

Faculty **Profiles**

ENGINEERING
SCIENCES AND
DESIGN



Tokyo Tech

ENGINEERING SCIENCES AND DESIGN

Solving various problems in society through Engineering Design.

The Graduate Major in Engineering Sciences and Design (ESD) is one of the Interdisciplinary Graduate Majors in the graduate school. Various researchers belonging to one of seven departments in two Schools (School of Engineering, School of Environment and Society) get together, and conduct research practices on design methodologies to create new technologies, values, and concepts sought by society.

Main Faculty Members in Charge of the ESD Graduate Major

The main faculty members in charge of the Graduate Major in Engineering Sciences and Design curriculum are also responsible for its creation and management thereof.

*The list of faculty members is sorted by family name.

Professor

Fujii, Haruyuki

**School of Environment and Society
Dept. of Architecture and Building Eng.**

Doctor of Engineering / Waseda University

Career: Waseda University / Carnegie Mellon University /
Shimizu Corporation / The University of Sydney

Design Science

Constructive Methodology

First-Person Study

Spatial Schema

Design Computing

Designing a methodology for design science that sheds light on the action known as design

I have been developing a methodology for design science that bridges the subjectivity in designing, such as subjective insight, illogical thinking, and individual localization, and the objectivity in natural science, such as objective grounding, logical thinking, and universal explanation. This activity is composed of interdisciplinary exploration and design of the following four pillars; (1) a method of first-person study that allows subjectivity and objectivity to coexist, (2) a constructive method where logical thinking - deduction - and illogical thinking - induction and abduction - are employed, (3) the dynamic relationships between the symbolic representation and operation in designing and their referents - physical matters and conceptual issues - and (4) spatial schema representing the spatial and temporal relationships between man and environment via artifacts. In addition, in relation to the activities mentioned above, I am involved in some intermedia art activities that express the experience of architectural spaces and landscapes in the form of sound and music with a composer.

Selected Publications

Design of Intellect, Suwa Masaki & Haruyuki Fujii, Kindaigakusha, 2015. / On Study about Activities of Creation, Haruyuki Fujii, Journal of JSAI 28(5), 720-725, 2013 / Designing Action Know as Design, Haruyuki Fujii & Nakashima Hideyuki, Journal of JCSS, 17(3), 403-416, 2010

Professional Activities

Vice-Chair, Design Computing and Cognition (2004 - current)

Associate Professor

Hijikata, Wataru

**School of Engineering
Dept. of Mechanical Eng.**

Doctor of Engineering / Tokyo Institute of Technology

Career: Tokyo Institute of Technology / TOYOTA Central R&D Labs., Inc.

Medical mechatronics

In-vivo energy harvesting

Wireless power transfer

Artificial heart

Development of mechanical systems enhancing quality of life

The purpose of the research topics is to realize a medical mechatronics system, which enhances quality of life. In the research of "in-vivo energy harvesting system", I develop a generator system, which can convert the energy of human activity into electrical energy inside the body to power an implantable medical device such as a pacemaker and an in-vivo health monitoring sensor. An implantable artificial heart and power assist suit, however, consumes 10 to 100 watts. Therefore, for these devices, I also develop "a wireless power transfer system," with a function that tracks the movement of humans wearing such devices. Another research topic is "an intelligent artificial heart," whereby the thrombus can be automatically detected inside itself, as well as the flow rate controlled by cooperating with a patient's failing heart.

Selected Publications

Implantable power generation system utilizing muscle contractions excited by electrical stimulation, J Engineering in Medicine, 2016.
Sensorless Viscosity Measurement in a Magnetically-Levitated Rotary Blood Pump, Wataru Hijikata, et al., Artificial Organs. 2015.

Professional Activities

International symposium on magnetic bearing, Organizing committee (2016)
ROBOMECH 2016 Organizing committee (2016)
International conference on Mechatronics Technology, Organizing committee (2015)

Associate Professor

Inaba, Kazuaki

Engineering Design

Mechanical Engineering

Multi-physics



Research and development of new machines and structures through engineering design

To combat various problems in industry, we are creating new machines and structures and proposing evaluation methods based on mechanical engineering, especially the strength of mechanics and fluid mechanics. With high-speed cameras and numerical simulations, we visualize invisible phenomena and build theoretical models. Research subjects are widely spread from small instruments, such as collarium containers and ophthalmic surgical instruments, to large parts, such as automobile parts, shock absorbers, pumps, and pipelines. Materials and structures with functions suitable for various applications are studied and developed experimentally, theoretically, and numerically. We are conducting numerous studies focused on fluid-structure interaction, impact phenomena, and multi-physics such as water hammer, liquid atomization, bubble dynamics, and cavitation erosion. Moreover, in the Tokyo Tech Design Factory, we are developing practical design methodology in engineering design processes, such as extraction of user needs, prototyping with 3D printers, laser cutters and similar tools, business model generations with managers, visualization and measurement of users' experiences.

Selected Publications

Kojima et al., J Press Vessel Tech, 139, 2017.
Ushifusa et al., J Supercritical Fluids, 94, 2014.
Inaba & Shepherd, J Press Vessel Tech, 132, 2010.

Professional Activities

ASME PVP FSI Tech Committee, Vice Chair (2017-)
JSME M&M, Steering Committee Member (2017-)
JSMS Kanto Branch, Secretary (2016-2018)

Associate Professor

Nakatani, Momoko

User Experience

Service Design

Well-being



Solving social problem through design of services that move people's hearts

In order to design services that move people's hearts using technologies and to solve complex social issues, it is essential that the people who use services, and other related stakeholders, are involved in the design process; multiple stakeholders need to work hand in hand to seek out intrinsic needs and derive solutions through a process of trial and error.

Our laboratory promotes research into technologies and methodologies for effective collaboration utilizing the perspectives and expertise of a diverse range of people based on design thinking and human-centered design. In particular, we focus on "living labs" where users, companies, and governments co-create services over a long period of time. By observing the changes in people's minds and behaviors in the process of co-creation, user models are constructed, and tools and methodologies for effective co-creation are developed. We do not intend to support the pursuit of profit by companies alone, but to solve social issues through creating services, particularly focusing on solving the isolation of the elderly and parents raising infants. We aim to contribute to improving well-being and to the realization of a sustainable society by studying the process of co-creation.

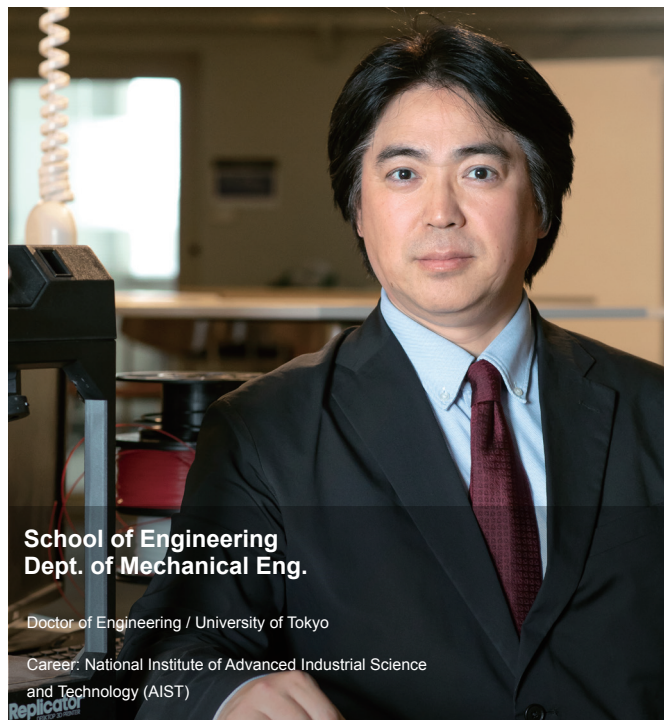
Selected Publications

M. Nakatani, A. Nakane, F. Akasaka, Y. Ishii, M. Watanabe: Potential of the dialogue in the living lab: Case study on "Service Lab for Nurturing", The Transactions of Human Interface Society, 21(4), pp. 391-404, (2019) in Japanese.
M. Nakatani, T. Ohno, A. Nakane, A. Komatsubara, S. Hashimoto: How to Motivate People to Use Internet at Home: Understanding the Psychology of Non-active users, Proceedings of APCHI'12, pp.259-268 (2012).

Professional Activities

Chair of Special Interest Group on Communication Enhancement, Human Interface Society-Committee member of Special Interest Group on User Experience and Service Design, Human Interface Society

Professor

Nishida, Yoshifumi

**School of Engineering
Dept. of Mechanical Eng.**

Doctor of Engineering / University of Tokyo

Career: National Institute of Advanced Industrial Science
and Technology (AIST)

Living Function

Human Centric Design

Artificial Intelligence

IoT

Living Centric Design: a New Methodology for Resilience to Human Living Function Change

A society that fosters resilience to changes in living function (a “living function resilient society”) is required in the centenarian era. It has become even more imperative to address the physical and cognitive changes faced by children, the elderly, and disabled persons, and to ensure they enjoy safe living environments in ways that allow them to maintain active social participation levels.

Building the living function resilient society requires a new methodology for “living centric design”. Recently, low-cost sensors, storage devices and artificial intelligence have become widely available. To facilitate a scientific approach to living centric design based on these technologies, our laboratory is engaged in developing 1) living geometry, which is computational technology for a living database, 2) living sensing and support modules that enable personalized safety and social participation, and 3) a living innovation social system for transforming UN’s Sustainable Development Goals level social problems into industry level solutions as components of a community-based participatory research approach.

Selected Publications

Detecting and Modeling Child’s Play Behavior Using Sensor-Embedded Climbing Playground Equipment, International Journal of Arts and Technology, 2012
Development of Childhood Fall Motion Database and Browser Based on Behavior Measurements, Accident Analysis & Prevention, 2013

Professional Activities

Board Member of Children Safety Society of Japan, Japan Association of Community Based Civil Safety Sciences, and Safe Kids Japan.

Program Manager of Social Technology Domain of SECOM Science and Technology Foundation

Associate Professor

Ohashi, Takumi

**School of Environment and Society /
Dept. of Transdisciplinary Science and Eng.**

Doctor of Engineering; Master of Management of Technology /
Tokyo Institute of Technology

Career: Tokyo Institute of Technology / Stanford University

Human-centered design

Cognitive psychology

Design process

Electronic devices

Beyond Human-Centeredness: Designing for People and the Planet

“Human-centered design” is a method of problem-solving that aims to make systems usable and useful by focusing on the users. While it creates solutions that meet human needs, in recent years, design has taken on greater responsibility. Actually, SDGs are well-known Global Goals that aim to take into consideration their long-term effect on human society and the global environment. For instance, “wicked problems” such as climate change, an aging society, food loss, and lack of quality education access cannot be solved simply by meeting human needs. Our lab engages in transdisciplinary research to scientifically investigate the design process in order to solve “wicked problems” by realizing the preferable future based on socio-cultural trends and cutting-edge technology. Members are encouraged to develop and implement systems/products while working with experts in the actual field while rigorously analyzing the design in order to understand how and why the design process works and fails. We design in a wide variety of domains, including livestock breeding, nursing care, education, and disaster management.

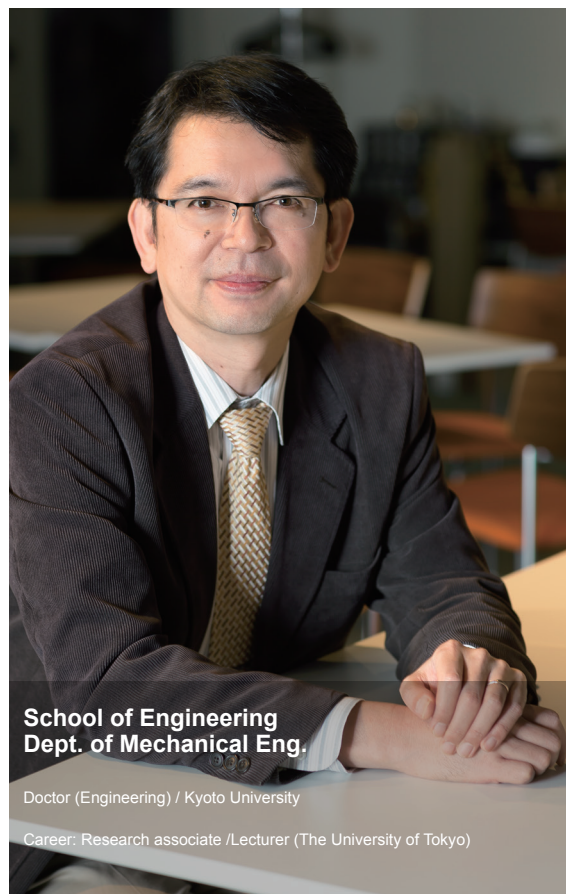
Selected Publications

Ohashi, T., et al. (2021). Real-Time Assessment of Causal Attribution Shift and Stay Between Two Successive Tests of Movement Aids. Integr. Psych. Behav.
Ohashi, T., et al. (2015). Multi-layered MoS₂ Film Formed by High-temperature Sputtering for Enhancement-mode nMOSFETs. Jpn. J. Appl. Phys.

Professional Activities

Scientific Advisory Board, AHFE International Conference on Human Factors in Accessibility and Assistive Technology (HFAAT)

Professor

Okada, Masafumi

Robotics

Control Engineering

Human Centric Design

Robotics and non-linear dynamics for quality of life improvement

My research interests are quality of life improvement in our daily life based on Robotics and Control Engineering. Some mechanical devices have been developed as useful tools, e.g., medical robots and welfare devices, while my research fields are not limited to them. To date, I have challenged 'Development of a human motion support device', 'Motion enhancement for motion instruction', 'Optimal distribution of objects in exhibition space' and more, based on motion capture data or human muscle characteristics. These topics are strictly related to our daily life and the main purposes are realization of a 'comfortable life' with the keyword 'non-linear dynamics'. The non-linearity of the mechanism and dynamics makes it difficult to intuitively understand; however, it sometimes yields useful phenomena. The main focus of my research is designing and synthesizing these phenomena for our comfortable life and environments from engineering and science points of view.

Selected Publications

Motion optimization for first-aid chest compression based on kinematic, dynamic and temporal redundancy, Masafumi OKADA and Shun KAYASHIMA, Mechanical Engineering Journal, 2016

Professional Activities

Robotics Society of Japan, International administration officer (2015-2016)
SICE SI-division, division secretary (2014)

Professor

Saijo, Miki

Communication design

Discourse analysis

User-centered design

Diffusion of innovation

Communication design for diffusion of innovation

For diffusion of innovation to solve various social issues and improve people's quality of life, it is essential to cooperate with people of diverse background and knowledge. However, to realize this cooperation, a proposition that dialogue among diverse people tends to be easily broken must be solved by "Communication Design." Our laboratory policy is to conduct "Action Research," a repeating cycle of going to actual fields where problems occur, extracting and analyzing the issues, and giving feedback to the fields. In the actual local community, we strongly promote cooperation and collaboration between local governments, residents, and companies, to solve the social issues that are complexly intertwined. To date, we have tried to develop assistive technology devices, such as a 4-wheel electric power-assisted bicycle and a meal assistive robot for frail elderly people, by interdisciplinary and multi-industry cooperation. Highly welcome are especially those who want to analyze the diffusion of innovation from the viewpoint of people's interaction, those who are interested in communication and cooperation among people having less common points, and those who want to organize communication problems in their own workplaces from a bird's-eye view.

Selected Publications

Saijo, M., Communication Design, Kuroshio Publishers, 2014.

Saijo, M., Structure of Centre of Attention in a Multi-Party Conversation in Japanese. Meta-informative Centering in Utterances: Between Semantics and Pragmatics, 2013: 183-192.

Professional Activities

Member, Science Council of Japan

Professor

Saito, Shigeki

**School of Environment and Society
Dept. of Transdisciplinary Science and Eng.**

Doctor of Engineering / University of Tokyo

Career: University of Tokyo / Tokyo Institute of Technology

Micro-robotics

Engineering Design

Value creation by development of micro-robotics technology and methodology of engineering design

Our lab has two main focuses for research interests: "Development of Micro-robotics Technology" and "Methodology of Engineering Design". The goal of the first focus is to synthesize new types of functional structures that enable ways of attaching and detaching a target object in the field of robotics by designing micro-mechanical structure and surface material properties. The example research themes are "Gecko-type electrostatic chuck" and "Manipulation technology using capillary force on hydrophilic/hydrophobic surfaces". The goal of the second focus is to establish "the Methodology of Engineering Design" that enables value creation in the process of development of products and/or services through investigations using an engineering and cognitive science approach, where the fundamental background knowledge of this topic comes from the Project-Based-Learning class, Engineering Design Project, at ESD of Tokyo Tech for industry-university collaborations. The research theme examples are "Members' diversity effect on ideation process in design projects" and "Incubation effect on the success rate in solving insight problems".

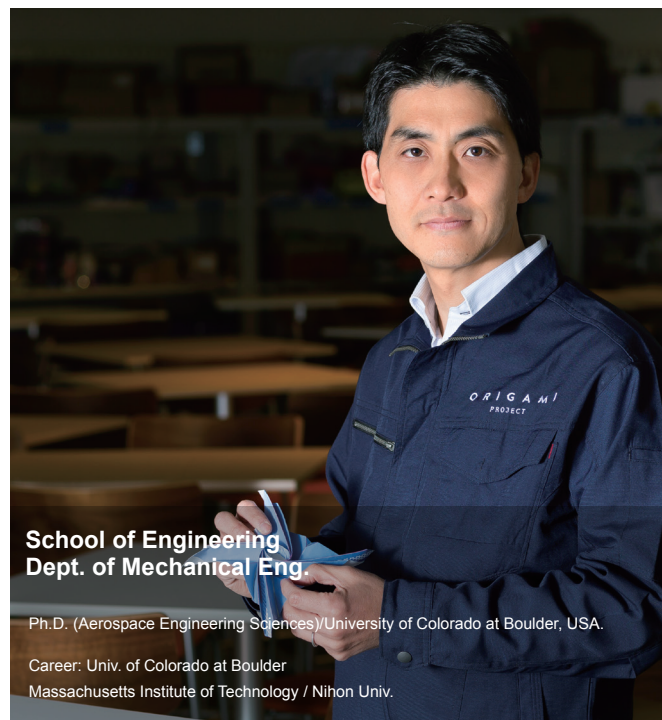
Selected Publications

"Compliant electrostatic chuck based on hairy microstructure", Smart Materials and Structures, Vol.22, pp.015019(1-6), 2013. / "Introduction to Design Thinking for Engineers", Shoeisha, 2017 (in Japanese). / "Educational Effectiveness and Implementation Challenge in Engineering Design Project by Radical Collaboration among People Having Different Expertise and/or Backgrounds", Journal of Japanese Society for Engineering Education, Vol.65, No.4, pp. 57-62, 2017 (in Japanese).

Professional Activities

Member of Steering Committee of Micro-Nano Science and Technology Division, the Japan Society of Mechanical Engineers / Conference Chair of 4th Conference of Society of Education for Innovation / Member of Internal Selection Committee of Nikkei Award for Excellent Product/Service

Associate Professor

Sakamoto, Hiraku

**School of Engineering
Dept. of Mechanical Eng.**

Ph.D. (Aerospace Engineering Sciences)/University of Colorado at Boulder, USA.

Career: Univ. of Colorado at Boulder

Massachusetts Institute of Technology / Nihon Univ.

Space Structures Engineering

Structural Dynamics

Nano-satellite Development

Systems Engineering

Design Thinking

Creation of innovative large space structures using numerical analysis technologies and nano-satellite demonstrations

For the construction of significantly large space structures, advances in space-deployment, space-assembly, and space-manufacturing technologies are important. Our laboratory conducts (i) the proposal of origami-based deployable space structures, (ii) the development of verification methodology for large space structures using state-of-the-art numerical analysis techniques, and (iii) space demonstration of technologies by developing nano-satellites ourselves. For example, our laboratory leads the development of 3U CubeSat, OrigamiSat-1. It will be launched by a Japanese Epsilon rocket, and will demonstrate multi-functional membrane deployment technology. Thin-film devices, such as flexible solar cells, can be attached throughout the OrigamiSat-1's membrane. Additionally, our laboratory develops the verification strategies through numerical analyses, which are applicable to actual solar power sail missions; and develops the active shape-control mechanisms and control laws for radio frequency space antennas. Through these technology developments, our laboratory envisions new space structure systems in the future.

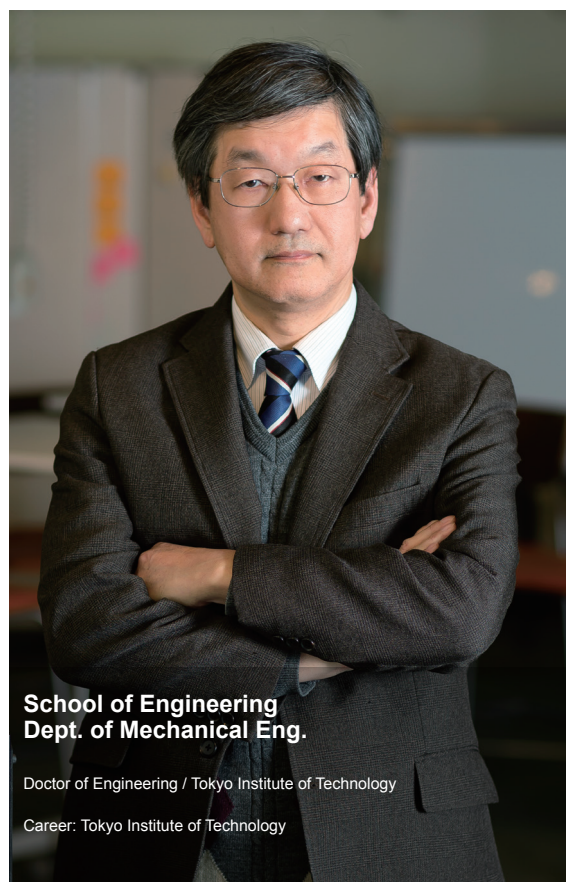
Selected Publications

Testing Large Ultra-Lightweight Spacecraft (Chap. 4), AIAA, 2017 / "Folding Patterns of Planar Gossamer Space Structures Consisting of Membranes and Booms", Acta Astronautica, 94(1), 2014.

Professional Activities

University Space Engineering Consortium (UNISEC), Board Member; Japan Society of Mechanical Engineers, Member; Japan Society for Aeronautical and Space Sciences, Member; American Institute of Aeronautics and Astronautics, Senior Member.

Professor

Yoshida, Kazuhiro

Microrobotics

Actuators

Functional materials

Realization of high-power density microrobots using functional materials

We have been developing microrobots that are micro-sized, travel in wide space supporting their own weight, and perform power-needed tasks. The feature of our research is using functional materials. First, by using electro-rheological fluid (ERF) that changes its viscosity when subjected to an electric field, we proposed and have been developing simple and miniaturizable ER microvalves. Based on MEMS (micro-electro-mechanical systems) technologies, we have realized a 3-mm-long flexible ER microvalve. Second, for multiple degrees of freedom actuator systems, we proposed and have been developing alternating pressure systems. By rectifying alternating flows due to an alternating pressure source using synchronized switching of ER microvalves, we have realized a 1.6-mm-long microfingert. Third, as hydraulic power sources, we proposed and have been developing piezoelectric micropumps using fluid inertia that has an outlet pipe instead of a check valve. We have realized the micropump with the world's highest level of power density.

Selected Publications

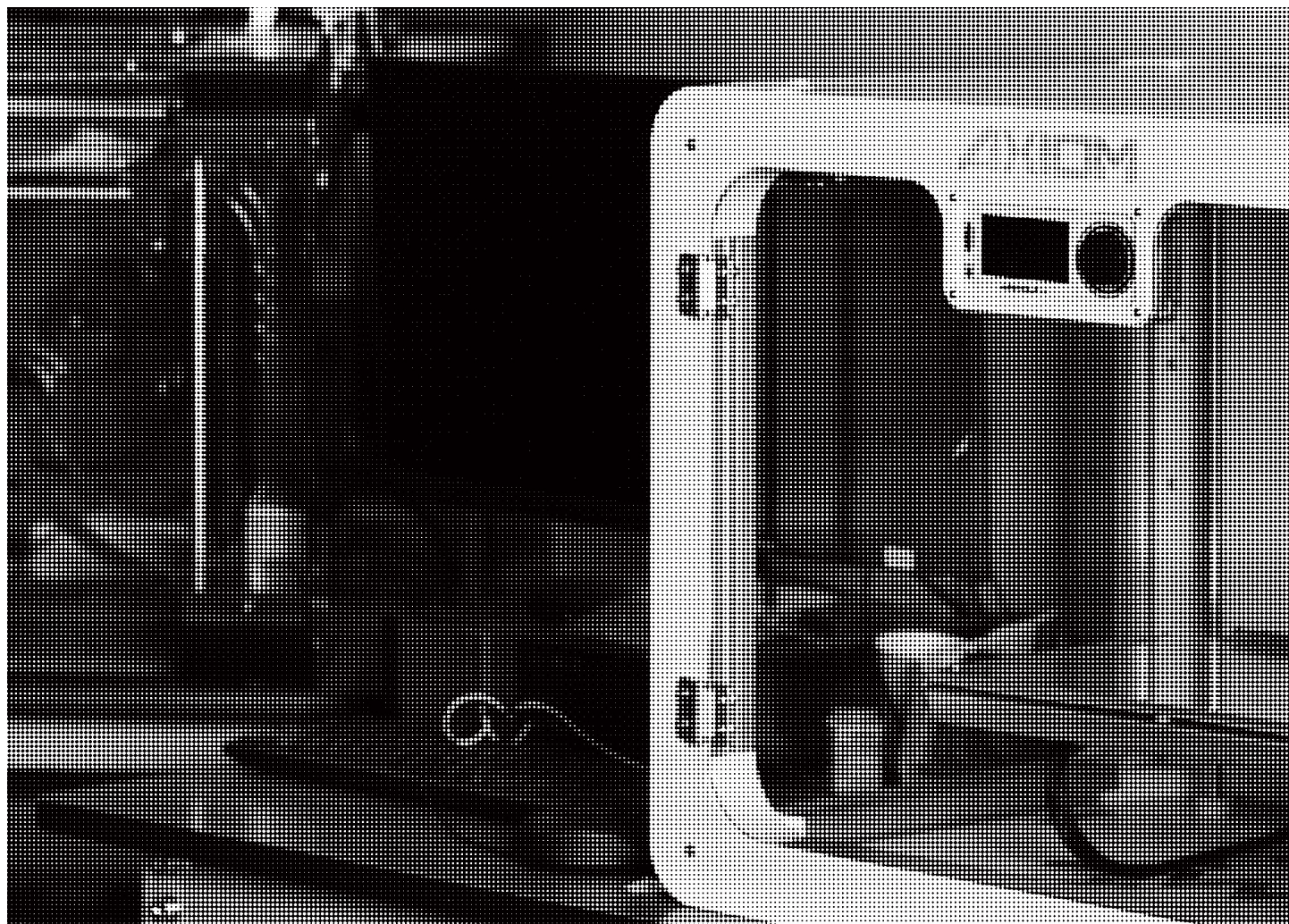
A study on a soft microgripper using MEMS-based divided electrode type flexible electro-rheological valves, *Mechatronics*, 29, Aug. 2014 / An MEMS-based multiple electro-rheological bending actuator system with an alternating pressure source, *Sensors & Actuators A*, 245, Apr. 2016

Professional Activities

The Japan Society of Mechanical Engineers, Division of Machine Design & Tribology, Secretary (2007, 2013)

The Japan Fluid Power System Society, Director (2006-2010, 2012-2014)

The Japan Fluid Power System Society, Editorial Committee, Chairperson (2012-2014)



School of Environment and Society / Dept. of Transdisciplinary Science and Eng.

Sadeghzadeh Nazari, Mehrdad Lecturer

Earthquake Engineering

Seismic Control

Tuned Mass damper

Base Isolation

**Aspiring taller and longer through realizing innovative structural seismic vibration control systems**

My research interests include developing innovative seismic structural/non-structural vibration control systems, with specific focus on Tuned Mass Dampers and vibration base isolators. I am currently working on improving a novel compact Tuned Roller Mass Damper system on which I could claim a patent through the University of Tokyo. The system may be applied to various structures from high-rise buildings and long-span bridges to non-structural equipment, in order to mitigate unwanted vibrations due to earthquakes or wind. I strive to make advantage of various science and engineering disciplines to address Earthquake Engineering and Structural Dynamics problems.

Ph.D. (Civil Engineering) / The University of Tokyo

Postdoctoral Fellow, Institute of Industrial Science, The University of Tokyo
Seismic Retrofit Researcher, SHO-SEKKEI Corporation, Tokyo

Selected Publications

"Analyzing the Seismic Behavior of Secondary Systems, and proposing the Floor Design Spectra considering Structural Inelastic Behavior and Primary-Secondary Interaction", co-authored, 206-P Report, International Institute of Earthquake Engineering and Seismology, 2020 (to be), Iran

School of Engineering / Dept. of Industrial Eng. and Economics

Ho, Bach Quang Assistant Professor

Serviceology

Well-Being

Transformative Service Research

Consumer Research

**Realization of society for the human well-being through services**

"Service" means "human exchange process to co-create value" in service marketing. My research analyzes service as a component of the society, and focuses on service systems that achieve well-being, especially those that transform people's behavior and attitudes and promote their growth. Well-being research to date has mainly focused on "what is well-being?". However, the findings of existing research have not yet been fully utilized in our society. Therefore, the research of "how can we enhance well-being in economic and social activities?" is needed and my research vision is to increase the number of services oriented toward human well-being in the society.

Ph.D. (Knowledge Science) / Japan Advanced Institute of Science and Technology

The University of Tokyo, Project Researcher

University of Strathclyde, Visiting Researcher

Selected Publications

Ho, B. Q. & Shirahada, K. (2019). Barriers to Elderly Consumers' Use of Support Services: Community Support in Japan's Super-Aged Society. Journal of Nonprofit and Public Sector Marketing.

School of Environment and Society / Dept. of Architecture and Building Eng.

Kahlon, Yuval Assistant Professor

Design Cognition

Intelligent CAD

Situatdness in Design

**Making Intelligent Systems for Design Studies and Practices**

Since design is a highly intelligent activity, studying human design processes enables to get valuable insights into human thinking, and the ways it facilitates intelligent action. The value of such insights is twofold - they both deepen our understanding of human cognition, and enable us to enhance current computational design systems. Specifically, I am interested in the relations between seeing and acting in design, as they are tightly linked with human designers' adaptability to changing situations. By observing human designers, we develop a new understanding of design processes, which is utilized for constructing intelligent design systems.

Doctor (Engineering)
Tokyo Institute of Technology

IAUI, Computational Design Instructor
ParaGroup Israel, Former Co-Founder & CTO

Selected Publications

Y. Kahlon and H. Fujii, "Towards Modelling Interpretation of Structure as a Situated Activity: A Case Study of Japanese Rock Garden Designs", in Design Computing and Cognition '20, 2020.

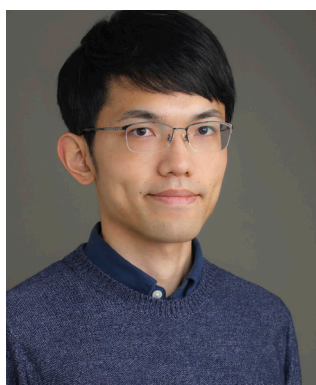
School of Environment and Society / Dept. of Transdisciplinary Science and Eng.

Taoka, Yuki Assistant Professor

Design Engineering

Co-design

Technology for development

**Exploring design as a way to apply technologies into social problems**

His research interest is on co-design as a way to create "usable and attractive" interface between technology and societies. His research aims to analyze and to support co-design which enables people from various backgrounds such as users to collaboratively find needs, and generate and deploy ideas. Currently, his research focuses on idea generation with support of tactile objects. In addition, co-design is used to apply technologies for development in developing countries. His interests also cover methods to develop technologies which is culturally acceptable and sustainably manageable by local people.

Ph.D. / Tokyo Institute of Technology

UNICEF ECARO (Internship)

WHILL, Inc. (Internship)

Selected Publications

Taoka, Y., Kagohashi, K., & Mougnot, C. (2018). A cross-cultural study of co-design: the impact of power distance on group dynamics in Japan. CoDesign

Secondary Faculty Members in Charge of the ESD Graduate Major

Secondary faculty members with diverse backgrounds and expertise are also assigned to help develop ESD graduate studies, which contributes to widely varied research and education in engineering design.

ENGINEERING
SCIENCES AND
DESIGN

Associate Professor **Abe, Naoya**



**School of Environment and Society
Dept. of Transdisciplinary Science and Eng.**
Ph.D. (Applied Economics and Management) /
Cornell University

Career: Overseas Economic Cooperation
Fund (OECF), Japan Bank for International
Cooperation (JBIC), National Institute for
Environmental Studies (NIES), Tokyo Tech.

Environmental and Social Sustainability Assessment

Social adaption and diffusion of renewable energy systems

People-centered research on environmental and social sustainability

Our research group mainly works in three fields: environmental sustainability (e.g., assessment of social adaptation and diffusion of a renewable energy system) and social sustainability (e.g., assessment of the introduction of e-government in a developing country) and the combined area of those two fields (e.g.,

assessment and proposal of a more effective municipal solid waste management in a rapidly aging society from a life-stage perspective). We value on-the-ground activities greatly for unique research accomplishments.

Selected Publications

Junichirou Ishio, Naoya Abe. Measuring Affective Well-Being by the Combination of the Day Reconstruction Method and a Wearable Device: Case Study of an Aging and Depopulating Community in Japan, Augmented Human Research, Springer Singapore, Feb. 2017.

Hiroki Nakamura, Naoya Abe. Tourist decisions in renting various personal travel modes: A case study in Kitakyushu City, Japan, Tourism Management, Vol. 55, Page 85-93, Aug. 2016.

Professional Activities

The Society for Environmental Economics and Policy Studies (SEEPS), The Japan Society for International Development (JASID), Member of the Center for Environmental Information Science

Associate Professor Akasaka, Hiroki



**School of Engineering
Dept. of Mechanical Eng.**

Doctor of Engineering
Tokyo Institute of Technology

Career: Nagaoka University of Technology /
Citizen Watch Co., Ltd.

Materials engineering

Material analysis

Thin-film science and engineering

Inorganic carbon materials

Innovation through development of new functional materials

Development of new functional materials, mainly carbon materials, is the research field of our laboratory. Although we mainly focus on the materials field, we also study in an interdisciplinary field crossing these fields because I have studied in three disciplines, electrical engineering, chemical and mechanical engineering. Research on diamond-like carbon films and composite materials with nanomaterials,

such as carbon nanotubes, are currently conducted. To obtain the higher advanced functional materials, we investigate not only estimation of material properties but also analysis of their structure, and obtain guidelines for material design. Additionally, we investigate the possibility of doping, among other factors, to obtain more advanced materials.

Selected Publications

N. Ata, N. Ohtake, H. Akasaka, Polyethylene–Carbon Nanotube Composite Film Deposited by Cold Spray Technique, J. Therm. Spray Technol. 26 (2017) 1541 / Yutaro Suzuki, Yasuyoshi Kurokawa, Tsuneo Suzuki, Kazuhiro Kanda, Masahito Niibe, Masayuki Nakano, Naoto Ohtake, Hiroki Akasaka. Structure and physical properties of stable isotopic amorphous carbon films, Dia. Relat. Mater., 63(2015) 115.

Professional Activities

Materials and Processing division the Japan Society of Mechanical Engineers
Japan New Diamond Forum
The Japan Society for Precision Engineering

Associate Professor Akita, Daisuke



**School of Environment and Society
Dept. of Transdisciplinary Science and Eng.**

Doctor (Science)
The University of Tokyo

Career: JAXA/ISAS / The University of Tokyo,
Institute of Industrial Science

Planetary exploration systems

Space transportation systems

High-speed aerodynamics

Passive exploration systems using diverse environments of space

We study about planetary exploration systems and space transportation systems, based on aerodynamics, with a long-term perspective. We are particularly interested in passive systems that take advantage of the seemingly severe and diverse environments of space; for example, sails, balloons, or kites, which must look like strange vehicles

in space. In addition to ground experiments and numerical simulations, we perform flight demonstrations in orbit in collaboration with JAXA and other universities. We aim to develop the concepts of exciting and attractive systems with creative young students to explore new horizons.

Selected Publications

Suborbital Reentry Demonstration of Inflatable Flare-type Thin-membrane Aeroshell using a Sounding Rocket, Kazuhiko Yamada, Yasunori Nagata, Takashi Abe, Kojiro Suzuki, Osamu Imamura, Daisuke Akita, Journal of Spacecraft and Rockets, 2015.

Professor Endo, Gen



**School of Engineering, Dept. of
Mechanical Eng.**

Doctor of Engineering
Tokyo Institute of Technology

Career: Sony Corporation / Tokyo Medical
and Dental University / Tokyo Institute of
Technology

Robotics

Mechanism

Mechatronics

Creation of robot systems that contribute to society

My research field is in robotics, particularly in mechanical design and its application to a practical robotic system. Our final goal is to contribute to society by solving actual problems using a new robotic system. For example, robot technology is essential for decommissioning of the Fukushima Daiichi nuclear power plant under a high radiation dose level. I have been developing a long-reach manipulator

to access confined spaces, and a mobile manipulator to carry ultrasonic sensors with collaborators. In the case of welfare robotics, I have proposed a mobile robot to help home oxygen therapy patients. Frequent field tests as well as user feedback are also involved in investigating practical solutions.

Selected Publications

"Development of a Coupled Tendon-Driven 3D Multi-Joint Manipulator", A. Horigome, H. Yamada, G. Endo, S. Sen, S. Hirose, E. F. Fukushima, Int. Conf. on Robotics and Automation, 2014

Professional Activities

Secretary of System Integration Division of Society of Instrument and Control Engineers (2009)
Secretary of Robotics and Mechatronics Division of Japan Society of Mechanical Engineers (2014)
Delegate of Robotics Society of Japan (2016)

Associate Professor
Furuya, Hiroshi

Space Structures Engineering

Structural Analysis

Structural Optimization and Design

Concept of Deployable Structures

Smart Structures

**School of Engineering
Dept. of Mechanical Eng.**

Doctor in Engineering / The University of Tokyo

Career: Nagoya University / Tokyo Institute of
Technology**Creation of highly functional space
structures and optimum design**

To realize highly functional structural systems, we focus on structural systems related to human activities in the space environment (including space satellites and space stations). We treat optimization problems, the control of structural vibration, the concept of morphology under the special environment, the autonomous or passive vibration control

system, the simultaneous optimization of the control system and structures by applying the techniques such as space dynamics, optimum design engineering, morphology, applied mathematical engineering, origami engineering, genetic algorithms, computer science, and techniques in various research fields.

Selected Publications

Undesired Equilibrium Configurations of Boom-Membrane Integrated Structure during Deploying Motion, pp.1-21, AIAA-2018-0695.

Decrement Properties of Deployment Torque for Self-deployable Tubular CFRP Booms under Stored State, IAC-17. C2.2.6

Professional Activities

JSASS Structures Division (2016-2017), JSME Space Engineering Division (2004-), AIAA Spacecraft Structures Technical Committee(2010-), IAC Materials and Structures Committee, International Program Committee(2013-), et al.

Associate Professor
Hasegawa, Shoichi

Virtual Reality

Haptics

Physics simulation

Human Interface

Robotics

**School of Engineering, Department of
Information and Communications Eng.**Doctor (Engineering) / Tokyo Institute of
TechnologyCareer: The University of Electro-Communications
/ Tokyo Institute of Technology**Virtual Reality
Technology and design for creating experience**

Researching fields of virtual reality (VR), simulation, and interaction, we hope to create the information environment where people can live naturally and enjoyably and creatively. In VR, the reality tends to be focused, but it is important to have a good environment, not the copy of the reality, that is, an environment where people can naturally behave. I think "naturally" is one of the essential values of VR, which is more general than the "reality".

This requires taking into account the human body and mind, the sensorimotor system, human perceptions and emotions, the nature of the real world in which people live, and then using technology to create an environment. The characteristics of our laboratory are handling the factors above on computers (i.e. creating simulation models of humans and the real world) and creating interfaces taking into account human haptics.

Selected Publications

TEllipsoid: Ellipsoidal Display for Videoconference System Transmitting Accurate Gaze Direction, IEEE VR, 2020.

Continuous Collision Detection for Virtual Proxy Haptic Rendering of Deformable Triangular Mesh Models, IEEE Trans. on Haptics, 2019.

Haptic Rendering based on Finite Element Simulation of Vibration', Haptics Symposium, 2014.

Professional Activities

Publication co-chair in IEEE World Haptics 2019

Publicity co-chair in Asia Haptics 2018

Program co-chair in Asia Haptics 2016

Professor
Hayashizaki, Noriyosu

Particle Accelerator Engineering

Quantum Beam Science

**School of Environment and Society, Dept.
of Transdisciplinary Science and Eng.**Doctor (Engineering) / Tokyo Institute of
TechnologyCareer: KEK (High Energy Accelerator Research
Organization) / Tokyo Institute of Technology**Creating a prosperous and sustainable society through
particle accelerator and quantum beam technologies**

Quantum beams (ion, electron, X-ray, neutron, etc.) are used in the fields of cancer treatment, medical imaging, pharmaceutical production, sterilization, nondestructive inspection and semiconductor manufacturing in addition to the frontiers of elementary particle physics and material science, and technologies based on quantum beams are indispensable for daily life. Our group develops compact particle accelerators that create quantum beams, with

properties depending on the application, through a design process that incorporates 3D CAD modeling and multiphysics simulation, followed by precise fabrication. This process delivers high reliability and operability for collaborating faculty and students. A multi-beam linear accelerator, a compact accelerator-driven neutron source for nondestructive bridge inspection and a medical accelerator are under development in our laboratory.

Selected Publications

Noriyosu Hayashizaki, Shota Ikeda, Aki Murata, Development of a downsized proton accelerator system for compact neutron sources, Nuclear Inst. and Methods in Physics Research B, 461 (2019) 243-246.

Professional Activities

National Institute of Advanced Industrial Science and Technology (AIST), Cross-appointment fellow

National Institutes for Quantum and Radiological Science and Technology (QST), Senior Researcher

Associate Professor
Hope, Tom

School of Environment and Society
Dept. of Transdisciplinary Science and Eng.
PhD (Sociology) / The University of York

Career: National Institute for Advanced Industrial
Science and Technology (AIST) / Tokyo Institute
of Technology

Sociology

Human-computer interaction

Qualitative research methodologies

Ethnomethodology

Sociological studies of engineering issues

My research explores the ways groups of users interact with technology, particularly focusing on how small groups use mobile computing technologies to create, understand and maintain a sense of community. Grounded in qualitative research approaches, I conduct studies of human-computer interaction, using the analysis of conversation and non-verbal actions to help design better systems and user

experience.

Research to date includes the development of a community networking system for conferences and an exploration of group interaction with a museum guidance system. More recently I look at technology and health, with a project to develop a system to aid the sharing of 'caring' knowledge between nurses and care professionals.

Selected Publications

"Familial collaborations in a museum" Hope, T. et al. CHI 2009

"Doing community: co-construction of meaning and use with interactive information kiosks." Hope, T. et al. UbiComp 2006

Professor
Iwatsuki, Nobuyuki

School of Engineering
Dept. of Mechanical Eng.
Doctor of Engineering
Tokyo Institute of Technology

Career: Professor, School of Engineering, Tokyo
Institute of Technology Faculty of Engineering,
Precision and Intelligent Laboratory

Kinematics and dynamics of robots

Silent engineering

Functional material actuator

Development of human-friendly robotic environment and sound environment

To build a human-friendly robotic environment with regard to sound environment, various design issues related to human daily life are being researched. The current principal research themes are as follows: "Motion control of hyper redundant robots that can generate complicated and flexible motions", "Synthesis and motion control of flexible robots composed of elastic links and elastic joints", "Motion control of underactuated mechanisms constrained with

elastic elements or gravitational force", "Estimation of noise radiating from a vibrating structure and its structural optimization to reduce noise", "Active noise control to modify noise to a comfortable sound based on human psychology", and "Development of a functional material actuator and a mechanical system driven by it".

Selected Publications

Large Deformation Analysis and Synthesis of Elastic Closed-loop Mechanism Made of a Certain Spring Wire Described by Free Curves, Chinese Journal of Mechanical Engineering, Vol.28, No.4, (2015), pp.756-762.,

Professional Activities

Director, Japan Society for Design Engineering(2012-) Vice president, Japanese Council of IFToMM (2011-) Director, Japan Society for Precision Engineering (2007-2008)

Professor
Kurabayashi, Daisuke

School of Engineering
Dept. of Systems and Control Eng.

Ph. D / The University of Tokyo

Career: Postdoctoral Researcher for RIKEN,
Lecturer, Associate Professor, and Professor for
Tokyo Institute of Technology

Biomimetics

Control Engineering

Robotics, Motion Planning

Intelligent control of distributed autonomous systems based on biomimetics

Why can animals behave adaptively to situations? We are exploring the functional mechanisms of animals to exhibit intelligent behaviors and trying to migrate them into artificial systems. We believe the intelligence relies not only on elements, such as a brain, sensors, or organs, but also interactions among them. We have found that an insect that has only 100 thousand neurons can behave adaptively, quickly, and effectively, while a robot with a modern

central processing unit that includes one billion transistors running at 3 GHz cannot. Based on neuroethology, electrophysiology, control theory, and stochastic analysis, we are investigating the secret of intelligence and building novel intelligent distributed systems with resilience.

Selected Publications

Time-Varying Moth-inspired Algorithm for Chemical Plume Tracing in Turbulent Environment. IEEE Robotics and Automation Letters, 3(1), 2018.
A Novel Method for Full Locomotion Compensation of an Untethered Walking Insect. Bioinspiration and Biomimetics, 12(1), 2016.
Echo State Networks with Thikonov Regularization: Optimization using Integral Gain. Advanced Robotics, 29(12), 801-814, 2015.

Associate Professor
Mizutani, Yoshihiro

Nondestructive Inspection

Structural Integrity Evaluation

Signal Processing

School of Engineering
Dept. of Mechanical Eng.Doctor (Engineering)
Aoyama Gakuin UniversityCareer: TU Delft / NASDA
Aoyama Gakuin Univ./ JSPS**Design of machinery and structures that are considered maintenance**

Our main research topics are nondestructive inspection and structural integrity evaluation. The target of NDT is mainly fiber-reinforced plastic (FRP). Although FRP has been applied to products in various industrial fields, only few inspection methods have been established. My laboratory is mainly studying acoustic emission testing, ultrasonic testing, and eddy current testing. Recently, we have also

been attempting to measure the ultra-thin tribo film that forms on the surface of gears. Examples of research related to integrity evaluation are "Relationship between inspection capability and integrity of pressurized piping", "Modeling of the fatigue of gears under various conditions", and "Dynamics of high-strength chemical fiber having a complicated structure".

Selected Publications

V. Sry, Y. Mizutani et. al., Journal of Textile Science and Technology, 3, 1-16 (2017) / K. Mizukami, Y. Mizutani et. al., Composites Part B Engineering, 86, 84-94 (2016) / T. Yasuoka, Y. Mizutani et. al., Mechanical Engineering Journal JSME, 1-3, SMM0009 (2014)

Professional Activities

Member of JSME committee on, FFS code for nuclear power plants, welding code for thermal power plants, Design, FFS, and welding code for nuclear reprocessing plants.

Member of JAXA's committee on code for high-pressure equipment for space use.

Chair of Acoustic Emission Testing education committee, division of new materials of JSNDI

Associate Professor
Murata, Ryo

Environmental Architecture

Passive Solar design

Architectural Design

Courtyard house

School of Environment and Society
Dept. of Architecture and Building Eng.Doctor of Engineering
Tokyo Institute of TechnologyCareer: Estec Design Co. Ltd., Yasuo Murata
Architects and Associates**Creating architecture and cities in response to the environment**

Our main theme is "creating architecture and cities in response to the environment". Considering various historical and geographical factors and their relationships with architecture and cities, we are practicing design and

research with the objective of clarifying the fundamental mechanisms of an excellent building environment.

Selected Publications

SECTIONAL COMPOSITION AND LIGHT ENVIRONMENT IN WINTER OF THE COURTYARD AND ADJACENT ROOMS IN CONTEMPORARY JAPANESE COURTYARD HOUSES: ARCHITECTURAL INSTITUTE OF JAPAN, June 2014

Professional Activities

Life Cycle Carbon Minus House Research and Development Committee(2009-), Architectural design works: Courtyard House A(2017), Tokyo Tech Genso Cube(2015)

Associate Professor
Nakamaru, Mayuko

Social simulation

Evolutionary game theory

Mathematical biology

Human behavior and evolution

School of Environment and Society
Dept. of Transdisciplinary Science and Eng.

Doctor of Science / Kyushu University

Career: Shizuoka University / Japan Science
and Technology Corporation**Understand the principle of our society by social simulations and evolutionary game theory**

Cooperation is a foundation of our society. The free-rider problem, in which cooperators pay a cost for cooperation and free-riders obtain benefit from cooperators without paying any cost, appears in our society. We challenge this problem by means of mathematical models and computer

simulations. Especially, we focus on two research topics: (i) which rules and systems promote cooperation in organizations, and (ii) what the ultimate factors for the evolution of human cooperation, which is related to the evolution of human-specific cognitive abilities, are.

Selected Publications

Nakamaru, M., Matsuda, H. and Iwasa, Y. (1997) The evolution of cooperation in a lattice-structured population. Journal of Theoretical Biology 184, 65-81.

Nakamaru, M. and Yokoyama, A. (2014) The effect of ostracism and optional participation on the evolution of cooperation in the voluntary public goods game. PLoS ONE 9 (9), e108423.

Nakamaru, M. (2011) Evolving system, Minerva, Kyoto, Japan, 342pp.

Professional Activities

Science Council of Japan, member (the 24th-25th term)

Human Behavior & Evolution Society of Japan, Standing director (2008-2015) and Director (2016-2018)

Japanese Society for Mathematical Biology, Steering committee (2002-2004, 2007-2010, 2013-2016, 2019-2020)

Associate Professor Nakanishi, Hiroki



School of Engineering Dept. of Mechanical Eng.

Doctor of Engineering
Tokyo Institute of Technology

Career: Tohoku University / JAXA /
Tokyo Institute of Technology

Space Robot

Space Engineering

Robotics

Nanosatellite

Advanced space system developed by robotics

Space is a great frontier, but severe environment. To utilize it safely, conveniently, and sustainably, I am trying to develop a future space system based on fusion of robot technologies and space technologies. Now, dynamics, mechanism, and control of "a novel mobility system on a space structure", and "Spacecraft capture system for orbital Servicing and space debris removal",

among others, are being investigated. Furthermore, "orbital demonstration and verification method for new space robot" is also an important theme. A minimum system for the demonstration is investigated through the development of a nanosatellite.

Selected Publications

"Dynamics, Control, and ImpedanceMatching for Robotic Capture of a Non-cooperative Satellite," Kazuya Yoshida, Hiroki Nakanishi, et al.,
RSJ Advanced Robotics Vol.18, No.2, 2004.

Professional Activities

Activity planning committee member, The Robotics Society of Japan (2015 -2016)
Administrative board member, University Space Engineering Consortium (UNISEC) (2017 -)

Professor Nohara, Kayoko



School of Environment and Society Dept. of Transdisciplinary Science and Eng.

DPhil in Translation Studies
University of Oxford

Career: University of Oxford / JSPS /
Gakushuin University / Katholieke Universiteit
Leuven / Tokyo Institute of Technology

Translation Studies

Semiotics

Science Communication

Science & Art/Design

"Translating" science and art/design to produce innovative communication

Nohara uses linguistics, semiotics, and communication studies to perform and provide transdisciplinary research and education, with the key word being "translation". To translate is to express something in a different medium, creating new value. When science is expressed with sensitivity and narrative, new art and logic can be born. Integrating art thinking also brings science to a different

mode. She creates new places and ideas connecting science with art and design by collaborating internationally with artists, designers, editors, journalists, museums, and companies. Various collaborative schemes with UAL Central Saint Martins, Musashino Art University etc. are going on. The latest theme is "wearable" - come and join us!

Selected Publications

Kayoko Nohara. Translating Popular Fiction: Embracing Otherness in Japanese Translation. Peter Lang: Oxford. 2018.
Kayoko Nohara. Translation Studies in Discussions. Sanseido: Tokyo. 2014.

Professional Activities

The Institute of Electronics, Information and Communication Engineers (IEICE) 2017-
The Japan Association for Interpreting and Translation Studies (JAITS) 2010-
Japan Association of Contrastive Study of Linguistic Behavior (JACSLB) 2003-

Professor Ohtake, Naoto



School of Engineering Dept. of Mechanical Eng.

Doctor of Engineering
Tokyo Institute of Technology

Career: Nagoya University
Tokyo Institute of Technology

Functional materials

Materials processing

Thin films

Plasma technology

Innovation in materials and processing, with "right material in the right place through the right process"

My main field of interest is functional materials and surface engineering and science, including chemical vapor deposition and physical vapor deposition of hard carbon films and its application to industrial uses including mechanical parts, tribological parts as well as medical devices and fuel cells. My research interest extends to development of the joining

process of High Tensile Strength Steel and Al alloy. Even substances with any excellent properties cannot be applied to industrial uses unless they can be formed into the designed shape. My research group and I will continue pursuing innovation in materials and processing, with "right material in the right place through the right process" as our motto.

Selected Publications

Deposition of boron doped DLC films on TiNb and characterization of their mechanical properties and blood compatibility, STAM, (2017) 76.
Perpendicular ultrasonic joining of steel to aluminium alloy plates, J. Mater. Proc. Technol. (2016)112.
Fabrication of micro segment structured DLC film, Mech. Eng. J., 2 (2015) 14-00437

Professional Activities

Executive board directors, General affairs, The Japan Society of Mechanical Engineers (2017-current)
ISO TC107 PL for "Classification of Carbon Films"(2016-current)
Executive board directors, Vice President, Japan New Diamond Forum (2014-current)

Professor Sampei, Mitsuji



**School of Engineering
Dept. of Systems and Control Eng.**

Doctor of Engineering
Tokyo Institute of Technology

Career: Chiba University
Tokyo Institute of Technology

Nonlinear Control Theory

Control Engineering

Under-Actuated Systems

Robotics

Control hard-to-control systems: Nonlinear Control Theory

How can we achieve self-driving cars? One of the key technologies for self-driving is "Control." While keeping inside the lane, a car should first recognize the lane (Sensing), and then it should steer the steering wheel (Control). The basic control strategy is "Feedback Control," i.e., if the car is close to the left edge of the lane, then it should steer the steering wheel to the right, and if it is close to the right edge then it should steer to the left. This strategy appears to work

fine, but in reality, it may cause meandering movements, or instability. Thus, we need "Control Theory". Our main focus is nonlinear control systems, especially, systems that are difficult to control with conventional control theory. Our theory enables us to control robots, drones, and even social systems.

Selected Publications

Suppression of vertical bending and rigid-body-mode vibration in railway vehicle car body by primary and secondary suspension control, Journal of Rail and Rapid Transit, 2010, George Stephenson Prize (Institution of Mech. Eng., UK)

Professional Activities

Fellow of the Society of Instrument and Control Engineers (SICE), Japan
54th IEEE Conference on Decision and Control (CDC), PC Chair (2015)
IEEE Conference on Control Applications (CCA), PC Chair (2010)

Associate Professor Sasaki, Eiichi



**School of Environment and Society
Dept. of Civil and Environmental Eng.**

Doctor of Engineering
Tokyo Institute of Technology

Career: Research Associate (Tokyo Institute of Technology), Associate Professor (Yokohama National University), prior to the present position.

Structural Engineering

Fracture Control

Steel Structures

Structural Monitoring

Innovative technologies development for safety of structures

The main research topics in our laboratory are all related to development of innovative technologies in the safe management of infrastructures, especially for steel structures. There are four major research approaches in our laboratory: "fracture and fatigue", "field measurement (structural monitoring)", "inspection technologies", and "energy harvesting". All of the major research approaches are interrelated, and are important to establish efficient safety management of structures. In

"fracture and fatigue", fracture control design of steel structures is investigated. "Field measurement" includes development of advanced structural monitoring systems and damage detection analysis of structures. In "inspection technologies", new efficient inspection methods for infrastructures are developed. "Energy harvesting" investigations enable us to conduct long-term monitoring and to design a new damper system for structures.

Selected Publications

Ayako Akutsu, Eiichi Sasaki, Yuki Ebisawa, Hiroshi Tamura: Analysis of Corrosion Damage Condition of Steel Members Using Low Frequency Eddy Current Testing, Journal of JSCE, A1, 2017. Koichi Takeya, Eiichi Sasaki, Hiroshi Iwabuki et al, Development of A Tuned Mass Generator for Energy Harvesting Using Bridge Vibration, Journal of JSCE, A1, 2016.

Professional Activities

Secretary, Committee of Steel Structure, JSCE (2017-)
WG Chief, International Committee, JSSC (2016-)
Secretary, Committee of Fatigue Strength, JWS (2013-)



Professor
Sato, Chiaki



**School of Engineering
Dept. of Mechanical Eng.**

Doctor of Engineering
Tokyo Institute of Technology

Career: Laboratory for Future Interdisciplinary
Research of Science and Technology / Laboratory
for Materials and Structures

Adhesive bonding

Structural Design

Finite-element analysis

Development of Novel Adhesion Technology and Application

Adhesive bonding is often regarded by ordinary people as a very weak joining method. However, this reality has been changed drastically by the development of modern novel adhesives that are very strong compared with previous ones. Hence, use of adhesive bonding has been expanding for many applications instead of other joining method, such as welding or brazing. Against this background, our laboratory conducts research on adhesive bonding to

replace other conventional joining methods. In recent years, "multi-material structures" are especially focused on weight reduction of automobiles, and adhesive bonding is the key technology for this application. Our research topics are not fundamental but close to real application because we believe that the seeds of true fundamental research come from difficulties found in actual development.

Selected Publications

Design of Adhesive Joints Under Humid Conditions, Springer, 2013

Professional Activities

Adhesion Society of Japan, Board Member
Society for Research on Structural Adhesion, Chair

Associate Professor
Seaborn, Katie



**School of Engineering
Dept. of Industrial Eng. and Economics**

Doctor (Mechanical & Industrial Engineering) /
The University of Toronto

Career: RIKEN / The University of Tokyo /
University College London

Human-computer Interaction

User-centered design

Inclusive design

Games and gamification

User experience

Designing to provoke, motivate, and inspire

Interactive technology can be designed to influence, motivate, and provoke. I design and research interactive agents, interfaces, and experiences that use attitude and behaviour change methods for personal and social good. In the Lab for Aspirational Computing at Tokyo Tech (ACTT), I work with an international group of students and researchers work to promote innovative research in the fields of human factors engineering, interaction design,

and human-computer interaction. Specialties include gamification and serious games, mixed reality and physical computing, voice assistants and social robots, and inclusive design with older adults. We combine critical thinking and problem solving, engineering and design ability, and mixed methods research with human participants.

Selected Publications

Seaborn & Fels (2015). Gamification in theory and action: A survey. IJHCS, 74, 14-31.

Professional Activities

Member, Association for Computing Machinery (ACM)

Professor
Senoo, Dai



**School of Engineering
Dept. of Industrial Eng. and Economics**

Doctor of Commerce
Hitotsubashi University

Career: Japan Advanced Institute of Science
and Technology

Knowledge management

Organization theory

Information systems

Business creation

Work style

Theory construction on dynamic interaction processes between individuals and organizations

How do individual workers find what they want to do and realize it in an organizational context? With this question in mind, I am conducting several research projects and attempting to use the findings to promote innovation. Recently, I have been focusing on the following three concepts: "Diversity"; I am focusing not only on diversity of ethnic groups and gender, but also on the diversity of knowledge including values and frameworks. "Work style

change"; I am classifying workstyles and analyzing business cases based on a new definition of work. "Open innovation"; I am targeting research and development organizations and communities of practice, to measure absorptive capacities and to clarify the customer co-creation process.

Selected Publications

On Practice : Knowledge Creation and Utilization. Hakuto-shobou. Nov, 2001. / Shaping knowledge management: organization and national culture. Journal of Knowledge Management. Emerald. 2010. / A Study of Knowledge Management Enablers across Countries. The Essentials of Knowledge Management. Palgrave Macmillan. 2015.

Professional Activities

Director, General Affairs, The Japan Society for Management Information (2011-2012) Member, Intellectual Productivity Committee, Ministry of Land, Infrastructure and Transport (2007-2013), Member, FutureCity Initiative Committee, Cabinet Office (2013-)

Associate Professor Sugahara, Yusuke



School of Engineering Dept. of Mechanical Eng.

Doctor of Engineering / Waseda University

Career: Research Associate, Waseda Univ. /
Assist. Prof. Tohoku Univ. / Lecturer,
Kokushikan Univ.

Robotics

Mechanism

Mechanical design

Mechatronics

Systems design, control, and integration of mechanical and robotic systems

Robotics has a broad related field, and I am particularly interested in designing problems of robot systems, the methodology of system design and the integration of robots. Based on the problem of consciousness, i.e., "how to design, what kind of robot system, to make the world better for living", I am making robots while considering individual problems such as mechanisms synthesis, mechanical design and control system design, as well as about what kind

of robots are worth designing and how to integrate (not implement) them into our society. Specific research topics include: biped walking vehicle, stair-climbing wheelchair, task partner robot, Aero-Train: aerodynamically levitated train system, human-powered robotics, reconfigurable parallel mechanism, and personal mobility vehicle.

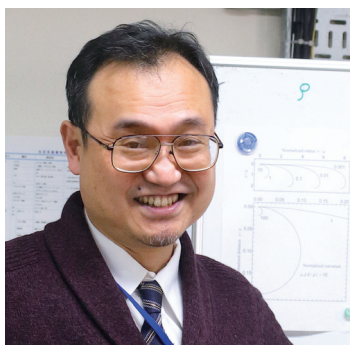
Selected Publications

A human-powered joint drive mechanism using regenerative clutches, IEEE/RSJ IROS2017.
Levitation control of AEROTRAIN, J. of Robotics and Mechatronics, 2011.
Realization of dynamic human-carrying walking by a biped locomotor, IEEE ICRA2004.

Professional Activities

General Affairs Chair, IEEE ICRA2009 (2009)
Associate Editor, IEEE ICRA2012 (2012)
Member of Technical Committee Linkages and Mechanical Controls, IFToMM (2018-)

Professor Takahashi, Kunio



School of Environment and Society Dept. of Transdisciplinary Science and Eng.

Doctor (Engineering) / Osaka university

Career: Assistant professor, Associate professor,
Professor of Tokyo Institute of Technology

Mechanical engineering

Material Science

Surface and Interfacial science

Adhesion

Welding and joining

Design of processes and devices based on adhesion and joining science

Our research works are based around "Biomimetic design of grip-release devices", "Understanding and application of adhesion phenomena", "Design and control of joining processes", "Energy harvesting", and "Micro-plasma", among others. In this laboratory, processes and devices are designed based on physics. Mechanisms of phenomena are investigated and expressed with the simplest model. Meanwhile, the main targets are phenomena related

to surface or interface; some students challenge the other targets using the potentials of this laboratory. The policy in this laboratory is design based on logic. The basics are important. Students in this laboratory keep in mind obtaining the skill of logical consideration and its presentation.

Selected Publications

"Geckos' foot hair structure and their ability..."K.Takahashi, International J. of adhesion & adhesives, vol.26, pp.639-643, (2006). "A simple formula for surface energy..." Kunio Takahashi, et.al., Physical Review B, vol.48, p.5689-5691(1993)

Professional Activities

Japan Welding Engineering Society. Chair of Education committee, ...
High Pressure Institute of Japan, Chair of Editorial Committee, ...
The High Pressure Gas Safety Institute of Japan

Professor Takeda, Yukio



School of Engineering / Dept. of Mechanical Eng & School of Environment and Society / Dept. of Transdisciplinary Science and Eng.

Doctor of Engineering / Tokyo Institute of
Technology

Career: Tokyo Tech/TU Munich, University of
Florida, Program Officer of KAKEN-hi

Mechanical System Design

Robotics

Assistive Device

Mechanism Design

To establish the optimal mechanism design methodology governing the basic characteristics of mechanical systems and to validate it through design, prototyping and experiments

The basic performances, such as accuracy, efficiency and usability, of mechanical systems, such as robots and assistive devices, are governed by the kinematic structures and dimensions of the mechanisms. Our research aims to develop design methodology of mechanisms focused on the essential characteristics of the mechanisms, such as the transmissibility of motion and force. To date, several mechanical systems with superior performances have been

developed in our laboratory, such as a three-dimensional pipe bender using a specially designed parallel mechanism performing precise bending and an ankle rehabilitation device with a special structure that is easy to perform and comfortable to use.

Selected Publications

Portable Design and Range of Motion Control for an Ankle Rehabilitation Mechanism Capable of Adjusting to Changes in Joint Axis, Int. J. Mech. & Rob. Syst., 2016. / Kinematic performance evaluation of high-speed Delta parallel robots based on motion/force transmission indices, Mechanism and Machine Theory, 2018. / Kinematics of Machinery, Text Series, JSME, 2007.

Professional Activities

Division Chair of Machine Design and Tribology of JSME (2016)/TC chair for Robotics and Mechatronics of IFToMM (2017-)/Associate Editor, Mechanism and Machine Theory(2016-).

Professor Tsujiimoto, Masaharu

Ecosystem

Platform

Business Model

Startup



School of Environment and Society, Dept. of Transdisciplinary Science and Eng.

Doctor (Media and Governance) / Keio University

Career: TUHH / ETH Zurich

Change the society by the Ecosystem analysis, design and implementation

The main research topics are Ecosystem Management and Platform Management. In Ecosystem Management, we are challenging to find new insights by applying the concept of ecosystem in biology to management science. Ecosystem management research is characterized by the fact that it analyzes the entire product/service system that creating value to customers. Specifically, we are currently working on the analysis, design, and implementation of an

ecosystem using hydrogen energy, which is supported by the Toyota Mobility Fund and JST. For example, we have designed new ecosystems using microgrid (we call it a geofree energy society), and we are conducting action research for implementation in cooperation with several companies, governments, and municipalities.

Selected Publications

Tsujiimoto M., Kajikawa Y., Tomita J., Matsumoto Y., A review of the ecosystem concept—Towards coherent ecosystem design, *Technological Forecasting and Social Change* 136, 49-58, 2018, <https://doi.org/10.1016/j.techfore.2017.06.032>.

Professional Activities

Japan MOT Society, Chairman of the Editorial Committee
Japan MOT Society, Executive Director

Associate Professor Wijeyewickrema, Anil C.

Computational seismic engineering

Solid mechanics



**School of Environment and Society
Dept. of Civil and Environmental Eng.**

Ph.D. / Northwestern University, USA

Career: Tokyo Institute of Technology, Asian Institute of Technology, Thailand, Northwestern University, Evanston, IL, USA.

Developing numerical modeling techniques that can simulate the realistic behavior of structures and seismic protective systems

In spite of the fact that most modern structures are well designed, recent major earthquakes have shown disturbing images of damage, ranging from moderate structural damage to collapse of structures. Although safety and functionality of the structures are crucial, it is not practical to conduct experimental tests on all existing and newly designed structures for performance assessment. Therefore, numerical simulations are used as a viable

alternative for performance assessment of structures.

Detailed numerical models of the structures are created using state-of-the-art finite element software and are verified against experimental results. Hence, we are working to develop numerical modeling techniques that can simulate the realistic behavior of structures and seismic protective systems. Solid mechanics research is also been carried out.

Selected Publications

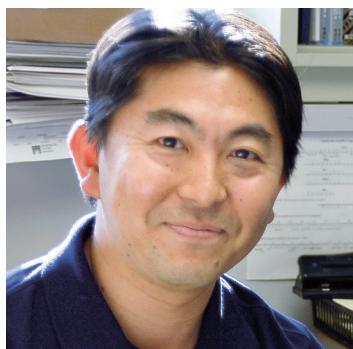
Samith Buddha, H. A. D. and Wijeyewickrema, A. C., 2018, "Seismic Shear Forces in Post-Tensioned Hybrid Precast Concrete Walls", *ASCE Journal of Structural Engineering*. / Kayestha, P., Rodrigues Ferreira, E. and Wijeyewickrema, A. C., 2015, "Finite-amplitude Love waves in a pre-stressed compressible elastic half-space with a double surface layer", *Wave Motion*, Vol. 56, pp. 205-220. / Pant, D. R. and Wijeyewickrema, A. C., 2014, "Performance of base-isolated reinforced concrete buildings under bidirectional seismic excitation considering pounding with retaining walls including friction effects", *Earthquake Engineering and Structural Dynamics*, Vol. 43, Issue 10, pp. 1521-1541.

Professional Activities

Member, Japanese Society of Civil Engineers (JSCE). Chair, Elasticity Committee, Engineering Mechanics Institute, American Society of Civil Engineers (ASCE), Oct 2017 – Sept 2019.



Professor Yagi, Tohru



School of Engineering Dept. of Mechanical Eng.

Doctor (Engineering) /Nagoya University

Career: JSPS, RIKEN, Nagoya University,
NIDEC Co., MIT

Biomedical Engineering

Neural Engineering

Human Interface

Makers

Neural engineering to connect man and machine

The goal of this laboratory is to understand the neural mechanisms and computational principles of the biological brain and vision, and to exploit the findings in engineering applications, especially with relation to biomedical/rehabilitation engineering and bio-mimetic robotics. This involves a combination of engineering and biomedical

experimental approaches based on neuroscience. The current project is to develop a neural interface, which is a direct technological interface between the nervous system and a computer.

Selected Publications

Personal Identification Number Application Using Adaptive P300 Brain-Computer Interface, IEEEJ Transactions on Electronics, Information and Systems, 136, 9, 1277-1282, 2016. / Research of the Characteristics of Alzheimer's Disease Using EEG, IEEEJ Transactions on Electronics, Information and Systems, 130, 10, 1827-1832, 2010. Biohybrid Visual Prosthesis for Restoring Blindness, Int. J. of Applied Biomedical Engineering, 2, 1, 1-5, 2009.

Professional Activities

Board Member, Japan Society for Medical and Biological Engineering (2015-present) / Board Member, Japanese Society for Engineering Education, (2014-present) / Board Member, Institute of Electrical Engineers C Section (2017-present)

Associate Professor Yamakita, Masaki



School of Engineering Dept. of Systems and Control Eng.

Doctor of Engineering
Tokyo Institute of Technology

Career: Toyohashi University of Technology/
Riken

Control Engineering

Robotics

Adaptive Learning Control

Design methodology

No control, No life

Our main research topics are advanced control theory and its application to industry. To apply control theory, system modeling, system analysis, control system design, and performance validation are very important. In our laboratory, advanced methods in each step are studied. For example, in a system modeling a system modeling method that is robust against observation noise based on machine learning techniques has been proposed aside conventional

modeling based on physical and chemical laws. Fast model predictive control algorithm, and algorithms for state estimation and prediction of future behavior in future based on the model have been proposed. In the robotics field, realization of energy-efficient biped running, and development of artificial muscle actuators and its application are studied.

Selected Publications

Iterative generation of virtual reference for a manipulator M.Yamakita, K.Furuta, Robotica, Vol. 9, pp. 1/80 (1991), A Novel Gait Generation for Biped walking Robots Based on Mechanical Energy Constraint, F.Asano, M.Yamakita, IEEE Trans. on Robotics and Automation, Vol. 20, No3. pp.565/573(2004)

Professional Activities

IIFAC AUTOMATICA, Associate Editor (2001-2007)
Robotics Society of Japan, Councilor (2003-2004)
SICE SI-division Technical Committee on Soft Material,
Technical editor(2007-2008)

Associate Professor Yamazaki, Takahisa



School of Engineering Dept. of Mechanical Eng.

Doctor of Engineering
Tokyo Institute of Technology

Career: Tokyo Institute of Technology / NASDA
/ RIKEN

Joining

Brazing

Welding

Carbon related materials

Dissimilar materials

Joining of dissimilar materials to provide good mechanical property for aerospace

Our main theme is joining of carbon-related materials to super alloys for aerospace use. To use these joints under a severe environment, some techniques were applied to materials that provide good mechanical property to produce these joints. Arc, plasma or light beam were applied

to produce these dissimilar materials joints, then they were fractured to obtain mechanical property data using various devices to serve as aerospace materials.

Selected Publications

Takahisa Yamazaki, Ryusei Ninomiya, Magnet Formation by the Surface Modification of Diamond with Manganese Detected by the Magnet Flux Density on the Surface, Materials Sciences and Applications, 2017, 8, 642-648 doi:10.4236/ma.2017.88045 / T Yamazaki, K Shoji, T-T Ikeshoji, A Suzumura, The healing effect of stearic acid applied on amorphous carbon film with dispersed nanodiamonds, Journal of Physics: Conference Series 379 (2012) 012010. (p.1-10).

Professional Activities

JWES comitee of brazing , advanced materials joining group / JWS vice chair of the interface joining research section

Professor Yasuda, Koichi



School of Environment and Society
Dept. of Architecture and Building Eng.

Ph.D. / Tokyo Institute of Technology
M. Arch / Yale University

Career: Worked for Nikken Sekkei Ltd. and
Bernard Tschumi Architects

Architectural Design

Art Museum / Aquarium

Campus Design

Industrial Design

Architectural design process and integration method for sustainable architecture and products

The main study themes are study and design of "Art museum and Aquariums," "University Campus Planning and Facilities," "Environmentally-conscious Building," "Renovation/Conversion," "Façade Engineering," and "Industrial Design." I investigate the establishment process of high-quality architecture in cities or other environmental conditions, to clarify integrated design technique. This will

be achieved by searching what kind of technologies are used under what kind of design process, and what the relation with the background social system is. It is difficult to express the modern environment and social conditions surrounding a building in a unified way. I believe that deep thoughts and concepts are born by integrating extensive information.

Selected Publications

POLA Museum of Art (2002)
Marine Place Aquarium UMITAMAGO/ASOBEECH
(2004/2015)
Tokyo Institute of Technology Library (2011)

Professional Activities

The Architectural Institute of Japan, Director for Events and Awards
Next-generation public building meeting for IFC/BIM, Chairman
The Japan Institute of Architects (JIA), Green Building Award,
Chairman of Jury

Associate Professor Yuasa, Kazuhiro



School of Environment and Society Dept. of
Architecture and Building Eng.

Doctor of Engineering /Tokyo Institute of
Technology

Career: Tokyo Institute of Technology

Environmental Engineering

Building Services

Urban Energy systems

Energy Conservation

Application of the effective energy utilization technology in buildings

Our major subjects are as follows; 1) energy consumption in many buildings, such as houses, offices and commercial buildings, are analyzed by questionnaire survey and measurement; 2) energy conservation effects via application of distributed energy systems, such as photovoltaic power generation, wind power generation, and a cogeneration system, to building an urban area are estimated by energy simulation; 3) energy conservation effects of district heating

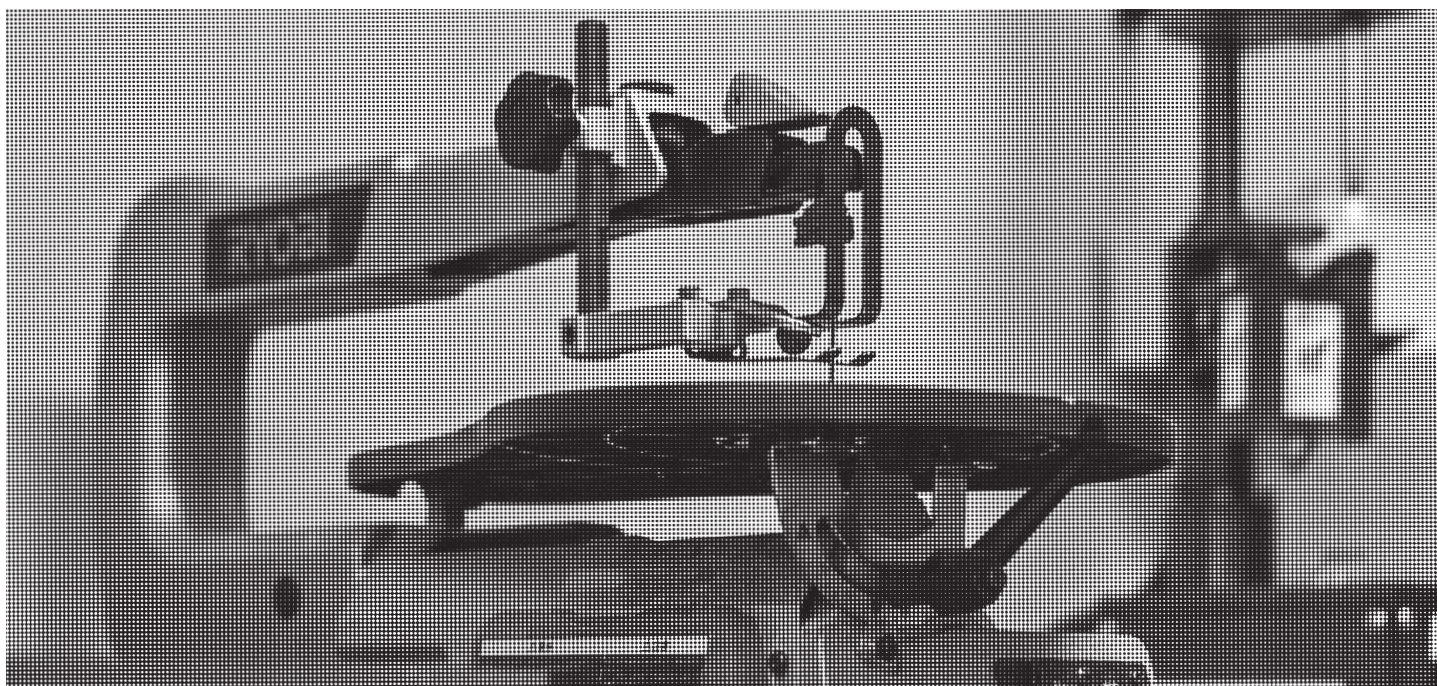
and cooling systems are surveyed; and 4) effects of behavior for energy conservation in houses and educational facilities are analyzed by a questionnaire survey, measurement, and energy simulation.

Selected Publications

Evaluation on SOFC-cgs installation with consideration to electricity and hot water demand variation, Transactions of AIJ, 2015, / Energy saving potential of low-impact life style in residential buildings, Transactions of AIJ, 2009

Professional Activities

Architectural institute of Japan
Institute of environmental management, administration and maintenance of Japan
Japan building maintenance association



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Department of Architecture and Building Engineering

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*The list of faculty members is sorted by family name.

ENGINEERING SCIENCES AND DESIGN

エンジニアリングデザインコース

Book

Introduction to Design Thinking for Engineers

Tokyo Tech
Engineering Design Project



Author: Tokyo Tech Engineering Design Project,
Shigeki Saito, Hiraku Sakamoto, Yoko Takeda,
Masanori Kado, Takako Ouchi

Editor: Takako Ouchi
Price: 2,480 yen (+tax)
Page: 304 pages
Publisher: Shoeisha
Format: Softcover, E-Book

This book was written by Tokyo Tech faculty members involved in the Engineering Design Project (EDP), which is a series of core lectures in the ESD Graduate Major. The book covers in detail the contents of the EDP lectures. It introduces prospective students to the EDP very well; moreover, it can be used by professionals of various industries as a practical guide to the design thinking methodology. (As of 2022, the book is only available in Japanese.)



Faculty **Profiles**

ENGINEERING SCIENCES AND DESIGN

2022 Version



Tokyo Tech

Tokyo Institute of Technology - Engineering Sciences and Design

Address ▶ 2-12-1 Ookayama Meguro Tokyo, Japan

WEB ▶ https://www.titech.ac.jp/english/education/graduate_majors/esd/

