ADMISSIONS

	Examination Date	Application period
The 1st selection	July 1, 2023	May 30 – June 8, 2023
The 2nd selection	August 27 2023	July 24 – August 4, 2023
The 3rd selection	October 7, 2023	September 6 – 20, 2023
The 4th selection	January 20, 2024	December 7 – 21, 2023

^{*}For interview and oral examinations will be conducted through the Internet.

How to apply

Contact

Find a laboratory in your desired field and contact the faculty member.





Password to apply Send the requesting email to the admission section





Online Registration Website

Admission Application Guidance







Invitation to Life Science and Systems Engineering



Takashi YASUDA

Graduate School of Life Science and Systems Engineering (LSSE) was established in 2000 at Kitakyushu Science and Research Park to promote advanced research based on superior biological functions and implement them into practical engineering technology. LSSE has succeeded in creating frontier technologies for meeting social needs in broad technical fields related to environment/energy, robot/artificial intelligence, medical application, etc.

Diversity in students is a big feature of LSSE. In addition to students from two undergraduate schools of Kyushu Institute of Technology, many students gather from domestic universities and colleges of technology throughout Japan and from various overseas universities. Collaborative works among these students with different experiences and values generate fresh ideas leading to technical innovation as well as fostering communication ability with recognition of diversity.

LSSE has educational programs and research projects in collaboration with universities and companies within Kitakyushu Science and Research Park. Also, LSSE is offering study abroad programs with overseas partner universities, and conducting many international joint research projects with them. Through these programs and projects students can strongly enhance their global perspectives.

We invite you to LSSE to immerse yourself in a cutting-edge education and research environment and to launch your promising career on an international stage.

Special courses for International students 3 Main Activities 4 Department of Biological Functions Engineering 6

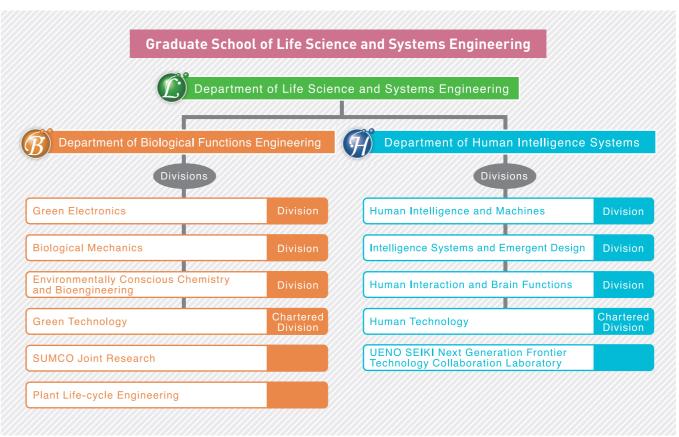
Faculty Member (Department of Biological Functions Engineering) 7 Department of Human Intelligence Systems 11

International Exchanges 16

 CHARACTERISTICS of the graduate course Utilizing Life in Engineering Applying Engineering to Life

Distinguishing Features of the Graduate School

The basic objective of this graduate school is the education and development of engineers and researchers capable of elucidating the structures and functions of living organisms for resource and energy saving, environmental symbiosis, human affinity, and other properties, and to develop their technological utilization. To achieve this goal, under the masters program, its Department of Biological Functions Engineering applies the superior functions of organisms to the solution of problems and needs that confront society, and its Department of Human Intelligence Systems develops the skills and capabilities for building an optimum society of ease and comfort in a world of complex intelligence-body-environmental systems. On the other hand, under the doctoral course of obtaining specialization in the life science and systems engineering field, focus is directed towards the promotion and intensification of cross-specialization and global education. The school is accordingly dedicated to the development of professionals that are constantly focusing on the emerging trends in research and technology and working to achieve innovation and advances. The school, in short, is dedicated to the development of globally oriented professionals who can work with society to meet the needs and solve the problems that confront it today and contribute to a sustainable and harmonious future.



INDEX

SPECIAL COURSES FOR INTERNATIONAL STUDENTS

MAIN ACTIVITIES

Advanced Assistive Robotics (Global AAR) Course

This course is an international course operated by our institute since 2015, and consists of Japanese and international students in the Department of Human Intelligence and Systems Engineering (masters course) and the Department of Life Science and Systems Engineering. We have accepted students from diverse fields such as integrated circuits, control, sensing, nanosystems, artificial intelligence, LOT systems, behavioral science, and neurosci-

The course is designed to accommodate international students by using English as the language for slide presentations and Q&A sessions. Besides, the course provides opportunities for English presentation and communication training through journal clubs where students read and understand the latest papers, AAR seminars with top-notch lecturers, and the practicum in Robot Operating System.





Website URL: https://www.brain.kyutech.ac.jp/global_aar/

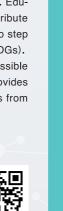


GE³ Course Global Education of Green Energy and Global Education of Green Energy Green Environment (GE3) Course

This course provides an integrated program of education and research related to "green energy/green electronics technology" and "carbon-neutral technology", with a view to the future of energy and environmental cooperation across a wide area of Asian countries, including Japan. It is also an innovative program to develop 21st-century global engineers who can maintain a sustainable socio-economy and lead the world through global seminars and collaborative projects. Education and research on these green technology will not only contribute to the development of peaceful, safe, and secure societies but also step forward towards achieving the Sustainable Development Goals (SDGs). Lectures are also designed for international students, and it is possible to complete the master's course in English only. "GE3 Seminar" provides state-of-the-art technologies and research topics inviting lecturers from academics and Japanese companies.

- Printable photovoltaic cells
 Biomolecular Engineering
- Functional materials and their electrochemical devices.
- Organic electronic devices
 Motor-drive system
- Highly efficient and flexible energy-conversion
- Environmental-Benign Functional Materials
- Next-generation power semiconductor

Website URL: http://www.life.kyutech.ac.jp/~ge3/en/





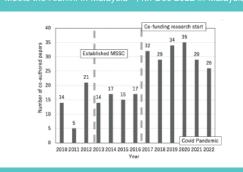
Clean Cycle Chemistry Course to learn SDGs realized by chemistry

The SDGs are the "17 goals set by 193 UN member states to achieve in the 15 years from 2016 to 2030" adopted at the 2015 UN Summit. The "Clean Cycle Chemistry Course" is an active learning program with the theme of research and development aiming at the goals that can be achieved by chemical technology among the 17 goals and the establishment of the chemical technology. Professors in charge of this course are advanced researchers who promotes green chemistry research and green biogeochemical research to make elements a recyclable resource. The professors not only gives lectures, but also conducts active learning as a FACILITATOR of "cultivation of creativity". In one of the compulsory subjects, students will plan and present concept and chemical methods that students can contribute to achieving their goals in their respective research fields. Excellent Presentation Prize will be awarded to excellent proposal, and in addition, feasible collaboration proposals will be developed into cross-disciplinary cyclical chemistry research by conducting collaboration demonstration experiments between the students and Professors in charge of this course. This course is intended for graduate students in the master's program, and takes and masters the designated 6 compulsory subjects (The language used for all curriculums is Japanese). Those who complete the course will be received a "Certificate of Completion of the Clean Cycle Chemistry Course".



ABOUT





It will be 10 years since MSSC overseas education and research base was established, MSSC is operated jointly with University of Putra Malaysia (UPM), MSSC is an international center promoting education and research along with supporting various activities such as short-term study programs, research programs at UPM, corporate internships with Japanese companies in Malaysia, and alumni associations with Malaysian graduates. The most representative program between the two schools is SAES, which is held alternately every year at each university. The number of participants has grown to more than 500 even though both countries under the COVID-19 pandemic.

These our activities have also greatly spread on the outcome of the research of both schools. The number of papers co-authored by UPM is increasing year by year. Regarding Field Weighted Citation Impact (FWCI) from 2019 to 2022, Kyutech is 0.95 and UPM is 1.04. However, co-authored publication is 1.28.



Website URL: https://www.kyutech.ac.jp/english/mssc/

MAIN ACTIVITIES Join Robot Competitions!!

Hibikino-Musashi@Home

The Kyutech Home Service Robot team Hibikino-Musashi@Home (HMA) won the first prize two years in a row in Domestic Standard Platform League (DSPL) of RoboCup 2017 and 2018, and Partner Robot Challenge (Real Space) in World Robot Summit 2018 and 2020 (held in 2021) . HMA also won the first prize six times in RoboCup JapanOpen.

https://www.brain.kyutech.ac.jp/~hma/



ACHIEVEMENT

- RoboCup 2017 Nagoya, @Home DSPL first place.
- RoboCup 2018 Montreal, @Home DSPL first place, P&G Dishwasher Challenge Award
- World Robot Challenge 2018, 2020 (held in 2021), Service Robotics Category Partner Robot Challenge Real Space first place. METI Minister's Award. RSJ Special Award.
- RoboCup 2019 Sydney, @Home DSPL third place.
- RoboCup 2021 Worldwide (Online), @Home DSPL second place.
- RoboCup Asia-Pacific 2021, @Home OPL first place, DSPL first place, Simulation first place.
- RoboCup 2022 Bangkok, @Home DSPL third place
- RoboCup JapanOpen 2018, @Home Open Platform League (OPL) first place. JSAI Award.
- RoboCup JapanOpen 2019, @Home OPL first place, DSPL first place.
- RoboCup JapanOpen 2020, @Home OPL first place, DSPL first place, OPL Technical Challenge first place.
- RoboCup JapanOpen 2021, @Home DSPL first place

TEAM INTRODUCTION

Team KUROSHIO, the allied team of 8 institutions including Kyutech, won the second place and 1 million US dollars in Shell Ocean Discovery XPRIZE, the international competition of autonomous ocean

exploration technologies.







Kyutech Underwater Team won in the AUV League of Underwater Robotics Competition in Okinawa URC in 2020. As the URC is held in the sea, AUVs are required to be highly autonomous and completeness.



Hibikino-Toms, agricultural robots must work in the actual field and need AI, gentle mechanism to living things. Kyutech "Tometoers" join the Tomato-Harvesting-Robot competition and show good results (Winner in 2019, 3rd in 2020, 2nd in 2021)



Hibikino-Musashi, the Kyutech Robo Cup MSL team Hibikino-Musashi won the championship more than 10 times in Japan Open and one of veteran teams in World Cup. Each team joins with 5 soccer robots which act autonomously with mounted sensors only.

DEPARTMENT OF BIOLOGICAL FUNCTIONS ENGINEERING

Graduate School of Life Science and Systems Engineering

Division Overview



The research and education in this department deals with the realization of materials, structures and energy conversion functionalities of nature/organisms along with their utilization in engineering. The main objective of this department lies in discovering solutions to social issues like the global environment and human health to promote the creation of new industries, by integrating the fields of the environment, energy, materials, and bioengineering. Apart from this, global education such as international internship has been performed at our international research bases.

Divisions

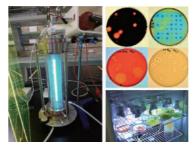
Division of Green Electronics

This division is devoted to the investigation of "green electronics technology," such as the fabrication and evaluation of printable solar cells, new functional materials, and their application to electrochemical devices, organic photo-electronic devices, construction of flexible and efficient power conversion and motor control systems, development of energy production systems utilizing renewable energies and environmentally friendly devices with carbon materials. The teaching curriculum is provided under the research themes outlined above.



Divsion of Biological Mechanics

The research and education in this division are conducted based on mechanical engineering such as the mechanics of materials, fluid and thermodynamics, the dynamics of machinery and micromachining, and the materials science of metals and ceramics. These activities contribute to the following area of industrial/medical applications: (i) the maintenance and recovery of bio-functions, (ii) medical and welfare support, (iii) development of biocompatible materials and medical devices, and (iv) design and development of biomimetic materials and intelligent machines.



Division of Environment Conscious Chemistry and Bioengineering

The goal of this division is to re-vitalize the engineering technologies responsible for the sustainable development of industries and society with environmental consciousness. The academic field of this division includes chemical and biological research and technologies that are learned from the highly efficient reactions of biological systems. Environmentally conscious chemistry and bioengineering may lead to innovations in chemical and biological technologies. This division strives to globalize our graduate program through the development of frontier research in environmentally conscious chemistry and bioengineering.

Functional Biomaterials

tmiya@life.kyutech.ac.jp

Research Overview

Development of novel biomaterials for

http://www.life.kyutech.ac.jp/~tmiya/

regeneration of bone, tooth and nerve

consumption inspired by biological system

Development of biocompatible materials for repair and

Development of ceramic processing with low energy

Development of microparticles for cancer treatment

Toshiki MIYAZAKI

Power Electronics

Tsuyoshi HANAMOTO Professor, Ph.D

Study on power electronics and its application. Development of motor controls and power conversion systems

hanamoto@life.kyutech.ac.jp

http://www.life.kvutech.ac.ip/~hanamoto/

■ Motor control ● Hardware control

 High efficiency power conversion ● Environmentally friendly control

Development of human-friendly and environmentally

friendly electrical power conversion systems and application for motor control systems.

Power semiconductors.

Power electronics and systems

omura@life.kvutech.ac.jp

http://power.kvutech.ac.ip/

Professor, Dr. Eng.

Department of Biological Functions Engineering

Development of ultimate power semiconductor devices to atcheve carbon neutral. Power semiconductors are key device for xEVs, PVs and wind firm for the energy

Power Semiconductors, Power Electronics

Ichiro OMURA

Division of Green Electronics



Nanomaterials, solar cells, Metal ion batteries

Professor, Ph.D. Tingli MA

Development of nanomaterials and application for solar cell, metal ion batteries, metal air batteries

nail tinglima@life.kvutech.ac.ip

http://www.life.kyutech.ac.jp/~tinglima/

Keywords Research Overview

 Design and synhthesis of Nano material Li ion battery

Na ion Battery Metal air battery

● Perovskite solar cell

High performance

Design and syhtheses of nanomaterials and their characterization. Development of new materials for stable perovskite solar cells. Development electrode materials with high performance and low cost for application to Li-ion batteries and Na-ion batteries,

as well as metal-air batteries.

Application

Division of Green Electronics

Division of Green Electronics



Keywords

Power Flectronics

Carbon Neutral

Silicon Wefer

Functional Materials and Devices

Professor, Ph.D.

shvam@life.kvutech.ac.ip

Research Overview

 Molecular design Solar cells

Organic devices

 Photo-functional materials Smart materials

http://www.life.kvutech.ac.ip/~shvam/

Division of Green Electronics



Power semiconductor, Semiconductoer material

Associate Professor, Dr. Eng.

Akihiko WATANABE

Development of diamond power devices to realize the next generation power society

Keywords

http://www.life.kyutech.ac.jp/~watanabe/ Research Overview

watanabe@life.kyutech.ac.jp

direct current transmission.

Diamond

Research on ultra-high performance power devices based on the superior semiconductor properties of Ultra high voltage power devices
 diamond. The realization of diamond power devices will contribute to the realization of a decarbonized society by enabling the highly efficient use of electrical energy and the construction of energy grids with the



Biomechanics

Biomedical Engineering and Biomechanics for

http://www.life.kyutech.ac.jp/~yamada/

Keywords

 Mechanical testing Finite element method

 Sensor device development Vascular diseases Pressure injury

Medical diagnosis assistance and prevention of diseases and injuries through measurement-device development, mechanical testing, constitutive modeling and computational analysis, focusing on mechanics of diseased arteries, endodontic treatments, prevention of pressure injury

Division of Biological Mechanics



Biofluid Engineering

Micromachine with concentration Maragoni effect engine
 Fractal analysis and network of arterials
 Keyword:Bio-fluid dynamics, Bio Medical Engineer-

Professor, Dr.Eng.

Masaaki TAMAGAWA **Biofluid Engineering for Advanced Medicine**

tama@life.kyutech.ac.jp

Biomechanical Analysis of Brain Injury by Fall ing, CFD, Shock Wave

http://www.life.kyutech.ac.jp/~tama/

and Development of Medical Devices

Keywords

■ Flow visualization

Blood flows

Research Overview ● Computational Fluid Dynamics (CFD) 1.Computational and experimental studies of Hemolysis and Thrombus formation in blood flows, 2. Application of Shock Waves and Ultrasonic to Drug ● Hemolysis and Thrombus formation Delivery Systems, Water treatment, Tissue Engineer Shock wave drug delivery systems ing. 3. Development of driving force of micromachines.

Bio-microdevices

yasuda@life.kyutech.ac.jp

Keywords

Cell analysis

Microliquid handling

Biosensing

 Micro-nanofabrication Surface modification Cell culture

Research Overview

we are developing biomedical microdevices such as microfluidic devices for single-cell analysis, nicroelectrode array devices for extracellular potential measurement, microhole array devices for production/separation of extracellular vesicles, etc.

Shyam S.PANDEY

Synthesis and Characterization of Photo-functional Materials for Advanced Device Applications

Design and development of photo-functional materials for energy harvesting and organic electronic devices.

Division of Biological Mechanics



Professor, Dr. Eng.

Hiroshi YAMADA

Life-Sustaining Technologies nail yamada@life.kyutech.ac.jp

Biomedical engineering

Research Overview

Professor, Ph.D.

Takashi YASUDA Study on Bio-microdevices for Medical

esearch and Drug Development

http://www.life.kyutech.ac.jp/~yasuda/

MEMS (Micro Electro Mechanical System

Using techniques of microfabrication and cell culture.

 Hybrid material Artificial bone Artificial ioint Cancer treatmen

Biomaterial

Ceramics

Biocompatible material

Division of Biological Mechanics

Professor, Ph.D.

tissue repair

Division of Biological Mechanics



-mail momo@life.kyutech.ac.jp

Kevwords

DNA

● Tumor cell

Keywords

New energy

CO₂ fixation

Functional interface

Radical chemical process

Phases and Interfaces

On-chip analysis

MEMS ■ Micro Total Analysis Systems

 Mechanical characterization Real-time measurement

http://www.life.kyutech.ac.jp/~momo/ Research Overview

Applying MEMS (Micro Electro Mechanical Systems) technology to biological research at the molecular, cellular, and tissue level. Development and characterization of novel microfluidics for mechanical, chemical, and genetic assays for oncological studies.

Division of Environment Conscious Chemistry and Bioengineering

ail haruyama@life.kyutech.ac.jp



Professor, Dr. Eng. Tetsuya HARUYAMA

Establishing technology from elucidation of interface functions: leading to solutions to social issues

Functional Interface Engineering

http://www.life.kyutech.ac.jp/~haruyama/ Research Overview

We are developing research to realize various functional interfaces (reaction fields) by elucidating

the functions of heterogeneous interfaces, "Chemical resource conversion of nitrogen, oxygen, and water (phase interface reaction technology) ", "interface that converts CO2 into resources", "process technology with low environmental load", "safe decomposition of harmful substances", etc.

Division of Environment Conscious Chemistry and Bioengineering



Keywords

Photocatalyst

Nanomaterial

Photoelectrode

Photoacoustic spectroscopy

Analytical Physical Chemistry

Professor, Ph.D. Naoya MURAKAMI Spectroscopic analysis on semiconductor photocatalyst and development of photocatalytic system for light-energy conversion

murakami@che.kyutech.ac.jp http://www.life.kyutech.ac.jp/~murakami/

Research Overview

Analysis of photofunctional material using photoacoustic spectroscopy, Development of photocatalytic system for light-energy conversion.

Division of Biological Mechanics



Intelligent machine

Associate professor, Ph.D. (Eng.)

Kazuto TAKASHIMA

Study on soft sensors and actuators, and applications to medical, welfare and industrial technologies

FACULTY MEMBER

ktakashima@life.kvutech.ac.ip http://www.life.kvutech.ac.ip/~ktakashima/

Research Overview

 Smart soft materials Soft actuator ● Endovascular treatmen

 Tactile sensor Surgical simulato

 Stiffness control Biotribology

Keywords

Ceramics

Organic molecules

Tissue regenerative medicine

Environmental purification

Metals

Keywords

Applications of shape-memory materials and artificial muscle to human-interactive robot. Development of

soft tactile sensor. Development of device placement simulator for endovascular treatment.

Division of Biological Mechanics



Harmonic Functional Materials Associate professor, Jin NAKAMURA

Development of harmonic functional materials towards medical and environmental applications

jin@life.kyutech.ac.jp http://www.life.kyutech.ac.jp/~jin

Research Overview Functional materials Development of composite materials (ceramics,

metals, and organic molecules) that exhibit multifunctions in response to stimuli emitted by living organisms. Development of synthetic processes for composite materials with controlled structures at molecular order Development of materials for tissue regeneration

Unique microbioal functions can be elucidated and

Toshinari MAEDA

medicine and environmental purification

Division of Environment Conscious Chemistry and Bioengineering



Microbial Biotechnology

Advanced Biotechnologies using Unique **Microbial Functions**

nail toshi.maeda@life.kyutech.ac.jp http://www.life.kyutech.ac.jp/~toshi.maeda,

Professor, Ph. D.

Keywords Metabolic Engineering

improved using biotechnologically-engineered Genetic Engineering approaches to construct an innovative technology Environmental Biotechnology which should be useful to the environment and human White Biotechnology society

Division of Environment Conscious Chemistry and Bioengineering

Research Overview



Bioremediation Environmental Bio-adaptation

Bacterial interaction

Biopolymers, Structure and Function Associate Professor, Tamaki KATO

tmkato@life.kyutech.ac.jp

Design, synthesis, and conformational analysis of functional biomolecules.

http://www.life.kyutech.ac.jp/~tmkato/ Research Overview

Enzyme Amino acids

Design, synthesis, and conformational analysis of peptide-based artificial functional molecules (Peptide

Keywords Peptide

Molecular design

Organic Synthesis
 SAR

nanostructures, peptide-based drug design etc)

Division of Environment Conscious Chemistry and Bioengineering



Biomolecular Engineering

Associate professor, Shinya IKENO

Development and application of functionalized nanomaterials using biomolecular

ikeno@life.kyutech.ac.jp

http://www.life.kyutech.ac.jp/~ikeno/

Functionalized peptide

- Biopesticide
- Biostimulants

- Genetic engineeringRecombinat protein
- Drug screening
- Nanoparticle

I have been studying development of functionalized nanomaterial combined with biomolecule and nanoparticle, and application of functionalized

biomolecular to bioprocess such as production of recombinant protein.

Division of Environment Conscious Chemistry and Bioengineering



Catalyst Electrolytic Engineering

Associate Professor, Yoshiyuki TAKATSUJI

Efficient and selective electrochemical conversion of substances

ail takatsuji@life.kyutech.ac.jp

- Catalytic metal electrode
- Plating technology ● CO₂ fixation

Energy and environment

Research Overview

Our research has committed to solving to environmental and energy problems with the catalytic a metal electrode that can produce the efficiency substance.

The catalytic metal electrodes have been developing and also analyzing the reaction mechanism and the produced substance. We will pursue research in the field of clean cycle chemistry (Tri-C) and achieve the goals of the SDGs.

- Sustaibable Society
- Additional value Cellulose
- Global Issue
- Polymer Materials Organic Synthesis

We aim to realize a material cyclical society based on both environmental preservation and economy. Highly value-added functional materials based on

https://www.life.kyutech.ac.jp/~yando/wp/?page_id=34

Environmental-Benign Functional Materials

characteristics of waste and biomass are established and evaluated.

Department of Biological Functions Engineering

Division of Environment Conscious Chemistry and Bioengineering

Associate Prof, Ph.D. Yoshito ANDO

based on biomass and/or waste with a

yando@life.kyutech.ac.jp

Design and evaluation of functional materials

nigh-added value forward to sustainable society

Division of Green Technology



Micro-Technology

Iwao SASAKI Professor, Ph.D.

The research on the upgrading of the materials or Mechatoronics equipments

http://www.life.kyutech.ac.jp/~sasaki/sasaki_j.htm

● Functional Thin Film

 Solid Lubrication Bearing Vapor Deposition

Magnetic Material

sasaki@life.kyutech.ac.jp

Research on functional materials utilizing the unique

phenomena, which are prominant in a micro/nanome-

Division of Green Technology



Mechatronics

of Engineering

Visiting Professor, Doctor Hideki HONDA

Mechatronics Control to fit in human society

honda@life.kyutech.ac.jp

Mechatronics Control Theory Motion Control

http://www.life.kyutech.ac.jp/~honda/

As robots are good examples, mechatronic devices are now used in various fields as well as in the industry. Therefore, in addition to research on the high-speed and high-accuracy performance required by the industry, we also study mechatronics technology that is kind to people and supports them.

Division of Plant Life-cycle Engineering



Special Appointment

Plant Life Cycle Engineering

Associate Professor

Masahiro NAKANO

mail nakano@life.kyutech.ac.jp

Plant Life Cycle Engineering

AI

● Plant Life Cycle

Welding repair

Equipment diagnosis

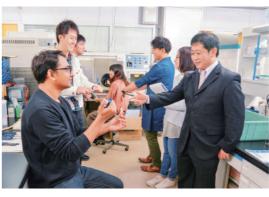
Image analysis

Research Overview

Plant Life Cycle Engineering (Research on autonomously controlled robot welding, and Research on thermal elasto-plastic analysis of welds and

● Thermal elasto-plastic analysis optimization of welding order)







Department of **Biological Functions** Engineering









DEPARTMENT OF HUMAN INTELLIGENCE SYSTEMS

Graduate School of Life Science and Systems Engineering

Division Overview



Department of Human Intelligence Systems aims to incorporate the principles of human intelligence into intelligent information processing platforms and artificial intelligent systems, as well as to actively contribute to the development in the industry. The research and education in this department covers but is not limited to (i) advanced development of mechanical systems and devices such as intelligent autonomous robots, (ii) intelligent information system development and artificial intelligence algorithms design that incorporates the principles of human reasoning, (iii) scientific analysis of social activities and human intelligence by using mathematical modeling, brain science and cognitive science in general.

Divisions



Division of Human Intelligence and Machines

Division of Human Intelligence and Machines is teaching and researching in the fields of robotics and devices, which could realize human-like intelligence by utilizing rational and significant structures as well as functions of biological organisms to achieve low-energy consumption, harmony with the environment, and human-friendly behavior. Through the teaching and research, we will bring students up to be persons and professionals who are actively involved in the global world with to create new public services, new business, and new social value.



Division of Intelligence Systems and Emergent Design

The division is engaged in the design of new technologies and theories that are inspired by human intelligence. It is a form of societal engineering focusing not only on cognitive functions of recognition, learning, and reasoning, but also on social abilities with emotions, Kansei, and communications. This field requires the study of mathematical modeling, informatics, and systems engineering toward a comprehensive understanding of computation in brain-bodyenviro ment interaction and an advanced development of intelligent partners and platforms.



Division of Human Interaction and Brain Functions

It is important to study the relationship between the function of the brain, and the nature of society made by humans to clarify human intelligence. In this division, we study the characteristics of neurons of which the brain consists, the information processing in which many neurons are involved, behaviors as results of the processing, and the communication mechanism of humans in a society.

Division of Human Intelligence and Machines



Field Robotics

Professor, Ph.D

Kazuo ISHII

Research on field robotics and their applications

ishii@brain.kvutech.ac.ip

http://www.brain.kvutech.ac.ip/~ishii/

- Field robot
- Underwater robot Agricultural robo
- Soccer robot
- Inspection robot Motion control system

self-localization system, adaptive learning system, motion control system, bio-inspired information

Development of field robots such as underwater robot, agricultural robot, inspection robot, and research on related topics, environment recongnition system,

Neural networks

Division of Human Intelligence and Machines



Human function substitution systems

Professor, Ph.D. (Eng.) Chikamune WADA Research on developing functional substitution system for the disabled/the elderly people based on human sensory/motor characteristics

mail wada@brain.kyutech.ac.jp

http://www.brain.kvutech.ac.ip/~wada/

Research Overview

Human interface

- Assistive technology ● Functional substituti
- Biological information
- Biological data measurement

Research on developing human-friendly assistive device/substitution system for the disabled/the elderly people based on psychophysical analysis of human sensory-motor systems.

- Brain-like computer
- Softcomputing
- Digital hardware design

FACULTY MEMBER

Division of Human Intelligence and Machines



Intelligence Emerging Nanosystems

Hirofumi TANAKA

Design, development, and integration of nanodevices for artificial intelligence hardware devices.

-mail tanaka@brain.kvutech.ac.ip http://www.brain.kvutech.ac.ip/~tanaka/

Keywords

- Intelligent information processing panodevices
- Artificial intelligence nanodevices Neuromorphic nanodevices
- Integrated circuits for nonlinea dynamical nanosystems, and

Research and development of electric nanodevices for artificial intelligence hardware, whose target is to generate new electrical functionalities by using the

circuit of the nanodevices.

Division of Human Intelligence and Machines



search Brain-like Computer System

Hakaru TAMUKOH Professor, Ph.D.

Realization of a brain-like computer system and its application to human-friendly systems

-mail tamukoh@brain.kvutech.ac.ip

http://www.brain.kyutech.ac.jp/~tamukoh/

Research Overview

- hw/sw complex system

A brain-like computer system laboratory aims to realize a brain-like computer based on a hardware/software complex system and its application to

embedded systems on home-service robots.

Division of Human Intelligence and Machines



Keywords

Motor learning

Image processing

Learning by watching

Brain-Like Intelligent Machines

Associate Professor, Hiroyuki MIYAMOTO

ent of brain-like intelligent mach with emphasis on construction of self-learning robots

acquisition robot, motor learning robot, walfare robot

miyamo@brain.kyutech.ac.jp http://www.brain.kyutech.ac.jp/~miyamo/

Research Overview Development of learning by watching robot, skill

Division of Human Intelligence and Machines



Bio-inspired artificial vision

Associate Professor, Shinsuke YASUKAWA

Information processing in biological sensory systems and their applications in field robotics

s-yasukawa@brain.kyutech.ac.jp

Keywords Research Overview

- Bio-inspired system
- Robot vision

Development of living creature observation/

manipulation technique using robot, Simulation of the visual nervous system. Development of Bio-inspired robot vision system, Trials of their techniques in field,

http://www.brain.kyutech.ac.jp/~s-yasukawa/

Division of Human Intelligence and Machines



Field Robotics

Associate professor,

Development of control system and technology for field robot

Yuya NISHIDA

mail y-nishida@brain.kyutech.ac.jp

Motion analysis

Research Overview

● Field robot Motion control

To reliably accomplish the mission, our laboratory develops robot that robustly navigates in actual environment, and its elemental technology. We survey actual environment using developed robot and system

to benefit society.

Division of Human Intelligence and Machines



Nanomaterial Intelligence

Assistant prof, Dr. Sci. Yuki USAMI Creation for brain-inspired information processing system by nanomaterial

mail usami@brain.kyutech.ac.jp

Research Overview

Hvbrid material

Mesoscopic physics

pysical properties of organic/inorganic materials for extracting flexible bio-inspired function. Creation of unconventional nanodevices by circuitization and

Research and development of nanoscale various basic

 Nanostructure analysis Molecular electronics

deviceization from nanomaterial function

Division of Human Intelligence and Machines



Brain-like Al Systems

Specially Appointed Professor Osamu NOMURA

Research and development of brain-like Al models and circuit architectures

mail nomura@brain.kvutech.ac.ip

Brain-like information processing Analog integrated circuits

Robot control

Research Overview

Research and development of integrated circuit models of brain functions to achieve extremely low energy consumption, targeting service and assistive robots.

Division of Human Intelligence and Machines



Brain-like Integrated Systems

Department of Human Intelligence Systems

Specially Appointed Takashi MORIE Professor, Dr.Eng. Design and development of integrated circuits, devices and systems for brain-like artificial

morie@brain.kyutech.ac.jp

http://www.brain.kyutech.ac.jp/~morie/

■ Brain-like artificial intelligence Vision and image recognition model Integrated systems for robots Integrated circuit for nonlinear

dynamical system Analog integrated system

Research and development of brain-like processing models, new functional devices and digital/analog integrated circuits (VLSI) and systems mainly targeted to service robots toward achieving brain-like artificial intelligence.

Division of Human Intelligence and Machines



Brain-like Integrated Circuit, and Nonlinear Dynamical Systems

Assistant Professor, Seiji UENOHARA Dr.Eng.

Design and development of integrated circuits. devices and systems for brain-like artificial ntelligence

E-mail uenohara@brain.kvutech.ac.ip

Keywords

- Brain-like artificial intelligence
- Integrated circuits for nonlinear dynamical systems
- Mixed signal integrated circuits

Research Overview

Research of brain-like processing models, integrated circuit (VLSI) design toward high efficiency brain-like artificial intelligence and its social implementation.

Division of Intelligence Systems and Emergent Design



Learning theory of brain-like artificial intelligence

Professor, Ph.D. Tetsuo FURUKAWA

Learning theories of brain-like artificial intelligence and mathematical modeling of behavior development

-mail furukawa@brain.kvutech.ac.ip

http://www.brain.kyutech.ac.jp/~furukawa/

Research Overview

● Brain-like artificial intelligence Self-organizing systems

 Neural networks Machine learning

Keywords

Our destination is to develop the learning theory and its algorithms, which enable us to discover general rules and intrinsic information underlying the given datasets. Typical themes are higher-order modeling

throungh meta-learning and multi-task learning. Besides, we also challenge to model children's

Division of Intelligence Systems and Emergent Design



Human and Social Intelligence Systems

Tomohiro SHIBATA Professor, Ph.D.

Science and Engineering Understanding of **Humans and Societies, Assistive System Development and Social Implementation**

mail tom@brain.kyutech.ac.jp https://www.brain.kyutech.ac.jp/~tom/

Keywords

Robotics

- Artificial intelligence
- Biomechanics
- Biological Signal Processing
- Mixed Reality/Metaverse Brain Science
- Medical,KAIGO,Welfare

Research Overview

We are researching and developing assistive technologies to apply various knowledge and technologies, such as robotics, artificial intelligence, biomechanics, and biological signal processing, to the medical, nursing, and welfare fields. We are also promoting the social implementation of these technologies in collaboration with various players, including the elderly, people with disabilities, medical, nursing, and nursing care professionals, private companies, and governments.

Division of Intelligence Systems and Emergent Design



Professor, Ph.D.

Intelligent Information Processing Systems

Keiichi HORIO

evelopment of fundamental technology of intelligent information processing system aiming at nodeling and analyzing behavior of human beings

horio@brain.kyutech.ac.jp http://www.brain.kyutech.ac.jp/~horio/

Keywords

Research Overview

 Behavior analysis Communication analysis Estimation of personality Intelligent data analysis

Intelligent image processing

Learning syster

individual characteristics by measuring and analyzing human behavior. Besides, we pursue optimization of the intervention method based on analysis results and aim to apply it to real-world society, especially data

Investigating principles of neural dynamics,

http://www.brain.kyutech.ac.jp/~waga/

to understand biological intelligence

waga@brain.kyutech.ac.jp

oody kinetics/morphology and societal abilities

The Research aimed at estimating and classifying

Brain-Inspired Robotics and Intelligence Dynamics

Hiroaki WAGATSUMA

Division of Intelligence Systems and Emergent Design Division of Intelligence Systems and Emergent Design



Professor. Doctor of Engineering

Sozo INOUE

Human Activity Recognition and Future Disease Prevention

Keywords

Application of Machine Learning

sozo@brain.kyutech.ac.jp http://sozolab.jp

Research Overview

 Human Activity Recognition Web / Ubiquitous

Big Data Application for Healthcare / Nursing Behavior Change

loT / Big Data

We develop human activity recognition from smartphones and sensors, and their services. We also

cultivate AI by collecting medical and nursing care big

Keywords

 Nonlinear dynamics ● Emergent intelligence Episodic memory and emotion

■ Societal robot Computational neuro ■ Neuroinformatics Sport biomechanics

Rehabilitation support

Research Overview

We explore systems design inspired by biological emergent intelligence, through an understanding of what makes us human (intelligence), how we are embodied in the environment (body kinetics/ morphology), why emotional and social aspects are so important to us (sociality) . Our mathematical modeling and investigation are applied to the design of an artificial intelligence, robot development, and rehabilitation tools.

Division of Intelligence Systems and Emergent Design



Human-Computer Interaction

Keywords

Soft Computing

Cognitive Psychology

Kansei Information Processing, Soft Computing

Associate Professor, Kaori YOSHIDA Dr. (Eng.)

Designing information system based on Kansei Information Processing

kaori@brain.kvutech.ac.ip

https://www.brain.kvutech.ac.ip/~kaori/

Research Overview

We study Kansei Information Processing as one of Human-Computer Interaction research. The research aims to design appropriate information systems based on psychological, social, and technical analysis. Research topics include human-centered design, soft

 Intelligent Image Processing Information System Design computing, usability, conceptual models, interface metaphors, human cognitive models, implicit behavior analysis, and interactivity structures.

Division of Intelligence Systems and Emergent Design



Statistical learning theory

Assistant Professor, Hideaki ISHIBASHI

Learning theory of information geometrical hierachical-modeling

-mail ishibashi@brain.kvutech.ac.ip

Keywords

- Meta-modeling Multi-task learning
- Meta-learning,
- Bayesian inference Machine learning, Energy based model

Research Overview

The aim of our research is to develop the learning theory and its algorithms for meta-modeling, which enables to discover meta-knowledge by modeling a set of knowledges or models. We will apply the proposed framework to various fields, such as cognitive science and robotics.

Division of Human Interaction and Brain Functions



Team Management

Professor, Ph.D. Doosub JAHNG

A Story of diverse individuals becoming one as

http://www.brain.kyutech.ac.jp/~jahng/

- Keywords ■ Team Communication
- Occupational Health Marketing Kev Words Meeting[®] Versatile Educational Tools

Integrated Solution

Comprehensive Health Resources

Research Overview

mail jahng@brain.kyutech.ac.jp

For diverse individuals to agree with each other and become one as a team, innate needs, learned knowledge/skills acquired needs from personal/ environmental circumstances, self-action, health resources and communication become essential. We conduct research on the factors above by utilizing both people's conceptual needs and experimental/ statistical designs to further our study on team management.

Division of Human Interaction and Brain Functions



Keywords

Patch-clamp

■ Ca²⁺-imaging

Immunohistoche

Single cell RT-PCR

Confocal laser micr

Signal transduction

Action potentials

Neuroscience

Associate Professor, Yoshitaka OTSUBO Ph.D.

Taste transduction mechanisms

otsubo@brain.kyutech.ac.jp

http://www.brain.kyutech.ac.jp/~otsubo/ Research Overview

We investigate the cellular and molecular mechanisms underlying the signal processing occurred in mammalian taste buds and we contribute to develop a new signal processing based on features of taste buds

Division of Intelligence Systems and Emergent Design



Bioinspired Intelligence Systems Associate Professor, Shuhei IKEMOTO

Ph.D. Robots/Algorithms inspired from biological

FACULTY MEMBER

Research Overview

- Bioinspired robot
- Riginspired algorithm Learning control Stochastic resonance

Keywords

Behind sophisticated abilities of living organisms are the mechanisms that exploit demerits, e.g., complexity/flexibility of body and unignorable noise, as merits. Toward understanding and applying the mechanisms, academic studies about biologically inspired systems based on robotics have been conducted.

http://www.brain.kyutech.ac.jp/~ikemoto/index.html

Division of Human Interaction and Brain Functions



Keywords

EEG

Neuronal rhythm

Circadian rhythm

Brain machine interface

 L2 English learning Music rhythm esports

Hippocampal

h Neuronal rhythm and Brain Machine Interface (BMI)

Kiyohisa NATSUME Professor, Ph.D. The relationship between the generation of

neuronal rhythm and memory process

http://www.brain.kvutech.ac.ip/~natume/

Research Overview

natume@brain.kvutech.ac.ip

learners using BMI technology.

We study experimentally on the generation of neuronal rhythm and compute the rhythm on the computer. We also developed the e-learning system for Japanese English

Division of Human Interaction and Brain Functions

Associate Professor,



Mathematical Neural Network

Katsumi TATENO Ph.D. **Neural coding and Neurodynamics**

-mail tateno@brain.kyutech.ac.jp

http://www.brain.kyutech.ac.jp/~tateno/

Research Overview

Keywords

 Neural coding Medial entorhinal cortex

Memory Learning Electroreceptor

Our interests are complex behavior of neural activity and theoretical investigation on neural coding in the brain. Specifically, we are currently researching neural network models of the medial temporal lobe.

Division of Human Technology



Systems Intelligence

Visiting Professor,

Ph.D. Basic and applied research on intelligent system development

Intelligent system

 Social intelligence Systems healthcare

Research Overview Research and development on algorithms of intelligent

systems by studying soft computing, statistical analysis, and social intelligence in human-machine collaboration systems with application studies.

Hiroshi NAKAJIMA

Keywords

 Soft computing Computational intelligence Causal analysis

Machine learning

Health manageme

Biomimetic Robot System

Visiting Associate Professor, Takayuki MATSUO

Development of Robot Systems based on

motion control and information processing

Division of Human Technology



Vision Sensing

Visiting Professor,

Masaki SUWA

Basic and applied research on intelligent vision system

- 3D SensingPhysics-based Vision
- Pattern Recognition

Research Overview

Research and development on vision sensing technologies such as object detection, 3D surface reconstruction and reflectance property analysis, for

applications in factory automation or society's

Neural network

Research Overview

Adaptive control

Division of Human Technology

Development of mobile robot systems inspired by mechanisms of animals for irregular terrain underwater and so on.

UENO SEIKI Next Generation Frontier Technology Collaboration Laboratory



Image sensing

Specially Appointed Associate Professor

Kazumichi TANAKA

Creating added value for semiconductor nspection machine using AI technology

k-tanakazu@brain.kyutech.ac.jp

- Artificial Intelligence

Value-added creation for mechatronics technologies such as Machine Vision System, high-speed, high-precision, energy-saving, and vibration control by combining AI technology with semiconductor

inspection machine manufactured by Ueno Seiki

Research Center for Neuromorphic AI Hardware

system of animals



Brain-inspired artificial intelligence

Assistant Professor, Ph.D.

Yuichiro TANAKA Development of brain-inspired artificial

intelligence and its application for robots

tanaka-yuichiro@brain.kyutech.ac.jp

with low power consumption.

- Computer system:
- Amygdala
- Prefrontal cortex
 FPGA

Aiming for a future in which home service robots work as human partners, I develop artificial intelligence models that mimic the functions of the brain, especially those of the hippocampus, amygdala, and prefrontal cortex, and hardware that operates them



Department of Human Intelligence **Systems**



■ List of overseas dispatched students in FY2022 (by country)



and exemption

The tuition and other fees are shown below. Only a limited number of students can get exemption of full or half of fees through a selection procedure.

INTERNATIONAL EXCHANGES

▶ Application fee: ¥30,000 ▶ Enrollment fee: ¥282,000

▶ Tuition fee: ¥267,900 per half year

living cost

Students can apply for various scholarships financed by our university or other foundations. The monthly stipend is from ¥20,000 to ¥140,000.

Doctoral course students may get about ¥45,000 per month as a research assistant. The monthly cost of living in Kitakyushu city is approximately from ¥60,000 to ¥80,000 including house rent and utilities.

Accommodation

Students can apply to stay in the international student housing (Sakura House) near Wakamatsu campus. However, as we have limited rooms available, not all students will be able to stay at Sakura House.

The rent of Sakura House is from ¥11,700 to ¥18,000 per month.

A tutor, who is current student in the laboratory, can help new students for their study and daily life in Japan. This tutor system is available for the first three months after enrollment.

Japanese language class

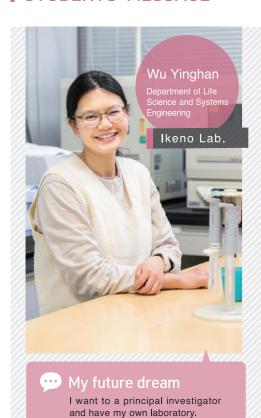
Students can take the appropriate Japanese language class.

▼English Information for international students in our web site is as follows.

Q https://www.kyutech.ac.jp/english/

ACCESS

I STUDENTS' MESSAGE



Why Kyutech?

In October 2019, I participated in the double-degree-exchange program between YangZhou University and Kyutech, During the period, I studied bioengineering, especially in the field of biomolecules. There friendly research environment in the Ikeno Lab. always allow me to asking questions freely and that gave me the enthusiasm for learning more. So after obtaining my master degree, I chose to continue my ph.D study here.

About Research

Now, I am continuing my study at the functional biomolecules field. As we all know, the peptides have a lot of biofunctions in vivo and have demonstrated a promising ability as therapeutic agents and biochemical tools. I am working on the cyclic peptides study, especially, analysis the cyclic peptides' functions in the cell and screening for the new functional cyclic peptides.

Best point of Kyutech

The people in kyutech are nice and kind people. The stuff in kyutech, they always give kind help and support with a big smile. The students in the school, they are very patient and attentive. In fact, I learn the Japanese from my Lab. members. They are always very patient to teach me over and over again.

My recommended place from Kyutech

There are many beautiful views in Kyutech. My favorite is the sunset in the parking. I like to enjoy such a good moment when I am going to the shop. It healing your soul.

What surprised me most in Japan

The shops here close early and it is important to manage your time when you want to buy something.

What kind of life

When I first arrived in Japan, I didn't know any Japanese. I learned it slowly, and although my Japanese is not very good even now. Luckily, the students in the lab are very good Japanese teachers. Until now, I have been learning Japanese from them.

Why Kyutech?

Kyutech provides an excellent and extensive setting for research, from its facilities to the assistance it gives its students.

About Research

Under Prof. Horio's supervision, I am currently using deep learning to analyze kindergartener behavior and the immediate surroundings, Professor Horio puts in a lot of effort and is always prepared to provide a helping hand; he consistently offered me a myriad of concrete suggestions that often proved to be spot on. He granted me the opportunity to go off on my own and keep on facilitating the discussion about my research interests.

Best point of Kyutech

Many international students from places as diverse as America, Europe, Australia, and Asia have been accepted to study at Kyutech. That way, discussions among students can include a wide range of viewpoints (global perspectives), not just those gleaned from academic research or cross-cultural experiences.

My recommended place from Kvutech

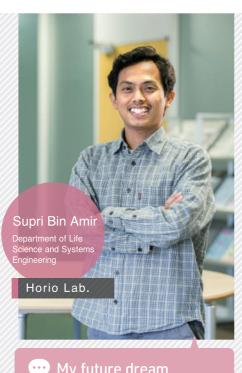
For me, nothing beats spending time in the lab. It's not just a place to get work done; it's also a communal hub where people can swap tales unrelated to our studies. Having access to play sports with my peers in the aymnasium is one of the perks of studying at KYUTECH, making it one of my favorite places to go.

What surprised me most in Japan

The timely work and the dedication of the whole system in Japan is one of the things that has impressed me a lot.

What kind of life

It's wonderful to meet new people, and I've recently become part of a local community that has encouraged me to join celebrations of all kinds, from festive occasions to outings. If you plan on relocating to Kitakyushu with your family during your study, you'll be happy to know that the Kitakvushu International Association (KIA) is one of many expat support organizations in the area, providing a wide range of services to help us such as provide learning iapanese, organize some event, etc.



··· My future dream

I want to explore leading-edge research that makes a impact to the society.

Wakamatsu Campus in Kitakvushu Science and Research Park



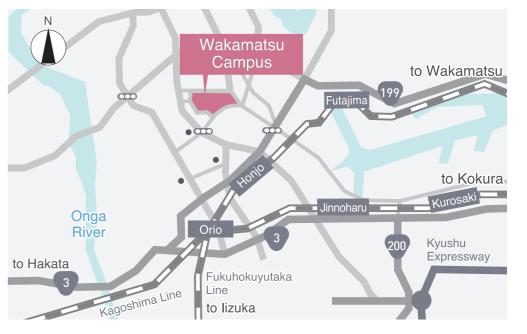
Graduate School of Life Science and Systems Engineering



Cafeteria



Kitakvushu Science and Research Park





Beijin — Fukuoka

HongKong — Fukuoka

· · About 2H50M

Other Campuses of Kyushu Institute of Technology



Tohata Campus



