Surface function
Predictive control
Welfare robot
Variable-pitch propeller ship control
Axonal elongation control
Assistance of sit-to-stand movement
Lubrication mechanism of synovial joints
Service blueprinting
Stem cells
Biomechanics
Visual feedback control
Tissue engineering
Nano-structural materials
Semiconductor quantum dot lasers
Environmentally conscious materials
Magnetocardiography
Wettability and fluidity
Biocompatibility
Finite-element human head model
Self-assembly of particles
Adaptive control
Service engineering
Sliding mode control
Multi-input multi-output plant
Functional spinal cord imaging
Multisensory informatics
Haptic display
Persona model
Traumatic brain injury
Spatial human interface
Psychophysiological information measurement and evaluation
Biologically inspired robots
Wearable interface
Robot therapy
Mechanical tolerance of neuronal cells
Design structure matrix
Augmented reality
Multiscale forming
Micro metal forming
Surface modification
Magnetoencephalography
Micro bio analysis
Environmentally conscious design
Mental health care
Human-robot interaction
Psychophysiological and social experiment
Bedroom type robot
Power assist
Micro medical devices
Design theory
Underwater robots
Neuroimaging
Haptic devices
Smart variable space
Fine particles
Ultra reality
Pedestrian/traffic flow model
Virtual reality
Source reconstruction

Tokyo Metropolitan University, Faculty of System Design

Division of Intelligent Mechanical Systems

INTELLIGENT
MECHANICAL
SYSTEMS

Enhancing the welfare of society

Modern society is faced with diverse challenges that are intricately intertwined such as environmental issues, a low birthrate, an aging population, and the declining competitiveness of Japan's manufacturing industry, which is a fundamental underpinning our country. Merely applying traditional technologies will not resolve these problems.

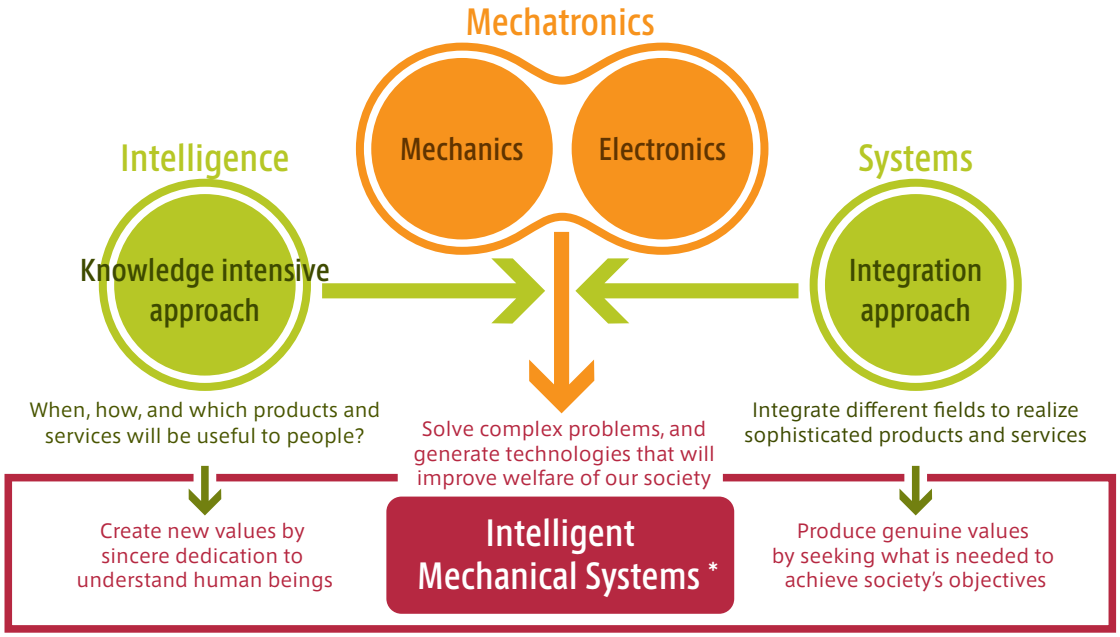
The Division of Intelligent Mechanical Systems aims to solve these complex challenges, create technologies that will improve welfare of our society, and foster future talent through advanced education and research activities with the following three focal points:

- **A human-centered viewpoint:**
  We believe that a sincere dedication to understand human beings is necessary to generate new values. When, how, and which products will be useful to people? All of our endeavors aim to answer this question.
- **An integrated approach:**
  We aspire to create genuine value by seeking what is needed to achieve society's objectives and integrate different fields to realize sophisticated products and services.
- **Continuous cutting-edge exploration:**
  In addition to addressing current issues, our research strives to develop solutions for tomorrow's challenges.

Fostering future leaders in mechatronics

Because we anticipate that future mechatronics technologies will realize intelligent behaviors, in April 2015 our name has changed to *Division of Intelligent Mechanical Systems*.

Mechatronics, which represents a field that combines mechanics and electronics, originated in Japan but is now found globally. However, conventional mechatronics is insufficient to solve many current issues. Because young people like you will realize *future intelligent mechanical systems*, we have developed the necessary curriculum to allow you to acquire the proper skills to successfully tackle these challenges.



* Beginning in fiscal year 2015 the name of our division/department was changed from "Human Mechatronics Systems" to "Intelligent Mechanical Systems."

What you will learn

To understand, protect, and support human beings, innovative intelligent mechanical systems that go beyond conventional mechatronics must be realized. The Division of Intelligent Mechanical Systems will provide you with a fundamental and applied education in intelligent technologies and mechatronics, which will be indispensable for resolving complex challenges with intricately intertwined elements.

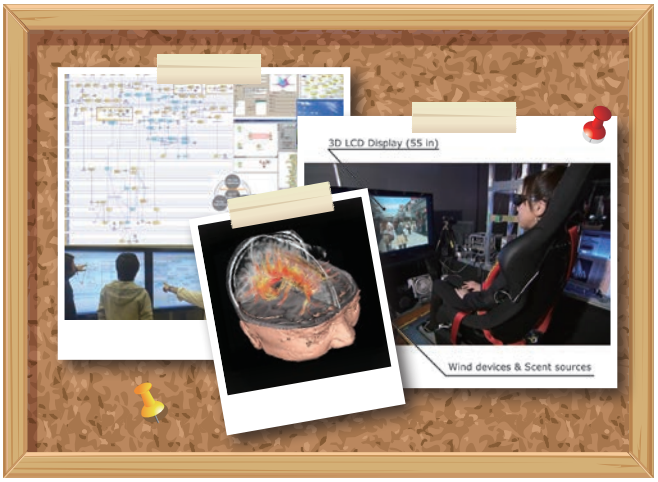
We have established an environment where you can systematically learn information engineering, mechanical engineering, and electronic engineering, which are basis of intelligent technologies and mechatronics. In addition, you will develop your logical and analytical skills, problem-setting and -solving abilities, presentation abilities, and ethical judgment to appropriately handle technological advances.

Field of Control and Robotics

Important issues in various industries are to increase the affinity between machinery and people, improve the adaptability to society, and enhance security. In this field, you will learn about the development of mechatronics technology related to robots as well as fundamental theories necessary to control systems. Additionally, you will learn cutting-edge technologies related to vehicle control (e.g., ships and automobiles), advanced system control (e.g., steel plants and chemical plants), robots that support people, robot partners that co-exist with people, and robot therapies.

Field of Human and System Engineering

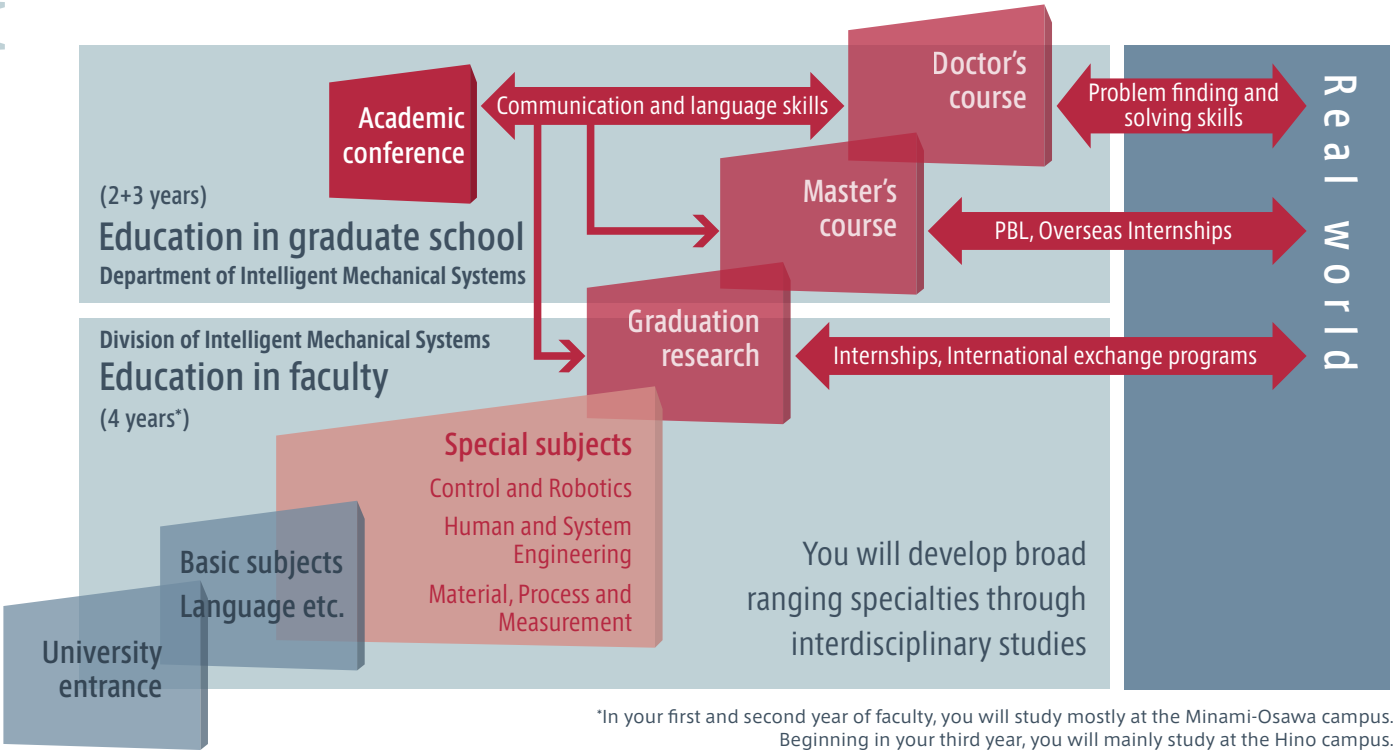
We aim to create novel systems that learn about and support people. Specifically, you will study human motion, biomechanics to determine the mechanisms that damage to human tissues, biometrics to understand the complex activity of a human brain from outside of the body, as well as virtual reality technology and interfaces to be able to simulate interactions between people and their environments on computers. In addition to realize a sustainable circulating society, you will study service-oriented systems that combine human beings, machineries, and society.



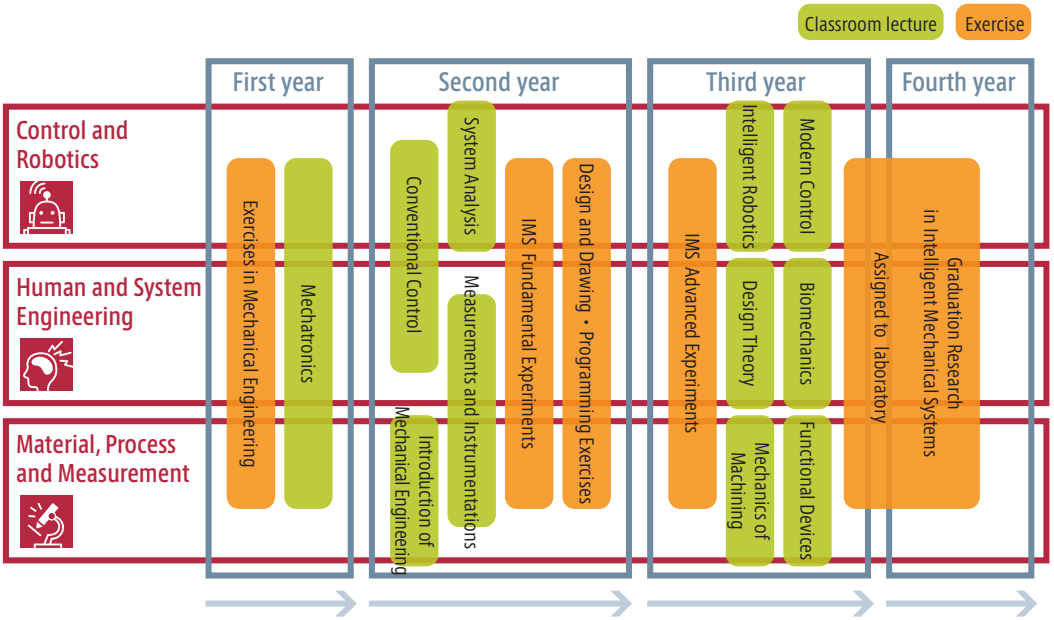
Field of Material, Process and Measurement

Because mechanical engineering, measurement engineering, electronic circuits, and micro- and nanotechnologies are the foundation for the design of electronic and mechanical functions, you will learn about these areas and related technologies. Specifically, you will contribute to the safety, security, and comfort of society by advancing cutting-edge technologies, including fabrication technologies of self-organizing micro- and nanostructures, high-precision sensing technologies to detect biomolecules and advance cell culturing environments for regenerative medicine, and functional surface- and membrane-related technologies to control light and electrons.

Building a comprehensive foundation in machine engineering



*In your first and second year of faculty, you will study mostly at the Minami-Osawa campus. Beginning in your third year, you will mainly study at the Hino campus.



Experience-based internships

You will have opportunities to understand and solve realistic challenges in modern society through an internship program where you will gain precious experience that cannot be taught in a classroom.

Research projects

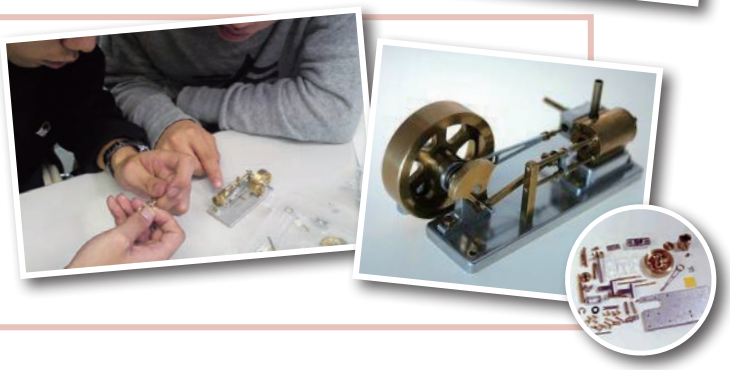
In close cooperation with businesses, you will have opportunities to develop projects that will solve unique challenges determined by actual businesses. You can develop pragmatic problem-solving skills by establishing and implementing your own approach and team to solve these tasks.

Multidisciplinary interim assessment

You will have opportunities to present your research in an interdisciplinary setting with fellow students and teaching staff. This forum allows you to simultaneously improve your research quality and presentation skills.

Drafting and Design

You will develop an understanding of the structure of objects through a series of processes: touching, resolving, and assembling. In addition, you will learn the basis of drafting and CAD (software that supports design work) as well as how to express objects.



We have integrated a variety of experience-based programs to cultivate your practical abilities in Machine Engineering, which is a cornerstone of mechatronics.

Pathways after graduation

Attending graduate school

After completing our four-year undergraduate program, you will earn a Bachelor's degree (engineering). During your first three years as a member of our Division of Intelligent Mechatronics Systems, you will develop a strong foundation, which is applied during your final year to conduct state-of-the-art undergraduate research.

Over 70% of our students pursue advanced degrees. Upon completing our Master's program, you can either dive into research and development at a private company with a Master's degree (engineering) or enter our doctoral program to obtain a PhD (engineering), which will allow you to engage in private enterprises or pursue a career in academia.

Pursuing a career

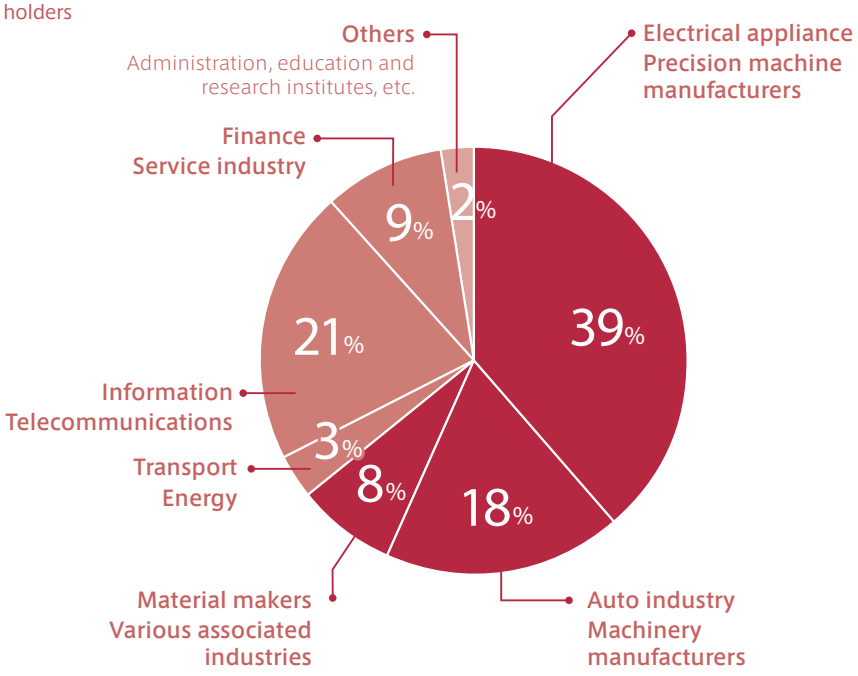
In our Division of Intelligent Mechatronics Systems, you will learn the basics and applications of technologies related to new intelligent machinery systems. This knowledge is essential to resolving challenges in modern society. Our graduates have pursued careers in various fields, including materials, processing, machinery, electric appliances, ICT systems, consulting, and finance.

In a close cooperation with our graduates, who have pursued jobs in all sectors (industry, government, and academia), we can assist you in your job search by providing necessary information, networking opportunities with external organizations via internships, and training programs.

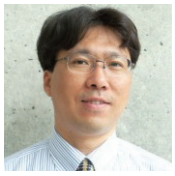
Employment for alumni; breakdown by business type (2011-2015)

Results for
Division of Intelligent Mechanical Systems graduates and
Department of Intelligent Mechanical Systems degree holders

Including data of the division/department of Human Mechatronics Systems



Field of Control and Robotics



Kubota, Naoyuki Professor

Intelligent robot

Smart robots and their practical application will open up the next generation.

Mori, Yasuchika Professor

Control engineering,
Control applications, Robot control

Control engineering, the technology of moving things in a safe and purpose-oriented way.

Wada, Kazuyoshi Associate Professor

Robotics, Welfare robot,
Psychophysiological and social experiment

Let's create a new world with innovative ideas!

Kojima, Akira Professor

Control theory and applications,
Robust control, Model predictive control

The future of control theory is for us to create.

Takesue, Naoyuki Associate Professor

Robotics, Mechatronics,
Intelligent mechanical systems

Challenge to global stages by developing and activating robots.

Field of Human and System Engineering

Aomura, Shigeru Professor

Computational mechanics,
Biomechanics, Biomedical engineering

Discovering the secrets of the human body through engineering-medicine collaboration.

Shimomura, Yoshiki Professor

Design engineering, Service engineering,
Intelligent machine, Knowledge engineering

Your field is in the world. Let's seize the chance together!

Sakamoto, Naoya Associate Professor

Mechanobiology, Bioengineering,
Biomechanics

Reveal the *laws* in biology and physiology by mechanics and engineering.

Ikei, Yasushi Professor

Human interface, Virtual reality,
Multisensory informatics, Instructional technology

Multi-sensory information technology will make the future ultra-reality world come true.

Fujie, Hiromichi Professor

Biomechanics, Biotribology,
Tissue engineering

Learn from fascinating living organisms and open up a new engineering.

Field of Material, Process and Measurement

Moronuki, Nobuyuki Professor

Precise and micro-machining, Surface function,
Self-organizing processes

Surface functions expressed in a fine pellicle is deeper than meets the eye.

Sugawara, Hiroharu Associate Professor

Photonics and electronic materials,
Nanostructured semiconductors,
Materials engineering

Let's look at our precognitions from a new point of view!

Yang, Ming Professor

Microforming,
Micro bio analysis

Manufacturing technology is a key to the happiness of mankind.

Kaneko, Arata Associate Professor

Nano/micro-structure,
Self-organization

Let's create technology that supports society and people 100 years from now!

Assistant Professors

Ishibashi, Ryota	Robotics	Shimizu, Tetsuhide	Surface reforming
Ogawa, Sachiko	Surface Function	Nakadate, Hiromichi	Medical and biological engineering
Kimita, Koji	Design engineering	Yarimitsu, Seido	Biotribology

Enhanced training systems provided by our teaching staff is full of character

首都大学東京
TOKYO METROPOLITAN UNIVERSITY

Tokyo Metropolitan University, Faculty of System Design
Division of Intelligent Mechanical Systems

Tokyo Metropolitan University, Graduate School of System Design
Department of Intelligent Mechanical Systems

◉ **Address**
6-6 Asahigaoka, Hino-shi, Tokyo 191-0065, Japan

◉ **Access**
from JR Toyoda Station (North Exit):
- 20 minutes on foot
- 5 minutes by bus and a 5-minute walk (take Keio bus at the *Hirayama Kogyo-Danchi Junkan* bus stop and get off at *Asahigaoka Chuo-Koen*)

from JR Hachioji Station (North Exit) or Keio-Line Keio Hachioji Station (West Exit):
- 15-30 minutes by bus and a 10-minute walk (take Keio bus for Hino Station or Toyoda Station and get off the bus at *Oowada Sakaue*)

◉ **Inquiries about the entrance examination**
Secretariat of the Graduate School of System Design: Tel. 042-585-8611
◉ **Inquiries about the department**
Prof. Moronuki, Nobuyuki, Head of Faculty and Department:
moronuki@tmu.ac.jp

http://www.comp.sd.tmu.ac.jp/ims/index_e.html

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