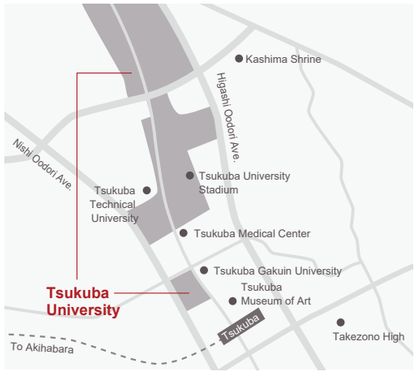


▲Map of the Tsukuba Station Area

▲Tsukuba University Campus Detailed Map

By train

Get off at the Tsukuba Station of the Tsukuba Express Line
Go to the Tsukuba Center, Bus Stop #6
Take the “Tsukuba Daigaku Junkan Hidarimawari / Migimawari” bus,
get off at the TARA Center Bus stop
The bus takes approximately 15 minutes

By car

Approximately 15 minutes from "Tsukuba Central IC" in the metropolitan Chuo Liaison Expressway

Website
https://air.tsukuba.ac.jp/en/

Center for Artificial Intelligence Research
University of Tsukuba
1-1-1 Tennodai, Tsukuba, Ibaraki 305-8577
Tsukuba Industrial Liaison and Cooperative Research Center (ILC)

2024.01 EN

筑波大学
University of Tsukuba

CENTER FOR ARTIFICIAL INTELLIGENCE RESEARCH

筑波大学　人工知能科学センター

2023-2024

About C-AIR

The University of Tsukuba has established the Center for Artificial Intelligence Research (C-AIR) to foster groundbreaking research projects in the field of Artificial Intelligence.
This center works as a hub for Interdisciplinary Research, fostering cooperation between different departments in the university, centered around the application of interdisciplinary Big Data.

In particular, the center promotes the research of "Human-supporting Artificial Intelligence" for the realization of the next generation smart communities.
To this end, C-AIR forms a spiral from basic scientific research to practical and industrial applications, which is achieved through the collaboration with various research institutes and companies.

Message from the Director

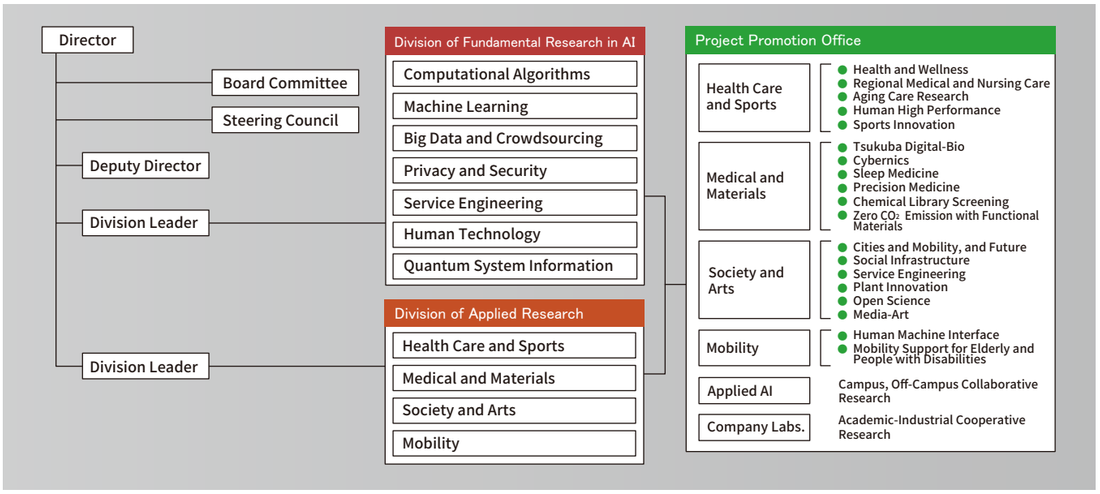
The Center for Artificial Intelligence Research (C-AIR) was founded in April, 2017. Because modern research in Artificial Intelligence (AI) requires the collaboration of different fields, and leads to diverse applications in society, it was necessary for the university to construct a structure to facilitate cross-disciplinary research and education activities.
At this center, we employ the interdisciplinary nature of our university to assemble a network of research centers and research projects from different fields, conducting basic and applied research on AI.
We also actively pursue industry-university collaboration initiatives in order to allow the AI technology developed on campus to provide concrete benefits to society.
It is also an important task to foster new human resources capable of developing AI and advanced knowledge of data analysis and putting it into practical applications. In this sense, we plan to develop activities that contribute to improving the research skills of researchers at companies and other members of society.

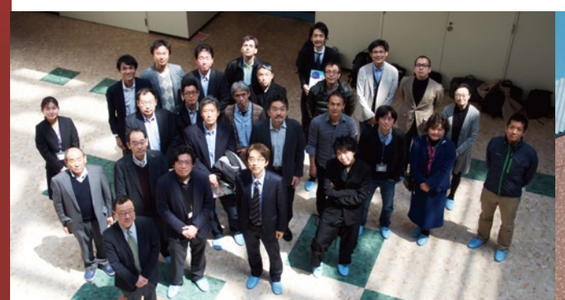
Tetsuya Sakurai

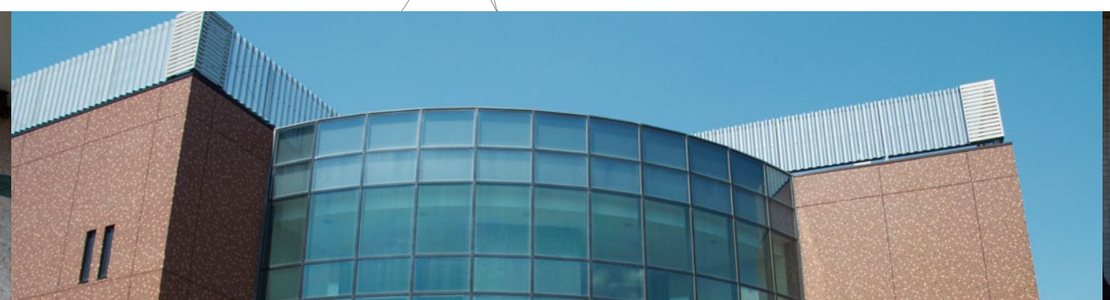
Director of Center for Artificial Intelligence Research,
Univerisity of Tsukuba

Organizational Structure

The C-AIR is composed of the "Artificial Intelligence Infrastructure Research Division" and the "Project Research Division."
In the Artificial Intelligence Infrastructure Research Division, we conduct basic research on fundamental fields of AI, such as machine learning, mathematical algorithms, quantum system information, big data analysis, cloud infrastructure, and privacy protection. In addition to these, we also conduct research on fundamental technologies that support the application of Service Engineering and Human Technology.
The Project Research Division is divided into four fields: "Health Care and Sports," "Medical and Material," "Society and Arts," and "Mobility." Researchers from other departments and projects in Tsukuba University and other Research Institutions coordinate and collaborate with researchers from the Artificial Intelligence Infrastructure Research Division in application-oriented research projects.
The field of "Health Care and Sports" promotes research in these fields using health and medical care data held by municipalities, developing projects for the use of AI in data analysis of regional medical care, comprehensive care, and services. Working in cooperation with the Human High Performance Research Center, this field also performs research on state-of-the-art sports measurement and data visualization technology and virtual reality.
In the "Medical and Materials" field, we are developing a system for automatic sleep stage determination using machine learning in collaboration with the International Institute for Integrated Sleep Medicine (WPI-IIIS) and the Center for Computational Science Research. We are also developing Digital-Bio research through integrating biological science and digital/AI technology with the Tsukuba Digital-Bio International Center, research on innovative Cybernic Systems in cooperation with the Center for Cybernics Research, and research on the next-generation sequencer, along with a functional prediction of candidate substances using chemical screening in collaboration with the Precision Medicine Development Research Center.
In the "Society and Arts" field, we collaborate with the R&D Center for Frontiers of MIRAI in Policy and Technology and municipal governments on the research of regional infrastructure and basic research on the social engineering of future societies. Also, we accelerate research and development on fundamental technologies for "Green Innovation" by leveraging AI technology with the R&D Center for Zero CO_2 Emission with Functional Materials. Using data analysis and artistic approaches, we perform research work on design, service engineering, and the development of future agricultural industries.
In the "Mobility" field, we investigate technologies for developing self-driving cars and advanced driving support technology, based on driver and pedestrian movement analysis and risk assessment. This also includes applications of these technologies in various fields such as drone systems and the Naval fields.

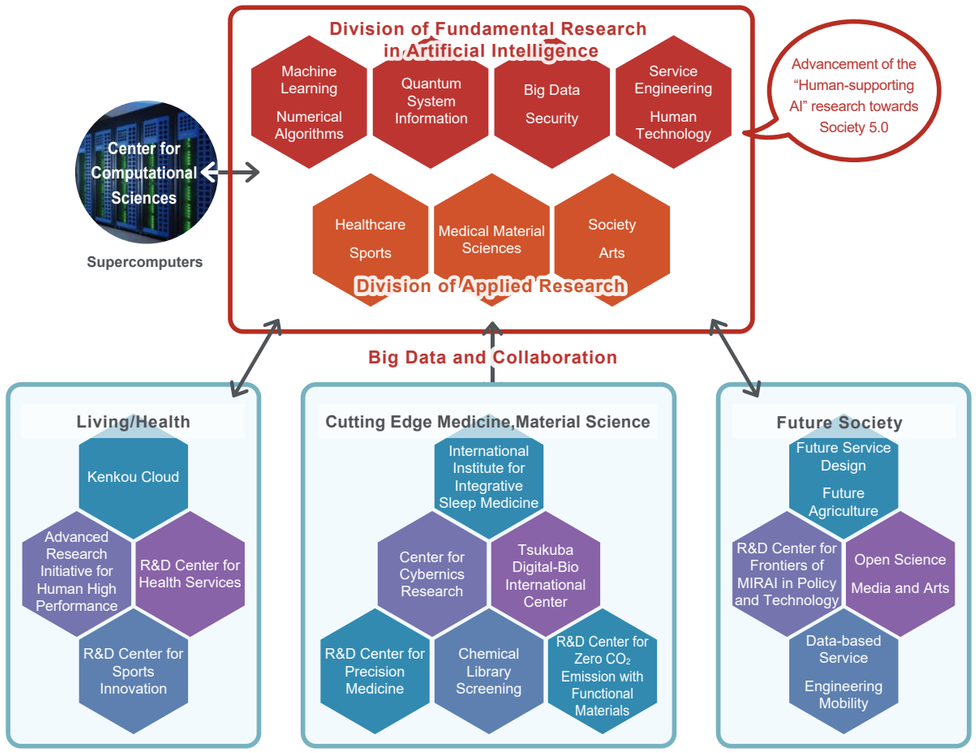






Mission

The University of Tsukuba opened the Center for Artificial Intelligence Research (C-AIR) in April 2017 to promote advanced research and education on AI. This center supports and organizes the activities and collaborations between AI research groups from different fields in the University, promoting the interdisciplinarity that is key to the University of Tsukuba's research vision. In this sense, this center will work as a hub to mediate the cross-sectoral network of Research Centers and AI research projects within the University of Tsukuba.
In particular, through collaboration with the Center for Cybernics Research, the International Center for Integrated Sleep Medical Science, the Center for Computational Science, the R&D Center for Frontiers of MIRAI in Policy and Technology, the Precision Medicine Development Research Center, the Tsukuba Digital-Bio International Center, and the R&D Center for Zero CO_2 Emission with Functional Materials, among others, we aim to explore new areas of research related to the theme "Human-supporting Artificial Intelligence." Our work draws a spiral of projects that begin at basic scientific research and reach to applied and industrial research, contributing to the creation of new values and the realization of the future super smart society.



Implementation of the "Super Smart Community" with Tsukuba Area as a model City

- Collaboration with Industry
- Collaboration with local National Research Institutes (NIMS, AIST, NIED, etc)
- Collaboration with TIA
- Collaboration with the AI center of AIST
- Collaboration with the Advanced Intelligence Project at RIKEN

Development of a base for Big Data utilization

Using the Interdisciplinary Character of our university, we will build a Big Data Utilization base through a network with each research center.

Use of the Tsukuba Area as an Empirical Model City

Application of new technologies in Tsukuba as an Empirical Model City through the collaborative network with national research institutes and enterprises.

Development of AI technologies employing the power of Supercomputing

Through collaboration with our university's Center for Computational Sciences, we will develop large-scale data analysis tools for Artificial Intelligence.

Development of New Human Resources for AI and Data Analysis

Develop new human resources capable of deploying high level knowledge of AI and data analysis technologies to real world applications. We conduct education through research activities to members of society in industries, etc.

Members / Laboratories

Division of Fundamental Research in Artificial Intelligence

Specialty on Numerical Algorithms

Tetsuya Sakurai
Director of Center for Artificial Intelligence Research, Professor / Institute of Systems and Information Engineering

Area of Expertise
Computational Mathematics

Keywords Related to Research
High performance algorithms, Data analysis, Image analysis, Neural network computation

Shigeru Saito
Visiting Professor / SIGNATE Inc.

Area of Expertise
Wisdom of Crowds, System Life Science

Keywords Related to Research
Open innovation, Machine learning, OMICs data analysis

Akira Imakura
Associate Professor / Institute of Systems and Information Engineering

Area of Expertise
Numerical analysis

Keywords Related to Research
Matrix computations, Matrix factorization-based algorithms for deep neural network computation

Akira Terui
Associate Professor / Institute of Pure and Applied Sciences

Area of Expertise
Computer Algebra, Symbolic Computation

Keywords Related to Research
Computer algebra, Symbolic-numeric computation, Automated deduction

Yasunori Futamura
Associate Professor / Institute of Systems and Information Engineering

Area of Expertise
Parallel Numerical Algorithm

Keywords Related to Research
Dimensionality reduction, High performance parallel algorithm, Parallel solver for eigenvalue problems, Parallel numerical software

Xiucai Ye
Associate Professor / Institute of Systems and Information Engineering

Area of Expertise
Machine Learning

Keywords Related to Research
Feature selection, Data analysis, Clustering, Classification, Network computing

Keiichi Morikuni
Assistant Professor / Institute of Systems and Information Engineering

Area of Expertise
Numerical Linear Algebra

Keywords Related to Research
Least Squares Problem, Singular System, Preconditioning, Krylov Subspace Method, Eigenproblem

Tomoki Mihara
Assistant Professor / Institute of Pure and Applied Sciences

Area of Expertise
Number Theory

Keywords Related to Research
p-adic analysis, p-adic geometry, p-adic representation

Specialty on Machine Learning

Kazuhiro Fukui
Professor /
Institute of Systems and Information Engineering

Area of Expertise
Pattern Recognition, Machine Learning, Computer Vision

Keywords Related to Research
Subspace methods, Mutual subspace method, Object recognition, Face image analysis, Time series analysis, Motion analysis

Taro Tezuka
Professor /
Institute of Systems and Information Engineering

Area of Expertise
Machine Learning, Database

Keywords Related to Research
Kernel methods, Computational neuroscience

Takumi Kobayashi
Professor (Cooperative Graduate School Program) /
Institute of Systems and Information Engineering

Area of Expertise
Pattern Recognition, Machine Learning

Keywords Related to Research
Feature Extraction, Feature Representation Learning, Image Recognition, Deep Learning, Sensor Data Analysis

Satoshi Iizuka
Associate Professor /
Institute of Systems and Information Engineering

Area of Expertise
Computer graphics, Computer vision, Machine learning

Keywords Related to Research
Image processing and generation, Image recognition, Deep learning

Claus Aranha
Assistant Professor /
Institute of Systems and Information Engineering

Area of Expertise
Theory and Application of Evolutionary Algorithms, Modeling and Program Generation

Keywords Related to Research
Evolutionary algorithms, Swarm intelligence, Artificial life

Ryotaro Sakamoto
Assistant Professor /
Institute of Pure and Applied Sciences

Area of Expertise
Number Theory

Keywords Related to Research
Iwasawa Theory, Selmer group, L-function

Specialty on Big Data / Crowdsourcing

Toshiyuki Amagasa
Professor / Center for Computational Sciences

Area of Expertise
Database, Data Engineering

Keywords Related to Research
Big data, Data mining, Semi-structured data

Atsuyuki Morishima
Professor /
Institute of Library, Information and Media Science

Area of Expertise
Database Systems

Keywords Related to Research
Crowdsourcing systems, Crowdsourcing applications, Human computation, Query processing

Hiroaki Shiokawa
Associate Professor / Center for Computational Sciences

Area of Expertise
Data Engineering, Database System

Keywords Related to Research
Big data processing, Data mining, Graph data management

Kazumasa Horie
Assistant Professor / Center for Computational Sciences

Area of Expertise
Machine Learning, Biological Signal Processing

Keywords Related to Research
Neural networks, Deep Learning, Electroencephalogram, Electromyogram

Bou Savong
Assistant Professor / Center for Computational Sciences

Area of Expertise
Data Engineering, Database System

Keywords Related to Research
Big data processing, Data mining, Data stream processing・analytics

Hiroyoshi Ito
Assistant Professor /
Institute of Library, Information and Media Science

Area of Expertise
Data mining, Machine learning

Keywords Related to Research
Time-series data analysis, Social network mining, Human-AI collaboration

Specialty on Security / Privacy

Kazumasa Omote
Professor /
Institute of Systems and Information Engineering

Area of Expertise
Information Security

Keywords Related to Research
Malware countermeasure, Cloud security, Risk assessment for cyber attacks

Youhei Akimoto
Associate Professor /
Institute of Systems and Information Engineering

Area of Expertise
Black-Box Optimization

Keywords Related to Research
Evolutionary Computation, Machine Learning, Markov Chain Analysis

Kazuto Fukuchi
Assistant Professor /
Institute of Systems and Information Engineering

Area of Expertise
Mathematical statistics and machine learning

Keywords Related to Research
Statistical inference, Machine learning, Fairness, Privacy

Specialty on Service Engineering

Yukihiko Okada
Professor /
Institute of Systems and Information Engineering

Area of Expertise
Japan's Service Development Theory

Keywords Related to Research
Service target costing, Data-driven service engineering, Applied statistics

Akiko Yoshise
Professor /
Institute of Systems and Information Engineering

Area of Expertise
Mathematical Optimization, Operations Research

Keywords Related to Research
Conic optimization, Algorithms, Optimization models

Hiroyasu Ando
Visiting Professor / Tohoku University

Area of Expertise
Complex Networked Systems

Keywords Related to Research
Mathematical modeling, Dynamics analysis, Data science

Tuan Phung-Duc
Associate Professor /
Institute of Systems and Information Engineering

Area of Expertise
Applied Stochastic Process

Keywords Related to Research
Modelling and performance analysis of services and information systems, Stochastic models, Queueing theory

Yuichi Takano
Associate Professor /
Institute of Systems and Information Engineering

Area of Expertise
Operations Research

Keywords Related to Research
Mathematical Optimization, Financial Engineering, Machine Learning

Kyosuke Yamamoto
Associate Professor /
Institute of Systems and Information Engineering

Area of Expertise
Civil Engineering

Keywords Related to Research
Bridge Maintenance, Structure Design

Specialty on Human Technology

Kenji Suzuki
Vice Director, Professor / Center for Cybernics Research,
Institute of Systems and Information Engineering

Area of Expertise
Artificial Intelligence and Robotics

Keywords Related to Research
Cybernics, Medicine and healthcare, Assistive technologies

Yasushi Nakauchi
Professor /
Institute of Systems and Information Engineering

Area of Expertise
Intelligent Environments

Keywords Related to Research
IoT, Sensor network, Big data analysis

Hajime Nobuhara
Professor /
Institute of Systems and Information Engineering

Area of Expertise
Computational Intelligence

Keywords Related to Research
Computational intelligence, Multi-media processing, Web intelligence, Drone

Naoto Ienaga
Assistant Professor /
Institute of Systems and Information Engineering

Area of Expertise
Machine learning, Computer vision

Keywords Related to Research
Deep learning, Fisheries, Occupational therapy

Specialty on Quantum System Information

Noboru Kunihiro
Professor /
Institute of Systems and Information Engineering

Area of Expertise
Cryptography, Quantum Computation

Keywords Related to Research
Cryptanalysis, Quantum Algorithm, Information Security

Yasuhiro Tokura
Professor / Institute of Pure and Applied Sciences

Area of Expertise
Condensed matter physics, Quantum Information

Keywords Related to Research
Semiconductor qubit, Quantum network, Non-equilibrium statistical physics

Yutaka Shikano
Professor /
Institute of Systems and Information Engineering

Area of Expertise
Quantum Information Science, Theoretical Physics

Keywords Related to Research
Quantum Metrology, Quantum Measurement, Quantum Randomness, Fundamental Physics Search

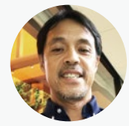
Division of Applied Research

Specialty on Healthcare and Sports

Shinya Kuno
Professor / Institute of Health and Sport Sciences

Area of Expertise
Sport Medicine, Health promotion, Health policy

Keywords Related to Research
Health promotion for the middle-aged and elderly, Health policy in community and workplace, Prevention of lifestyle-related diseases and nursing care, Prevention of sarcopenia and sarcopenic obesity



Tsuyoshi Matsumoto
Associate Professor /
Institute of Health and Sport Sciences

Area of Expertise
Sport Coaching

Keywords Related to Research
Sport, Coaching, Tactics, Strategy

Etsuko T. Harada
Professor / Institute of Human Sciences

Area of Expertise
Cognitive Psychology, Cognitive Science, Cognitive Engineering

Keywords Related to Research
Human-artifact interaction, Cognitive aging

Nanako Tamiya
Director, Professor /
R&D Center for Health Services, Institute of Medicine

Area of Expertise
Medicine, Medical and Health Services Research

Keywords Related to Research
Health services research, Research based on medical & long-term care claim data, Outcome research, Public health, Long-term care insurance system, The integrated community-care system, Evaluation of quality of medical treatment, Nursing and social welfare services

Li-Chen Fu
Visiting Professor / National Taiwan University

Area of Expertise
Smart Healthcare, Intelligent Robotics, AR/VR, Visual Application, Control

Keywords Related to Research
Socially Assisted Robots, Elderly Care, Visual Detection, AR for Metaverse, UAV

Bogdanova Anna
Assistant Professor /
Institute of Systems and Information Engineering

Area of Expertise
Machine Learning

Keywords Related to Research
Distributed Data Analysis, Federated Learning, Explainability, Natural Language Processing

Specialty on Medical and Material Sciences

Taka-Aki Sato
Director, Professor / R&D Center for Precision Medicine

Area of Expertise
Molecular Oncology

Keywords Related to Research
Oncogene, Tumor suppressor gene, Liquid biopsy, Metabolome analysis

Masashi Yanagisawa
Director, Professor / International Institute for Integrative Sleep Medicine (WPI-IIIS)

Area of Expertise
Sleep Biomedicine, Neuroscience, Pharmacology

Keywords Related to Research
Sleep / Wake, Electroencephalography, Polysomnography

Yoshiyuki Sankai
Executive Research Director, Director, Professor / Center for Cybernics Research, R&D Center for Frontiers of MIRAI in Policy and Technology, Institute of Systems and Information Engineering

Area of Expertise
Cybernics, HOJO-brain, Artificial Intelligence; AI, Artificial brain, Cybernic kernel

Keywords Related to Research
Cybernics, Robotic treatment device, Bio robotics, Neuro-machine interface

Masahide Itoh
Director, Professor / R&D Center for Innovative Material Characterization, Institute of Pure and Applied Sciences

Area of Expertise
Applied optics

Keywords Related to Research
Optical information processing, High-precision interferometric measurement, Optical wavefront measurement

Kazuya Morikawa
Professor / Institute of Medicine

Area of Expertise
Bacteriology

Keywords Related to Research
Gram-positive pathogens, Staphylococcus

Larry Nagahara
Visiting Professor / Johns Hopkins University

Area of Expertise
Nanotechnology, Sensors, Scanning Probe Microscopy

Keywords Related to Research
Nanosensors, Nanobiotechnology, Internet of Things

Chii-Wann Lin
Visiting Professor / National Taiwan University

Area of Expertise
Bio-electronics, Optical Biosensor, Medical Devices

Keywords Related to Research
Neuromodulation, Plasmonics, Bio-signal Analysis

Haruka Ozaki
Associate Professor / Institute of Medicine

Area of Expertise
Bioinformatics, Computational Biology

Keywords Related to Research
Single-cell omics data analyses, Multi-omics data analyses, HTS, Epigenomics, Biological sequence analysis

Takaho Tsuchiya
Assistant Professor / Institute of Medicine

Area of Expertise
Systems Biology, Bioinformatics, Computational Biology

Keywords Related to Research
Single cell omics data analysis, Sparse modeling, System identification

Specialty on Society and Arts

Hiroshi Ezura
Professor / Institute of Life and Environmental Sciences

Area of Expertise
Horticulture, Plant Molecular Breeding

Keywords Related to Research
Tomato, Melon, Genetics and breeding, Plant biotechnology, Genetic transformation, Genome editing

Naoya Fukuda
Professor / Institute of Life and Environmental Sciences, Tsukuba-Plant Innovation Research Center

Area of Expertise
Protected Horticulture

Keywords Related to Research
Greenhouse management, Plant physiology, ICT for agriculture

Kou Miyake
Visiting Professor / NTT Data Intellilink Corp.

Area of Expertise
Cybersecurity, IT System Architecture

Keywords Related to Research
Cybersecurity Architecture and related leading-edge technology, Risk Management, Security Management, National Security

Nii O. Attoh-Okine
Visiting Professor / University of Maryland, College Park

Area of Expertise
Artificial Intelligence, Cyber Resilience, Cyber Security in Critical Infrastructure, Graphical Probability Models and Railway Engineering

Keywords Related to Research
Graphical Probability Models, Railway Track Engineering, Blockchain Technology, Bayesian Networks, Neural Networks

Hitoshi Imaoka
Visiting Professor / NEC Corporation

Area of Expertise
Biometrics, Pattern Recognition

Keywords Related to Research
Face Recognition, Medical Image Processing, Machine Learning

Toshiaki Uchiyama
Associate Professor / Institute of Art and Design

Area of Expertise
Design Science

Keywords Related to Research
Design Science

Yoichi Ochiai
Associate Professor / Institute of Library, Information and Media Science

Area of Expertise
CGH, HCI, VR, Visual Auditory Tactile Display, Digital Fabrication

Keywords Related to Research
CGH, HCI, VR

Hiroko Terasawa
Associate Professor / Institute of Library, Information and Media Science

Area of Expertise
Acoustics, Computer Music, and Sound Design

Keywords Related to Research
Sound synthesis, Data sonification, Sonic interaction, Musical emotion, and Timbre perception

Specialty on Mobility

Makoto Itoh
Professor / Institute of Systems and Information Engineering

Area of Expertise
Human Factors

Keywords Related to Research
Human-Machine Systems, Automation, Automated Driving

Yoshinari Kameda
Professor / Center for Computational Sciences

Area of Expertise
Computational Media

Keywords Related to Research
Computer vision, Mixed reality, Virtual reality, Augmented reality

Yuichi Saito
Assistant Professor / Institute of Systems and Information Engineering

Area of Expertise
Human-machine systems, Cognitive engineering, Human interaction

Keywords Related to Research
Automated driving, Driver assistance, Shared control, Analysis of drive recorder data