Laboratory Introduction 2022

Number of Lab Primary 33, Secondary 8 s

GEDES Global Engineering for Development, Environment and Society

People-centered sustainability research on Water, Food and Renewable Energy Systems:

Examples of some past bachelor theses

- The impact of urbanization on water utilities performance in a developing country: A case study of the Philippines
- Environmental and social impacts on communities associated with urban honeybee project
- A Pareto Frontier Analysis of Household Budget and Environment for Energy Saving Goods

Appealing Points of the Lab:

- Keen attentions to the intersection between social science (esp., statistics, economics) plus behavioral science and engineering/technology
- Appreciation to diversity and multi-cultural settings
- Presentation and discussion in seminar in English
- Site visit and survey valued most
- Keen to social and economic evolution



設置・接続イメージ Installation Diagram



(Source: NEDO, http://www.nedo.go.jp/news/press/AA5 100488.html)

ABE, Naoya (Professor) nabe@ide.titech.ac.jp http://www.ide.titech.ac.jp/~nabe/wp/

- Modeling atmospheric turbulence in urban areas
- Future climate prediction in megacities
- Database construction of global urban parameters
- Urban climate observation by thermal imaging
- Measurements of human thermal comfort

• Appealing Points of the Lab:

- Strong bond among members and alumni
- Global pioneering research
- International & interdisciplinary environment

KANDA, Manabu kanda.m.aa@m.titech.ac.jp http://www.ide.titech.ac.jp/~kandalab/





Hydrology and Water Resources Impact of Climate Change and Urbanization

- Flood analysis of Klang River catchment, Malaysia (BSc, 2018)
- Prediction of water resources for metropolitan area of Bolivia (BSc, 2018)
- Development of a numerical model of urban inundation in Phnom Penh and its application for future prediction (BSc, 2017)
- Estimation of seasonal rainfall over Indo-China Peninsula based on existing climate indices (BSc, 2017)

• Appealing Points of the Lab:

- We do studies for a variety of fields in Japan and overseas for clarifying and solving actual problems.
- Our interdisciplinary approach enables us to acquire broader range of knowledge and experiences, including numerical analysis, experiment, observation and chemical analysis.



KINOUCHI, Tsuyoshi

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Radio Propagation for Communication and Sensing

- Device-free Single-person Indoor Localization using Wi-Fi Channel State Information
- Design of passive reflectors for illumination of shadowed regions in 28 GHz
- Measurement and clustering of Reflection Coefficient of Different Materials
- Comparison of Complex Permittivity Measurement Methods for Radio Propagation
- Object Shadowing Detection Method by Stereo Vision for Wireless Channel Simulation

• Appealing Points of the Lab:

- Students from all over the world
- English as common language for technical discussions and social events
- International network of alumna and research collaborators
- Joint research with industry / National projects



Prof. Jun-ichi Takada

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http://www.ap.ide.titech.ac.jp

Manufacturing based on Mechanical, Electrical, Material, Surface science, etc...

- Bio-inspired grip & release devices
- Adhesion phenomena
- Energy harvesting
- Self charging drone with energy harvester
- Mechanics and electronics at contact
- Micro plasma
- Molecular mechanics
- Appealing Points of the Lab:
 - Theory and experimental approaches
 - Conference presentation recommended
 - Collaboration with SAITO Shigeki lab.
 - New challenging will be supported based on the potential of lab.

TAKAHASHI, Kunio

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- Communication, Media Translation, Science/Technology & Art/Design
- Science communication in newspaper: 3.11 nuclear plant accident
- Human-robot/smartphone communication
- Game (TRPG) playing and critical thinking
- Film subtitle translation / Oral interpretation studies ... and many more
- 4th floor, South 5:
 - International exchange and network: London Science Museum, Central St Martins UAL, European Parliament...
 - Many opportunities to collaborate with artists, creators, journalists, companies....
 - Science x Art Satellite Lab STADHI
 - Come and talk! We have great tea parties



NOHARA, Kayoko

http://www.tse.ens.titech.ac.jp/~nohara/en/ https://www.tse.ens.titech.ac.jp/~deepmode/csm/

- Research Areas:
- Transport Development Studies
- International Freight Transport and Logistics
- Air Transport
- Appealing Points of the Lab:
 - Respect for autonomy and voluntary behavior
 - Multinational members
 - Official language is English



Hanaoka Research Group

Transport Studies Unit (TSU)

Transport; Logistics; Developing countries



Transport Development Studies / Logistics and Freight Transport

- Urban Transport in Developing Countries
- Regional Transport in Developing Countries
- Transport and Economy in Developing Countries
- Humanitarian Logistics

Cross-Border TransportIntermodal Transport

Maritime Transport

Port Operation/Management



Air Transport

- Low-Cost Carriers (LCC)
- Airport Operation/ Management
- Air Cargo

HANAOKA, Shinya

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Energy & environmental technologies for carbon-neutralization. Experiments and computational sciences.

- Novel CO₂ adsorbents, solid-state batteries etc. developed using covalent organic frameworks
- Thermofluidic device and system to recover waste heats
- Photon upconversion materials
- Appealing Points of the Lab:



We are new laboratory in TSE started in April 2022. We accept a lab tour throughout year. Feel free to contact us.

- Advanced R&D with big dreams and pioneer spirits.
- Bright and fresh lab environments with good communications between prof., seniors, and juniors.
- Students can grow gaining experiences via conference presentations, joint research with companies, etc.

MURAKAMI, Yoichi <u>murakami.y.af@m.titech.ac.jp</u> <u>http://www.fel.zc.iir.titech.ac.jp/index-e.html</u>

Environmental planning and policy

- Potential Evaluation of Geothermal Energy Development Considering Environmental and Social Conditions
- Environmental and social impact assessment of offshore wind farm projects in china
- Estimation of annual human risks induced by a hazardous pollutant by chemical accidents
- Community empowerment through NGO's activities on international cooperation
- Appealing Points of the Lab:
 - Design social systems, considering the relation between Sci. & Tech. and society.
 - Almost half from international students, Both Japanese and English seminars held.
 - According to students' interests, we will take shape research topics with our lab's concerns and experiences.



MURAYAMA, Takehiko

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Aerospace Systems, High-Speed Aerodynamics

- Mars orbit insertion by Aerocapture
- Asteroid global exploration with nanolanders
- Deployable atmospheric reentry vehicle using Waverider effect
- Asymmetirc capacitor thruster
- Space debris removal using electromagnetic force
- Appealing Points of the Lab:
 - Opportunity to be involved in flight projects
 - Numerical simulation, Ground tests, Flight tests
 - Collaborative research with JAXA and other universities



AKITA, Daisuke

akita@ide.titech.ac.jp http://www.ide.titech.ac.jp/~akita/

Chem. Eng., esp. Separation Eng. for Environment and Development

- Recovery of Bioactive Component in Palm Fatty Acid Distillate
- Computational Simulation of Rare Earth Metal Extraction Process
- Phytoremediation of Aquatic Environment Polluted by Antibiotics
- Bioenergy Productions
- Appealing Points of the Lab:
 - Synthesis of chemical process
 - Various survey, laboratory scale experiments, etc. to obtain parameters in the process
 - Computational simulation using the above parameters to check feasibility of the process



EGASHIRA, Ryuichi HABAKI, Hiroaki

Phytoremediation Reactor



Rare Earth Metal Extraction Process

regashir@tse.ens.titech.ac.jp
http://www.ide.titech.ac.jp/~regashir/grp/

Costal Disaster Research for Asian Countries

Bachelor thesis titles:

- Field survey and numerical analysis of storm surge inundation in Tacloban City caused by the 2013 Typhoon Haiyan
- Numerical analysis of storm surge inundation in Tacloban City caused by the 2013 Typhoon Haiyan and analysis of evacuation
- Tsunami Vulnerability Assessment in Tokyo Bay Using a Numerical Simulation
- Study on the Propagation of the Tidal Waves in the Mekong River
- Tsunami Run-up Simulations for Complex Terrain
- Numerical analysis of the 1917 Storm Surge in Tokyo Bay based on a reproduced topography
- Field survey and numerical analysis for floods in Ho Chi Minh City
- Applicability of a 3D Numerical Model for Assessing the Effectiveness of Wooden Pile Breakwaters
- Numerical analysis of tsunami overflow behind coastal dikes
- Numerical Modeling for Predicting River Flow in the Mekong Delta
- Influence of Speed of Gate Opening in Dam-break Experiment
- Abnormal tides caused by storm surges in Tokyo Bay
- Assessment of Technical Feasibility of Jakarta's Giant Seawall Project

Master thesis titles:

- Development of Numerical Model Evaluating Ground Scour behind Coastal Dykes due to Tsunamis
- Research on Maximum Wind Speed Radius of Typhoon Passing through Japanese Southern Ocean Basin
- Stochastic Typhoon Model in Low Latitudes of Northwest Pacific Ocean
- Evaluation of the effectiveness of the proposed mitigation structures after the 2011 Great East Japan Earthquake
- Field Survey and Numerical Simulation of Inundation in the Mekong Delta's Largest City
- Three-dimensional hydrodynamic analysis for the design of wood pile breakwaters under irregular waves
- Estimation of Seepage Flow through Breakwater Mound Subjected to Tsunami by Using Numerical Model
- Projection of high tide inundation under rapid land subsidence and sea level rise Effectiveness and limitation of coastal dykes in Jakarta
- Forecasting extreme storm surges in Manila Bayan adverse combination of unusual tropical cyclone tracks and southwest monsoon



COASTAL DISASTERS AND CLIMATE CHANGE IN VIETNAM

ENGINEERING AND PLANNING PERSPECTIVES

EDITED BY NGUYEN DANH THAO • HIROSHI TAKAGI • MIGUEL ESTEBAN

TAKAGI, Hiroshi takagi@ide.titech.ac.jp http://www.ide.titech.ac .jp/~takagi/

- Research Areas and Past Topics: Energy Storage & Conversion / CO₂ capture/ Energy Carrier
 - Next generation solid oxide cell for CO₂ direct electrolysis
 - Metallic hydrogen separation membranes and its advanced utilization
 - Innovative NH₃ Storage Materials
 - Thermal battery for renewable energy
 - High-temperature carbon dioxide absorption materials
- Appealing Points of the Lab:
 - Conducting research in energy chemistry
 - While respecting independence, student education focuses on student growth.
 - Promoting a productive and comfortable laboratory environment (Let's have a chat")

Let's grow together in the lab, having fun but seriously engaging in research!





NH₃ storage material







Hiroki TAKASU

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Wastes recycles, biomass utilizations, and psychological analysis

- Characterization of waste combustion ash
- Waste-to-Energy technology for biomass and household wastes
- Advanced waste recycles driven by additional value creation

(e.g. Porous geopolymer made of coal ash)

- **Design analysis** for waste recycles
 - Trash bin design for waste separation encouragement
 - Perception analysis on NIMBY facilities
 - Presentation material design

Appealing Points of the Lab:

- Transdisciplinary approaches (Mineralogy, chemistry, psychology, etc)
- Many opportunities of presentation in domestic/international conferences

a) b) c) d) a) b) c) d) b) c) d) c

takahashif@tse.ens.titech.ac.jp http://www.tf.depe.titech.ac.jp/index.html



Techno-economic assessment of energy technologies Systems modeling on resources and environment Lifecycle assessment (LCA)

Economics on sustainable development

- A field survey of relationship between subjective well-being and social capital
- Study on a model to Cost of Electricity for biomass including learning effect

Appealing Points of the Lab:

- Socio-economics; Be conscious how your own, proactive research works can contribute to society (See Fig.)
- **Diversity**; Broaden your outlook, by catching various opportunities to learn sense of values, academic background, and origins.
- Self-directed; Let's involve your colleagues and be inspired by considering your self-fulfillment and carrier development, since you are adult and very in front of going out into the world.



TOKIMATSU, Koji

tokimatsu.k.ac@m.titech.ac.jp http://www.kt.depe.titech.ac.jp/index.html

Environmental Fluid Dynamics in river & lake, Computational Simulation

- Development of drowning simulator combining a human motion and fluid
- Research on water current in Kamafusa lake based on field observation and computer simulation.
- Salinity intrusion in an estuary area of Nomi River in Tokyo
- Field observation and remote sensing of suspended sediment in Tonle Sap Lake in Camobodia

• Appealing Points of the Lab:

- From a viewpoint of water flow, environmental problems and disaster prevention are considered.
- You can lean both of field observation and advanced computational analysis.



Nakamura, Takashi (中村恭志)

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http://nakalab.depe.titech.ac.jp/Lab

Ecosystem modeling, Biogeochemistry, Coastal ecology, Remote sensing, Ecosystem conservation

- A low-trophic ecosystem model for predicting outbreaks of crown-of-thorns starfish in Sekisei lagoon, Japan
- Mapping bathymetry and benthic coverages of coral reef area by spectral unmixing technique using Google Earth image
- In situ measurement of coral community metabolism under various flow conditions

• Appealing Points of the Lab:

- Coastal ecosystems, such as coral reefs, mangrove areas, seagrass meadows, are main study fields
- Based on many kinds of methodologies, such as field-based physical, ecological, biogeochemical measurements, remote sensing, and incubation experiments, we try to elucidate background mechanisms of the ecosystem and to develop an integrated modeling system for ecosystem conservation.



NAKAMURA, Takashi

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http://www.nakamulab.mei.titech.ac.jp

Environmental Impact Assessment, Social Acceptance of Renewable Energies

- Current Status and Solutions of Environmental Disputes due to Wind Power Projects
- Community Acceptance of Woody Biomass Plants
- Tourist Response to Visual Impacts: Geothermal Power Plants in National Parks
- Characteristics of Concise Assessment under US NEPA
- Appealing Points of the Lab:
 - Pursuing a creation of sustainable society from environmental policy & planning perspectives
 - Supporting a sound promotion of renewable energies through conflict resolution & consensus building
 - Approaching to environmental issues through patient field survey and proposing practical solutions



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Global Urban Climatology Urbanization & Future Climate Studies

- Multi-city climate modeling
- GIS-based urban parametric construction
- Urban climate change adaptation & mitigation
- Investigating urban climate through satellites
- Appealing Points of the Lab:
 - Curious towards nature and society.
 - Very open to consultation.
 - Enjoy research and make friends in lab.
 - International lab environment.



VARQUEZ, Alvin Christopher Galang

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Nuclear Engineering Laboratory for Zero-Carbon Energy

Develop new nuclear reactor with high safety and less radioactive waste using natural resource effectively

Themes of recent master theses

- Breed and Burn reactor with rotational shuffling scheme
- CANDLE burning reactor with plutonium initial core
- Burnup analysis of small CANDLE reactor with Monte Carlo method
- Spectrum shift Breed and Burn reactor
- Appealing Points of the Lab:
 - Numerical analysis study is performed using high speed servers and the supercomputer.
 - Each student has his/her own research topic.
 - The study is performed based on the detail discussion by the professor and the student.

Simulation of the innovative nuclear reactor



Hiroki Osato, Jun Nishiyama, Toru Obara , 2017 ANS Winter Meeting @Washington DC, November 2, 2017

OBARA, Toru

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Particle accelerator, Beam science, Ion source, Electron gun, RF cavity, Accelerator driven neutron source, Medical and industrial application

- Low power RF test of a low-energy muon linear accelerator
- Multipacting analysis of an RF coupler of the IFMIF RFQ linear accelerator
- Development of a thermionic electron gun by back-face fiber laser heating
- Appealing Points of the Lab:
 - Laboratory that develops particle accelerators is very rare in universities.
 - Various research themes such as design, simulation, fabrication and experiment.
 - Collaboration with KEK, RIKEN, AIST, etc.

HAYASHIZAKI Noriyosu nhayashi@tse.ens.titech.ac.jp



Radiation Biology and Medicine, Molecular and Cellular Biology

- Mechanisms for the Regulation of DNA Repair through Protein Post Translational Modifications
- Generation and Characterization of DNA Repair-deficient Human Cells by Genome Editing Technology
- Implication of DNA Repair Genes in Human Diseases (e.g., Microcephaly, Immunodeficiency)
- Effects of Radiation on Stem Cells (including iPS Cells)

• Appealing Points of the Lab:

- Substantial equipments for experiments using DNA, protein and cells.
- Can learn from basic to cutting edge in molecular and cellular biology.
- Consists of international members. Use English in meetings.

MATSUMOTO, Yoshihisa

yoshim@lane.iir.titech.ac.jp http://www.nr.titech.ac.jp/~yoshim



Study on neutron nuclear reactions Medical application using a neutron beam

- Development of online dose imaging system for neutron capture therapy
- Study on neutron reactions for reduction of long-lived nuclear waste
- Study on nucleosynthesis in stars

• Appealing Points of the Lab:

- Neutron beam experiments are possible using own particle accelerator.
- A student learns on radiation detection and neutron beam experiments.
- A student research project can be chosen from wide research fields such as nuclear engineering, medical application, detector development, beam analysis, and astrophysics.



KATABUCHI, Tatsuya

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Pursuing Peaceful Use of Nuclear Energy to solve Global Issues

- Carbon-emission free stable energy
- Nuclear waste minimization & utilization by nuclear transmutation
- Robust nuclear energy system design against comprehensive threats
- Safety, Security and Safeguards by design, unique lab in Japan
- Appealing Points of the Lab:
 - Many International Cooperation Researches with Global Partners
 - Many student awardees!!
 - Numerical analysis, no experience needed!
 - Diverse members, 3 staffs, 5 doctor, 5 master students, 3 women, 3 Int. students(U.S., Malaysia)

n

Safety

安全





SAGARA, Hiroshi

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Safeguards

Security

核セキュリティ

Plasma physics related to nuclear fusion, Superconducting magnetic energy storage

- Identification and Control of Plasma with Elongated Cross Section under Existence of Magnetic Material
- Investigation of Finite Larmor Radius Effects in the Ripple Resonance Diffusion of Alpha Particles
- Multi-layers Method for Stable Equilibrium Analysis of Tokamak Plasma with Iron Core
- Acceleration of Orbit Following Monte Carlo code by Using GPGPU
- Appealing Points of the Lab:
 - Both of Theory/Analysis and Experiment (with IIO research Group)
 - Harmony of Science and Engineering

TSUTSUI, Hiroaki

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Plasma / Quantum-Beam Science and Engineering, Fusion Energy, Radiation Application

- Development of high-power beam sources for fusion reactors
- Development of laser ion sources for heavy-ion cancer therapy
- Development of compact neutron sources for nondestructive inspection
- Numerical simulation of fusion neutron source
- Research on plasma thrusters using magnetic nozzles
- Appealing Points of the Lab:
 - Based on plasma & quantum beam engineering, we are conducting researches to solve energy problems and realize a green society.
 - We promote interdisciplinary researches by combining experiments and numerical simulations.

HASEGAWA, Jun

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Energy storage and conversion, lowcarbon energy systems

- Magnesium oxide/CO₂ chemical heat pump
- Calcium Chloride/H₂O chemical heat pump for electric vehicles
- CO₂ electrolysis by solid oxide electrolysis cell
- Low-cost high-efficient hydrogen membrane
- Appealing Points of the Lab:
 - Aiming research contribution on people and beautiful earth with nice members.
 - Meaningful laboratory activities with respect each other.
 - International collaboration, student presentations in international meetings.



KATO, Yukitaka

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Creation of Smart Material/Device for Green and Energy transformation

- Advanced Rare Metal Recycle using Stimuli-Responsive Organic-Inorganic Hybrid Materials
- Environmentally-Friendly Lab-on-a-Chip Chemical Device
- Rapid-Facile Analysis Methods of Radionuclides and Its Application to Fukushima Decommissioning
- Photo-Thermal-Voltaic Conversion

• Appealing Points of the Lab:

- Challenge to create **SMART SCIENCE** based on interdisciplinary researches
- Extensive experimental equipment and research environment rich in diversity (Hands-on nuclear/radioactive operations)
- Highly active international-domestic collaboration projects



TSUKAHARA, Takehiko



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Plasma Science and Engineering/Plasma Diagnostics

- Measurement of underwater Ar-H₂ arc plasma for decontamination of nuclear equipment
- Plasma spectroscopic study on excited state number density in nitrogen-oxygen mixed gas discharge
- Measurement of electron temperature by optical emission spectroscopy of atmospheric pressure non-equilibrium Ar plasma
- Examination of sheath by particle simulation of DC ionized weakly ionized plasma
- Appealing Points of the Lab:
 - Development of measurement techniques applying various atomic/molecular physics and chemistry for various low-temperature plasmas such as electronics, machinery, space, materials, and nuclear engineering
 - Thesis topics are arranged to make you equipped with ability in comprehensive area of science and engineering, through basic plasma studies.





AKATSUKA, Hiroshi

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Development of advanced nuclear thermal hydraulics measurement technology and research for Fukushima revitalizics

- Development of advanced nuclear thermal hydraulics-related measurement technologies using ultrasound, laser, electric conduction, image processing, etc.
- Advanced research on the vitrification process for high-level waste liquid vitrification
- Study on decommissioning of the Tokyo Electric Power Company HD Fukushima Daiichi Nuclear Power Station
- Fukushima Revitalization, Research on collaboration between nuclear energy and renewable energy, etc.

• Appealing Points of the Lab:

- The key words to describe the lab are "measurement", "safety" and "diagnosis".
- Students interested in fluid mechanics, thermal engineering, robotics, and energy are enrolled in this laboratory.
- International students and researchers who have a wealth of knowledge about the plant engineering belong to the lab.



Development of Remote Sensing Technologies using Robot



Development of AR Ultrasonic Flow / Defect Monitoring Technology



KIKURA, Hiroshige

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[Material science and thermal hydraulics for energy power plant]

- Development of energy conversion systems of fusion reactors
- High heat flux component for fusion reactors
- Development of coolant for innovative energy power plant

[Interdisciplinary Research]

- Concave mirrors by low melting point metal
- Concrete materials based on liquid metal technology
- Seawater desalination by liquid metal technology

Appealing Points of the Lab:

- > You do mainly experimental works.
- We support your thesis
- We support your conference presentation
- We do collaboration with various institute in the world.
- We have a lot of social events (Softball match, festival, Table tennis match, some parties, hiking)

Application of liquid metal technology to various field



Masatoshi KONDO Associate professor

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S

Research areas

- Effects of Ba- and Ca-doping on the CO₂ uptake performance of molten alkalimetal borates
- Intermediate temperature CO₂ sorbents for high-efficiency SE-WGS system.
- Developments of nano-hybrid catalysts for low-cost electrochemical CO₂ conversion.
- Synthesis of functional porous membranes for selective carbon capture.
- Appealing Points of the Lab:
 - CO₂ Capture & Utilization
 →Let's find out new solutions
 together to address the crucial
 issues on climate change
 - New research group since 2020 at Tokyo tech

 \rightarrow You can be the pioneers who inaugurate new research fields

For the establishment of future low-carbon society



Harada Research Group

HARADA, Takuya

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ESD Engineering Sciences and Design

Diffusion of innovation driven by Communication Design

- Product improvement cycle by user-test of feeding-aid robot
- Detecting "signs" of danger and establishing feedback method in nursing care facility
- Motives and difficulties of dairy farmers diversified their business
- Appealing Points of the Lab:
 - **Sustainability and Innovation**: consider in diverse field including elderly care, livestock farming, and space
 - Action Research: Co-creation with local government and industry
 - Discussion: Deepen your thinking by Seminar (1 vs all) + Tutorial (1 on 1)
 - **Diversity**: Members with different disciplines
 - **Output**: Promote int'l conf. (B4 student presented in 2020)



literacy of bicycle_fieldwork knowledge discourse diffusion design lay-judge education analysis lay-judge education analysis communication research approach sociolingusitics Calegournalism Social

r SAIJO, Miki

<u>saijo.m.aa@m.titech.ac.jp</u> <u>http://www.saijo.esd.titech.ac.jp/?lang=en</u>

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



Experimental study of hand trajectory for object detachment by bipolar electrostatic adhesional device with collective beam structure



Development of the bipolar electrostatic chuck module having beam assembly microstructure using lithographic technique



Effect of members' professional diversity in group for generating creative ideas

Development of user research methods using data collected from sensors

• Appealing Points of the Lab:

- We investigate research themes with high originality focuses via fundamental viewpoints.
- Even B4-students' research outcomes can be presented in domestic/international conferences.
- You can train yourself with friendly and creative colleagues in an enjoyable environment.



SAITO, Shigeki (PI, Professor)

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Designing innovative experiences of users with Engineering x Co-creation

- Development of nasal reservoir for improvement of reachability and delightness
- Crushing performance of impact absorbing member and development of car air conditioner
- Cavitation and bubble dynamics near solid walls in fluid machinery (multi-physics)

Appealing Points of the Lab:

- Utilizing design thinking, co-creating with users to find potential needs, conducting research to solve problems through applied mechanics, and providing users with innovative experiences.
- In engineering, visualization of high-speed camera, prototyping by 3D printer, and numerical analysis are used to clarify phenomena and build physical models.
- In co-creation design, we conduct industry-academia collaboration projects and operate and improve the co-creation space and community.

Tokyo Tech Design Factory Ishikawadai 5th bldg.



B4: 1(0), M1: 3(1), M2: 2(0), Dr: 4(3) Number of students (international students)

INABA, Kazuaki SADEGHZADEH NAZARI, Mehrdad <u>inaba.k.ag@m.titech.ac.jp</u>

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• Research Areas and Topics

Human-centered Design Research for Sustainable Society and Environment

Examples:

- Design Practices that Transform Producer and Consumer Mindsets on Animal Welfare
- Designing Assistive Technology for Machine-Caregiver Cooperative Nursing Care
- Designing Educational Programs, e.g., Entrepreneurial Education
- Satellite-based disaster management experience design

Appealing Points

- Promoting transdisciplinary team research
- Encouraging designing solutions based on repeated fieldwork, interview, and usertest
- Practicing qualitative and quantitative research, and logical and intuitive design



Cattle Monitoring System "PETER"; Fieldwork Place Example

Takumi OHASHI, Assoc. Prof. <u>ohashi.t.af@m.titech.ac.jp</u>

Social simulation; Evolutionary game theory; Human behavior and evolution

- The effect of various types of fake gossip on the evolution of cooperation in the spatial structured population (Master thesis, 2017)
- Indirect reciprocity in the mutual-aid game (Master thesis, 2016)
- The evolutionary game analysis of Microcredit (Master thesis, 2014)
- Appealing Points of the Lab:
 - Exploring principles of human society and behavior from the viewpoint of science by means of computer simulations and mathematical models
 - Comparison of experimental studies and field studies with the theoretical studies
 - Students who want to do original works and interdisciplinary studies between social sciences and science are welcomed.



NAKAMARU, Mayuko

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https://educ.titech.ac.jp/isc/faculty/

Energy

Energy conversion chemistry and energy systems design

-Designing materials and reactions and creating new energy conversion systems-

- Synthesizing new ionic conductors
- Developing protonic fuel cells
- Ammonia electrochemical synthesis
- Chemical-looping hydrogen production
- Techno-economic analysis of energy conversion systems
- Appealing Points of the Lab:
 - Integrating materials, reactions, and systems from microscopic phenomena to macroscopic systems
 - Approaching future energy transdisciplinarily via a fusion of technology and economy
 - Thinking energy and materials circulations based on renewable energy

OTOMO, Junichiro

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Bachelor Research Topics:

- Renewable Energy Policy in Kyushu
- Chatbot for TSE Prof. Lab
- All day Photovoltaic and Warm Water **Energy System**
- Thermal Storage in Phase Change **Bio-Materials**
- Waste Conversion to Biofuel
- Microplastics, Toxicology



Lab party

Experimental research

Appealing Points of the Lab:

- English Zemi and Global engineering
- Research topics: Renewable energy policy, Microplastics, Waste to biofuels (Engineering), AI in Education
- Design your own research project
- Award winning international laboratory

Prof. CROSS, Jeffrey Scott

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Aligning new energy technology with policy and local society for decarbonization

- Renewable energy potential evaluation by using GIS.
- Energy scenario analysis for 2030-2050 based on grid and dispatch model.
- Study on social acceptance of geothermal energy in Kenya and Japan.
- Study on grid management for large scale introduction of renewable energy.
- Appealing Points of the Lab:
 - Study on dispatch, grid, market and GIS model analysis of solutions such as policy, market and system to overcome the energy issues.
 - Organizing the joint zemi with Energy Policy group at Cross laboratory.





Model analysis

Social acceptance

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Performance assessment of corporate management, Productive efficiency analysis, Innovation, Energy industry, Regional Economies

- Efficiency assessment of generation and transmission/distribution divisions of Japan's electric power companies using DEA (Master thesis)
- Relationship analysis between environmental CSR and corporate performance of Japanese companies (Master thesis)
- Efficiency assessment of Japanese regional banks using a stochastic frontier model (Master thesis)
- Appealing Points of the Lab:
 - We develop methodology to assess performance of corporate management and conduct application research using data
 - Conduct quantitative efficiency analysis for regional economies and energy industries



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