Harmonizing Society and Information Technology

Global networking is rapidly expanding via information technology.
Based upon the trends of technologies that interact with our daily lives,
Social Informatics Course seeks to clarify the structures of highly complex
information societies and actually design information systems that are
globally useful.
Therefore, we endeavor to support globalizing activities in the areas of
culture, economics, ecology, disaster management, healthcare and
education.

Information is Born in the Lives of People

Sources of social information do not exist on the Internet.

These sources are usually found in people's daily lives. Social informatics includes processes from the acquisition of information from the sources, through constructing systems to utilize the information, to designing a better society using those information systems. For example, we collect ecological information relevant to fish by using bio-logging techniques for fishery resource conservation. We also glean biological information from forest ecosystems using various types of sensors to optimize the sustainable utilization of ecosystem services. Then, we study methods for database development to organize that information on natural resources and environments. Moreover, we study informatics applications in the fields of medical services and education, and also determine what types of information are needed for disaster prevention and harm minimization. We consider ways to utilize the data to design societies and social systems. We, the people in the Social Informatics Course, work to acquire data directly related to our lives and societies, and to reformulate and store it in the most accessible and useful way to enable the development of our sustainable future.

Nobuhito Ohte

Professor, Social Informatics Course

He is a Professor of the Biosphere Informatics Laboratory in the Division of Biosphere Informatics at Kyoto University. His research themes are to understand mechanisms of hydrological controls of nutrient transformations and transportations in the forested catchment, and to elucidate the geographical variations of those ecosystem dynamics among various types of climatic and geological conditions. He holds a BA in forestry from Graduate School of Agriculture at Kyoto University in 1987, and a PhD also from Kyoto University in forest hydrology in 1992. He was awarded Biwako Prize for Ecology in 2013. He is currently an associate editor of Biogeosciences (European Geoscience Union).

Applications of Information Technologies Expanding

Information technologies are causing our society to make great strides, with data science, artificial intelligence (AI), and information search becoming an integral part of our lifestyles. Meanwhile, robots, autonomous vehicles, and other information systems with advanced AI continue to blend into our physical world. As one new information technology after another is being developed, how can information systems be created that achieve harmony with society and are accepted and utilized? The Course of Social Informatics is privileged to have a faculty comprised of experts in information technologies and teaching staff versed in applications of information technologies in such fields as biology, agriculture, medical science, disaster management, and education. If you wish to create information technologies that lead to practical applications or information systems that are of genuine use to society, this is the place you want to conduct your research!

Takayuki Kanda

Social Informatics Course

He received a bachelor's degree from the Department of Information Science, Kyoto University Faculty of Engineering, in 1998, and completed his doctoral program at the Department of Social Informatics, Kyoto University Graduate School of Informatics, in 2003 to earn a Ph.D. in Informatics. He joined ATR Intelligent Robotics and Communication Laboratories in 2003 to successively assume the positions of researcher, senior researcher, and Group Leader. Since 2018, he has held a professorship at the Department of Social Informatics, Kyoto University Graduate School of Informatics. His research interests include human-robot interactions, especially robots' autonomous dialogue mechanisms and social competencies, dialogues by anthropomorphic robots using their bodies, and their applications to everyday life settings.

Outline

■ Group and Teaching Staff

Group	Teaching Staff
Distributed Information Systems	
Human-Robot Interaction	Takayuki Kanda/Professor Dražen Brščić/Associate Professor Jani Even/Program-Specific Senior Lecturer Stela H. Seo/Assistant Professor Kanae Kochigami/Program-Specific Assistant Professor
Social Media	Keishi Tajima/Professor (Secondary appointment: Institute of Liberal Arts and Sciences)
Sociotechnical Design (Adjunct Unit)	Naomi Yamashita/Kyoto University Visiting Professor (NTT Communication Science Laboratories)
Consensus Informatics	Takayuki Ito/Professor Rafik Hadfi/Program-Specific Associate Professor Ryuta Arisaka/Senior Lecturer Shiyao Ding/Assistant Professor Sofia Sahab/Program-Specific Assistant Professor Jawad Haqbeen/Program-Specific Assistant Professor
Information Security (Adjunct Unit)	Masayuki Abe/Kyoto University Visiting Professor Mehdi Tibouchi/Kyoto University Visiting Associate Professor (NTT Informatics Laboratories)
Bioresource Informatics	Hideyuki Doi/Professor Hideaki Nishizawa/Assistant Professor Satsuki Tsuji/Assistant Professor
Environmental Informatics	Nobuhito Ohte/Professor Lina A. Koyama/Associate Professor
Integrated Disaster Management Systems	Hirokazu Tatano/Professor Toshio Fujimi/Associate Professor Subhajyoti Samaddar/Associate Professor Huan Liu/Program-Specific Assistant Professor
Emergency Management for Disaster Reduction Systems	Katsuya Yamori /Professor Genta Nakano/Assistant Professor
Crisis Information Management System	Michinori Hatayama/Professor Kei Hiroi /Associate Professor
Medical Informatics	Tomohiro Kuroda/Professor Yukiko Mori /Senior Lecturer
Learning and Educational Technologies	Hiroaki Ogata/Professor Brendan Flanagan/Program-Specific Associate Professor Izumi Horikoshi/Assistant Professor
Data Engineering and Platform Research	Kazuyuki Shudo/Professor Shiori Hironaka/Assistant Professor

■ Curriculum of Social Informatics Course

Doctoral Program (Informatics)

3rd	Doctoral Thesis
2nd / 1nd	**Subjects provided by the Course (total 6 credits including 4 credits from seminars)** Seminar on Social Informatics, Adv. *E* (Mandatory, 2 credits) Seminar on Social Information Model, Advanced A, B *E* Seminar on Social Information Network, Advanced A, B *E* Seminar on Biosphere Informatics, Advanced A, B *E* Seminar on Regional Disaster Prevention Information Systems, Advanced A, B *E* Seminar on Medical Informatics, Advanced A, B *E* Seminar on Social informatics Analytics Infrastructure, Advanced A, B *E* (2 credits each)	**Research Guidance**

Master's Program (Informatics)

Master's Thesis

2nd / 1st — **Subjects provided by the Course** (6 credits from basic subjects, and optional 4 credits or more from subjects other than basic subjects)

Advanced Subjects (2 credits each; except for FBL/PBL1 & 2, which are 1 credit each)
Multiagent Systems   Human-Robot Interaction *E*,   Biosphere Informatics *E*,   Disaster Information
Emergency Management,   Medical Informatics   Informatics of E-business   Information Education
Distributed Systems *E*,   Cryptography and Information Society   User Experience (UX) *E*,   Service Modeling
Field based Learning/Problem based Learning (FBL/PBL) 1, 2

Basic Subjects (Assigned to M1, 2 credits each)
Information and Society *E,* Information System Analysis *E*, Practice of Information Systems *E*

General Subjects provided by the School

Interdisciplinary Subjects of the Perspectives in Informatics (Mandatory 2 credits)
Perspectives in Informatics 1   Perspectives in Informatics 2
Perspectives in Informatics 3*E*   Perspectives in Informatics 4*E*
Perspectives in Informatics 5*E*   (2 credits each)

Perspectives in Platform Studies (2 credits), Computational Science, Introduction (2 credits), Computational Science, Exercise A (1 credit), Information and Intellectual Property (2 credits), Innovation and Information (2 credits), Information Analysis and Management (2 credits), Information Analysis and Management, Exercise (1 credit), Social Contributions through Informatics *E* (1 credit), Internship in the Field of Informatics *E* (1 credit)

Seminars and exercises for Master's Thesis (Mandatory 10 credits)

Advanced Study in Social Informatics 2 *E*
(Assigned to M2, 5 credits)

Advanced Study in Social Informatics 1 *E*
(Assigned to M1, 5 credits)

Specific courses provided by the school

Prior to admission	Fundamental background of the subjects in the Course, etc.	Preferred to understand the subjects on the right	Data structure and Algorithms	Fundamental Programing	Fundamental concepts of Computational

Note: Courses marked with the letter "E" will be provided in English.

Human-Robot Interaction

Intelligent robotics for our daily social environments

There are a growing number of everyday applications for artificial intelligence and robotics such as social robots, self-driving cars, and automated shops. We expect that future society will be ubiquitous with various robots. Towards such a robotized society, we aim to study robots that interact with people and operate in harmony alongside them. Such robots are embodied agents with sensory feedback that have the ability to interact in real-time with their environments. Consequently, we conduct fundamental research in intelligent robotics, human interaction, sensor networks, and artificial intelligence (AI). We are aiming for applications in the service industry, elderly care, health care, collaborative work places, and learning.

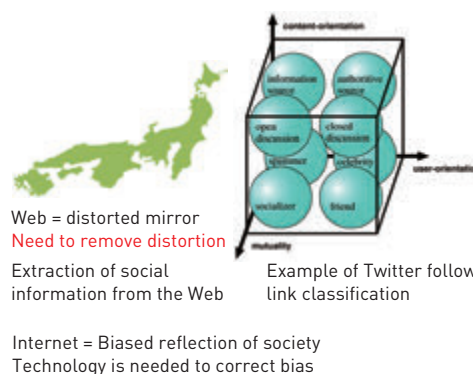[Takayuki Kanda , Dražen Bršćić , Jani Even , Stela H. Seo , Kanae Kochigami]

Social Media

Information environment for sharing and utilizing all useful information in the world

"Sharing and utilizing all useful information in the world" may sound to you like a mission statement of a major search engine company. It has, however, been the dream of researchers in the area of database systems and information retrieval since a long time ago. Thanks to the advance of computer and network technologies, we can now easily share and utilize data of large volume and high diversity which we cannot even think about until decades ago, and this "dream" is not a daydream anymore but is the goal. To achieve this goal, we conduct research on technologies for collecting, analyzing, extracting information and technologies for retrieving information you want from the extracted information. Our recent research themes includes: extraction of social information from the Web, social network analysis, information retrieval, and information access interface.

Web = distorted mirror
Need to remove distortion

Extraction of social information from the Web

Example of Twitter follow link classification

Internet = Biased reflection of society
Technology is needed to correct bias

[Keishi Tajima]

Sociotechnical Design (Adjunct Unit)

Toward an inclusive future society (in collaboration with NTT Corporation)

　The progress of the information society has enabled people to connect with anyone more easily, but at the same has given rise to problems such as weakening of interpersonal relations, fragmentation, and isolation. These problems cannot be resolved simply by providing more opportunities to connect with other people or support for those who are isolated. It is crucial to engage the surrounding community and environment in order to achieve solutions. This laboratory pursues research on basic communication technologies that foster deeper human relations and ensure that diverse individuals are included rather than left isolated.
　The research topics addressed include:

● Information technologies for the realization of inclusive societies　● Basic communication technologies that foster deeper human relations
● Information technologies that serve the collective good　● Collaborative technologies that enable sustainable work styles
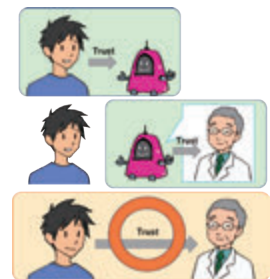
[NTT Communication Science Laboratories: Naomi Yamashita]

"Minamo-mate": a support tool for families of people with depression

Support for non-native speakers in multilingual projects

Dialogue agents fostering person-to-person trust

Consensus Informatics

Toward AI-powered Collective Intelligence

　Our interest lies in AI-powered collective intelligence, whereby people and computers or AI agents interact to form consensus and cooperate with each other. Recent research has shown that human collective intelligence is superior to individual intelligence. Adding highly networked computers and AI to a human population therefore has the potential to achieve higher levels of intelligence on a large scale and with great efficiency. Spectacular advances in AI technology in recent years, typified by large-scale language models, have enabled AI agents with dramatically improved accuracy. So, by getting these AI agents and humans to build consensus and cooperate with each other, we hope to demonstrate an unprecedented degree of collective intelligence, with the ultimate goal of shaping totally new social systems.

　The multi-agent AI presents a methodology and concepts that allow us to realize such new social systems and promote them with collective intellect and intelligent information technology. In multi-agent systems, we mainly explore possibilities of new social systems and implement such systems, while seeking the essence of social intelligence, with a focus on interdisciplinary studies with such fields as distributed AI, simulations, robotics, and game theory.

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　We will pursue both high ideals (theoretical studies) and down-to-earth approaches (commercialization of research achievements).

[Takayuki Ito , Rafik Hadfi , Ryuta Arisaka , Shiyao Ding , Sofia Sahab , Jawad Haqbeen]

Column   *From the World to Japan, from Japan to the World*

Over 40 foreign students are enrolled in the Course of Social Informatics, representing more than 15 countries. You may obtain a sense of global community by studying in such a diverse environment. Many students from the Course of Social Informatics make presentations, discuss research, and join internship programs abroad. A welcome party is held in October to welcome newcomers from foreign countries, and various kinds of international exchanges happen on a daily basis.

An international event

Research presentation at an international conference (Canada)

Information Security (Adjunct Unit)

Creating a safe digital society through cryptography(in collaboration with NTT Corporation)

In today's world, where the Internet is increasingly used to conduct electronic transactions such as electronic settlements and bidding in online auctions, or to carry out functions required by the government, such as the filing of tax returns, the maintenance of secure network services is becoming increasingly important. Modern cryptography is a key technology to achieve such security, and goes far beyond concealment technology to prevent eavesdropping. It is a field of intense study that is developing rapidly. It involves technical and logical systems which include digital signatures that verify the identity of the party you are communicating with and guarantee the authenticity of the data (which means that the data have not been altered), as well as cryptographic protocols that enable advanced network services which guarantee privacy. In our laboratory, we will study and develop various applied cryptographic techniques commonly used today such as public key cryptosystems, crypto currency, electronic voting, and other applications suitable for cloud computing with rigorous security analysis based on a firm theoretical foundation.

[NTT Social Informatics Laboratories: Masayuki Abe, Mehdi Tibouchi]

Cloud Security

| e-voting | crypto currency | cloud computing | access control |

CRYPTOGRAPY for Secure ICT
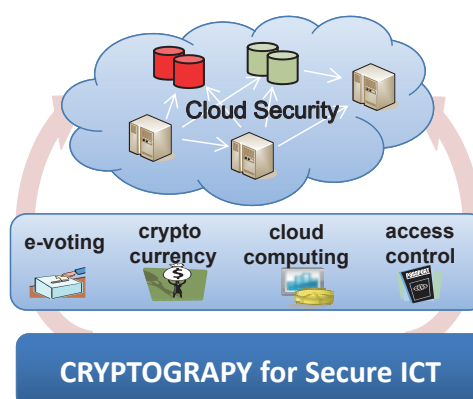
Bioresource Informatics

Seeking utilization and conservation of bioresources

Our research and education efforts are directed at a wide range of subjects to do with the extraction, analysis, and utilization of information, in connection to the use and conservation of terrestrial and marine biological resources. We are particularly focused on developing biologging, biotelemetry, and environmental DNA methods for collecting bioresource information, and tackling various basic and applied hypotheses related to bioresources, biology, and ecology using big data in the form of geographic information, satellite information, and large databases.

[Hideyuki Doi , Hideaki Nishizawa , Satsuki Tsuji]
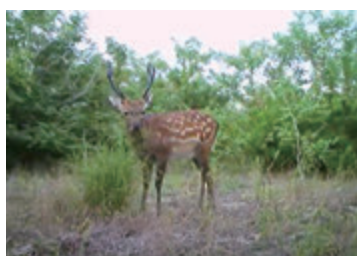
Various methods and techniques are applied

Environmental Informatics

Seeking conservation and utilization of ecosystems

Recently, society has been interested in environmental changes at various spatial/temporal scales. This group works on topics such as understanding/monitoring environmental information or the role of various organisms in ecosystems. Our research interests cover various fields related to terrestrial ecosystems, ranging from their diverse inhabitants such as plants, animals and microbes to their complete physical environment. We study how these relate to other organisms or environments in the ecosystems, or how human society influences them with respect to their sustainability in a changing environment. Various methods/approaches such as field investigation, questionnaires, remote-sensing or chemical/isotopic analyses are applied to collect and analyze key information about these ecosystems and organisms.

[Nobuhito Ohte , Lina A. Koyama]

Fieldwork is conducted in various types of sites

Integrated Disaster Management Systems

Aiming to build disaster prevention systems to ensure a safe and secure society

To build a safe and secure society, we need to put in place disaster prevention systems that will enable the planning and implementation of disaster risk control, financing, and other integrated policies in a rational manner. We will take an informational, organizational and economic approach to find out what kind of disaster prevention system will result in cities with greater resistance to natural disasters.

[Hirokazu Tatano , Toshio Fujimi , Subhajyoti Samaddar , Huan Liu]
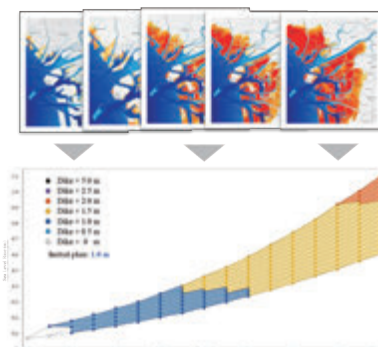
Flood Risk Communication Support System

Emergency Management for Disaster Reduction Systems

Social Scientific research for disaster damage reduction

Society is required to prepare and take actions to reduce the potential damage of disasters by sharing information and knowledge concerning potential disaster risks through communication among the members of society. This laboratory aims at developing disaster risk reduction systems through practical studies from the perspective of social psychology and systems analysis. The research interests include disaster psychology, disaster risk information and communication, disaster education, regional crisis management and decision making support, financing for disaster recovery.

[Katsuya Yamori , Genta Nakano]

Disaster education materials developed in our lab

Crisis Information Management System

Disaster Information Systems with Information Technology

Our goal is to establish design methodologies for the department of effective disaster management systems against various types of disaster for National/Local Governments, local communities in affected areas and disaster relief organizations. One of the most important key technologies are spatial temporal database to record, visualize and analyze current/near future status in affected areas. In addition our laboratory focuses on human behavior before/during/after disasters as targets to supply valuable services.

[Michinori Hatayama , Kei Hiroi]

Development of building damage certification system considering operator's ability in the Great East Japan Earthquake

Medical Informatics

Exploring approaches to medicine in the information age

The Medical Informatics Laboratory seeks to create a new vision for medicine in the information age by developing information platforms, analyzing real-life clinical information, and providing feasible information support for existing clinical entities. Our research covers all areas at the interface of information and medicine, including system development for ubiquitous hospital information systems, remote medical information systems, electronic health records, and other systems, hospital administration analysis, clinical epidemiological information analysis, data health research, VR-based medical education, clinical decision and surgery support, and information support for health tourism.


[Tomohiro Kuroda , Yukiko Mori]

Learning and Educational Technologies

Information Systems that Support Learning and Education

Our research focuses on information technology that supports activities in education and learning by analyzing their log data:

(1) Development of the infrastructure for accumulation and analysis of educational big data
(2) Analysis of learning experiences by using life log technologies
(3) Knowledge awareness for collaborative learning support
(4) Educational systems for Information security and ethics

[Hiroaki Ogata , Brendan Flanagan , Izumi Horikoshi]
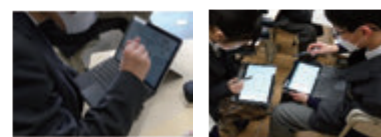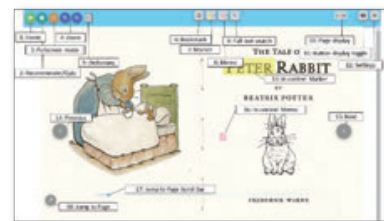
Example of a learning analytics system (LEAF/BookRoll/LogPallet)

Data Engineering and Platform Research

Research in support of internet-scale data infrastructure

Centering on the configuration of distributed systems ranging from several computers to tens of thousands of computers in size, this labor atory's research addresses topics from core systems for the handling of big data to methods for analysis of such data. Specific topics include:

● Peer-to-peer (decentralized-distributed system) algorithms
● Large-scale distributed system simulations
● Blockchain networks
● Decentralized-distributed machine learning methods
● Social graph analysis methods

[Kazuyuki Shudo , Shiori Hironaka]

Special Education Program of Social Informatics Course

1. Specialized Subjects and special Lecture

Special lecture

In the first year of the Master's program, students are introduced to specialized subjects including the design and analysis of information systems, and the relationship between information and society. They can acquire the fundamentals of informatics from the ground up through these subjects, and even students with less specific experience in informatics can benefit by combining their informatics and other expertise. In addition, we have more than 30 special lectures a year in our course, for which we invite lecturers from various universities, research institutes and government offices.

2. Education for Innovation

FBL (Field based Learning)/
PBL (Problem based Learning)

The Course of Social Informatics joins Kyoto University Design School, in which students take a course titled "FBL (Field based Learning)/ PBL (Problembased Learning)" that helps them acquire the skills needed to find and solve real-world problems. In this course, students select one of a variety of themes, and form small groups to tackle specific problems. The themes include "Designing a new environment for education: creating a place that fosters creativity", "Design of places for conversation over books and tea", and "Organization design in crowd-sourcing" Kyoto University Summer Design School arose from activities mainly led by the ourse of Social Informatics, and has become a seasonal tradition in summer, attracting more than 250 participants to share the same innovative space. Over 20 different kinds of themes were proposed by companies and universities, and were tackled by many students eager to solve real-world problems: they went into the field, and used trial-and-error methods by actually creating prototypes. The Course of Social Informatics proposed themes such as "Predicting Kyoto in 2050 by simulation" and "Designing safety into apartment buildings: first priority, disaster prevention".

3. Education for Globalization

Strategic communication seminar

Course of Social Informatics has an International Course Program in the curriculum. Students in the International Course Programs can take lectures in English, receive guidance in English from their supervisors, and acquire Master's and Doctoral degrees exclusively in English. Students who complete the course will receive a certificate of completion for the international course.