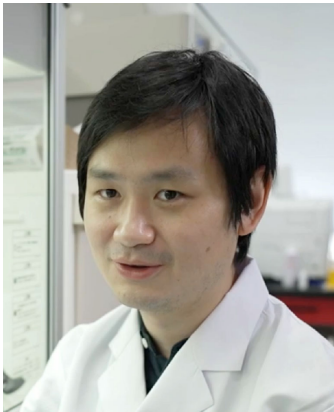
Blend living and artificial materials to create superior biohybrid robots.



MEMS (Micro-Electro-Mechanical Systems) *Fabricate functional microscale machines using microfabrication techniques.*



Minghao NIE
Senior Assistant Professor

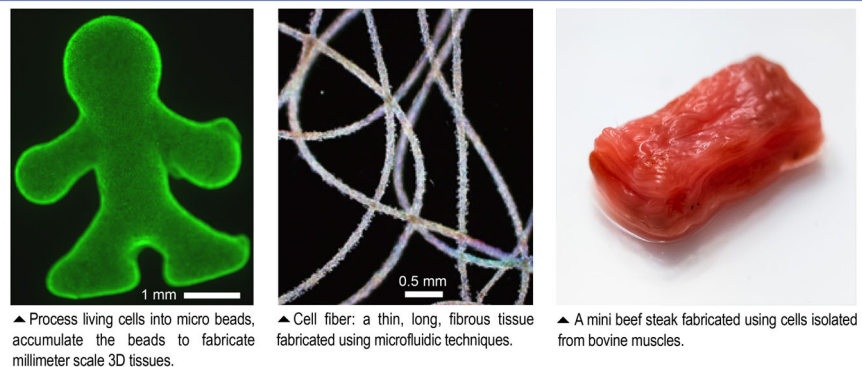


Eng. Bldg. 2, Rm. 83D2

e-mail:
nie@hybrid.t.u-tokyo.ac.jp

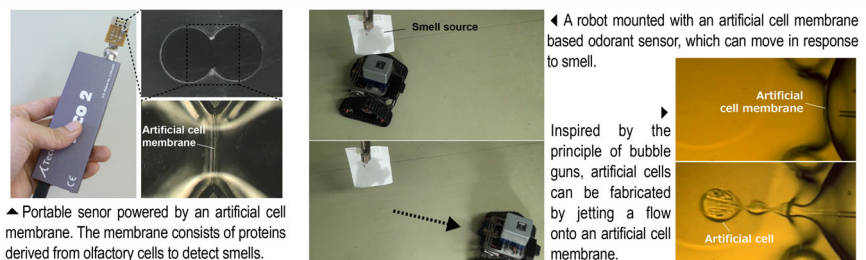
Biofabrication

Manufacture macroscopic tissues/organs by assembling cells and biomaterials.



Artificial cell membranes

Create artificial cells as highly sensitive and selective biosensors.



Hirokazu Takahashi
Professor



Eng. Bldg. 2, Rm. 81B
e-mail:
takahashi@i.u-tokyo.ac.jp

Tomoyo I.
Shiramatsu
Associate Professor



Eng. Bldg. 2, Rm. 81B
e-mail:
t.shiramatsu@ne.t.u-tokyo.ac.jp

Bio-intelligence Systems Lab.

<http://www.ne.t.u-tokyo.ac.jp/index-e.html>

Research Fields : The Bio-Intelligence Systems Lab aims to understand the brain in engineers' manner and to create next-generation brain-like computation systems. Our research field is interdisciplinary, ranging between informatics, engineering, and neuroscience. To reveal how intelligence, consciousness, and fine arts emerge, we investigate neural computation at various scales, ranging from dissociate culture of neurons on a petri dish, the rodent brain, and the human brain. We develop novel experimental methods and equipment, such as high-density microelectrode arrays and behavioral assays, to obtain large-scale experimental data, and make full use of state-of-the-art machine learning and artificial intelligence to characterize and analyze our own data. Based on these experiments, we reveal the dynamics of neural activities and construct mathematical models of the brain.

Research Examples:

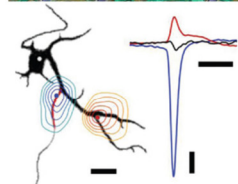
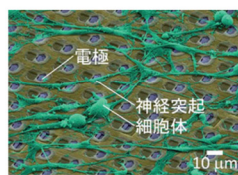


Fig. 1 Cellular level neural measurement

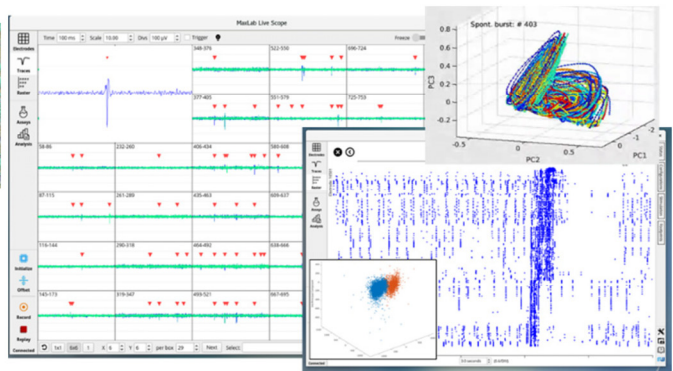


Fig. 2 Mathematical analyses and modeling of large-scale spatio-temporal neural data

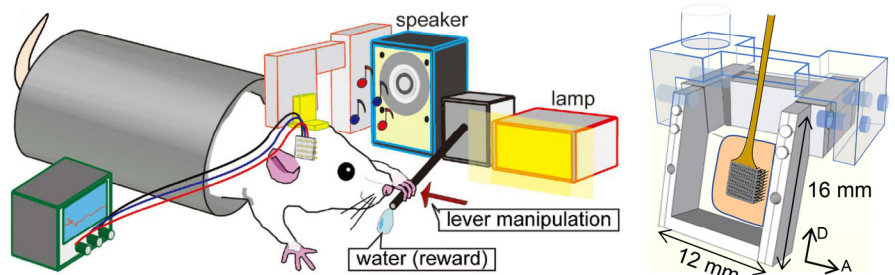


Fig. 3 Neural measurement with microelectrode array (electrophysiology)

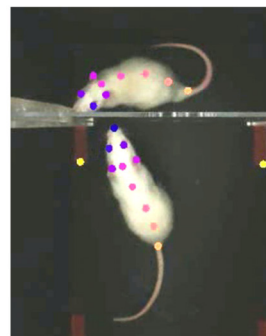


Fig. 4 Behavioral analysis with computer vision

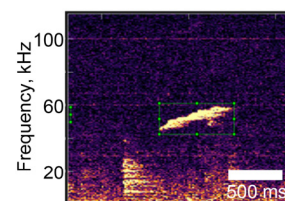


Fig. 5 Ultrasonic communication in rodents

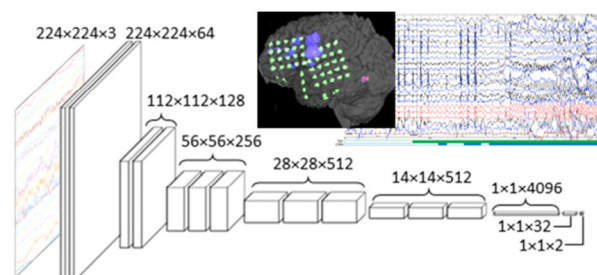


Fig. 6 Electroencephalography diagnosis system with deep learning

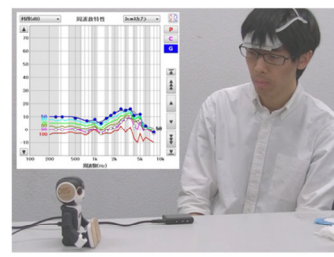


Fig. 7 Hearing aid support system with personal robot



Fig. 8 Digital medicine with VR/AR system

