CREATE ICT

2014 ETRI Technology Report

ETRI
Electronics and Telecommunications Research Institute

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at the Apple App Store or on Google Play.

Contents

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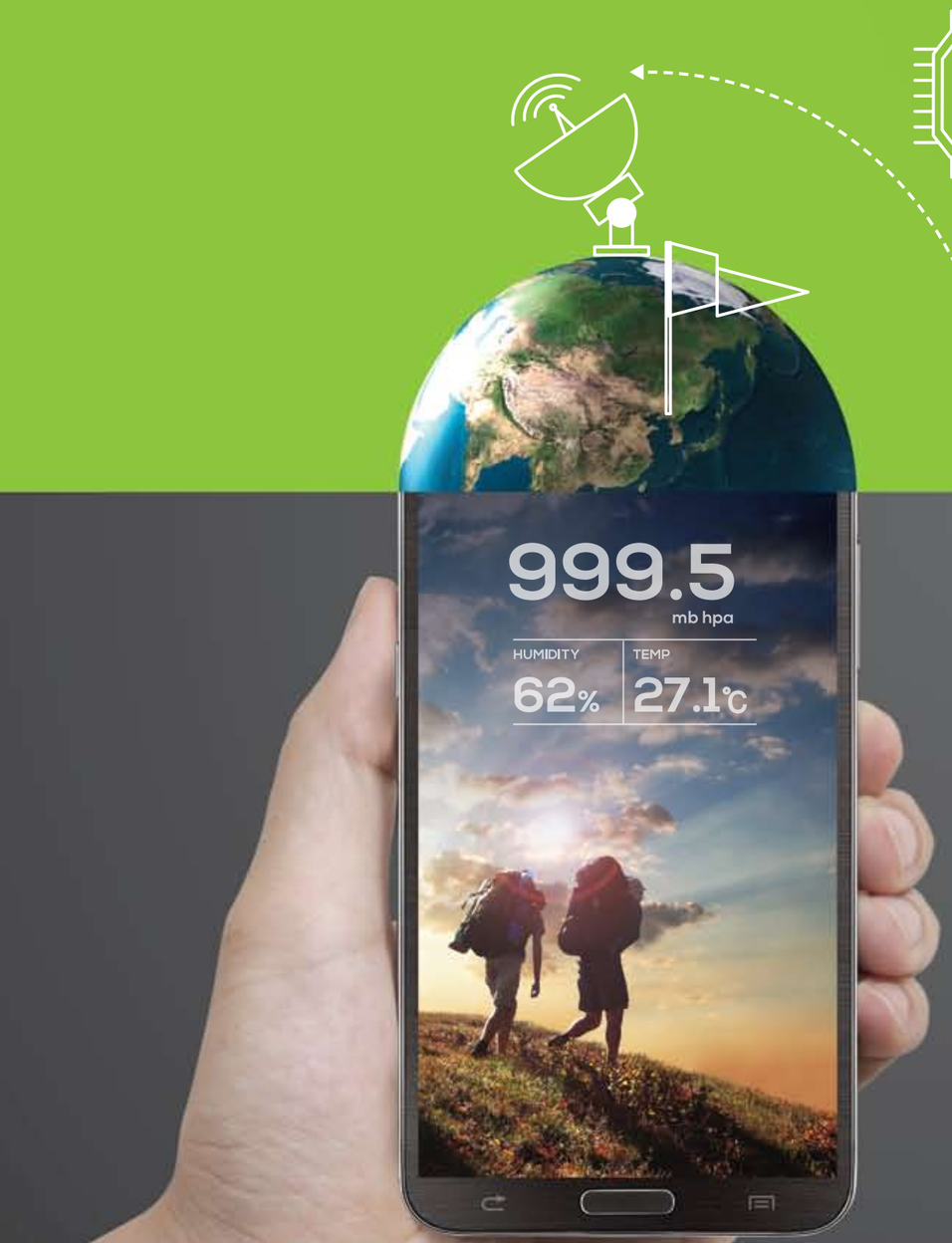
ICT TECHNOLOGY THAT CHANGES THE WORLD CREATING SUPREME VALUE

ETRI’s technology is created through passion for technology and an attitude of constantly taking on challenges.
ETRI’s technology has added value to our lives.
For the evolving world of ICT we will walk down new roads not yet taken to transform imagination into reality.

ICT Innovator for a great tomorrow

CREATE ICT



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ETRI CREATES THE FUTURE, SUGGESTS NEW DIRECTIONS

In the rapidly changing world of ICT, ETRI has firmly retained its place as the world’s first and best. In the future, we promise to become a world class research institute than can lead the creative economy through creative and revolutionary technological developments.

ICT Innovator for a great tomorrow

CREATE ICT

MESSAGE FROM THE PRESIDENT

ETRI will help the realization of a 'Smart World' where people, technology, and the environment are interconnected to create a more abundant, convenient, and safe life.

ETRI will open a new era of hope and happiness for all people through Creative Science and Technologies.

Since its establishment in 1976, ETRI, a global ICT research institute, has been putting forth immense efforts to provide Korea with remarkable growth in the field of ICT. By unceasingly developing the world's first and best technologies, ETRI has helped Korea become one of the top ICT nations globally.

Korea, once a veritable wasteland of science and technology, became a leader in ICT through indomitable will and a challenging spirit. In the 1980s, a one-phone-per-house era, which brought significant changes to the everyday lives of Koreans, was realized through the development of TDX(Time Division Exchange), a fully digital electronic switching system. Korea soon started to dominate the world's semiconductor industry through the successful development of 4M DRAM. During the 1990s, ETRI once again astonished the world by commercializing CDMA for the first time. In the 2000s, ETRI developed Terrestrial DMB, WiBro, and 4G LTE Advanced, which became the foundation of mobile communications.

Recently, as a national ICT leader, ETRI has been advancing communication and convergence by developing SAN Technology (cutting-edge ICT technology converging with shipbuilding), world class portable automatic interpretation technology (Korean/English, Korean/Japanese, Korea/Chinese), automated valet parking technology, and adjustable display technologies such as transparent displays.

Building on its past success, ETRI continues to dedicate its utmost efforts R&D to maintain its place among the world's best research institutes leading the creative economy. Additionally, with this vision, ICT Innovator, Creating the Future, ETRI will continuously strive to develop creative and innovative technologies to be responsible for the world's ICT industry beyond Korea by creating innovative research achievements, securing global IP competitiveness, and establishing an advanced world-class management system.

ETRI will help the realization of a 'Smart World' where people, technology, and the environment are interconnected to provide greater abundance, convenience, and safety to all of humanity. ETRI will open a new era of hope and happiness for all people through Creative Science and Technologies.

PRESIDENT OF ETRI Heung Nam Kim

HISTORY

1976. 12. 30

KERTI Established
Established to perform research on Electronic field

KIET Established
Established KIET to research in the field of electronics, e. g. semi-conductors, computers

1977. 12. 10

KTRI Established
KECRI became independent from KIST and KTRI was established in Dec 31, 1976 as a research institute specialized in telecommunication

1981. 01. 20

KETRI Established
Established KETRI(consolidation of KTRI and KERTI)

1985. 03. 26

ETRI Established
ETRI, institute specialize on Information and Telecommunication was established(consolidation of KIET and KETRI)

1996. 01. 01

SERI Established
SERI, which was opened as data process department of KIST, incorporated into ETRI as an affiliate in May 25, 1998

1997. 01. 31

ETRI, Institute's Korean Title changed
Renamed it as Electronics and Telecommunications Research Institute(ETRI) based on regulations for electronics and telecommunication

01 02 03 04 05 06 07

01. 02. 03.

1976.
Established KECRI, KIET, and KERTI, the origins of ETRI

On Dec. 30, 1976, KIET(Korea Institute of Electronics Technology) was established to research in the field of electronics, e. g. semi-conductors, computers

On Dec. 30, 1976, KERTI(Korea Electric Research and Testing Institute) was established to research in the field of electrics

On Dec. 31, 1976 KECRI was founded as an affiliate of KIST for systematic research and development in the field of communication technology and introduction and development of 'Electronic Switching System'.

On Dec. 10, 1977 Independent from KIST and renamed itself as KTRI

04.

1981.
Established KETRI

On Jan. 20, 1981, KETRI(Korea Electrotechnology and Telecommunications Research Institute) was established in consolidation of KTRI and KERTI

05.

1985.
Established ETRI

On March 26, 1985, ETRI, institute specialize on Information and Telecommunication was established(consolidation of KIET and KETRI) to meet with the emphasize on Electronics field

06.

1996.
Data process department of KIST transferred to ETRI as an affiliate

On June 27, 1967, SERI(Systems Engineering Research Institute) was opened as data process department of KIST. In accordance with, government restructuring of the Ministry of Science and Technology to the Ministry of Information and Communication SERI became affiliate of ETRI on January 1, 1996.

On May 25, 1998, Incorporated into ETRI

07.

1997.
ETRI, Institute's Korean Title changed

On Jan. 31, 1997, Institute renamed it as Electronics and Telecommunications Research Institute(ETRI) based on regulations for electronics and telecommunication

MISSION

ETRI makes contribution to the nation's
economic and social development through research,
development and distribution of
industrial core technologies in the field of Information,
Communications, Electronics, Broadcasting
and Convergence technologies.

ACHIEVEMENT

2010's

2013 · Development of automated valet parking technology using a smart phone
2012 · Developed 100 times faster Optical Internet Technology
· Developed Korean/English portable automatic interpretation technology
2011 · Developed transparency adjustable AMOLED display panel
· Developed packet-optical integrated transport network technology
2010 · The world's first 4G LTE-Advanced Technology
· Developed Smart Ship Technology(SAN)

2000's

2009 · SMMD-Based 4D System Technology
2008 · The world's first digital content vending machine
2007 · The world's first 3.6Gbps 4th Generation mobile communication technology(NoLA)
2006 · Wireless Home Network(UWB)
2005 · Succeeded in exported Embedded SW Solution
· Terrestrial DMB Service launched
2004 · WiBro Prototype

1990's

1999 · Synchronized IMT 2000(CDMA2000) STP System
1996 · CDMA ATM Exchanging Machine
1995 · Successfully commercialize CDMA for the first time in the world
1991 · Launched TDX-10
· Developed TiCOM II
1990 · Developed 32bit microprocessor

1980's

1989 · Starting with development of 4M DRAM, Korea successfully developed 16M, 64M and 256M DRAM
1988 · Developed 565Mbps Optical Communications System
1986 · Launched TDX-1
1984 · Succeeded in developing a 16bit UNIX domestic computer
1983 · Developed 8bit Educational Computer
1982 · Developed the Nation's first semiconductor product '32K ROM chip'

1970's

1977 · Established KTRI(Korea Telecommunication Research Institute)
1976 · Established ETRI, an affiliate of KIST
· Established KIET
· Established KERTI

VISION

ICT Innovator For a Great Tomorrow

MANAGEMENT PRINCIPLE

01
Innovation
Create innovative research achievement

02
Global Talent
Establish world class advanced management system

03
Intellectual Asset
Secure Global IP competitiveness

STRATEGY

Creative management through continuous improvement and innovation

- Build Creative Convergence Innovative R&D System
- Strengthen Global Open R&BD Capability
- Build win-win Ecosystem for Small and Medium Enterprise
- Strengthen Intellectual Property Biz Strategy
- Foster Creative Manpower Build HRD System

COMMON CORE TECHNOLOGY

Research planning system to build ICT based
Creative Economy through convergence ICT ecosystem

Develop vertical and horizontal
ICT convergence technology to create new industry
and strengthen competitiveness dramatically

Lead ICT policy·strategy·standard and develop creative technologies for the future

Develop smart global leading material technology to provide happiness and satisfaction to mankind

Develop creative software & contents technology to lay the groundwork for realizing the creative economy

Develop human friendly technologies to build smart advanced nation

Develop smart cloud internet technology to provide realistic private space services

ICT INNOVATOR FOR A GREAT TOMORROW

ETRI is leading the ICT ecosystem for humanity and joyful, convenient, and safe life.
As an institution that powers the growth of the nation's research and development, we will put forth our utmost efforts in pursuing and creating research outputs of elevated status.

RESEARCH FIELDS

RESEARCH FIELDS

IT CONVERGENCE TECHNOLOGY RESEARCH LABORATORY

With the vision of being 'The ICT Convergence Technology Leader of the Creative Economy' the Laboratory aims to develop ICT convergence technologies for emerging industries, public services, and performance expansion. In order to fulfill these goals, the Laboratory is developing a wide range of technologies, some of which are customized smart screen technology based on the Web of Things(WoT), autonomous agricultural robot technology, and laser-driven ion acceleration technology used for cancer treatment. The Laboratory is also committed to developing ICT and BT integrated u-health/life care treatment technology, human friendly geospatial intelligent robots, sensor and telecommunications-integrated vehicles and ships, intelligent post-mail distribution and logistics technology. Furthermore, the Laboratory is looking into creating intelligent living spaces by integrating everyday items into the internet-based USN/IoT convergence technology.

INDUSTRIES IT CONVERGENCE

With the goal of becoming the leading developer of intelligent next-generation vehicles and maritime infrastructure and communication e-navigation services, the Laboratory is committed to developing ICT-based decision making/control technology for vehicle/driver cooperative autonomous driving systems(Co-pilot), WAVE communication technology, vehicle convergence platform technology, safety-and-convenience oriented vehicle augmented reality system for the driver, ICT convergence-based vehicle guidance system, and an automated valet parking system. In the field of ship building, the Laboratory is developing a solution and seeking standardization for safe-ship navigation convergence technology based on the ad-hoc maritime network.

IoT CONVERGENCE

Smart convergence is a developing tool that will connect everything around us to the internet. The Laboratory is performing research to make 'smart life' a reality, where environmental and object distinguishing, object communications and networking, smart device, open platforms, and context-awareness and emotion convergence are real. IoT technology is being developed through core technologies such as environmental sensors, wireless charging, NFC, RFID, RTLS, sensor networks, smart sensor devices, collaborative devices, RFID/USN middleware, semantic service platform, Web plug-in for devices, synchronization between real and virtual worlds, and context-based dynamic device interactions. Furthermore, the Laboratory strives to apply these technologies to other areas such as agriculture, the environment, health, medical treatment, energy, social safety, vehicles, traffic, logistics, emotions, and etc.

INTELLIGENT COGNITIVE TECHNOLOGY

The Laboratory strives to become the leader in cognitive technology. The Laboratory's intelligent cognitive technology research focuses on the convergence of core cognitive technologies such as cognitive sensing, position recognition, knowledge, and intelligence. To achieve this goal, the main focal points of the research being performed revolve around Open Platform for Robotic Services(OPRoS), multimodal-based Human-Robot Interaction(HRI), autonomous robot navigation, and reasoning based knowledge convergence service technologies. Furthermore, intelligent cognitive technology is adopting technologies aimed at creating better welfare and social safety such as environmental recognition, location and in/outdoor awareness, 3D reconstruction based on spatial information, and spatial fusion engine technologies.

SMART GREEN LIFE

Smart Green Life technology refers to the ICT-based technology that creates human-centric, energy efficient living quarters. Smart Green Life research strives to make WPAN & eco-adaptive networking applications, Smart Life supporting SW platform technology, personalized immersive and emotional service, Smart Grid and home building-based energy management technology, and LED-based lighting communication services a reality.
Following the national agenda of creating a 'safe, integrated, sustainable society', the Laboratory strives to develop and improve on the core components and applications of improving the Quality of Life Technology(QoLT) and its vision of futuristic living quarters.

BIO-MEDICAL IT CONVERGENCE

To ensure a healthy aging society, the Laboratory is developing ICT-BT convergence technology. Research topics covered in this field include u-health(health management regardless of time and location), life care(maintaining a healthy life through daily management), point-of-care(on-site diagnostics), medical image visualization & analysis technologies to assist disease diagnosis, bio-informatics (predicting genetic diseases through genetic information analysis), and ICT-based new diagnostics & treatment systems.

POSTAL & LOGISTICS TECHNOLOGY

The Postal & Logistics Technology Research Department is dedicated to conducting research on postal logistics with the goal of improving the national infrastructures of the postal service. The research department plays a central role in the postal industry as it has already made numerous outstanding contributions, particularly in strengthening the competitiveness of the postal service through digitization and automation. Some of its achievements include designing the PostNet and other automated services such as address recognition and postal sorting machines including letter, registered, sequence, and parcel.

In order to remain consistent and flexible to changes, smart postal technology and rail logistics have become a priority for sustainable postal operations where self-service, automated classification and delivery technology, new postal-code classification, parcel sorting, delivery area adjustment, and hybrid(passenger-parcel) train systems are a way of life.

The Department is in the process of developing logistics convergence technologies for smart postal and rail operations(e.g. RFID system for Parcel and Courier Service, remote sensing technology, advanced robot technology, geographic information system, and a mobile mapping system). In addition, the Department plays a pivotal role in defining the future of the postal IT industry by establishing roadmaps in accordance to policies and trends.

DAEGU-GYEONGBUK RESEARCH CENTER

In 2011 the Daegu-Gyeongbuk Research Center was established in Yuga-myeon, Dalseong-gun, Daegu, to create R&D relevancy and strength while creating added value to the region. It aims to revitalize regional industries by commercializing local businesses' demand-based ICT convergence needs. The Research Center is committed to researching and developing eco-friendly smart greenhouse technology, smart sensor and Advanced Driver Assist System(ADAS) for vehicles, and healthcare ICT convergence technology.

AGRICULTURAL-ICT CONVERGENCE RESEARCH

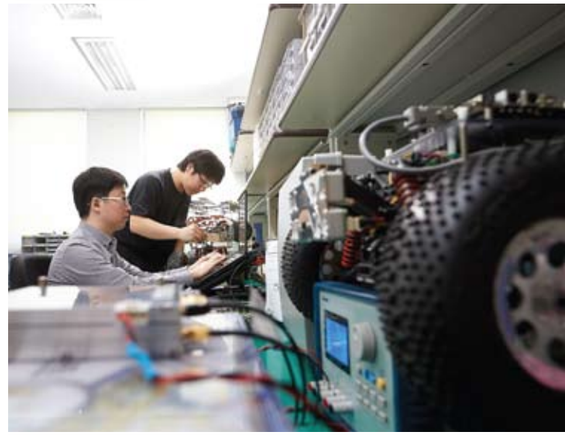
The Agricultural-ICT Convergence Solution is an intelligent greenhouse platform software for cultivating various crops, vegetables, and produce to ensure the competitiveness of the agricultural sector of Korea. The Agricultural-ICT embedded platform will include an internal environment prediction function and a growth environment model function for crops. Functions such as these are reflections of farmers' experiences, which in turn call for increased production capacity. The agricultural-ICT convergence technology aims for productivity improvement, less labor, and efficient energy usage.

AUTOMOTIVE-ICT CONVERGENCE RESEARCH

The Automotive-ICT Convergence Research Department's research, which is based on import products, aims to develop low-cost, miniaturized smart sensors, and vehicle safety systems. Situational awareness sensors around the vehicle include radar, 3D lidar, and vision sensors. These are the current research projects being pursued by the department. Additionally, in collaboration with local businesses, the Department is seeking to develop an Advanced Driver Assist System(ADAS) that combines a variety of sensors.

MEDICAL-ICT CONVERGENCE TECHNOLOGY

The Medical-ICT Convergence Technology Research Department is developing specialized medical IT technologies in the Daegu-Gyeongbuk region such as medical equipment, medical robots, and other needs sought by hospitals, doctors, and corporate fields. Projects under development include implantable automatic monitoring systems for chronic disease management, hair transplant robots, and medical 3D printers that are able to regenerate bones, cells, and tissues. The research department is also in the process of developing technology to predict the progression of diabetic complications by measuring the state of peripheral nerves, as well as a global smart drug monitoring system. The Daegu-Gyeongbuk Research Center is dedicated to meeting the Medical-ICT convergence needs of local businesses by promoting commercialization of these research results.



RESEARCH FIELDS

INFORMATION & COMMUNICATIONS CORE TECHNOLOGY RESEARCH LABORATORY

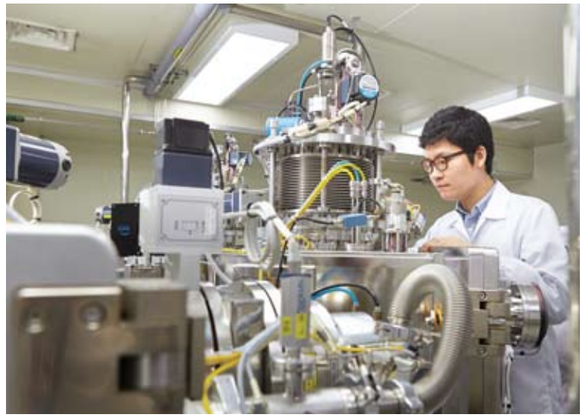
With the goal and motto of being 'The Global Components and Materials Technology Creator for the Growth of SMEs', the Information & Communications Core Technology Research Laboratory leads the way for development of core technology for convergence components and materials. The Laboratory's main researches consist of convergence components technology that implements multifunctional, high efficiency, high value-added systems along with revolutionized new semiconductor technology, and creative convergence components. The Lab is also involved in developing new system-service linked and high value-added convergence component technology. The Laboratory seeks to raise the bar on IT technology by actively engaging in creative and adventurous research.

SMART I/O PLATFORM

The Next Generation Display Research Department performs research on TFT-based material/element/processing technology, TFT-based reflective material/module technology(lighting, discoloration, colored e-paper material and module/panel), OLED(white OLED element/panel, light extraction element/film, lighting application), new material/element, and touch-screen technology.
In order to meet the display market's demand at the proper time and create a new source of growth, the Department is developing OLED displays, flexible displays, transparent displays, reflective displays, and low-energy-output LASA(Light Adaptable, Space Adaptable) displays among other next generation displays, such as OLED-panels that incorporate material/module/process technology.

PHOTONIC/WIRELESS CONVERGENCE COMPONENTS

The Photonic/Wireless Convergence Components Research Department performs research on compound semiconductor-based materials such as InP, GaAs, GaN, and et cetera to develop ultra high speed photonic/wireless convergence components. Researches being performed include HBT and HEMT-based Microwave Monolithic Integrated Circuit(MMIC), high speed optical internet components, and component development, photo-optical wiring, 3D packaging technology for optical and wireless convergence communication devices. The Department is also involved in solving energy problems by expanding its field to low energy output modules such as light emitting diodes(LED). Ultimately, the Department seeks to implement a high speed optical/wireless internet infrastructure while providing the Defense Acquisition Program Administration with more precise vital components.



NANO CONVERGENCE DEVICES

The Nano Scale Electronics & Optics Integration Research Department is involved in R&D of nano and MEMS-based low-energy convergence sensors, touch screen panels, energy storing modules, and BLDC motor driving circuits with high-voltage high-current energy semiconductors. Furthermore, the Department is also involved in analogue/digital mixed-signal technology, sensor interfaces that integrate intelligent algorithms, power semiconductor-based actuation circuits, integrated circuit/single chip optical elements technology, and high performance SoC technology. The Department also performs photoelectric convergence research for computers and communication technology(silicon photonics technology) for future implementation.

IT COMPONENTS AND MATERIALS INDUSTRY TECHNOLOGY

As energy problems such as the imminent depletion of fossil fuels and global warming are arising, the IT Components and Materials Industry Technology Research Department is involved in performing research to develop alternative energy sources. Specifically, the Department is committed to developing and commercializing the conversion of solar power into useable solar energy.

Furthermore, the Department also performs research on developing a thermoelement that suppresses phonon transmission using silicon/metal heterojunction technology in order to convert wasted heat into energy. Research towards energy and TFT devices, and super capacitors is also being performed. In addition, the Department heavily focuses on the advancement of low loss/high efficiency energy semiconductor industry and building a green IT society by performing research on GaN and silicon power semiconductor technology.

To strengthen electronic products and improve management of their heat-emissions, the Department is in the process of developing new cooling and module technologies. The thin-filmed cooling structure development provides a promising approach for high density electronic packaging. Furthermore, the Department utilizes current technology and equipment to provide support to SMEs in developing prototypes and solving technological issues.

RESEARCH FIELDS

BROADCASTING & TELECOMMUNICATIONS MEDIA RESEARCH LABORATORY

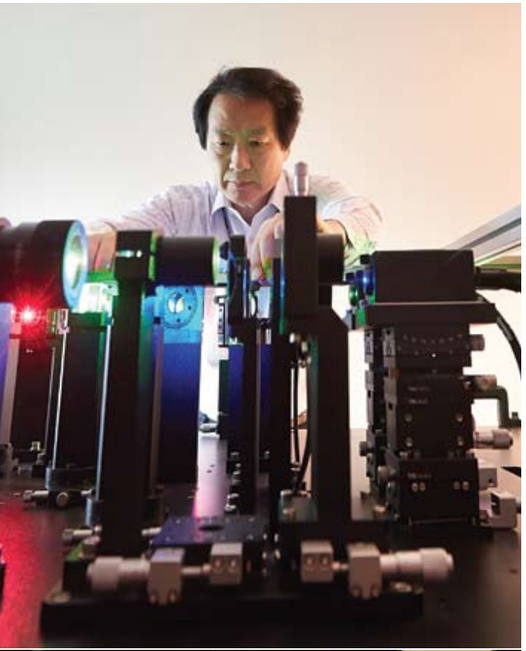
With the vision, 'To be the Leader in Creating New Broadcasting and Telecommunications Media Technologies that Bring Warmth to the World' the field of broadcasting and telecommunication media is creating technology that is second to none in the world by securing vital core and standard technology. Through technological development and expansion of immersive media, broadcasting & telecommunications convergence, and satellite and radio, high-quality global broadcasting and telecommunications convergence service is created. We are also focusing on research development with the goal of increasing the convenience of radio resource services though advancement of the application of wireless resources in radio broadcasting.

NEXT GENERATION SMART TV

Vital technology is being developed through research for Beyond Smart TV(Midas Media TV), grounded on CPND, which provides broadcasting, telecommunication, and broadcasting & telecommunication convergence, and computer services based on a multi-screen format. In particular, this research is focused on the development of a conceptually new hybrid media service technology that links technology, broadcast, and internet, and allows screen control through a user-friendly multimodal human interface. For the development of user-friendly convenience, user pleasure, and benefits of Midas Media TV, the following are being developed through research : a functional inspection test-bed, terminal STB technology, an HTML5 based Smart TV SW platform technology, mirrored smart remote technology, voice & gesture recognition technology based on multimodal UI/UX technology, enhanced two-way broadcasting and smart advertisement technology, hybrid media transmission, multi-screen service technology, and an intelligent media search & recommendation service.

BROADCASTING SYSTEMS

Not only is technology being developed for the advancement of digital broadcasting system/service, but original technology for next generation broadcasting is also being researched. Specifically, the following are being developed : cell node based convergence transmission technology used in the HFC network, 10Gbps-level cable broadcasting infrastructure technology development based on a wide range channel, frequency sharing terrestrial broadcasting technology, a wake-up emergency alarm broadcasting system utilizing DTV, advanced broadcasting system based on FTN, dynamic broadcasting&communications convergence technology, 3D-TV broadcasting technology that does not require glasses, and digital radio technology.



REALISTIC BROADCASTING MEDIA

Vital technology for realistic broadcasting is in research development. For information transmission that enhances the sense of being present and the sense of reality, UHDTV imaging and 3D realization audio acquisition, production and compression encoding technology, and ultra high definition panoramic image acquisition and reproduction technology are being developed. To further deliver a sense of being present and also to transmit a sense of emotion, the following are being developed : sense of touch and smell acquisition, transmission and expression technology, and digital holography technology, through research that will ultimately express 3D images.

INTELLIGENT CONVERGENCE MEDIA

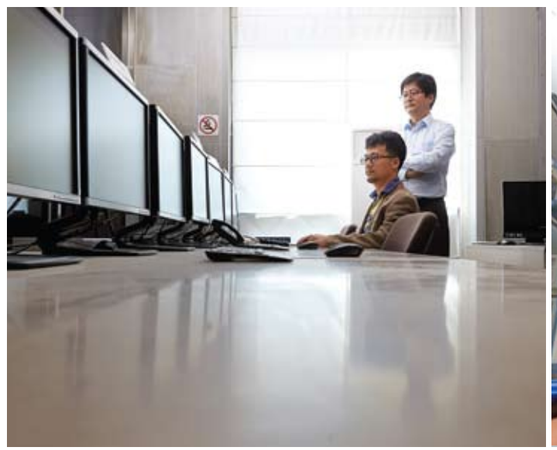
With the goal of providing convenient and useful services for various smart devices, through user focused participation & sharing and personalization & service convergence, we are conducting research and developing technology needed to upgrade services provided to a higher level. In particular, we are utilizing various vital convergence service technologies to respond quickly to future environmental changes of broadcasting and telecommunications, and are discovering and developing technological components linked to future convergence media services such as the next generation smart TV. Currently, the core tasks include the following : telescreen system technology, which is a next generation digital signage system based on context recognition, smart space technology to expedite the immersion screen industry, object image recognition based intelligence convergence system platform technology, web object based multi-integrated filming technology, web object architecture technology for smart home services, tailored calamity delivery technology through intelligent convergence media, and autonomous wireless railway sensing technology for convergence between industries.

SATELLITE & WIRELESS CONVERGENCE

We are looking to expand cutting edge satellite communication and broadcasting technologies based on a performance verification of the space recognition and control system of the Chollian satellite communication system, launched in June of 2010 and loaded with a domestically developed Ka bit-rate communication network. To achieve DVB-RCS 2 based high efficiency VSAT system core technology, channel adaptive realization satellite broadcasting transmission technology that guarantees continuous broadcasting even under weather and channel changes, satellite system and application technology, next generation satellite/terrestrial mobile communications for 4th generation satellite/terrestrial technology, and standards are being developed. Furthermore, based on the secured components and system development technologies acquired through the development of the Chollian satellite, next generation RF systems, including MMIC, used for radar/antenna/repeater for wireless satellite convergence, are being developed. Research is also being conducted for weather satellite data receipt processing technology.

RADIO TECHNOLOGY

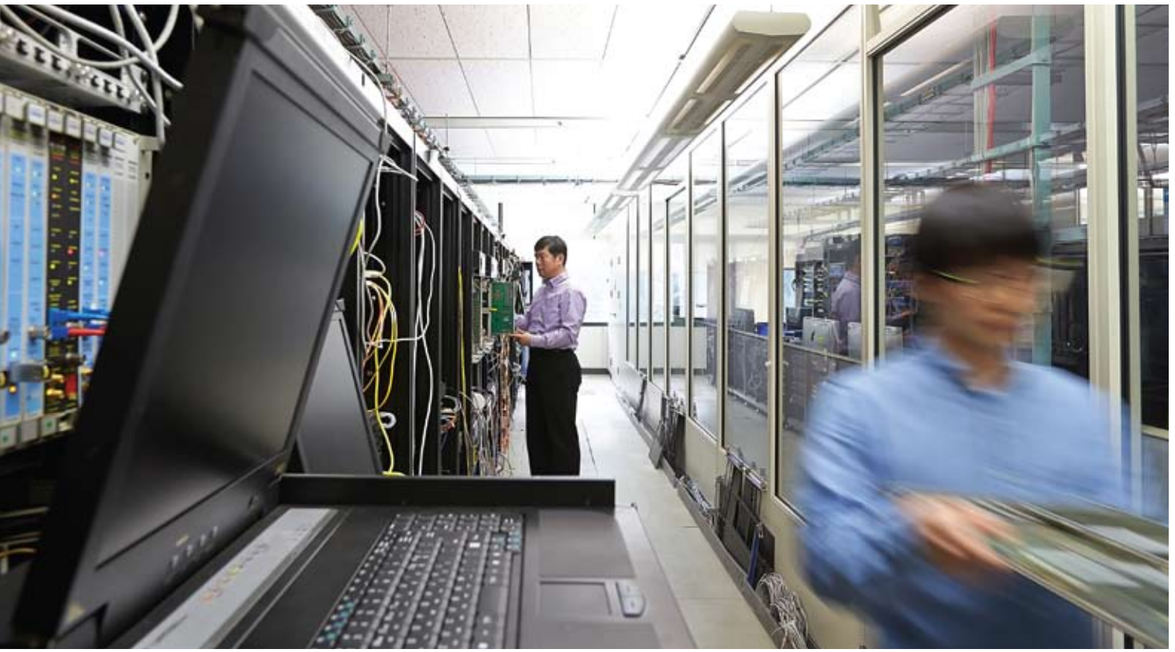
Research is being conducted on technology for efficient use radio wave resources, frequency sharing technology, new radio wave resource pioneering technology, electromagnetic engineering technology, and live radio wave technology. Spectrum engineering technology is being researched for the efficient use of radio waves within limited frequency resources through cognitive radio technology and radio wave characteristics of radio waves. Additionally, for the pioneering of new radio wave resource technology, the future technology of millimeter wave and TeraHertz band wave is being researched. Furthermore, especially for the utilization of 5G mobile communication and other next generation wireless communication systems, an environment appropriate for millimeter wave and TeraHertz band waves and wireless RF/antenna technology is being developed. Electromagnetic environment technology research is being carried out in relation to its effects on the human body, disturbances between electronic devices, countermeasures for adverse effects, electromagnetic wave interpretation technology, and electromagnetic wave measurement and monitoring technology. Live radio wave technology is being conducted based on characteristics of the microwave band, TeraHertz, and other electromagnetic waves for breast cancer diagnosis technology, detecting foreign substances in food, wireless energy transfer technology, and health monitoring technology.



RESEARCH FIELDS

COMMUNICATIONS INTERNET RESEARCH LABORATORY

The Communications Internet Research Laboratory is committed to enhancing the quality of life by creating a creative economic infrastructure that will bring Mobile Life into reality. With this innovation, people will be able to access high-speed communications services regardless of time or location. In order to materialize a knowledge-based future society that is integrated with Information and Communications Technology, the Laboratory is performing research on mobile communication technology that can embrace combined wire-wireless technology, fused broadcasting technology and also future internet technology. The Laboratory serves as the technological hub for the development of a regional strategic industry for the Honam Metropolitan Economic Areas through ICT fusion/mixed technologies. The Laboratory heavily focuses on 4th and 5th generation telecommunications technology, high-speed short range wireless communications, future internet and networking technology to support fluidity despite heavy traffic, packet-optical integration technology, platform technology for converged services, the military-based Tactical Information Communication Network, and other core-technology based fields along with growth-based technology commercialization.



WIRED & WIRELESS CONVERGENCE

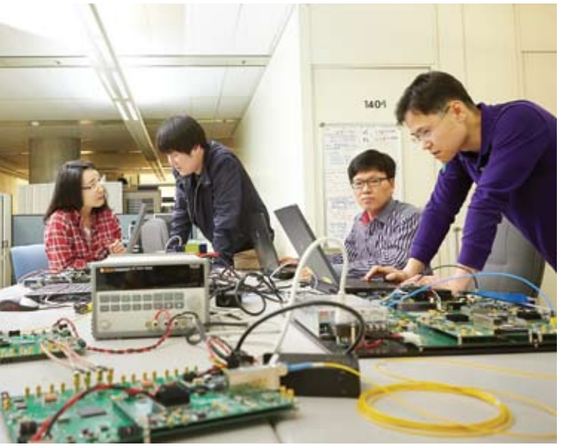
In order to fulfill the communication needs of the creative economy infrastructure, the Laboratory is in the process of developing medium and large scaled projects and individual projects utilizing wire/wireless convergence technology, to strengthen the technology and market share. Furthermore, the Laboratory is in charge of tasks pertaining to internationally standardizing technology through the International Standard Organization, marketing, and patent strategies. The Laboratory is currently performing research on convergence technology that will be capable of hosting high traffic and smart content transmission through low latency, and also aims to create a different networking paradigm that shifts from the current IP networking technologies, to overcome limits of modern technology by creating a new identification-based networking structure. The Laboratory is currently in the process of testing different user-experience service platforms that integrate the latest convergence technology and IT technology. The Laboratory is performing research on convergence technologies of multi-dimensional media, characterized as ultra-high-quality and ultra-high-volume, with wired and wireless networking.

WIRELESS APPLICATION

The commercialization of 4G mobile technology has opened doors to creating an era where users can access the internet without restriction to time and location. Yet, users are always seeking cheaper and better quality services. In order to meet user demand, small cell-based, next generation antennas to support heavy mobile traffic, mobile communication application technologies, and millimeter-broadband RF technology and channel modeling technology are currently being standardized. The Wireless Application Research Department is adapting to the shift in technological paradigm by performing research on developing small-cell solutions for base stations, next generation high-efficiency antennas, cellular and millimeter-broadband RF technology along with other technologies that pertain to mobile technology,suchasnationaldefensetechnologies,maritimecommunications, and public safety announcement communications.

WIRED & WIRELESS ACCESS

The growth in usage of smart devices, big data, and the cloud leads to more traffic. The growth in smart device network connections such as D2D and IoT calls for immediate research to create a platform that boasts the best of wired and wireless technologies. In response to these changes in the communication environment, wireless private network technologies are being fused to the infrastructure system, integrating wired and wireless networks. Furthermore, the development of the core technologies needed for future services, and international standardization of the 5G mobile communication technology, are underway. The Wired & Wireless Access Research Department is leading the change. With 'understand me service' (proximity services) and 'with me service' (private cloud) as goals in mind, proxi mity SNS technology, mobile private cloud technology, inter-device direct communication technology, distribution controlled device technology, next generation distribution cloud base station technology, and core 5G mobile communication technology (Giga-KOREA-5G Access Technology) are being researched.



WIRELESS TRANSMISSION

5G technology is capable of transmitting over 1000 times more data than the present system. 5G looks beyond voice and data transmission by benchmarking the human nerve system as a network for knowledge-enriched communication. The 5G vision consists of more than just an evolution from its predecessors, by revolutionizing new technologies that will open new dimensions in mobile communication services. The Wireless Transmission Department is developing core networking technologies that utilize mmWave and related RF technology, cellular-broadband performance enhancing technology, next generation wireless LAN technology, and wireless proximity communications technology. The ultimate goal is to contribute to the international standardization of this technology and become the leader in this field.

SMART NETWORK

The Smart Network Research Department seeks multi-dimensional solutions for resolving ICT infrastructure problems. Typical problems include limitations of value creation when using a network structure originally designed for simple internet traffic delivery, limitations on information distribution flexibility, limitations on reuse of network resources, and security issues pertaining to the current structure. The Department is focused on developing a tightly knit network of network, computing, and storage through smart cloud networking technology. The Department is also committed to research in SDN technology along with its operating system, as well as highly reliable networking technology.

OPTICAL INTERNET

An important aspect of modern society is its rapid transition to an information society and its need for large quantities of information distribution. Global data traffic is increasing at a rate of 40% per year and is projected to grow tenfold each year over the next 8 years. To support this growth, the Optical Internet Research Department is committed to developing new technologies that are cost-efficient and energy saving. The Department seeks to gradually increase transmission capability and feasibility beginning at 10Tb/s and gradually working up to 100Tb/s and 1Pb/s. The Department is also committed to performing research that relates to the optical internet, such as high-speed transmission technology, optical subscriber network technology, optical carrier Ethernet technology, and Transport SDN.

HONAM RESEARCH CENTER

The Honam Research Center is the technological hub of the Honam region for R&BD of ICT convergence technology. The Center supports technology from strategic businesses, develops customized technology for local businesses, and actively seeks commercialization of self-created technology. The Center has helped facilitate over 200 cases of A2LA recognition, testing, and calibration services. The Center appoints one researcher for each regional business to serve as a mentor for business development. This center was established in May 2001, and is located on Cheomdangwagi-ro, Buk-gu, Gwangju.

CUSTOMIZED R&D FOR REGIONAL STRATEGIC INDUSTRIES

In accordance with local demand, the Honam Research Center helps seek out joint research projects and also supports local businesses by supplying them ETRI's core ICT technologies to create products worth commercializing. The Center also fosters local businesses by providing troubleshooting, technical consulting, information, and internationally certifying optical communication components.

SMART OPTICAL REMOTE NODE AND MANAGEMENT PLATFORM TECHNOLOGY

The explosive growth of mobile traffic and optical broadband technology has contributed to the field's annual growth of over 20%. This calls for the development of an efficiently structured fiber management platform. Smart optical remote nodes offer real time lookout for high split FTTH networks while smart optical distribution network management platforms follow ITU-T and Broadband Forum-led internationally standardized footholds to automatize optical communication management. In order to boost early commercialization, smart optical remote node and management platforms will be applied to the Honam Research Center testbed.

PHOTONICS-CONVERGED SURVEILLANCE TECHNOLOGY

In order to efficiently perform surveillance on urban settings, the Honam Research Center is performing research and developing convergence technologies that will combine laser imaging and RF - impulse imaging with conventional CCTVs. Other technologies include photonics-converged 3D optical engines, related optical image processing, image recognition/pattern matching, and a standard CCTV platform. The Center plans on piloting developed hardware around the Honam area while integrating software pro-tocols with telecommunications companies.

OPTICAL APPLICATIONS COMPONENTS TECHNOLOGY

The development of optical applications component technology allows for the integration of optical communication into other industries such as consumer electronics, vehicles, and ship building. Research is being performed towards developing low cost 10Gbps optical network subscriber-based optical transmission component commercialization and BLU(Back Light Unit) for next generation glassless 3D display modules.

INTERNATIONAL CERTIFICATION TESTS IN OPTICAL COMMUNICATION

The Honam Research Center is the only laboratory in Korea that is A2LA-accredited for testing optical communication elements, components, modules, devices, and systems. Testing consists of 66 criteria such as Telcordia, IEEE, IEC, TIA/EIA, MIL-STD, 15 reliability tests which test temperature humidity cycling, mechanical shock, vibration, internal moisture test, and et cetera while 41 performance tests consist of center wavelength, return/insertion loss, and PMD.

RESEARCH FIELDS

SW · CONTENT RESEARCH LABORATORY

The SW·Content Research Laboratory is conducting research and development in an attempt to take the national competitiveness of SW and contents technology to the next level by producing reliable and breakthrough research results.
The Laboratory is researching and developing core SW technology to preempt future SW technologies, create innovative contents for the realization of warm, convenient, people-oriented digital life, to strengthen the core competitiveness of the SW-SoC convergence through SW-SoC convergence technology, and to build a clean and secure cyber environment through cyber security technology. The Laboratory is also beefing up our national strength in SW and contents with an all-phased R&D strategy that covers everything from basic research to core technology development, to commercialization of the technology. Furthermore, with its creative SW convergence R&D and open R&D cooperation, it is establishing a foundation in new SW markets, and working to play a key role in enhancing global competitiveness.

SW CORE TECHNOLOGY RESEARCH

With its motto, 'Creating software technology that changes the world' the Software Core Technology Research Division is focusing on the research and development of core software technologies in various areas for the purpose of securing strategic national SW technologies, preempting future SW technologies through creative research, and creating new SW markets.
Currently, our division is mainly performing R&D in the following areas : BigData platform which is leading the revolution in smart technology, human-friendly wearable computing platform and natural UI/UX technology, multilingual speech/text translation technology that eliminates language barriers, natural language and conversational speech interface technologies, knowledge evolutionary question answering technology, DaaS(Desktop as a Service) system and terminal technology, low-cost high-performance cloud storage SW technology, and supercomputing system technology specialized for genome data analysis.

CLOUD COMPUTING

Cloud computing is computing technology which provides virtualized ICT resources based on internet technology, and these resources can be accesses, as desired, by allowing clients to borrow ICT resources. It also supports real-time scalable services depending on the load, and the user pays according to the amount of usage. Cloud computing research develops next generation cloud computing core technologies, providing new concepts based on open software. This facilitates the creation of high quality and new knowledge information services so that Korea can maintain its reputation as a leader in internet technologies. Also, our group secures the highest fundamental computing technologies which will serve as a stepping stone for Korea to become a leading nation in information technologies.
Currently, our department is carrying out the following projects : Cloud DaaS(Desktop as a Service) system and terminal technology, Low-cost/high-performance cloud storage SW technology, 3D SW service method utilizing client rendering SW technology, Cloud service broker system technology, Supercomputing system technology specialized for genome data analysis and Energy recognition OS technology.

AUTOMATIC SPEECH TRANSLATION AND ARTIFICIAL INTELLIGENCE

The aim is to realize a convenient and human-friendly computing environment(Easy Community) for today's 21st century knowledge-centered society through remarkable developments in speech, language, knowledge processing, and artificial intelligence technologies. The technologies that we are conducting research on include : multilingual speech/text translation technology that eliminates language barriers in the global environments; conversational speech interface technologies for human-friendly knowledge-based services in a ubiquitous society and knowledge evolutionary question answering technology for human-machine communication(i.e., Exobrain). We are also developing a computer aided L2(second language) learning system using the conversational speech interface technology integrated with educational services.

BIGDATA SW PLATFORM

Bigdata has become a contemporary buzzword. The 'data big bang' in digital space has become a reality and emerged into a growing new engine as bigdata software technologies make it possible to create new value from bigdata. Furthermore, the necessity for bigdata analytics and bigdata platform technologies is rising as methods for pre-emptive response to national crisis such as calamities, diseases, and welfare. Next generation wearable computing technologies are also being developed and evolving to provide a human friendly and creative computing environment, by understanding people and interacting with human-centric UI/UX. BigData SW Platform Research is performing R&D in the following areas : Real-time and stream data processing technology, in-memory database technology, bigdata analytic software technology, collaborative open middleware and interoperable device technology, and realistic UI/UX technology.

CREATIVE CONTENT RESEARCH

Our goal is technological development for video, convergence, and smart content for the realization of a warm and convenient human-centric digital life. To pursue this goal, our division is focusing aggressively on research and development in the following areas of technologies : computer graphics, 2D-to-3D conversion and interaction technology, digital holographic content technology, virtual reality technology, u-learning technology, copyright protection management technology, mobile visual search technology, digital cinema and signage technology and high-quality video and gaming content production technology. Above all, our emphasis for future core technology and content creation, for the creation of new markets, has led to the goal of securing core technologies in 3D stereoscopic video, smart content, and experience-enabling content. The Creative Content Research Division strives to actively contribute to the growth of our nation's content production industry by developing the cutting edge tools and technologies required by the global content marketplace.

VISUAL CONTENT

Through the development of core and original digital media content, we have taken a leading position in the field of visual content by linking domestic and international universities and industries, and have secured international standards, standard patents, and intellectual property rights. More specifically, we have secured ample know-how and excellent research outcomes in computer vision technology, a field in which extensive research is currently being conducted in technologies such as 2D-3D conversion, u-learning, motion recognition and UI/UX. We are also focusing extensively on developing technologies for the digital actor, creatures, nature, and fluid simulation, real-time rendering, image mixing and animation specialties which are applied in computer graphics. To secure core technology and create new markets for next generation visual content, smart content, digital holography, e-Training, learning system allowing multiuser participation, and interaction we are concentrating on developing core technology for digital content which has allowed us to lead change in future technologies.

CONVERGENCE CONTENT

Research development is being conducted in virtual reality, u-learning, and smart content technology. In the field of virtual reality, we have developed new technologies related to mixed reality, virtual training simulation, and realistic 4D experiences. In the field of u-Learning, we are exploring new avenues related to interactive learning, mixed reality-based learning systems and cooperative interactive 3D e-Book technologies. Furthermore through the technical support of industries in the content area, we are operating support projects that strengthen the capacity of small-to-medium content developing companies. The main results in each field, respectively, include virtual welding simulator, see-through eyeglass display, motion platform for virtual paragliding, and interactive English learning systems for elementary school students. In the future we are also planning to conduct further research on Live 4D contents, e-Training, learning systems allowing multiuser participation, and user analysis of smart contents.

CONTENT PLATFORM

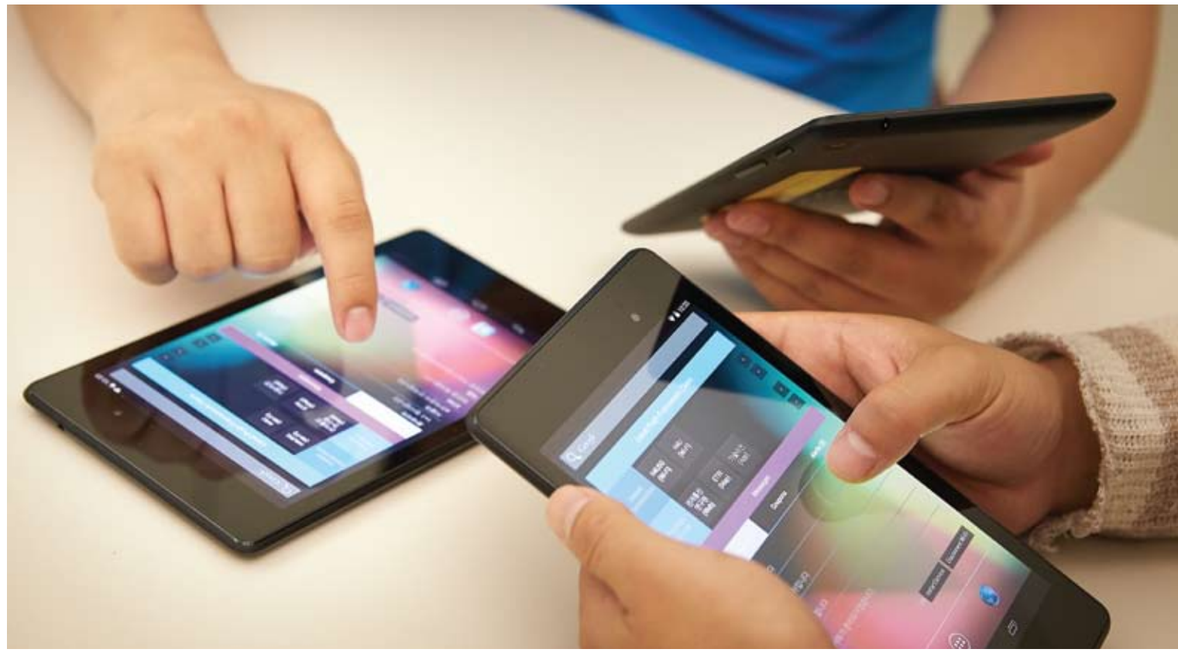
We are conducting research and development on technologies such as gamebot detection and counter-action technology, GPU-virtualization based cloud game streaming, camera-image based smart visual information retrieval technology, and content copyrights protection and distribution on clean cloud network, visual sensitivity communication for user emotion expression technology, and digital mastering cinema and digital signage for 8K-level quality image and video data. We will continue to work on developing basic and core technologies required to build content platforms for image-oriented content service and content distribution, aiming to enlarge and open up new service markets for various types of customized or personalized digital contents.

SW-SoC CONVERGENCE RESEARCH

The SW-SoC Convergence Research Division is leading innovation in technology, value, and infrastructure with its foothold in national SW-SoC convergence R&BD, which creates new industries in high value-added SW-system semiconductor convergence, through an open convergence platform. The SW-SoC Convergence Research Division is working to secure global competitiveness in new convergence industries for our nation by promoting convergence, offering business support and upbringing, and cultivating manpower in the development of new functions in core tools such as embedded SW technology and system semiconductors, a high value-added semiconductor.

EMBEDDED SW

Through R&D and dissemination of the open software platform, we have been endeavoring to enhance national competitiveness of next generation software by creating vital value adding components in the ICT and manufacturing industries.
To this end, the department is focusing its research on the following areas : national defense, aerospace, energy, automotive industries, and mobile and smart appliances. Also, it provides a software platform as an integrated form of operating system, middleware, and development tool that can be utilized by corporations and individual users. In addition, a SW-SoC platform is being developed that is able to linked and tested with SoC-SW convergence technology. Additionally, for the convenient use of the developed technology on-site, an on & offline service is in operation. In particular, the department is preparing for-convergence between various industries and services by developing original technology such as D2D smart connection, AV group communication, and CPS which is grounded on Linux, RTOS, and sensor OS.



SYSTEM ON CHIP(SoC)

Through the convergence of semiconductor and ICT signal processing technology, broadcast and communication convergence technology, and multi-industry convergence technology are being developed. As a type of signal processing technology, multi-core based embedded CPU core technology, error detection and recovery processor technology, and ultra high definition video codec SoC technology are being researched. Broadcast and communication convergence projects include the development of LTE based small-cell SoC technology, mobile TV SoC technology, digital RF SoC technology, broadband Wi-Fi SoC technology, human body communication SoC technology, and etc. Industry convergence technology research includes the following : CMOS based 77GHz vehicle radar SoC technology, integrated automobile ECU SoC technology, energy harvesting technology, semi-permanent battery management technology, conductive textile based IT system construction, and etc. With these technologies serving as a foundation, we are looking to aid the advancement of the system semiconductor industry through the development of SW-SoC convergence technology in new industries such as companion-device(c-device), emotional-lifeware(e-lifeware), intelligent-vehicle (i-vehicle), and etc.

SEOUL SW-SoC CONVERGENCE R&BD CENTER

By constructing an open platform in the field of SW-SoC we are commercializing new technology, overlooking the nurturing of SME's and human resources based on these technologies, allowing us to play a pivotal role in SW-SoC industrial development. Through the system semiconductor manpower cultivation project, based on industry demand, we have been training talents with ICT convergence knowledge through various education programs for graduate students and company employees. Also, through the system semiconductor industrial foundation project, by supporting and nurturing small and medium size fabless, we are contributing to the domestic production of components and the industrial competitiveness of system semiconductor SME's. In addition, through the development of the home appliance SW-SoC open convergence platform we are providing technical competitiveness by providing time-to-market and multi-product small production support to SME fabless and SW companies, which will later spread to mobile, automobile, and energy fields of open SW-SoC platforms. This will provide constant growth to vital original technologies which are the focus of domestic industries, thereby securing a cyclical environment leading to the competitive promotion of our nation's system semiconductor industry. (22, Daewangpangyo-ro 712beon-gil, Bundang-gu, Seongnam-si, Gyeonggi-do, 463-400, Korea)

CYBER SECURITY RESEARCH

In response to global cyber security threats the trend is changing and expanding, from an industrial problem to a national security problem and from the perspective of security technology and systems, it is changing and expanding from a competition of multifunction/speed to a competition of software intelligence. The Cyber Security Research Division aims to construct a safe and crime-free nation by solving pending issues and securing R&SD capacity that will raise industrial competitiveness by pursuing research development in various fields of cyber security.

CYBER SECURITY CORE TECHNOLOGY

The Cyber Security Core Technology Research Department is in the process of developing technologies for the following cyber security core areas. Cryptography technology for databases and data privacy security technology under the premise of a smart environment, digital forensics technology for the prevention of cyber crimes and to secure digital evidence, privacy enhancing personal information circulation platform technology that provides security curation for the safety management of user information, privacy protection technology in a big data environment, attack recognition/response and information leakage prevention for password leak verification and prevention technology on various mobile devices, real-time video(CCTV) that is able to analyze danger and protect video data through security products and service technology that looks to provide a safe living environment, and technology that blocks hazardous streaming contents.

CYBER SECURITY SYSTEM

The following technologies are in research development : virtual based malicious acts detection and analysis technology for cloud computing services, infringement incident symptom detection and response technology, internet radar technology including recognition and tracing technology for targets of cyber attacks, MTM based security technology to prevent information leakage in smart devices, prevention solution for unauthorized approach through a mobile device, industrial cyber protection technologies such as industrial firewall, danger analysis, and communication network management functions, next generation VTS technology development for the realization of marine safety, secured transmission between vehicle electronic ECU, technology transmission security(automobile, aviation, and etc.) technology, and transportation(vehicle·aviation) security technologies.

RESEARCH FIELDS

FUTURE RESEARCH CREATIVE LABORATORY

The Future Research Creative Laboratory(FRCL) is a collaborative think-tank that leads Korea's future ICT innovation policy and R&D planning, and is focused on future growth through ICT, creative research, and standardization. The FRCL consists of three departments : Economic Strategy Research Department, Future Technology Research Department, and Industry-Strategy Research Department. It is also organized into seven research centers : Protocol Engineering Center, Graphene Electronics Creative Research Center, THz Photonics Creative Research Center, MIT Creative Research Center, Transparent Transducer and UX Creative Research Center, Nano Electron-Source Creative Research Center, and Synapse Devices Creative Research Center. The major roles of the FRCL are to generate ICT policy and strategy with visions promoting cooperative research and convergence at ETRI and to establish the national ICT roadmap for 'The Creative Economy of Korea' mission, boosting the Korean government into a world leader.

ECONOMIC STRATEGY

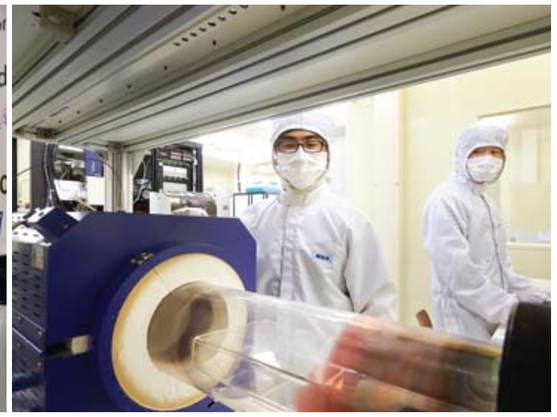
The Economic Strategy Research Department is playing an important role in establishing ICT innovation policy leading to a futuristic society. The department provides future scenarios and technology visions by pursuing convergent perspectives of society, economy and technology, and by employing creative research methods. Based on these main roles, it explores prospective future ICT R&D fields, and thus establishes a strategic R&D position by looking at the technology market as it relates to ETRI's R&D fields. Moreover, with regard to simultaneous of the ICT ecosystem, the department not only presents ways to foster R&D industries, but also analyzes laws and policies related to ICT and develops alternative ways to improve ICT and associated systems, to increase congruence in both innovation and industry policies.

FUTURE TECHNOLOGY

The mission of the Future Technology Research Department (FTRD) is the general organization and coordination of planning for research and development. To create and accept new projects based on external technical policy, FTRD also involves technical analyses, establishing strategies and planning. Interdisciplinary mega-scaled projects are being developed through the leading ICT-planning projects of ministries. The FTRD is also committed to creating an ICT and convergence-based smart future infrastructure, creative services, and trend research on convergence technology for future technology and idea development.

INDUSTRY-STRATEGY

The main role of the Industry-Strategy Research Department is to develop successful strategic roadmaps for government-funded research, industry and ETRI, while enhancing the competitiveness of the Korean ICT industry. This department is accomplishing diverse researches, ranging from ICT R&D planning to development of technology policy to development of business models. Specifically, this department encompasses several research areas. It focuses not only on development of policy alternatives for national ICT technical innovation, and techno-economic analysis of core ICT R&D, but also the establishment of regulatory policies and development of business models and strategies for broadcasting-communication market activation.

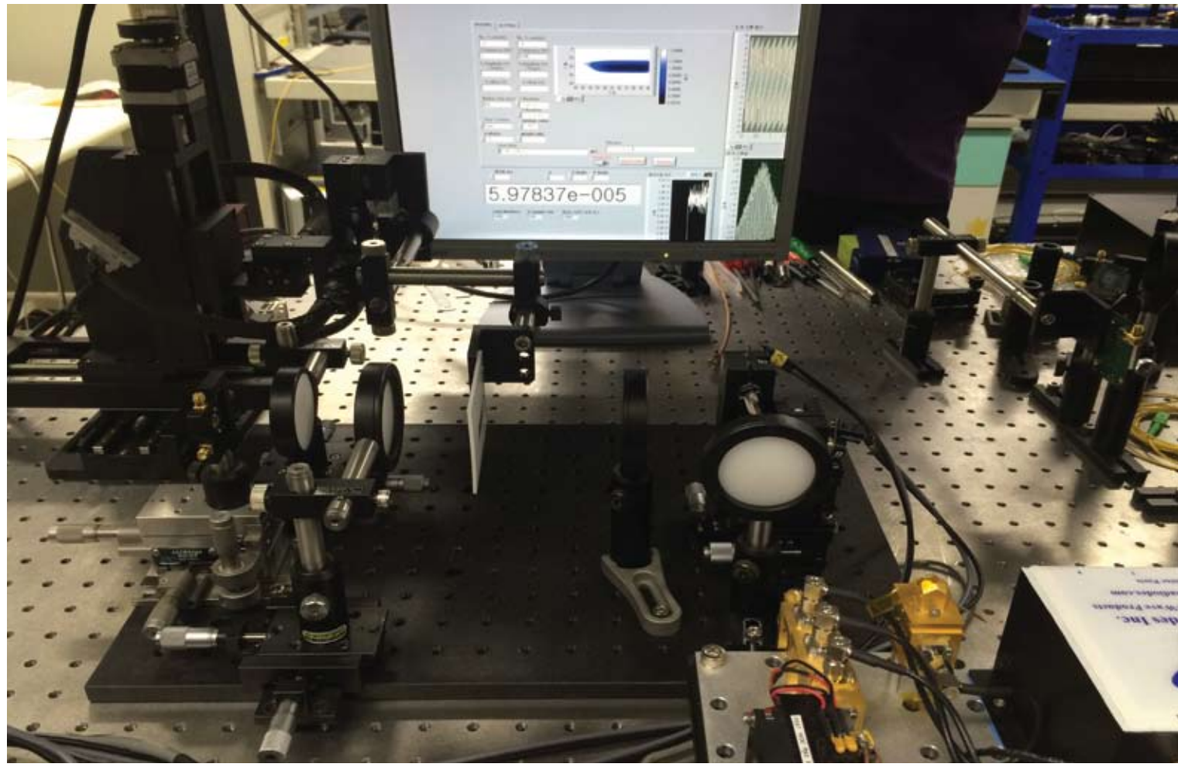


PROTOCOL ENGINEERING

The Protocol Engineering Center is ETRI's specialized group for ICT standardization. It overlooks the international standardization of ETRI's research development, standardization of public infrastructure for enhanced convenience, and the development of domestic and international standards not only for future technologies, but also for public services. Its major areas of research include IPTV/Smart TV, smart work, contents networking, overlay service networking, P2P, RFID/USN, M2M/IoT, Green ICT, Future Network, SDN, Mobile Web, Next Generation web, Cloud Computing, Mobile Telecommunications, Smart Grid, and so on. It also focuses on the regulatory aspects of national ICT standards to serve the general public.

CREATIVE GRAPHENE ELECTRONICS RESEARCH

The Graphene Electronics Creative Research Center is developing various electronic and optoelectronic devices using graphene, a dream nano-material. To carry out research on graphene electronic and optoelectronic devices, it is critical to be able to manufacture massive volumes of high quality graphene, and to secure the technology that enables the control of its properties. This center is developing a high-quality large-scale graphene growth technology through chemical synthesis, CVD growth method, graphene-based flexible devices, systems such as chemical and bio sensors, light emitting transistors, ultra high-speed transistors, logic devices, plasmonic optoelectronics, metamaterials, and transparent electrodes.



THz PHOTONICS CREATIVE RESEARCH

Recently, there have been active studies on the application of THz components to information and communications technology, security, biology, medicine, non-invasive testing, food and agricultural goods quality test, and environment monitoring. To exploit THz radiation in everyday life, small and cost-effective THz components and systems must be developed. If we adopt photonics technologies, we can benefit from using optical components, electronics components, measurement instruments, and measurement techniques developed for the photonics industries. We are developing THz components such as 1.3/1.55μm dual-mode laser diodes, broad band high-power photomixers, and high-sensitivity detectors, and THz systems such as THz spectrometers imagers, cost-effective THz thickness measurement systems, and tunable THz transceivers based on photonics technology to make portable THz systems a reality.

MIT CREATIVE RESEARCH

The Metal-Insulator Transition(MIT) is a topic for research interest in the condensed matter physics field. The MIT is produced by external parameters, such as temperature, pressure, light and electric or magnetic fields. The MIT Creative Research Center is focused on the MIT, the unsolved riddle of solid state physics, and is researching applied MIT technologies. MIT is also useful for applications in sensors, switches, and energy modules. An example of an application involves the discontinuity of transition in certain temperatures and as a result, it has opened doors for the development and commercialization of critical temperature switches. A MIT device-transistor combination device called the MITR is creating new applications and presently, research continues towards development of MIT-prone meta materials and MIT sensors.

TRANSPARENT TRANSDUCER AND UX CREATIVE RESEARCH

In modern technology, the value of the user interface is becoming more important than that of technology itself. Since it is expected that future electronic devices will require user interfaces enhancing user experience, the Transparent Transducer & UX Creative Research Center is studying innovative interfaces including intuitive interaction. Particularly, interfaces for future displays also need to be flexible and transparent.
The major research field of our lab is developing transparent actuators and sensors, and their applications for user interaction. In addition, our research center is managing a Pioneer Research Center for Reconfigurable Lens which mainly uses transparent electro-active polymer actuators.

NANO ELECTRON-SOURCE CREATIVE RESEARCH

The Nano Electron-Source Creative Research Center is focused on developing ultra-high density field emission electron-sources based on nanoscaled materials, for example, carbon nanotubes, graphene and nano wires. Specifically, we are developing a core technology of quantum-degenerate limit electron sources to overcome the technical limitation of conventional thermionic and cold cathode ones, and applying them to new-concept devices such as a super-miniaturized digital X-ray source, flat/parallel X-ray source, smart computed tomography or tomosynthesis system.

SYNAPSE DEVICES CREATIVE RESEARCH

The neuron is a key element in the brain distinguished by real-time information processing based on parallel architecture and adaptive learning capabilities and which can perform memory and processing functions in a unit cell. We are studying electro-optic materials, scalable devices, and adaptive integrated systems that resemble the biological synapse and spike firing property of a neuron. We are also developing real-time bi-directional interface technologies for connecting neuronal networks and hardware neural networks to establish plasticity-control technologies and to confirm the validity of a neuromorphic hardware neural network.

RESEARCH FIELDS

TECHNOLOGY COMMERCIALIZATION DIVISION

The Technology Commercialization Division's role is to promote and commercialize ETRI-developed technology. Serving as an innovative partner to SMEs(Small and Medium-Sized Enterprises), the Division plans and implements various kinds of support/promotion tech-biz programs. As the supervising cast of ETRI's '100, 10K, 100B Strategy' (Creating 100 technology-based startups, creating 10,000 jobs, and creating revenue of 100B Korean Won by 2017), the Division focuses on elevating and improving technology-commercialization practices that will eventually lead to job openings. To follow through with the said goals, the Division strives to operate a R&D commercialization-only track, perform research on technology commercialization and marketing practices, effectively manage a patent administration system, host a 1-on-1 supporting staff of technology and research specialists, and also support commercialization by providing various support programs to SMEs.

R&D COMMERCIALIZATION

The R&D Commercialization Center manages programs that allow accelerated market entries through commercialization and market research. The R&D Commercialization Program provides SMEs with support on commercializing early stages of research by creating additional R&D programs and dispatching ETRI personnel for fluid development transitions. As an integral part of technology commercialization, the Center strives to manage innovative programs that alert SMEs with up-to-date ETRI technologies, reflect needs and demands of SMEs to R&D planning, and build interagency networks and relationships.

INTELLECTUAL PROPERTY MANAGEMENT

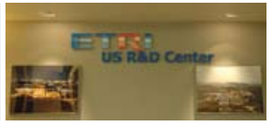
The Intellectual Property Management Department focuses on the preservation and commercialization of ETRI-developed intellectual property and its economic benefits through strategic means. Specifically, the Department performs TLO-led technology marketing, operation of and research for expediting commercialization, acquisition and management of IPR, contracting of acquired IP, legal action towards infringement of IPR, overseas licensing, and participating in the international standard patent pool. These activities allow ETRI to augment the economic value and productivity of the acquired patents, through which the Department actively seeks to increase licensing-revenue.

SMEs COOPERATION

The Cooperation Department supports ICT SMEs with the goal of leveraging the national economy and creating jobs. The Department implements a support strategy aimed towards(prospective) businesses, customized technical support services, provision of technology and experimental equipment support, on and offline mentoring services and subsequent commercialization support, Convergence Technology Research Commercialization Center(CTCC) infrastructure support, and technology commercialization using the Marblar Platform, among other services. The Department aims to create 100 startups, 10,000 jobs, and increase revenue by 1 trillion KRW with a strategy to reach 100 trillion by 2017.

OVERSEAS RESEARCH(ETRI BEIJING R&D CENTER, ETRI USA R&D CENTER)

The Overseas Research Centers facilitate local commercialization processes and also operate joint-research projects with domestic businesses. In order to fulfill these tasks, the R&D Centers perform market research to find the needs of local markets, seek-and-find promising local technologies, and utilize systematic technology marketing-based networks to expose these technologies. In addition, the Research Centers aim to strengthen relationships between overseas businesses and their respective related organizations and enhance marketing of ETRI-incorporated products in order to bolster joint-research, technology transferring, and joint-ventures.



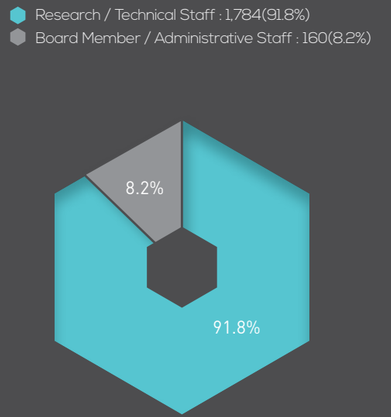
THE WORLD #1 IPR FACTORY

ETRI, which has been ranked #1 for 3 consecutive years in overall patent evaluation, is striving to contribute to the nation's competitiveness by securing international patent standards for technology and acquiring global markets in advance.
In the future, we promise to elevate our reputation as an IPR Factory, and lead the way in realizing the foundation for intellectual property in a creative economy.

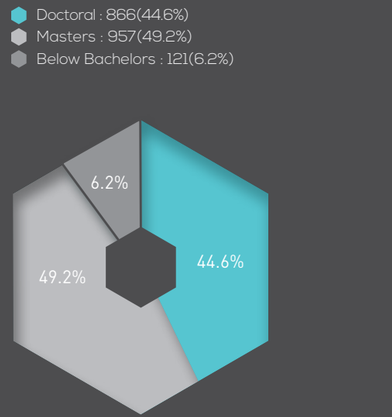
GENERAL STATUS

PERSONNEL STATUS

Total : 1,944(as of year 2013)



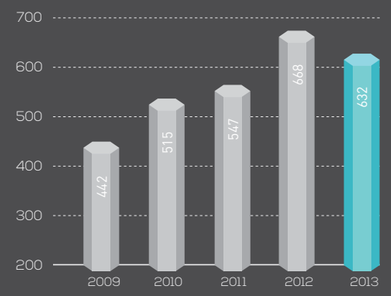
Type of Work



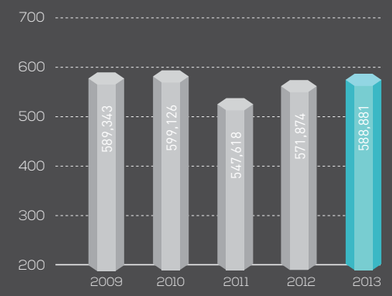
Status of Degree Holding

PROJECT STATUS

No. of Project / Budget : 2,804 Projects / 2 Trillion 8,968 hundred million won(Total of past 5 years)



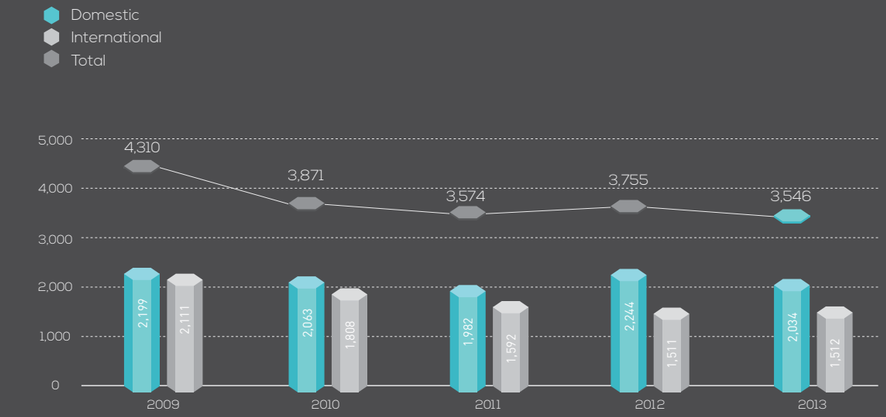
Number of Project(Unit : cases)



Budget(Unit : million won)

PATENT APPLICATION

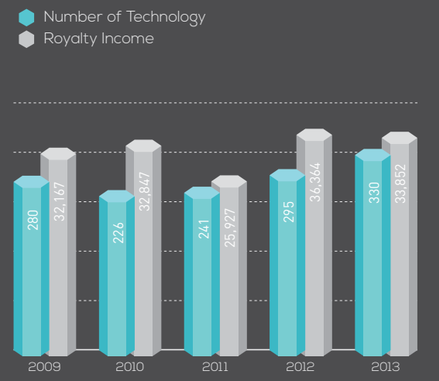
No. of Patent Application : 19,056 cases(Total of past 5 years)



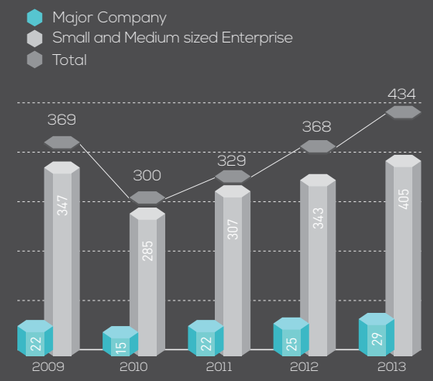
Patent Application(Unit : cases)

TECHNOLOGY TRANSFER

No. of Technology / Royalty Income : 1,372 cases / 1,612 hundred million won(Total of past 5 years)



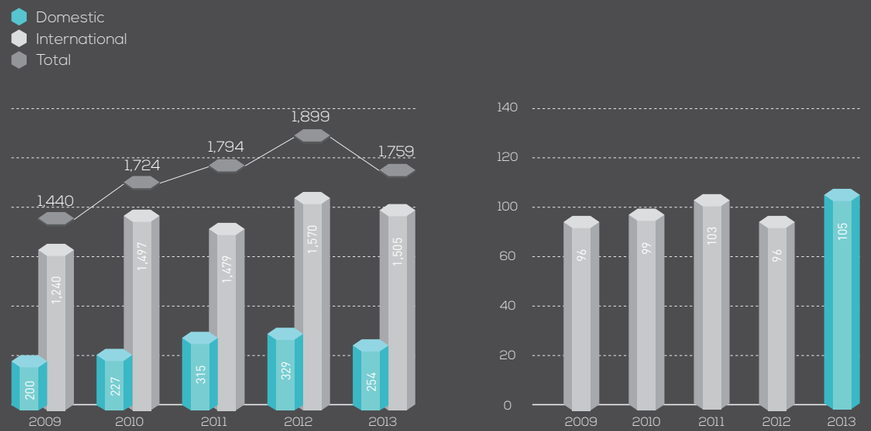
No. of Technology / Royalty Income
(Unit : cases, million won)



No. of Technology Transfer Companies
(Unit : cases)

STANDARDI -ZATION

No. of Standards Contributions Adopted / Standard Experts : 8,616 cases / 499(Total of past 5 years)

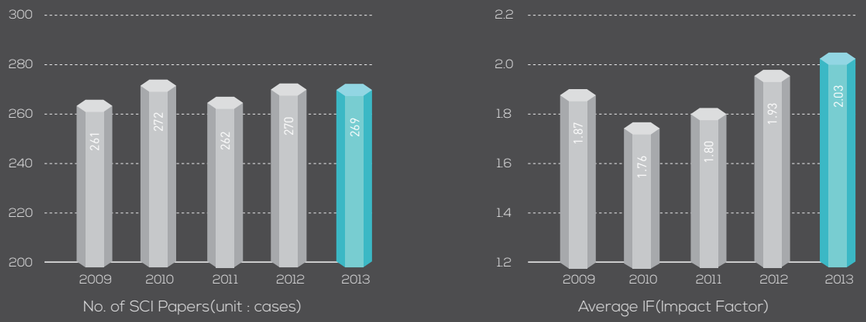


No. of Standards Contributions Adopted (unit : cases)

No. of Standard Experts (unit : person)

SCI PAPERS

No. of SCI Papers / Average IF : 1,334 cases(Total of past 5 years) / 1.90(Average)



No. of SCI Papers(unit : cases)

Average IF(Impact Factor)

STATUS AND PROGRESS OF COMPANIES ESTABLISHED BY ALUMNI

180 About — ALUMNI COMPANIES

12.7 Billion KRW — REVENUE

14.5 Billion KRW — TOTAL ASSETS

Companies : After the establishment of Sambo (Trigem) Computer in 1980 approximately 500 companies have been established

Initial Public Offering : 24 of ETRI Alumni Companies are listed [4 markets / 19 KOSDAQ / 1 KONEX- 'As of February 2014] Sambo (Trigem) Computer (Co.), Korea Telecom Data (Co.), ELEX Computer (Co.), Comtec Systems (Co.)

KOSDAQ : Handysoft (Co.), Apex (Co.), Seodu Inchip (Co.), Hyper Information and Communications (Co.), IT Telecom (Co.), Aralion (Co.), Gigatelecom (Co.), Kornic (Co.), Lightron (Co.), Innowireless (Co.), Havit Information (Co.), KL Tec (Co.), RF Semi (Co.), SNS Tech (Co.), NewGrid (Co.), ELK (Co.), Genesis Systems (Co.), KMAC (Co.), Secuve (Co.)

KONEX : Wiworld (Co.)

ETRI LABORATORY ENTERPRISE STATUS

21 — REGISTERED COMPANIES

15 — COMPANIES IN OPERATION

10 — SCHEDULED FOR REGISTRATION

Registered Companies : ETRI has set up 21 ETRI Companies through successful commercialization of research outcomes since 2007.

Companies in Operation : 15 ETRI Companies in Operation [As of February 2014]
BT Works (Co.), TEST MIDAS (Co.), 3D Nuri (Co.), Sogware (Co.), SmartQ Technologies (Co.), KCP (Co.), Sugentech (Co.), Aritel (Co.), Hojeonable (Co.), Imfact (Co.), New-run (Co.), Clouxen (Co.), Enlighting (Co.), Solid Link (Co.), MINDs (Co.)[OJ1] [OJ1]Confirmation required

Scheduled for Registration : 10 additional companies are expected to be added in 2014

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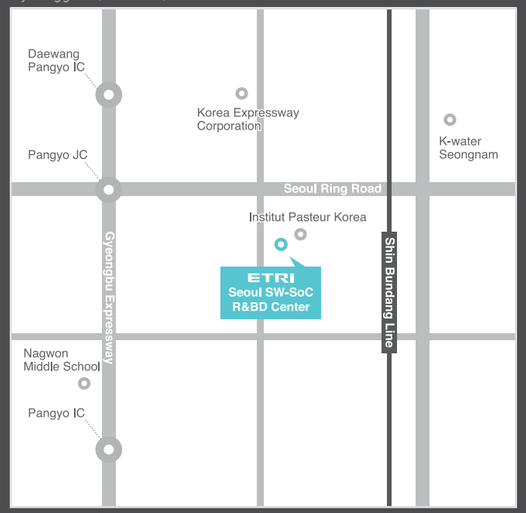

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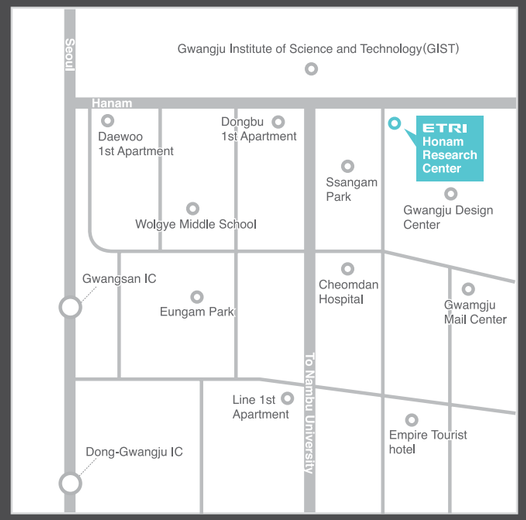

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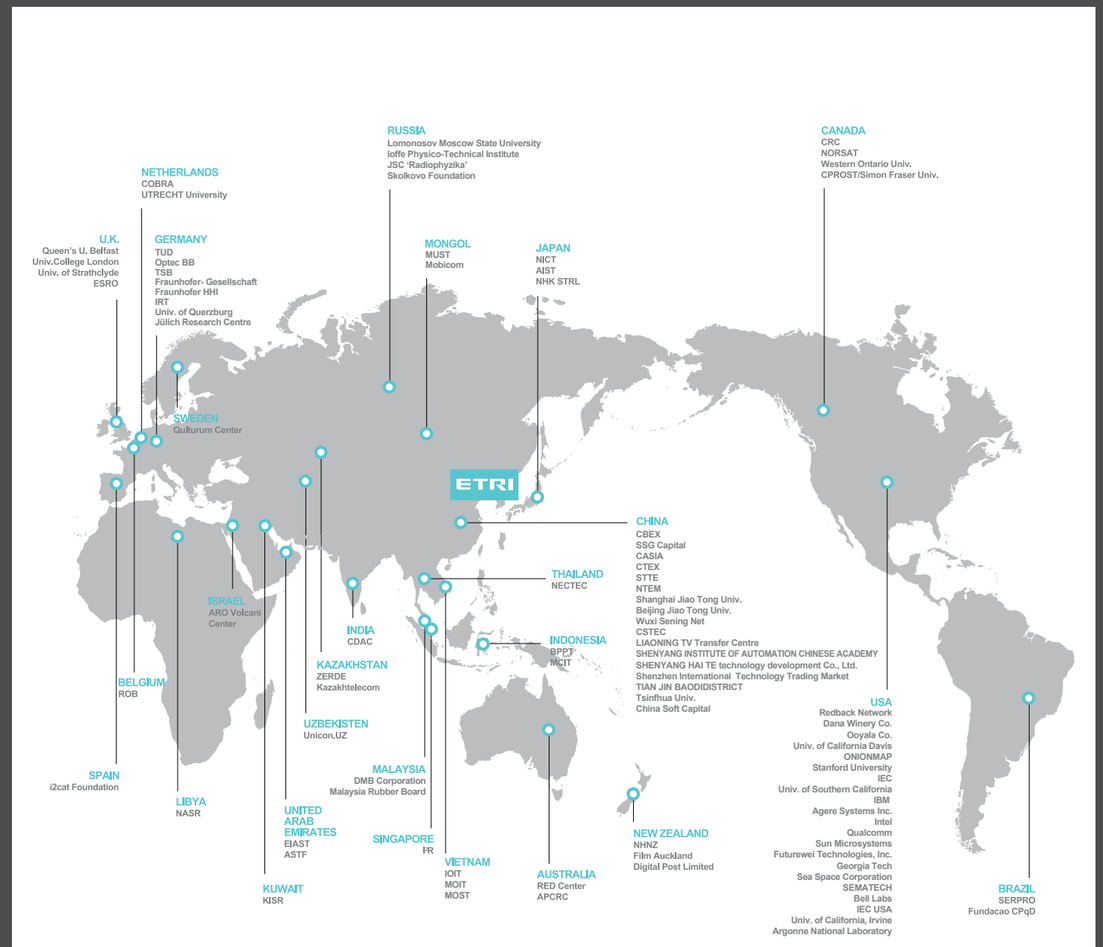
GLOBAL R&D COOPERATION NETWORK



27 countries / 93 organizations

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2014 ETRI TECHNOLOGY REPORT

Publisher . Heung-nam Kim
Publishing . ETRI(Electronics and Telecommunications Research Institute)
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Tel . +82-42-860-6114
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Design . Hongcommunications, Inc. www.hongcomm.com