Corporate Profile

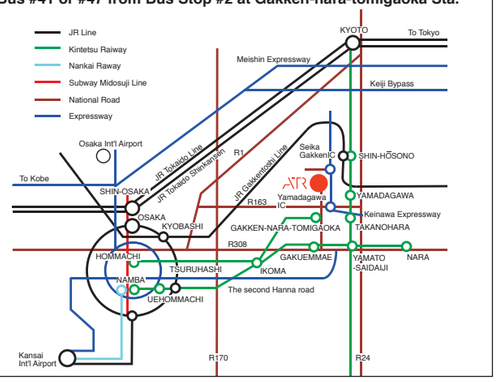
Advanced Telecommunications Research Institute International

Innovative Technology for Human Communication

From Gakken-nara-tomigaoka Sta., Kintetsu Keihanna Line

Nara Kotsu Bus (around 15 min.)

Bus #41 or #47 from Bus Stop #2 at Gakken-nara-tomigaoka Sta.



From Shin-hosono Sta., Kintetsu Kyoto Line / Hosono Sta., JR Gakkentoshi Line

Nara Kotsu Bus (around 15 min.)

Bus #36 or #47 from Bus Stop #1 or Bus #41 from Bus Stop #2 at Shin-hosono Sta. / JR Hosono Sta.

Advanced Telecommunications Research Institute International

2-2-2 Hikaridai Seika-cho, Soraku-gun, Kyoto 619-0288 Japan (Kansai Science City)

TEL +81 774 95 1111 / FAX +81 774 95 1108

URL: http://www.atr.jp/

2012

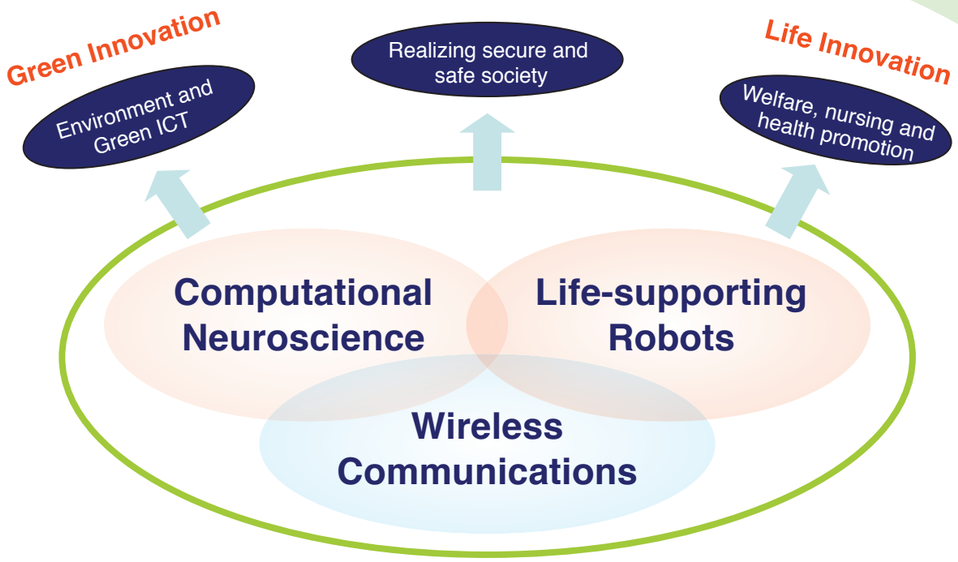
ATR creates new communication technologies to support comfortable human life

Mission

To promote pioneering and innovative research on information and communication-related fields with global collaboration among industry, academia and government

To contribute to a wide variety of welfare of society and humanity by outstanding achievements, and to develop highly -professional human resources

To lead growth of Kansai Science City as a center of excellence in the world



Approach interdisciplinary and transdisciplinary researches, in addition to these three areas

Fields of Research and Development

Greeting

ATR is a unique private company established in Kansai region in March 1986, through the broad support of industry, government and academia, with the aim of promoting fundamental and innovative R&D activities as well as contributing to society in a wide range of telecommunication fields.

For the last quarter century since our foundation, outstanding research outcomes have been steadily achieved in such fields as neuro/knowledge science, intelligent robotics, language translation and wireless communication through original and innovative research activities and collaboration work with various universities, research institutes, and companies within and outside of Japan.

Research and development for information and communication technology is indispensable to the formation of safe and secure society as well as a true communication society, which will provide people with a more satisfying living environment by facilitating human communication. In addition to continuous efforts in high-quality advanced research and development, we are determined to focus on the feasibility of broadly applying our research results in society and making them more useful and accessible to a variety of people.

Yasuo Hirata, President

ATR Company Profile

Advanced Telecommunications Research Institute International

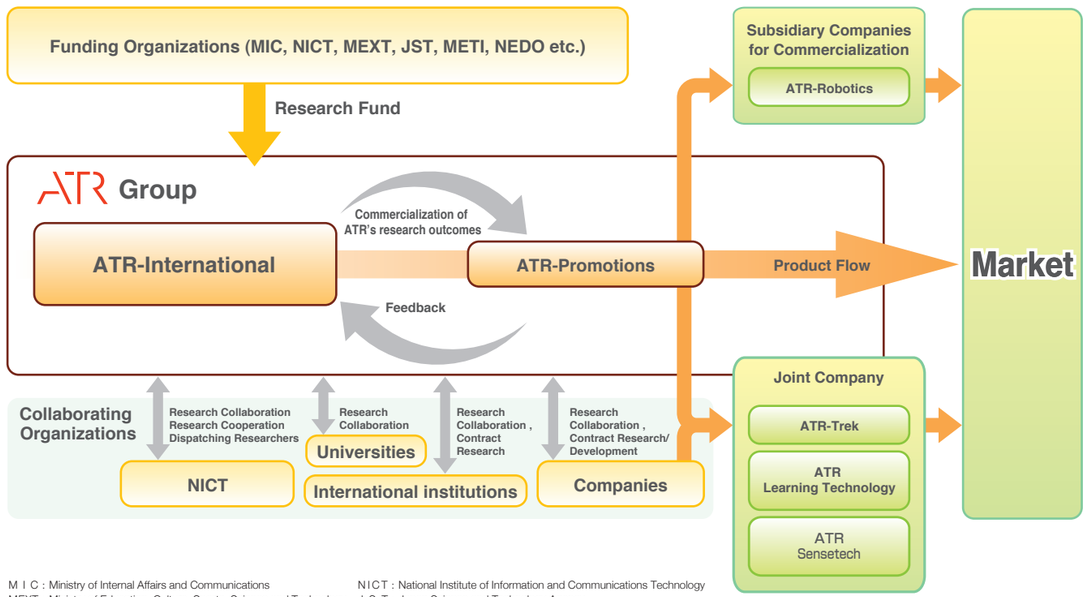
ATR Company Profile

Foundation	March 1986 Foundation of ATR 1989 Move to present location
Capital	100 million yen
Shareholder Composition	120 companies including NTT and KDDI
Location	2-2-2 Hikaridai Seika-cho, Soraku-gun, Kyoto 619-0288 Japan (Kansai Science City)
Employees	218 people (including 181 researchers) Breakdown of researchers: Contract researchers 85%, Loan researchers 8%, Permanent researchers 7%, International researchers 20% (as of April 1, 2012)

Main Board Members

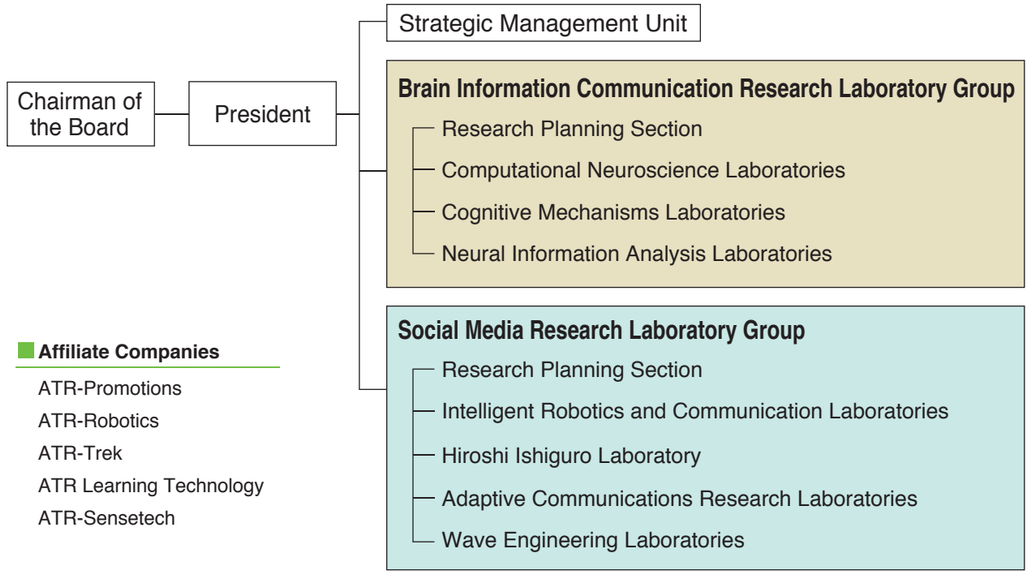
Chairman of the Board	Nobuaki Kumagai
President	Yasuo Hirata
Advisor of the Board	Shosuke Mori
Advisor of the Board	Yasuyoshi Katayama

ATR Commercialization Framework



M I C : Ministry of Internal Affairs and Communications
MEXT : Ministry of Education, Culture, Sports, Science and Technology
METI : Ministry of Economy, Trade and Industry
NICT : National Institute of Information and Communications Technology
J S T : Japan Science and Technology Agency
NEDO : New Energy and Industrial Technology Development Organization

Organization



Affiliate Companies

ATR-Promotions
ATR-Robotics
ATR-Trek
ATR Learning Technology
ATR-Sensetech

ATR History

March	**1986**	Foundation of Advanced Telecommunications Research Institute International
April	**1986**	Foundation of four research laboratories: ATR Communication Systems Research Laboratories (1986 – 96) ATR Interpreting Telephony Research Laboratories (1986 – 94) ATR Auditory and Visual Perception Research Laboratories (1986 – 94) ATR Optical and Radio Communications Research Laboratories (1986 – 96)
April	**1989**	Opening of full-scale laboratories (the first institute established in Kansai Science City, “Keihanna”)
March 〜 **March**	**1993** 〜 **1996**	Reorganization of research laboratories Foundation of ATR Human Information Processing Research Laboratories (1992 – 2001) Foundation of ATR Interpreting Telecommunications Research Laboratories (1993 – 2000) Foundation of ATR Media Integration & Communication Research Laboratories (1995 – 2001) Foundation of ATR Adaptive Communications Research Laboratories (1996 – 2001)
April	**2000**	Foundation of ATR Spoken Language Translation Research Laboratories (2000 – 2001)
October	**2001**	Integration of research laboratories into ATR International Change of funding scheme (KTC to TAO)
November	**2004**	Foundation of “ATR-Promotions,” a subsidiary for commercialization
April	**2006**	Change of funding scheme (transition to multi-funding system)
April	**2010**	Establishment of research laboratory group

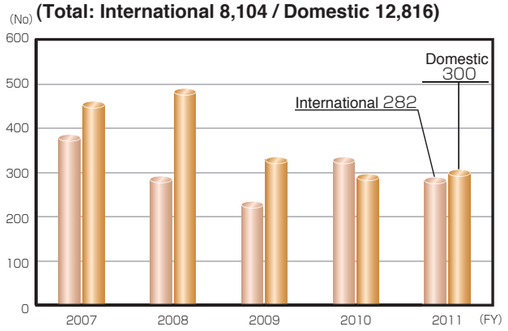
Overview of Research Activities

Examples of Recent Major R&D Results and Commercialization

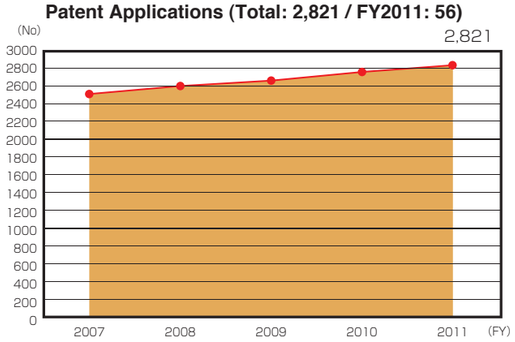
2011	Jun	Publicly released brain imaging software, VBMEG, which unifies MEG and fMRI information and visualize brain activity with high accuracy
	Jun	Developed a low power wake-up radio module for wireless LAN systems (collaboration of NEC Communication Systems, Ltd. and other three organizations)
	Jul	Held "House of Android", with teleoperated android "Geminoid F"
	Oct	Held a symposium on safe and secure ICT transportation
	Nov	Developed multiple access wireless communication technology to accelerate the greening of ICT equipments (collaboration of Oki Electric Industry, Co., Ltd.)
	Dec	Developed a learning protocol using decoded neurofeedback (DecNef) method
2012	Jan	Developed 8×8 non-linear multi-user multiple-input-multiple-output (MIMO)
	Jan	Released the synchronized data recording and playing software "SyncRecord" for wireless hybrid sensor (ATR-Promotions)
	Mar	Implemented the interactive collection search system "Image Finder" in the National Museum of Ethnology (ATR-Promotions)

Statistics

Publications(Papers and presentations) (Total: International 8,104 / Domestic 12,816)



Patent Applications (Total: 2,821 / FY2011: 56)



International Research Collaboration Network

① Boston University
② Massachusetts Institute of Technology
③ Carnegie Mellon University
④ University of Washington
⑤ Stanford University
⑥ University of Southern California
⑦ University of California, San Diego
⑧ McGill University
⑨ University of Toronto
⑩ The University of British Columbia
⑪ Simon Fraser University
⑫ Newcastle University
⑬ University of Cambridge
⑭ Imperial College London
⑮ Télécom ParisTech
⑯ Télécom SudParis
⑰ Technische Universiteit Eindhoven
⑱ Swiss Federal Institute of Technology
⑲ Scuola Superiore Sant'Anna
⑳ Universitat Politècnica de Catalunya
㉑ Technishe Universitat Munchen
㉒ Danish Technological Institute
㉓ Technical University of Denmark
㉔ Universita degli Studi di Palermo
㉕ Ars Electronica Linz GmbH
㉖ Jožef Stefan Institute
㉗ Middle East Technical University
㉘ Korea Advanced Institute of Science and Technology

Brain Information Communication Research Laboratory Group

We aim to understand the function of the brain through computational neuroscience and to develop a Brain Machine Interface (BMI) as a basic technology for IT that realizes ICT technology accessible to all and futuristic communication by applying our obtained knowledge.

Cognitive Mechanisms Laboratories (CMC) is developing communication interfaces that will be available anywhere for anyone by understanding the operating principle of the brain and a combination of brain activity measurement, robot engineering, and computational neuroscience.
Neural Information Analysis Laboratories (NIA) is investigating non-invasive measurements of brain activity and an estimation method to understand brain function. As well as realizing a highly accurate measurement method, we are promoting a simple measurement method with fewer restrictions for successful brain function measurements in various environments.
Computational Neuroscience Laboratories(CNS) seeks a way to apply brain information in bountiful life by promoting tests to apply information captured by the brain to rehabilitation and also develops decoding technology for analyzing signs measured from the brain and robots controlled by brain activity.

IT's drastic evolution over the last decade has allowed us to find necessary information through the Internet. Images and videos have become more common as means of sharing information and for telecommunication purposes. On the other hand, strong doubts remain about whether the Internet is improving our lives or our welfare in terms of excessive information, the digital divide, or huge energy consumption. To sort such problems out, we are committed to the pursuit of human-centered communication by developing BMI technology with simple operations and interfaces that address the special needs of the disabled or senior citizens to accurately retain human functions.

Director of Brain Information Communication Research Laboratory Group
Mitsuo Kawato

CNS Computational Neuroscience Laboratories

Toward Understanding Brain Function Using a Computational Approach

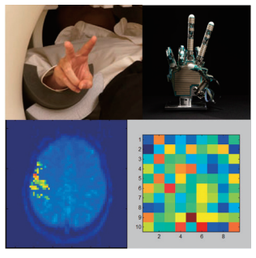
We aim to understand the brain function through computational neuroscience and to develop a Brain Machine Interface (BMI) for recovery of motor functions in humans as technology for IT and clinical applications.

Decoding Brain Signals

Neural decoding allows us to predict mental content from measured brain signals. Our group is developing computational techniques to decode human brain signals and study information coding in the human brain. Our goal is to establish novel communication technology that directly connects the brain and machines using decoded neural information.

From Mind-Reading to Brain-Machine Interfaces

Brain signals can be seen as 'codes' that encode our mental experiences. To decipher them, we combine neuroscience and machine learning methods. We are developing decoding techniques that capture the subtlety of our mental experiences and apply them to build brain-machine interfaces that control machines using decoded information.



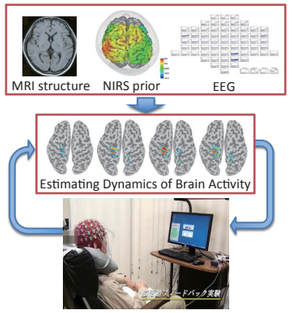
Brain-machine interface that decodes fMRI signals to reconstruct human hand movements (collaboration with Honda Research Institute)

Understanding Motor Control and Exploring Novel Neuro-Rehabilitation

Motor control is crucial for animals. We aim to understand the neural substrates underlining motor control and learning. Based on our neuroscience knowledge, we are exploring novel rehabilitation that induces neural plasticity and functional recovery by utilizing the technologies of non-invasive brain activity measurement and robots.

BMI Challenge for Functional Recovery

Our ability to adapt to novel environments stems from our brain's ability to acquire internal models. Even when our internal environment changes due to functional deficits in our body or our brain, neural plasticity paves the way to functional recovery. Through computational neuroscience and brain machine interface technology, we are approaching the mysteries of human motor control to challenge functional recovery.



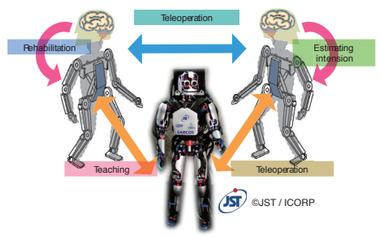
Real Time Feedback of Brain Activity for Stroke Patients

Connecting a Brain with a Robot

The goal of our study is to control robots by thoughts in the brain. This study is expected to contribute to the connection of humans and robots as a future telecommunication device and to the development of an assistive device for the recovery of motor functions in humans. We aim to understand brain mechanisms especially those of motor control.

Development of a Robotic Assistive Device Using Brain Activity

The goal of our study is to control an exoskeleton and/or a humanoid robot using brain activity. A non-invasive device to detect brain activity can only provide a limited amount of information. Therefore, we are developing a suitable autonomous controller that can complement the detected brain activity.



Using brain activity to control exoskeleton and our humanoid robot CBi.

CMC Cognitive Mechanisms Laboratories

Toward Understanding High-Order Brain Functions

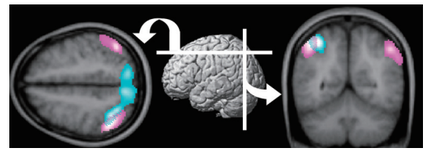
We investigate the mechanisms for high-order brain functions by utilizing advanced technologies for the measurement and the analysis of brain activity as well as simulations of brain functions based on robots and computers. Our results enhance human communications and the development of natural human-machine interfaces.

Understanding Brain Mechanisms for Cognition and Learning

Our objective is to clarify the cognitive and learning mechanisms underlying human intelligence using computational theories, psychological experiments, and brain activity measurements. Based on our knowledge of brain mechanisms, we are developing human-machine interfaces that help users, control algorithms for humanoid robots, establish new methods of education, and enhance communication ability.

Brain Mechanisms for Improving Communication

Environments around humans continuously change. We are investigating the attention mechanisms necessary for realizing the changes of environments and in the human brain during adaptation to new environments as well as the mechanisms for rapid and appropriate activation of acquired knowledge for adaptive behaviors.



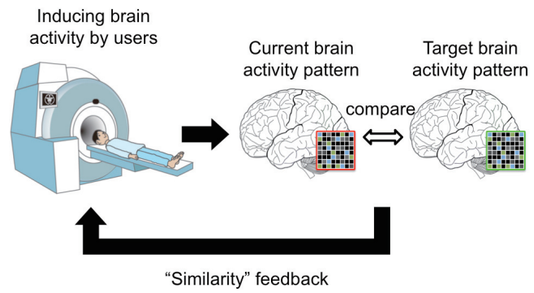
Difference in brain activity between predictive (cyan) and postdictive (magenta) selection of behaviors in changes of environments

Research and Application for Decoded fMRI Neurofeedback

We integrate psychophysical, neuroimaging, and computational approaches and apply the decoded neurofeedback (DecNef) method to BMI, medical treatment, and communication technology.

A New Approach in Neuroscience: DecNef Method

We have developed the decoded neurofeedback (DecNef) method to induce a targeted brain activity pattern in a targeted brain region.
Our long-term goal is to clarify the brain mechanism and to establish a new clinical framework in which to treat disease.



DecNef method(decoded fMRI neurofeedback)

NIA

Neural Information Analysis Laboratories

Analyze Brain Functions Using Statistical and Machine Learning Theory

The goal of our research is to develop analysis tools to clarify human brain functions and communication techniques based on brain activities.

Integrating Multiple Brain Imaging Data

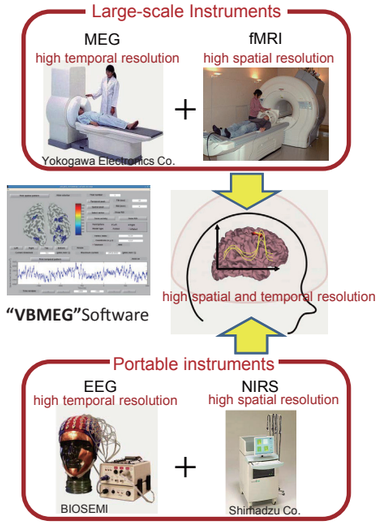
We are developing statistical methods to integrate existing non-invasive brain imaging modalities such as fMRI, MEG, EEG, and NIRS. We aim to enhance the spatial and temporal resolution that brain imaging techniques cannot achieve by themselves. Multimodal integration is dispensable to noninvasively understand the neural mechanism of humans.

Combining Large-Scale and High-Resolution Brain Imaging (MEG and fMRI) Data

MEG has high temporal resolution, even though it cannot provide the location of brain activities. On the other hand, fMRI provides the precise location of brain activities, but it lacks temporal resolution. To measure brain activities with both high temporal and spatial resolution, we are developing a statistical method to combine these two complementary brain techniques. Further, we have developed 'VBMEG' which is open-source software with graphical user interface and available from our Web page (http://vbmeg.atr.jp/?lang=en).

Combining Easy-to-Use and Portable Brain Imaging (EEG and NIRS) Data

Although MEG and fMRI provide brain activity data with high temporal/spatial resolution, they are not practical for daily use because of their large-scale instruments. On the other hand, since EEG and NIRS are portable, they allow brain activity measurements outside examination rooms. To estimate brain activities accurately under open environments, we are also developing methods that combine EEG with NIRS.



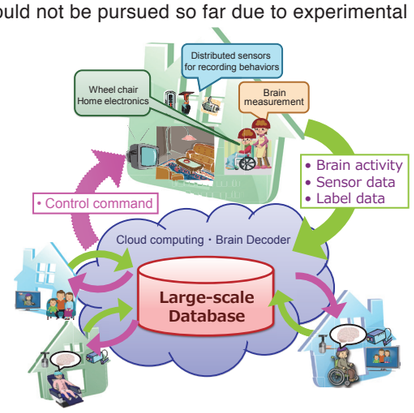
Estimation of brain activity with high temporal and spatial resolution by combining multiple brain imaging data

Application of Brain Decoding Technologies to Improve Quality of Life

We are developing the system using brain activities in natural environments to support persons who need care to become self-reliant. Such decoding systems in real-world environments will further open up possibilities to understand the neural mechanism of spontaneous behaviors and higher-order cognition, which could not be pursued so far due to experimental limitations.

Network Brain-Machine Interface

Since brain activities differ substantially between subjects and sessions even for same subjects, current brain-machine interfaces (BMIs) generally require long-time training periods for each subject before getting started. This prevents us from practical application of BMI technologies in daily life. We are tackling this problem by collecting enormous samples of brain activities in real life and by constructing the real-time system which retrieves inferred subjects' intentions with the help of ambient sensors as well. To achieve our goal, we develop various elemental technologies such as accurate decoding methods implemented on high-speed computers, subject-independent decoding procedures and artifact reduction techniques under natural environments.



Social Media Research Laboratory Group

Creating innovative concepts and core technologies, and developing innovative systems for different kinds of social communication.

The cloud computing ICT infrastructure, the next generation devices like smartphone, tablet devices, and LTE (Long Term Evolution) wireless communications have made rapid progress in our social media environment. The next research scope on social media may include actuation-typed social media, in specific, visible-typed robot service such as human-robot communication, safety robotic wheel-chairs and convenient cart robots with physical entity and invisible-typed robotic services such as route guidance services for power failure caused by earthquake without physical entity. They will greatly contribute to a few solutions on facing these social problems, decrease of birthrate, increase of elderly, health, education, energy and environment and post-disaster reconstruction. Therefore, we renamed to "Social Media Research Laboratory Group" in order to reflect our research scope. It consists of three laboratories and Hiroshi Ishiguro Laboratory.

Intelligent Robotics and Communication Laboratories focuses on the network robot platform and its standardization allowing visible-typed robot services and invisible-typed ones and also plans to do field experimentations in the shopping malls, day-care service centers and educational facilities.
Hiroshi Ishiguro Laboratory is doing the research on what is the nature of physical existence of human using tele-operated androids called "Geminoid™", "Telenoid™" and "Elfoid™", collaborating with artists, philosophies, and leading scientists.
Adaptive Communication Research Laboratories aims to develop next-generation wireless communication systems with ease of use and is creating core technologies on ad-hoc networks and cognitive wireless communications.
Wave Engineering Laboratories focuses on the development of wireless resource management systems which allow to keep high throughput rates even though simultaneous usage of many people and may contribute reduction of carbon dioxide emissions.

Director of Social Media Research Laboratory Group
Norihiro Hagita

IRC Intelligent Robotics and Communication Laboratories

Science and Core Technology for Life Care Robotics

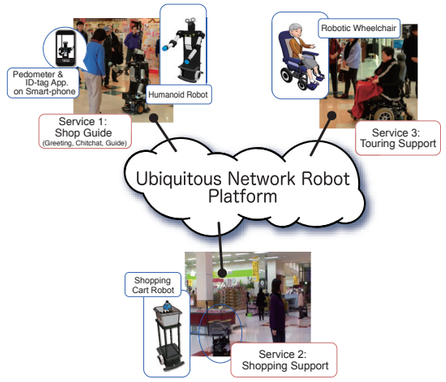
Our research and development is to create robots and intelligent environments for life care robotics. Our research on “knowing people activities” is promoted by both science and technology.

Ubiquitous Network Robot Systems

Development of network robot systems which enable to provide robot services that are created by combining robot and ubiquitous network technologies.

Ubiquitous Networked Robots

Research and development of robot services to persons over different places allowing cooperation with anthropomorphic agents on Internet, smartphone applications and environmental sensors such as cameras, laser range finders, RFID tags, etc. Ubiquitous Network Robot Platform is developed to manage networked robots and robotic services.



Ambient Intelligence

Ambient Intelligence Map related congested time and place will be created by accumulating records of people's positions and human behaviors using sensors which are embedded in the environments. It shows what kind of services is needed by robots such as for whom, time or place.

Humans Behavior Analysis

Development of algorithms and/or sensors on people's intentions, tastes, interests, and grip force for internal information and behaviors for external information.

Driving Assessment

Investigated automatic driving skill evaluation method using specially manufactured wireless gyroscope modules attached on the drivers cap and right foot.

Automatic Vital Data Collection

We developed sensor network system make vital data measuring instruments send obtained vital data referencing positional information to reduce amount of task and input error.

Purchasing Activity Analysis

The system observes the vital information on customer's purchasing activities, such as the locations of goods to be carted, the user trajectories and eye movements in a store. By analysing the activities, for example, the robot on the shelf can recommend goods inferred from the information to the customer for facilitating to purchase more goods.

Purchasing Behaviors in a Shop

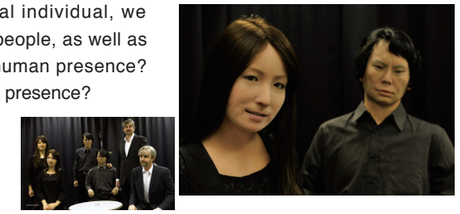
HIL Hiroshi Ishiguro Laboratory

Studies on Human Presence Based on Teleoperated Androids

Where does the feeling of human presence come from? Can we convey human presence or build a mechanism for recording it? To explore about these questions, we conduct research by developing various kinds of androids.

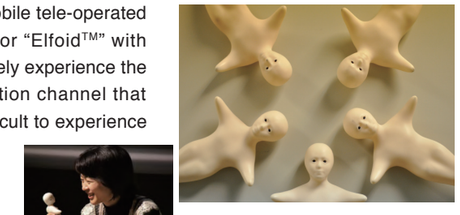
Study of Mechanism of Presence through Geminoid™

By developing tele-operated androids that closely resemble a real individual, we investigate about the effects of robot’s appearance and behavior on people, as well as working on fundamental questions such as: what is the concept of human presence? What elements is it composed of? How can we transfer or record human presence?



R&D of Portable Tele-Operated Androids that Transfer Human Presence

This research attempts to develop new communication media using mobile tele-operated androids. By developing social media robots such as “Telenoid™” or “Elfoid™” with minimum features of human appearance that allow any individual to freely experience the transfer into robot’s body, we realize an entirely novel communication channel that enables users to feel the presence of a remote partner, something difficult to experience through conventional telephones.

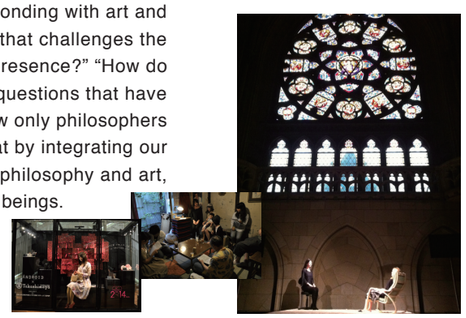


Field Experiments and Applications of Tele-Operated Androids

Focused on encouraging social communication between people, we introduce Telenoid™ to elderly care or educational facilities and conduct experiments on a wide range of generations from children to elderlies and also on people with various nationalities. Through these experiments, we try to verify the impact of tele-operated androids on people and aim to contribute to the realization of a society in which anyone from anywhere at anytime can support others.

Innovation of New Media by Integrating Technology, Art, Science and Philosophy

Going beyond science and technology frameworks, while corresponding with art and philosophy, we are dedicated to a fundamental research activity that challenges the creation of a truly new media. “What is the definition for human presence?” “How do people specify themselves as their own selves?” These are the questions that have remained unknown to mankind since long ago. However, until now only philosophers or artists could deal with such principle questions. We believe that by integrating our research regarding androids with other researches in the field of philosophy and art, we can scientifically tackle these principle questions about human beings.



ACR Adaptive Communications Research Laboratories

New Generation Wireless Communication Systems for Ubiquitous Network Society

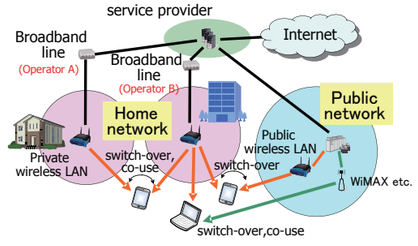
Research and development work is being carried out on new wireless communication systems towards a sustainable society. Such systems include cognitive radio networks which achieve more efficient use of precious radio spectrum resources, a wake-up receiver which reduces electric power consumption of ICT devices, and a GPS-based relative positioning method between vehicles.

Efficient Use of Radio Spectrum

Cognitive radio monitors changes in the availability and quality of radio channels, and dynamically selects one or more suitable wireless access systems for use. This technology promises to achieve more efficient use of radio-spectrum resources as well as enhanced performance of wireless terminals.

Reliable Internet Access

Our cognitive radio system (CRS) scenario allows users to share wireless access to their home Internet connection, and combine this with access to public wireless networks. The cooperative use of home and public networks will enable more reliable broadband Internet access.



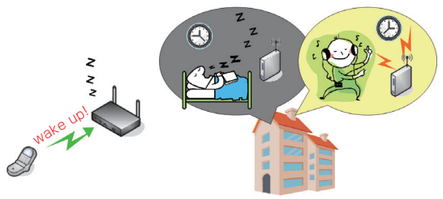
Cooperative use of home and public networks for reliable, broadband Internet access.

Reducing Electric Power Consumption

A low power consumption wake-up radio module receives a “wake-up” signal and starts ICT devices when they are needed. This achieves reducing waste electric power consumption.

Wake-Up ICT Devices When We Want to Use

Almost all wireless LAN accesspoints and ICT devices work and consume electric power all the time. If these devices sleep when they are not used, electric power consumption can be reduced. Out developed low power consumption radio module can wake up wireless LAN systems and ICT devices only when they are actually in need.



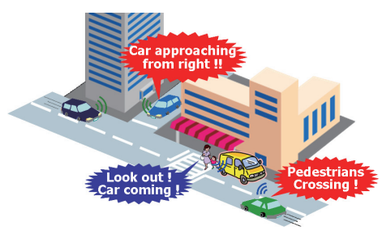
When users want to use the ICT device, users wake it up by sending wake-up signal and start to use. The ICT device sleeps when it is not used and does not waste electric power.

Communication among Vehicles and Pedestrians to Avoid Accidents

Research on wireless communication among vehicles and pedestrians aims to achieve fast and reliable sharing of position and motion information, which can be used in navigation devices to support safe driving and avoid road accidents.

Cooperative Relative Positioning Method for Vehicles

Being aware of relative position to other vehicles by exchanging the absolute position via the inter-vehicle communications is very important for preventing collision accidents from happening. In the urban area, however, due to multipath propagation, the non-correlated errors in the absolute position degrade the accuracy of relative position. By using the highly correlated GPS signals received from the common satellites including the reflected signals, the accuracy of relative position is improved.



Wireless communication between vehicles and pedestrians to warn of collision dangers.

WEL Wave Engineering Laboratories

Pursuing a Wealthy and Secure Society by Utilizing Radiowaves Everywhere

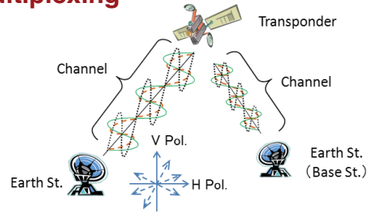
Wireless devices and services, ranging from smartphones to satellite communications, are essential in realizing a wealthy and secure society. We are engaged in R&D on innovative techniques and applications that achieve efficient and user-friendly wireless services that wholly utilize the limited radiowave resources.

Utilization of Limited Frequency Resource

The growing number of wireless devices is causing a congestion on radio resources. In order to solve this issue, we have conducted researches to improve the efficiency of spectrum usage by aggregating unused time and frequency resources, or by multiplexing several signals going through different propagation paths.

Boost of Satellite Communication by Poly-Polarization Multiplexing

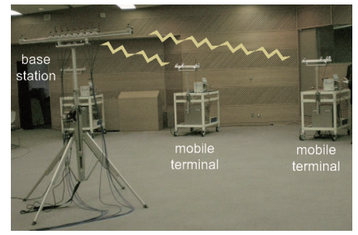
In typical satellite communication systems, two orthogonal polarization planes (vertical and horizontal), or circular waves are used. Some recent works have reported orthogonal polarization multiplexing or adaptive polarization multiplexing for better frequency utilization. Here we propose a more advanced scheme named poly-polarization multiplexing, that utilizes multi-planes of polarization and interference cancelling technology, based on an idea that the propagation between a transponder and an earth station has a Line-of-Sight (LOS) condition and thus the polarization planes between them are quite stable.



Poly-polarization multiplexing transmission

Spatial Multiplexing Technique for Next Generation Communications

We conduct research and development of Multi-User Multiple-Input Multiple-Output (MU-MIMO) technology, which improves the spectrum efficiency of next generation mobile communication systems in order to cope with a dramatically growing demand of traffic. A MU-MIMO technology decouples multiplexed signals for different users by exploiting the difference in propagation characteristics among users. A MU-MIMO technology based on a linear algorithm is already in practice. However, its performance degrades when the difference in propagation characteristics is small such as in a small-sized cell e.g. a picocell or femtocell. This research develops a MU-MIMO technology based on a non-linear algorithm which is effective even in a small-sized cell and experimentally verifies its validity.



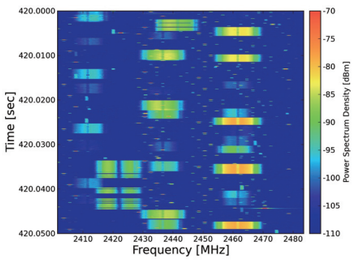
Experimental equipment of multi-user MIMO spatial multiplexing system

Survey and Consultation of Wireless Systems

The sharing of the spectrum is an important issue with multiple radio systems since the demand of the frequency band, especially the ISM band, is rapidly growing. Wave Engineering Laboratories survey and consult on the issue by using our deep knowledge of wireless systems and measurement know-how.

Measurement of Spectrogram and Traffic Across the Entire Frequency Band

A typical example is the 2.4 GHz ISM band where the demand of the frequency band is growing due to the diffusion of multiple hotspot services, smartphones, tablet PCs, and mobile routers. We analyze the spectrum usage of a frequency band. First of all we record the spectrogram in order to observe how the radio signal varies across the time and the frequency axis. And we also monitor the radio traffic between radio terminals. Based on the measurement results we calculate the spectrum efficiency, interference between wireless systems, and user throughput. We provide advice on improving the communication quality of a desired link that coexists with other systems such as wireless LAN, Bluetooth, cordless phones, and microwave ovens .



A measurement result of 2.4 GHz spectrogram recorded in an university hospital

ATR-Promotions Inc.

http://www.atr-p.com

ATR-Promotions Inc. was founded in 2004 to manage licensing of ATR patents and to promote the products developed using ATR technologies. We are also committed to develop interactive guide systems and to support in neuroimaging studies.

Licensing Intellectual Properties and Patents

We not only provide information on ATR patents but also support the development of new products using ATR technologies. We carry out this mission by licensing intellectual properties and patents.

Wireless hybrid sensor

Products for Human Researches

“Face expression database” and “Speech database” provide researchers with basic materials to investigate human information processing mechanism and to develop speech technology, respectively. A wireless hybrid sensor is available for human activity studies to record acceleration, angular velocity and geomagnetic field simultaneously as well as atmospheric pressure, temperature and some additional information using externally connected sensors.

An Interactive Guide System for Mobile Devices

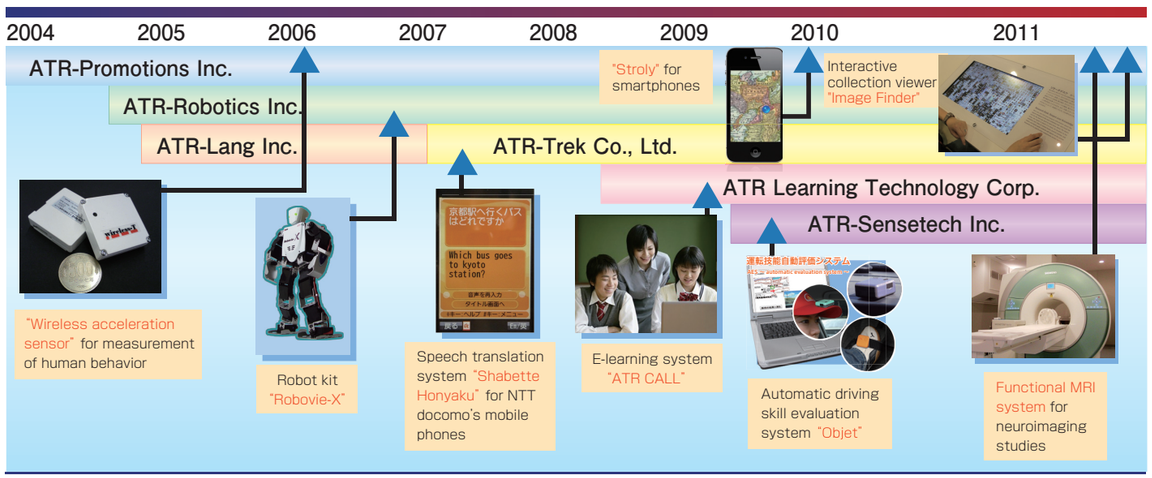
"Stroly" is a popular guide app series for mobile devices. It introduces new aspects of sightseeing spots and historic places through unique illustrated maps and information.


"Stroly" for smartphones

Advanced Support for Neuroimaging Researches

Neuroimaging experts support researchers using fMRI and MEG by (1) planning experiments,(2)programming stimulus control in experiments, and (3) analyzing the data. Short courses on data analysis and stimulus control are also available as well as consultation on functional brain research methodologies.


A staff member supporting MEG operation during a brain activity experiment



History of Product Development Based on ATR Technology（2004～2011）

Other ATR Affiliate Companies

Variety of products based on ATR technologies are available via following ATR group companies.

ATR-Robotics Inc.

http://www.atr-robo.com

ATR-Robotics Inc. was founded in January 2005 to promote the robot technology from ATR.

We promote the original robot series “Robovie” .
We also propose and develop a human tracking sensor system and a variety of interactive museum guide systems for museums and public spaces.


Interactive museum system "Digital Cabinet"

ATR-Trek Co., Ltd.

http://www.atr-trek.co.jp

ATR-Trek was founded in May 2007 in partnership with FueTrek Co., Ltd. to promote speech recognition, translation, and speech synthesis technologies.

Based on our advanced speech technologies we provide “Shabette Honyaku for A,” a real-time automatic speech translation service for smartphones. Our speech recognition technologies are also used in NTT DOCOMO,INC.’s various services, including “Shabette Concier™,” a voice-agent application.

Speech translation service "Shabette Honyaku for A: Large Vocabulary Version," for smartphones

ATR Learning Technology Corp.

http://www.atr-lt.jp

To market ATR’s foreign-language learning technology, ATR Learning Technology Corp. was founded in April 2008 in collaboration with Uchida Yoko Co., Ltd.

We have developed an e-Learning system, ATR CALL BRIX, for learners of English. It uses a scientifically proven learning method and ATR’s speech technologies. Among its various courses, the “TOEIC study course,” which uses official ETS materials, is widely used not only in schools but also in top global companies.

TOEIC study course in "ATR CALL BRIX"

ATR-Sensetech Inc.

http://www.sensetech.jp

In February 2009, ATR-Sensetech Inc. was founded to market the “Automatic Driving Skill Evaluation System,” which was developed by integrating ATR’s “human behavior sensing and understanding technologies” and the Yamashiro Driving School’s “teaching and technical driving expertise.”

We promote the “Automatic Driving Skill Evaluation System,” which supports the evaluation of safe driving skill at hazardous places based on the recorded data from motion sensors attached to the head and the foot of the driver.

Automatic driving skill evaluation system "Objet"

ATR HISTORY

PHASE 1 | PHASE 2 | PHASE 3 | PHASE 4 | PHASE 5 | PHASE 6

1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012

1986 Foundation of Advanced Telecommunication Research Institute International in Osaka Business Park

1989 Opening of full-scale laboratories in Keihanna-Science City

1991 Visit by Their Majesties the Emperor and Empress

1993 Visit by Their Imperia Highnesses Prince and Princess Akishino

1996 Visit by Ms.Copps, the then Deputy Prime Minister of Canada

1999 Foundation of Brain Activity Imaging Center

2002 Integration of research laboratories into ATR International

2003 Visit by Mr. Rau, the then President of the Federal Republic of Germany

2003 The invited lecture at the Nobel conference by Dr. Kawato

2006 Enhancing collaboration with NICT

2008 Selection as the core of BMI research in Strategic Research Program for Brain Sciences, implemented by MEXT

2010 Reorganization of research laboratories to two research laboratory groups

2010 Start of "Center for Neural Systems and Information Networks" with NICT and Osaka University

2011 Awarded Minister of Internal Affairs and Communications "Info-Communications Promotion Month" (Organization)

2012 The 25th Anniversary Celebration

ATR Interpreting Telephony Research Laboratories

1990 Development of Speech-to-speech Translation System, ASURA

1992 Collaborative Experiments of the Interpreting Telephony among three countries

ATR Interpreting Telecommunications Research Laboratories

1993 Establishment of Speech Translation Research Consortium, C-STAR

1993 Display at APEC Osaka Conference Demonstration at APEC Osaka Meeting

1994 Development of Speech-to-speech Translation System, ATR-MATRIX

1997 International Collaborative Experiments of Multi-lingual Speech Translation by C-STAR Consortium

1998 Construction of Japanese-English 500 thousand sentences parallel corpora

ATR Spoken Language Translation Research Laboratories

1998 Construction of Japanese-Chinese 500 thousand sentences parallel corpora

1999 Development of Multilingual Speech Recognition System, ATRASR

1999 Development of Waveform Concatenation Speech Synthesis System, XIMERA

2000 Development of Mobile-phone-based Japanese-Chinese Speech Translation System

2001 Establishment of Asian Speech Translation Research Consortium, A-STAR

2002 Succession of technologies of speech recognition & language translation and realistic communication to NICT

2002 Launch of world-first mobile-phone-based English-Japanese Speech Translation Commercial Service

2002 Development of Multi-lingual text translation system for 17 languages

Spoken Language Communication Research Laboratories

Brain Information Communication Research Laboratory Group

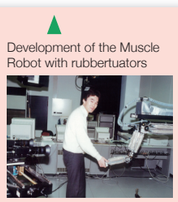
- Computational Neuroscience Laboratories
- Cognitive Mechanisms Laboratories
- Neural Information Analysis Laboratories

Cognitive Mechanisms Laboratories

Neural Information Analysis Laboratories

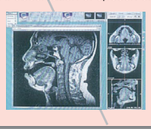
1995 Starting basic research for spoken mechanism of foreign language processing

1995 Development of the Muscle Robot with rubbertuators



1996 Development of a computational models to extract and reconstruct image features

1996 MRI observation of speech organs



1997 Application of imitation learning to the kendama task by the arm robot

1998 Development of the 30-degrees-of-freedom humanoid robot that has similar compliance to humans (collaborative research with JST-DRATO)

ATR Auditory and Visual Perception Research Laboratories

ATR Human Information Processing Research Laboratories

1999 Visualization of skills acquired in the cerebellum

Information Sciences Division

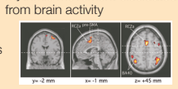
2000 Development for wireless control of electric wheelchairs with a tongue-pressure sensor

2001 Building a 3D face database with various facial expressions

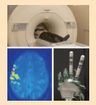
Human Information Science Laboratories

Network Informatics Laboratories

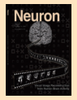
2000 Difference between discrete and rhythmic movement elucidated from brain activity



2001 Technology for control of robot hand using brain activity (collaborative research with HONDA)



2002 Success in the biped locomotion experiment of the robot controlled by the extracted monkey's brain activity(JST-ICORP)



2002 Reconstructing visual images from human brain activity patterns

2005 Development of BMI system to control robots by thoughts (collaborative research with HONDA and Shimadzu)

Computational Neuroscience Laboratories

2010 Developed a Learning Protocol Using Decoded Neurofeedback (DecNef) Method

2007 Verification of awakening effects by aroma presentation during driving (Joint research with Fuji Heavy Industries Ltd.)

Cognitive Information Science Laboratories

Social Media Research Laboratory Group

- Intelligent Robotics and Communication Laboratories
- Hiroshi Ishiguro Laboratory
- Adaptive Communications Research Laboratories
- Wave Engineering Laboratories

ATR Communication Systems Research Laboratories

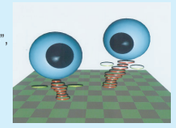
1995 Development of Gaze Tracking Device

1995 Development of the virtual space teleconferencing system(three remote locations)

1996 Development of Life-like, autonomous character "MIC", and feeling session character "MUSE" (Neuro-baby)

ATR Media Integration & Communication Research Laboratories

1997 Development of Talking-Eye



1998 Development and sales of everyday-robot "Robovie"

1999 Development of Communication robot "Robovie III"

Media Information Science Laboratories

2000 Development of Projection-Based Olfactory Display System

2005 Development of lip-sync animation system for CG character, ANIFACE

2000 Development and sales of commercial robot "Robovie-R", "Robovie-M"

2001 Sales on "Robovie-V"-Robocup's World Champion

2003 Development of teleoperated android "Geminoid"

2003 Development of Wearable Platform with Bluetooth

2004 Development of Workflow Measurement and Analysis with Wireless Sensor Network Systems for Supporting Nursing Activities

Knowledge Science Laboratories

2004 Started field experiment of elderly life support with ubiquitous networked robots

2004 Experiment of robot' guide service at shopping mall

2006 "Geminoid HI-1" is recorded in The Guinness Book of World Records 2008

2006 Released Tele-Operated Android "Geminoid F", "Telenoid R1"

Intelligent Robotics and Communication Laboratories

Hiroshi Ishiguro Laboratory

1995 International Workshop on Optical Space Communication (IWOSC90)

1995 Monolithic Microwave Integrated Circuit(MMIC)

1996 Optical Chaos Signal Generator

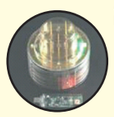
1996 Vertical-cavity Surface-emitting Laser

1997 A Millimeter-wave MMIC Balanced Amplifier Using Multilayer Configuration

1997 DBF Adaptive Array

ATR Optical and Radio Communications Research Laboratories

1998 ESPAR Antenna



1998 Chaos Mirror

1999 Experiments on Wireless Ad-hoc Network with Directional Antenna

1999 "Micro-origami" Technology

ATR Adaptive Communications Research Laboratories

2000 Field Experiments on Hand-held Microwave Direction-of-arrival Finder

2001 Secret Common Key Generation Using Reactance-domain Fading Profiles

2001 2-dimensional Microcavity Lasers

Adaptive Communications Research Laboratories

2002 Reliable Multi-hop Information Distribution System (UbiView)

2002 Hi-quality Wireless Mesh-network Technology

2003 Fast-response Inter-vehicle Communications Systems for Supporting Save Drive

2003 Public Demonstrations on Ubiquitous ITS
Public Demonstrations on Cognitive Wireless Communications

2005 Development of Radio-On-Demand Wireless LAN

2002 Verification of Semiconductor Fiber-optic Ring Laser Gyroscope

2002 Efficient Spectrum Use in Space Domain

2004 Multi-gigabit Wireless LAN Systems

2006 Angular Velocity Dependent Signal Detection in Full Semiconductor Fiber-optic Ring Laser Gyrochip

Wave Engineering Laboratories

2011.11