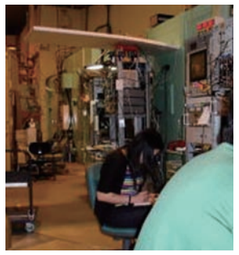
Education Program of Electronics and Informatics, Mathematics and Physics Domain of Electronics and Informatics, Mathematics and Physics

Department of Integrated Science and Technology



Electronics and Informatics, Mathematics and Physics

Division of Electronics and Informatics covers information and communication technology areas and it consists of two courses: electronics course and informatics course. Each course has three major areas.

(1) Electronics course is hardware and physics oriented. Our target is to contribute electronics, communication and computer as well as power electronics areas. We provide students education of fundamental and advanced electronics, electronic devices, semiconductor, electromagnetic wave theory, communication, power & energy electronics, control, measurement, computer hardware & software, circuits & systems and signal processing algorithm as well as their related research activities.

(2) Informatics course is software and mathematics oriented. Our target is to contribute computer software & hardware, multi-media, communication and network areas. We provide students education of fundamental and advanced electronics, electronic devices, semiconductor, electromagnetic wave, communication, power & energy electronics, control, measurement, computer hardware & software, circuit & systems and signal processing algorithm as well as their related research activities.

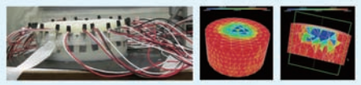
Producing next generation media technology

Rapid progress of high-speed image processing and image projection technologies is increasing demand for, high-speed, adaptive image acquisition and projection. Our laboratory proposes a new media technology named Dynamic Image Control(DIC) that refers to a technical concept of dynamic and adaptive control of image acquisition and/or projection depending on the scene. DIC requires optimization of all components of imaging and projection systems, including imagers, optics, and illumination. Thus, both devices and system/application are studied in this laboratory. Envisaged application fields of DIC are image industries such as film and advertising, medicine and biology requiring microscopic measurement, factory automation, and human-machine interfaces requiring comprehensible images.

Associate Professor Hiromasa Oku

Measurement technologies visualizing invisible information

In medical diagnostics, various measurement technologies have been developed to look inside the human body non-invasively. One of the typical examples is X-ray CT. These technologies commonly utilize image reconstruction algorithms, which estimate indirectly the inner image of the object under measurement by using the data directly observed and enable visualization of internal information that we cannot directly observe. Similar measurement technologies are widely needed not only in medical diagnostics but also in industry for nondestructive inspection. New measurement technologies adapted for individual purposes and applications are expected. In our laboratory, we are developing measurement technologies of this kind, such as electrical impedance CT for healthcare, which visualizes body fat distribution in the body from impedance data observed on the body surface.



Associate Professor Tadashi Ito

Faculty Members and Fields of Specialization ▶▶▶

Faculty Members	Fields of Specialization
Professors	
Kazuyuki Amano	Computational complexity, theory of algorithms, machine learnig
Masaaki Amou	Transcendental number theory, Diophantine approximations
Takeo Ishikawa	Electrical machines, power electronics, optimal design, and computer simulation by magnetic diffraction, scattering and absorption of synchrotron radiation
Naoya Ohta	Image processing, computer vision, and pattern recognition
Tomihiro Kamiya	High energy ion beam, microbeam, radiation detector, ion beam therapy
Haruo Kobayashi	Analog and digital integrated circuit design and signal processing algorithms
Hiroshi Sakurai	Magnetic nano device, measurement using x-rays
Yoichi Seki	Data mining, statistical learning theory and applied data analysis
Hayato Sone	Nanometer measurement and fabrication, nanoelectronic devices, high-sensitive biosensor for medical use, crystal growth
Kazumasa Takada	Design and characterization of optical fiber and WDM devices, Optical sensing
Manabu Takahashi	Theoretical study on electronic properties and magnetism in transition metal compounds
Kazumi Tanuma	Elasticity equations, inverse problems
Shin-ichi Nakano	Graph algorithm, and Information visualization
Seiji Hashimoto	Motion control, system identification, vibration control, precision control, renewable energy
Osamu Hanaizumi	Devices for optical communication, Microphotonics
Kuniyuki Motojima	Radio wave propagation, Wireless measurement, Electromagnetic wave simulation
Yoshiki Yamakoshi	Ultrasonic imaging systems for medical diagnoses, and measurement using ultrasonic waves
Koichi Yamazaki	Combinatorial optimization, approximation and randomized algorithms, computational complexity
Hidetoshi Yokoo	Data compression, data structures, and information theory
Shuji Watanabe	Integral transforms of Fourier type, commutation relations in quantum mechanics and their applications
Associate Professors	
Toru Araki	Graph theory, Graph algorithm, Combinatorial optimization
Tadashi Ito	Computed tomography and its applications, inverse problems in measurement
Hiromasa Oku	Dynamic image control, High-speed image processing, High-speed optical devices
Syun-ji Ozaki	The optical properties and electronic energy-band structures of nanostructured semiconductors and ternary compound semiconductors
Tsuyoshi Kato	Bioinformatics, machine learning, and statistical analysis
Ken-ichi Kawanishi	Information and communication systems, performance evaluation, queueing theory
Nobuyuki Kurita	Magnetic bearing, maglev motor, automatic control engineering, power electronics
Tamihiro Gotoh	Material science for optical devices
Morihiko Sato	Production of pulsed power generation system with MOSFETs and underwater pulsed electric discharge
Nobukazu Takai	CMOS analog integrated circuit design and its automated design algorithm.
Toshiki Takahashi	Physics of compact torus plasmas for thermonuclear fusion reactors
Yoshitaka Takahashi	Optoelectronics and quantum electronics
Tatsuya Nagao	Theory of strongly correlated electron system
Hirofumi Nagoshi	Analytic number theory, value-distribution of arithmetic functions
Toshiya Hikihara	low-dimensional strongly correlated electron systems, quantum spin systems, numerical calculation
Ken-etsu Fujita	Logic of programming, programming languages
Shin-ichi Furusawa	Physics of solid state ionics, nanoionics, ionic device.
Akio Matsuoka *	The production and electrical properties of Fullerenes
Kenta Miura	Light-emitting materials and devices, Photoelectric devices
Takashi Miwa	Applied measurement for electromagnetic and ultrasonic wave
Yoshifumi Morita	Theoretical study on low dimensional quantum systems and superconductors
Tomoyuki Morimae	Quantum computing, Quantum security
Ushio Yamamoto	Human interfaces, computer networks, and multi-agent systems
Yasushi Yuminaka	Multiple-valued logic and new-paradigm analog/digital integrated circuits
Hirofumi Yokouchi	Logic of programs and its applications to programming languages
Lecturer	
Takeshi Ohtsuka	Geometric surface evolution equation, Singular limit of reaction diffusion equation
Toshimitsu Takaesu	Spectral Analysis and Scattering Theory for Relativistic Quantum Field Models
Visiting Professors	
Koji Asami	Measuring and testing techniques for RF, analog and mixed-signal LSIs.
Masahiro Ishida	Testing methodologies for LSI circuits
Teruo Kohashi	Magnetic metrology, Spin polarized scanning electron microscopy
Kazuo Saito	Advanced electronic engineering
Naoya Sasaki	Molecule dynamic simulation, Nanometer dynamics of lubrication and wearing
Takahiro Miki	Analog integrated circuit design

* will retire in March, 2019

Students Voice

Graduate Student / Electronics and Computing / Rivero Rachelle Alvarez

My current research is about developing and applying machine learning techniques for data analysis. Data obtained nowadays are not only big, but also complex and unstructured; thus extracting knowledge from such data has become a difficult task. One of my interests includes data fusion, in which different data types are integrated in an effort to improve the accuracy of data analysis. Finding patterns and structures from big, complex data is now of particular interest among computer scientists and mathematicians alike, and combining various data might lead us to new and exciting insights about data analysis.