DGIST

**DAEGU GYEONGBUK INSTITUTE
OF SCIENCE & TECHNOLOGY**

DGVíST

2025 DGIST GRADUATE SCHOOL ADMISSION GUIDE

Innovative University Changing World through Convergence

DGIST

E1

Daegu Gyeongbuk Institute of Science & Technology

DGIST

교원 피인용 7위

국내 통합 9위

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DGIST
Research
Infrastructure

I.

Research Infrastructure

Institute of Next-generation Semiconductor Convergence Technology

The best semiconductor research facilities at the university level in Korea

Material Analysis	Advanced Bio-analysis	Device Cleanroom	Machining Lab	Measurement & Simulation
MA **72**	AB **31**	DC **83**	ML **35**	MS **17**
Analysis of the microstructure and composition of materials	Bioimaging and advanced bioanalysis	Infrastructure for the fabrication of microdevices and research on nanomaterials	Multi-scale multidimensional machining infrastructure	Multi-scale multidimensional machining infrastructure

- Through the CMOS module process infrastructure that only three universities (Seoul National University, KAIST and DGIST) have, it is possible to conduct semiconductor material verification and analysis in a single process.

- Users can conveniently check equipment availability and make reservations online at any time.

- The institute provides regular equipment and facility usage education program for students.

Laboratory Animal Resource Center

Provision of ethical, systematic management and technical support for animal experiments

Mice 35,000	Rat 300	Guinea Pig 50	Rabbit 24	Mini Pig 10

- The center provides experimental support for research in life sciences as well as biomedical engineering.
- In 2019, the Ministry of Food and Drug Safety in Korea qualified the center as the very first Korea Excellent Laboratory Animal Facility in Daegu.
- Variety of facility education programs are offered for both internal and external users.

Supercomputing AI Education and Research Center

Pursuing the development of converged science and technology based on supercomputing and big data

- Students easily handle a lot of research materials for AI and information research with the supercomputing infrastructure, which is one of the best research centers in Korea
- The center supports local companies for the development of its research capability by providing supercomputing infrastructure

Office of University-Industry Cooperation

- The office establishes strategic cooperation with local industry and start-ups by providing research infrastructure and various education programs.

Korea Brain Research Institute (KBRI)

- The institute supports brain research through various research organizations, including the Brain Research Policy Center, which is a think tank for national brain research policies.
- Collaborative research projects with diverse brain research institutions overseas are conducted, building a hub-and-spoke relationship.

II.

Programs for International Students

Korean Language Class

- DGIST provides Korean language classes not only for international students, but also for other international members such as faculty, researchers, staff, and long-term visitors, as well as their families. Two different levels of classes, one for beginners and the other for post-beginners, are offered each semester. International students can take the courses after registration at DGIST, while other members and their families can audit the courses.

  ※ International students must take at least one Korean Language course to meet the requirements for graduation. Students who achieve TOPIK level 3 or higher, or receive recognition of their proficiency from the professor of the Korean Language course, may be exempted from taking the course.

  ※ Auditors can take the courses for free of charge, and textbooks are provided.

Buddy Program

- Before arrival in Korea, a DGIST enrolled student, known as a DGIST Buddy, will be paired with each new international student. The Buddy will assist the new student in adapting to life at DGIST by picking them up at the Dong-Daegu station, assisting with dormitory check-in, and being a friend for the semester.

Cultural Events

- The International Affairs Team provides cultural field trips to cultural and historical sites in Korea for all international members, aimed at enhancing their understanding of Korean business, culture, and history. These events are held once a semester, typically in May and October.

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Admission Guide

I.

Scholarships

There are no additional application processes for DGIST scholarship benefits. Once applicants are accepted into the graduate program, they will automatically receive benefits based on the type of scholarship they applied for.

Government Scholarship

Scholarships that cover all (or part) of a student's educational expenses funded by the Korean government

Coverage
Full tuition (3.84 million KRW per semester)

Stipend
· Master's: A minimum of 7.8 million KRW annually + additional incentives
· Doctoral: A minimum of 14.04 million KRW annually + additional incentives

Applicable Departments
All departments excluding Interdisciplinary Engineering

DGIST Scholarship

Scholarships that cover all (or part) of a student's educational expenses supported by funds established by DGIST

Coverage
–

Stipend
· Master's: A minimum of 15 million KRW annually + additional incentives
· Doctoral: A minimum of 22 million KRW annually + additional incentives

Applicable Departments
Interdisciplinary Engineering

General Scholarship

Scholarships that cover all (or part) of a student's educational expenses supported by domestic and international businesses, research and educational institutes

Coverage
–

Stipend
–

Applicable Departments
All departments excluding Interdisciplinary Engineering

※ The above information is subject to change depending on the academic year.
※ The amount of additional incentives will vary depending on students' research performance.
※ General Scholarship is available for applicants who wish to pursue graduate studies while working at a job (which supports their expenses).

II.
Admission Procedures

STEP 1. Online Application

- Online application link: DGIST International Graduate Admissions website (https://dgist.ac.kr/iadm/)
- Application Form and Statement of Purpose (SoP): uploaded on the online application as a single PDF file
- It is possible to revise the Application Form, SoP, and submitted documents at any time, after the application fee payment.

※ For the change of departments or degree courses applied on the application, please contact the Admissions Team.

STEP 2. Document Screening

- Evaluation of applicants' academic ability based on submitted documents in the online application, such as the academic transcripts, SoP and etc.
- The document screening results will be released on the International Graduate Admissions website.

STEP 3. Interview

- Only applicants who pass the document screening are selected as an interviewee.
- Interviewees will be guided for interviews by each department office via email.

※ For any details or enquiries regarding the interview, please contact a department office.

- Evaluation of applicants' fundamental knowledge of the field of study, enthusiasm for research, and communication skills, through individual (or group) interviews.
- An online interview will be conducted, if necessary.
- Interviews for international applicants will be conducted in English.

STEP 4. Final Results

- Final admissions decisions will be announced on the International Graduate Admissions website.

STEP 5. Online Registration

- Details about the online registration period and process will be provided along with the announcement of successful applicants.
- All admitted applicants must complete the online registration within the designated period to confirm the admissions.

III.

2025 Admission Guidelines

Admission Schedule

Procedures	2025 Spring			2025 Fall
	1st Round	2nd Round	3rd Round	
Online Application	'24. 6. 27.(Thu) ~ 7. 11.(Thu)	'24. 8. 29.(Thu) ~ 9. 12.(Thu)	'24. 11. 7.(Thu) ~ 11. 21.(Thu)	'25. 4. 17.(Thu) ~ 5. 1.(Thu)
Document Screening Results	'24. 7. 30.(Tue), 14:00	'24. 10. 8.(Tue), 14:00	'24. 12. 10.(Tue), 14:00	'25. 5. 20.(Tue), 14:00
Interview	'24. 8. 5.(Mon) ~ 8. 12.(Mon)	'24. 10. 14.(Mon) ~ 10. 21.(Mon)	'24. 12. 16.(Mon) ~ 12. 23.(Mon)	'25. 5. 26.(Mon) ~ 6. 2.(Mon)
Final Results	'24. 8. 26.(Mon), 14:00	'24. 11. 4.(Mon), 14:00	'25. 1. 13.(Mon), 14:00	'25. 6. 16.(Mon), 14:00

※ Spring: March ~ June / Fall: September ~ December
※ All dates are based on Korean Standard Time (KST).
※ The above information is subject to change depending on the academic year.

Departments and Programs

Department	Major	Available Scholarship	Available Program
Physics and Chemistry			
Electrical Engineering and Computer Science			
Robotics and Mechatronics Engineering			
Energy Science and Engineering		Government General	Master's Doctoral Integrated MS & Ph.D.
Brain Sciences			
New Biology			
Interdisciplinary Studies	Artificial Intelligence		
	Interdisciplinary Engineering	DGIST	

※ Applicants to the Integrated MS & Ph.D. program may be considered for admission to the Master's program depending on the department's assessment.
※ All classes of DGIST Graduate School are delivered in English language.

Eligibility

Semester		Course	Eligibility
2025	Spring	Master's	Applicants who have acquired or are expected to acquire a Bachelor's degree by February 2025
		Integrated MS & Ph.D.	
		Doctoral	Applicants who have acquired or are expected to acquire a Master's degree by February 2025
	Fall	Master's	Applicants who have acquired or are expected to acquire a Bachelor's degree by August 2025
		Integrated MS & Ph.D.	
		Doctoral	Applicants who have acquired or are expected to acquire a Bachelor's degree by August 2025

Required Documents

Compulsory	① Application Form	• Must be filled out on the online application website. • Must be written in Korean or English language. • Interdisciplinary Engineering It is necessary to contact a faculty member in the field of interest before submitting the online application. • Robotics and Mechatronics Engineering ※ Ph.D. applicants only - It is necessary to contact a faculty member in the field of interest before submitting the online application.
	② Statement of Purpose (SoP)	- It is necessary to state the name of lab you wish to join on the Statement of Purpose (SoP). • Electrical Engineering and Computer Science It is necessary to mention one to three research areas that you are interested in, on the SoP.
	③ (Expected) Graduation Certificate	• Both Graduation Certificate and Official Transcripts must be in ENGLISH or accompanied by a NOTARIZED ENGLISH TRANSLATION, and uploaded through the online application. • Both Graduation Certificate and Official Transcripts must be NOTARIZED BY the KOREAN CONSULATE in your country or APOSTILLED. • While an Expected Graduation Certificate is acceptable, it is mandatory to submit the Graduation Certificate before the admission date. ※ Applicants who attended or graduate from schools in China must submit Verification Report on Education and Degree issued by the Chinese Ministry of Education (CHSI - 学信网)

	④ Academic Transcripts	• Master's and Integrated applicants
		  - Undergraduate Graduation Certificate
		  - Undergraduate Academic Transcripts
		• Doctoral applicants
		  - Both Undergraduate and Graduate Graduation Certificate
		  - Both Undergraduate and Graduate Academic Transcripts
		• New Biology Include your class rank in Academic Transcripts (if possible)

Optional	⑤ English Proficiency Certificate	• New Biology Interdisciplinary Engineering Mandatory to submit English language test report
		  – New Biology Certificate available from the last 4 years before the application deadline
		  – Interdisciplinary Engineering Certificate available from the last 2 years before the application deadline
		※ Optional for applicants except for those applying to New Biology and Interdisciplinary Engineering
		• Only official certificates are accepted (TOEIC, TOEFL IBT, TOEFL CBT, TOEFL PBT, IELTS, TEPS and etc.)
		• No minimum score required
		• Exemption
		  – Applicants who have completed their degree program in the majority native English speaking countries
		  Antigua and Barbuda, Australia, The Bahamas, Barbados, Belize, Canada, Dominica, Grenada, Guyana, Ireland, Jamaica, Malta, New Zealand, St Kitts and Nevis, St Vincent and the Grenadines, Trinidad and Tobago, United Kingdom, United States
		  – Applicants who have completed their degree program in the countries where English is the official language
		  – Applicants who have been admitted to DGIST Graduate School before

	⑥ Certificate of Employment	• Compulsory for General Scholarship applicants • The designated form is available on the DGIST Graduate Admissions website.
	⑦ Letter of Recommendation	• Submitted directly by the evaluator (to admission@dgist.ac.kr) • Written on the prescribed form (available on the DGIST Graduate Admissions website) • No limitation of the number of recommendation letters • Must be written in Korean or English language.
	⑧ Other Certificates	• Any other certificates demonstrating the competencies and potential

Document Notarization

Apostille Certification
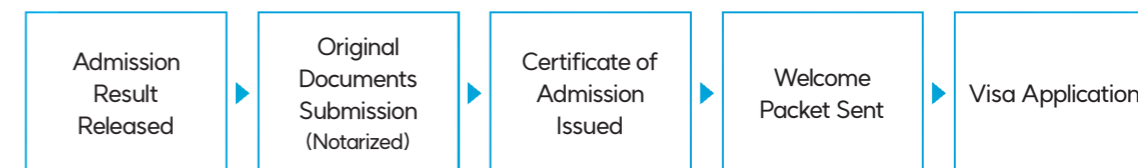• Official public documents (from state or public schools)

Documents Issued from School	▶	Visit Apostille Issuing Organization	▶	Request Apostille Certificate	▶	Assessment by Apostille Issuing Organization	▶	Apostille Issued

• Private documents (from private schools)

Documents Issued from School	▶	Document Notarization	▶	Visit Apostille Issuing Organization	▶	Request Apostille Certificate	▶	Assessment by Apostille Issuing Organization	▶	Apostille Issued

Consular Authentication
• Korean Embassy and Consulate in the country where the university (or college) is located in

Visa Issuance

Admission Result Released	▶	Original Documents Submission (Notarized)	▶	Certificate of Admission Issued	▶	Welcome Packet Sent	▶	Visa Application

① Admission results are released on DGIST International Graduate Admissions website.
② Submit the original copies of Graduation Certificate and Academic Transcripts (consular notarized or apostilled) to DGIST Admissions Team.
③ Certificate of Admission (CoA) issued by DGIST Admissions Team.
④ Receive your CoA via email and the Welcome Packet via post.
⑤ Apply for a visa at the Korean consulate and embassy in your country.

Notes

• Original copies of your Graduation Certificate and Academic Transcripts with consular notarization (or apostille) must be submitted via international post to DGIST Admissions Team.
• Proof of postage (e.g. DHL invoice, etc.) must be emailed to the DGIST Admissions Team.
• Original copy of CoA is also sent to students by post as a part of Welcome Packet including Scholarship Letter and Business Registration Certificate.
• As required documents for visa issuance will be sent as scanned copies via email, it is recommended to apply for a visa with the provided soft copies. (However, please note that some countries may require original copies, so it's necessary to check this with the consulate in advance)
• Contact the Korean consulate in your country for general enquiries regarding visa issuance.

Important Notes

Application	• The application form and Statement of Purpose (SoP) must be submitted through the online application portal (UwayApply). • The accessible link to the online application will be announced on DGIST International Graduate Admissions website (https://dgist.ac.kr/iadm/). • Please ensure that all required documents are successfully uploaded to the online application. Missing documents may result in the failure of document screening process.

Documentation	· All required documents must be written in English.
	· All required documents, except for the application form and SoP, must be combined into a single PDF file, and uploaded to the online application before the due date.
	· Once documents are submitted to the Admissions Team, they will not be returned under any circumstances.
	· If any submitted documents are found to contain false information, the applicant's admission will be canceled.
	· Applicants who attended or graduate from schools in China must submit Verification Report on Education and Degree issued by the Chinese Ministry of Education. (CHSI – 学信网)
	  – Organization: 教育部学生服务与素质发展中心
	  – Website: http://www.chsi.com.cn

Etc.	· Applicants are fully responsible for any disadvantages resulting from errors or omissions in the provided information. · The results for each stage of the graduate admission process are released on the DGIST International Graduate Admissions website. It is the responsibility of the applicant to check the results. · If an admitted applicant is unable to graduate from their previous school by the enrollment date, which is the starting date of the semester, their admission will be canceled.

FAQ

Q.1

Is it possible to view the application form, Statement of Purpose (SoP), or recommendation letter before submitting the online application?

The forms are available in the Archive section of DGIST International Graduate Admissions website (https://dgist.ac.kr/iadm/). However, applicants are required to submit the application form and Statement of Purpose (SoP) through the online application portal (UwayApply) for admission. Also, the recommendation letter must be submitted directly by the evaluator and within the online application period.

Q.2

If I am unable to submit a graduation certificate for the online application, what alternatives are available?

A certificate of enrollment can temporarily replace the graduation certificate for the online application, but the graduation certificate must be submitted after admission to DGIST.

Q.3

What shoud I do if my transcript does not include the grades of my last semester which I am currently in?

You can submit the most recent transcript, which should include the grades for all courses completed before your last semester.

Q.4

Are documents in languages other than English acceptable for the online application?

No, DGIST only accepts documents written in English. However, if your institution is unable to issue documents in English due to its policy, you may submit them in Korean instead.

Q.5

Does DGIST limit the number of students admitted for each Spring 1st, 2nd, 3rd, and Fall term?

There is no specific limitation or quota for the number of admitted students for each admission period. However, if the total number of students exceeds the maximum capacity for the academic year, we may close admission for Spring 2nd, 3rd, or Fall term.

Q.6

Are there any minimum academic eligibility requirements for graduate admission?

There are no specific minimum requirements for academic eligibility for graduate admission. Even if your undergraduate (or graduate) major differs from the one you are applying for, your diverse background can be an advantage for convergence research.

Q.7

Is it necessary to contact a faculty member in the field of my interest before applying?

It is not mandatory, but recommended to reach out to a faculty member in your field of interest to inquire about the capacity of the lab and the possibility of conducting research of your interest in advance. You can find information about each lab on DGIST International Graduate Admissions website.

Contact

E. admission@dgist.ac.kr
T. +82 53-785-5143(5146)
A. 333, Techno jungang-daero, Hyeonpung-eup, Dalseong-gun, Daegu, 42988, Republic of Korea

03

Departments and Majors

I.
Physics and Chemistry

T. 053-785-6503
E. physchem@dgist.ac.kr
https://physchem.dgist.ac.kr

PHYSCHEM

Mankind has innovated through the ages through endless development of new materials, both simple and complex, rather than rely solely on materials that exist naturally in the environment. Materialsciences are a backbone of human history as well as contemporary scienceandtechnology. The Department of Physics and Chemistry at DGIST seeks to contribute to the lives of future humanity by drawing on knowledge in chemistry and physics to develop new materials for the benefit of all of humanity. In particular, the department is a leader in technology-intensivematerial sciences through convergence of chemistry, physics, materials and biosciences. producing the nanomaterials, functional materials, biomaterials, extreme materials and new drugmaterials that a high added value industry needs. Technological trends and lead the progresses of modern materials science, as well as to foster global leaders, to define the future technologies.

Vision
- Research in contemporary physics and chemistry for new materials development
- Fostering creative talent
- Global leadership in research

Key areas of research
- Quantum materials and devices, spintronics materials and devices, bio-friendly flexible materials, next-generation semiconductor materials, nanobio convergence materials and devices, energy materials
- Organic and inorganic hybrid materials, next-generation catalysts, asymmetric organic synthesis, cellular biology, biomass, biomimetic materials
- Machine learning-based materials research, ultrafast spectroscopy research

Career paths
- Government-funded and corporate research institutes : Korea Research Institute of Chemical Technology, Korea Research Institute of Standards and Science, Korea Institute of Energy Research, Korea Advanced Institute of Science and Technology, Electronics and Telecommunications Research Institute, Korea Research Institute of Bioscience & Biotechnology, etc
- Post-doctoral research: Labs in Korea, the U.S.and overseas Kolmar, etc.)
- Machine learning-based materials research, ultrafast spectroscopy research

The interview process
- Inquiry into basic and applied knowledge in physics and chemistry, basic knowledgeand character as a student of science, and future vision
- Oral presentation : Applicants for masters and combined masters & PhD programs are required to give a presentation on their understanding of important concepts acquiredduring bachelor's studies(English Powerpoint presentation, not exceeding 7minutes). Applicants for PhD programs are required to present their masters research anddoctoral research plans (English Powerpoint presentation, not exceeding 10 minutes)
- Applicants residing abroad and unable to present in person maybe inte viewed remotely

What topics are studied in the Department of Physics and Chemistry?

Physics and Chemistry are essential and breakthrough fields in the semiconductor and AI era.

In today's society, where Information (AI) and material (semiconductor) technology are highly valued, the role of chemistry and physics is to lead innovation and integration in these two fields. By learning basic theories and experimental techniques related to materials and energy, and conducting research on the latest material design, nanotechnology, semiconductor technology, biochemistry, and the environment, chemistry and physucs plays an Important role in producing and storing new information. This specialized knowledge and skills are essential in the AI field, along with semiconductor technology, and are utilized in various fields. By conducting creative and innovative research in these fields, Physics and Chemistry students can grow into the future leaders who will lead the world.

As experts in cutting-edge research facilities and future convergent talents.

Department of physics and chemistry provides the best environment for learning and research, as well as the technology and equipment that will be used in actual research and industry. Through this, students can learn the experience and skills needed to solve problems based on theoretical knowledge. In particular, research is being conducted in a wide range of fields such as chemistry, physics, engineering, and life science, allowing students to choose their areas of interest to conduct research. Through this research environment, our students can develop creativity, problem-solving skills required in the field, and practical skills.

What do students study in the Department of Physics and Chemistry?

The Department of Physics and Chemistry deals with convergence sciences, harmonizing the basic sciences, investigating the basic characteristics of matter through chemistry and physics, with applied sciences. Our academics are oriented toward cuttingedge convergence science encompassing physics, chemistry, biology and material sciences, and students explore new materials, biomaterials, nanomaterials, functional materials, flexible materials and other core areas important to progress in state-of-the-art sciences and industry.

What areas do students need to major in, and which courses must be completed to be eligible to apply for graduate studies in the Department of Physics and Chemistry?

The Department of Physics and Chemistry is involved in multidisciplinary convergence with a foundation in chemistry and physics. We encourage students holding degrees not only in chemistry and physics but also other natural and engineering sciences to apply. Any applicants with fundamental knowledge in general chemistry and physics and an interest in graduate level re search may apply: Completion of chemistry and physics courses is preferred but not mandatory. Applicants accepted into our programs can consult with our faculty, with broad expertise across a variety of academic fields, to decide their area of study.

What career opportunities are there for graduates of the Department of Physics and Chemistry?

Graduates holding advanced degrees from the Department of Physics and Chemistry may become professors or researchers at universities in Korea and abroad, or find employment in government-funded research institutes(Korea Research Institute of Chemical Technology and the Korea Research Institute of Standards and Science, etc.), private firms (Samsung Electronics, LG Electronics, SK Hynix, etc.), and public corporations. DGIST also operates a student-initiated research and entrepreneurship program with support from local government, further diversifying graduates career options.

I'd like to know more about the labs at the Department of Physics and Chemistry.

Prof. Joongoo Kang
Chemical physics/machine learning/materials design
Computational Materials Theory Lab
- Chemical physics
- Materials research at the intersection of physics, chemistry, and computational science
- First principles(Density functional theory, DFT) modeling of real materials
- Machine learning/materials design
- New materials through high-throughput screening and machine learning
- Materials design fo energy and information applications

Prof. Seong Kyun Kim
Inorganic Chemistry/Catalytic Chemistry/ Energy&Environmental Materials
Sustainable Chemistry Lab
- Catalytic Chemistry
- Biomass, Waste Polymer Conversion Catalysts
- Energy & Environmental Materials
- Solar Desalination Materials / – Atmospheric Water Harvesting Materials
- Sustainable Materials from Biomass Conversion

Prof. Soyeun Kim
Strongly Correlated Quantum Materials/Ultrafast·Infrared Spectroscopy
Correlated Matter Spectroscopy Lab
- Emergent phases in strongly correlated materials
- Phase transition mechanism / – Quasiparticle investigation
- Non-equilibrium and Equilibrium Optical Spectroscopy
- Optical and electronic properties of quantum materials
- Low-energy (infrared, terahertz) electrodynamics
- Time-resolved polarimetry/reflectivity/scattering measurement

Prof. Aaram J. Kim
Computational Quantum Many-Body Physics
Quantum Many-Body Theory Group
- Developing computational algorithms for strongly-correlated systems
- Diagrammatic Monte Carlo method / – Dynamical mean-field Theory
- Emergent phenomena of strongly correlated systems
- Model study of experimentally measurable response functions
- Symmetry-breaking including superconductivity magnetism, and so on

Prof. Youngwook Kim
Quantum Hall Effect/Topological Quantum Computing/Quantum Circuit
Topological Quantum Device
- Quantum Hall Effect
- Dissipation less quantized current in two dimensional materials
- Topological Quantum Computing/Quantum Circuit
- Build quantum circuit including topological quantum gate based on anyon

Prof. Jong Goo Kim
Reaction Mechanism/Protein Structural Dynamics/Time-resolved X-ray Scattering
Reaction Mechanism & Structural Dynamics Lab
- Reaction Mechanism Study
- Revealing reaction mechanism by visualization of real-time structural changes of molecules
- Investigating transition states of reactions by tracking the wavepacket motion in the femtosecond region
- Protein Structural Dynamics
- Investigating the kinetics and three-dimensional intermediate structures of protein-involved reactions
- Elucidating reaction mechanisms of biological reactions using machine learning techniques

Prof. CheolGi Kim
Spintronics Devices/Bio-NEMS & MEMS/Sensors
Emerging materials science and multifunctional devices
- Novel spintronics devices / – Innovative 3D field sensors
- Bio-NEMS/MEMS / – Bio-initiative magnetic devic

Prof. Hye Won Moon
Inorganic Synthesis/Main Group Chemistry/Organometallic Chemistry
Molecular Inorganic Synthesis and Catalysis Lab
- Molecular organometallic catalyst development
- New ligand design and synthesis / – Spectroscopic and crystallographic studies
- Reactivity studies and reaction development
- Small molecule activation and reduction
- Coordination chemistry of main group complexes
- Main group (electro) catalysis development

Prof. Keeseong Park
Quantum Materials
Novel Quantum Materials Lab
- Superconductors and Magnetic Materials / – Topological Materials
- Single Crystal Synthesis / – Low Temperature Physics

Prof. Jinhee Park
Organic-Inorganic Hybrid Materials
Organic-Inorganic Hybrids Lab
- Functional Metal-Organic Frameworks/Polyhedra/Aerogels
- Inorganic/organic/supramolecular chemistry-based synthesis
- Development of stimuli-responsive smart materials
- Studies of porous structures and functionalities
- Energy and environmental applications: (photo)catalysis, sensing, and sorption

Prof. Daeha Seo
Nano-chemistry/Bio-physics/Cell biology
SMALL Lab
- Nanochemistry
- Synthesis and design of nanoparticles / – Single catalysis study
- Diagnosis and therapeutic research using nanoparticles
- Biophysics
- Single molecule/cell imaging, tracking, and AI analysis
- Biomolecular mechanism research through movie of cell signaling
- Diagnosis of diseases through physical parameters

Prof. Sangwon Seo
Organic Chemistry/Organometallic Chemistry/Catalysis
Chemical Design & Sustainable Catalysis
- Chemical Design
- Reaction development through design of new chemicals
- Base Metal Catalysis
- Design of new catalytic systems based on cheap base metals
- Mechanistic investigations using computational chemistry
- Biocatalysis
- Development of new chemoenzymatic catalysis

Prof. Jungpil Seo
Quantum Physics/Topological Matters/Future Semiconductors
Nanospm Lab
- Quantum Physics
- Scanning Tunneling Microscopy / – Quantum Microscopy
- Topological Matters/Semiconductors
- Dirac Materials / – Superconducting Heterostructures / – 2D Semiconductors

Prof. Jooyoung Sung
Time & Space-resolved Spectroscopy/Next Generation Energy Materials /Photophysical Dynamics
FemtoLab for Advanced Energy Materials
- Time and Space-resolvedS pectroscopy
- Investigation on photophysical properties of next generation energy materials by fs-transient absorption/reflection microscopy
- Next Generation Energy Materials/Photophysical Dynamics
- Charge carrier dynamics and photophysics of perovksites
- Charge carrier dynamics and photophysics of quantum dots
- Charge carrier dynamics and photophysics of two-dimensional semiconductors

Prof. Chun-Yeol You
Spintronics/Magnetism
Spin Phenomena Information Nano-devices Lab
- Spintronics and emerging magnetic materials
- Spin nano devices for the next generation semi-conductor applications.
- Non-volatility and ultra-fast devices
- High density and low power consumption memory devices
- Emerging spin phenomena and materials properties
- Close relationship with INST and Sensorium at DGIST.

Prof. Sunggi Lee
Organic Synthesis/Reaction and Catalyst Development
Organic Synthesis and Catalysis Lab
- Organic Synthesis / – Reaction and Catalyst Development / – Material Development

Prof. Sungwon Lee
Flexible electronics/Bio Sensors/Bio compatible device
Bio-harmonized device Lab
- Flexible electronics
- Development of extremely flexible & stretchable devices using hybrid materials.
- Bio sensors/Bioc ompatible devices
- Sweat & Air permeable device fabrication for extremely bio compatible electronics
- Skin attachable bio sensors for long term health monitoring
- Development of implantable materials and devices.

Prof. Shinbuhm Lee
Semiconductor/Energy/Sensor/Film/Nanostructure
Semiconductor Energy Sensor Lab
- Intelligent information technology
- Semiconductors for artificial intelligence system, Quantum computing display, automobile
- New energy industry
- Hydrogen economy, Transparent solar cell, All-solid-state nanobattery
- Bio-health
- Healthcare sensor, Medical material

Prof. JaeDong Lee
Condensed Matter Physics Theory/Ultrafast Dynamics
Light and Matter Theory Lab
- Theoretical Condensed Matter Physics
- Ultrafast Dynamics and Optics
- Nonequilibrium Phenomena

Prof. Nak Cheon Jeong
Inorganic Chemistry/Supramolecular Chemistry/ Metal-Organic Framework(MOF)/Conducting materials
NC Laboratory of Advanced Inorganic Materials Chemistry
- Hybrid Organic-Inorganic Supramolecular Materials
- Synthesis of Supramolecular Materials
- Catalytic Activity Studies of Supramolecular Materials
- Research on Atmospheric Water Harvesting and Production
- Inorganic Materials
- Studies on Ionic Conductivity and Electrical Conductivity
- Research on Electron Transfer Reactions
- Investigation of Novel Chemical Bonds in Nanoscale Environments

Prof. Byunghyuck Jung
Organic Synthesis/Asymmetric Catalysts/ Natural Products and Drug Synthesis
Asymmetric Organic Synthesis and Drug Synthesis Lab
- Organic Synthesis
- Synthetic Studies of Novel C-C Bond Formation
- Asymmetric Catalysts
- Transition Metal-Catalyzed Asymmetric Synthesis
- Organocatalytic Asymmetric Synthesis
- Natural Products and Drug Synthesis

Prof. Chang-Hee Cho
Semiconductors/Nanophotonics/Quantum Information Devices
Future Semiconductor Nanophotonics Lab
- Semiconductor Optics
- Physics of Excitons and Polaritons / – 2D/Perovskite Semiconductors
- Quantum Information Devices
- Polaritonic Devices for Quantum Information Processing

Prof. Seonki Hong
Organic/Polymeric Biomaterials
Bioinspired Organic Materials Lab
- Nature-inspired Emerging Materials
- Polyphenol-based adhesive organic/polymeric materials
- Materials for biomedical applications
- Nanomaterials for disease diagnosis and therapy
- Surface biofunctionalization /- Tissue-adhesive hydrogels, soft materials

Prof. Jung-Il Hong
Spintronics/Magnetism/Nano Materials
Spin Nanotech Lab
- Nature-inspired Emerging Materials
- Electric and magnetic properties of nanomaterial.
- Spintronics / – Thin films of metal, semiconductor, and oxide materials

Faculty

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Career& Major achievements. Postdoctoral Researcher, University of Pennsylvania | Visiting Professor, POSTECH

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Degree. Ph.D., KAIST
Research interests. Synthetic Nanochemistry | Biophysics | Cell Biology
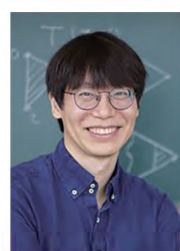Career& Major achievements. Postdoctoral Researcher in U.C.San Francisco | U.C.Berkeley | LBNL

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Research interests. Strongly Correlated Systems | Computational Many-Body Aigorithm
Career& Major achievements. Postdoctoral Researcher in University of Fribourg | King's College London | Goethe University

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Research interests. Novel magentic material | NEMS/MEMS devices | NanobbEn neerings
Career& Major achievements. Professor at Chungnam Natbnal University | Invited professor at Tohoku University & McMaster University | Director, Center of NanoBioEngineering & Spintronics

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Career& Major achievements. Postdoctoral researcher at Max-Planck-Institut für Kohlenforschung

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Degree. Ph.D., University of Texas at Austin
Research interests. Inorganic synthesis / Main group chemistry / Organometallic chemistry
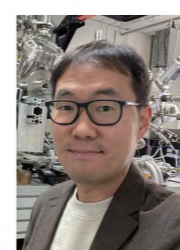Career& Major achievements. Postdoctoral researcher at Max-Planck-Institut für Kohlenforschung

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Career& Major achievements. Postdoctoral Researcher at Cavendish Laboratory, University of Cambridge, UK | Postdoctoral Researcher at University of Oxford, UK

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Career& Major achievements. Postdoctoral Researcher in Max-Planck-Institut | Postdoctoral

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Career& Major achievements. Postdoctoral Researcher in the University of Tokyo, Japan

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Career& Major achievements. Postdoctoral Researcher in University of Cambridge (UK) and Oak Ridge National Laboratory(US)

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Career& Major achievements. Postdoctoral Fellow at Northwestern University

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Career& Major achievements. Postdoctoral researcher in Massachusetts General Hospital | Harvard Medical School
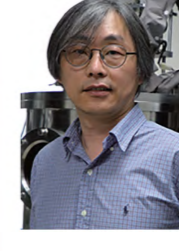
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Research interests. Electric and magnetic properties of nanomaterial systems
Career& Major achievements. Georgia Tech Research Faculty | CMRR(in Univ. of Cal.–SanDiego) Researcher | RPIABB Postdoctoral fellow

Interview

Dr. Yu Hyeon-Hye
Research Engineer,
LG Display

There are many opportunities to conduct various exchanges and collaborative research between laboratories.

Q. Welcome. Please introduce yourself.

Hello. My name is Yu Hyeon-Hye, and I received my doctoral degree from the Department of Physics and Chemistry at DGIST. My advisor was professor Kim Chil-Min (Retired, Chair Professor in School of Undergraduate Studies, DGIST). My area of research was non-hermitian physics in 2-dimensional micro-laser resonance mode dynamics, and am currently an OLED optics research engineer in a lab under the CTO at LG Display.

Q. What were your reasons for choosing the DGIST graduate school, and your department and lab here?

I majored physics as an undergraduate and chose to continue graduate-level studies to pursue my interest in optics. Research in optics generally involves experiments exploring the interactions between light and matter. I was drawn to the fact that I could engage in both experimental and theoretical research in my lab. In particular, I was able to encounter computing science while carrying out theory-based optics simulation research. Convergence is the motto of DGIST, and there are ample opportunities for cross-lab exchange and cooperative research. I appreciated the opportunity to explore and choose from a broad range of research areas.

Q. Please tell us about your area of research and research goals.

My lab is engaged in theoretical research on the nonhermitian characteristics apparent in resonance mode dynamics of 2-dimensional micro-scale resonators and quantum chaos phenomena in closed resonators (hermitian systems). Based on this research, we are developing extremely high-sensitivity bio-chemical sensors based on ultra-high Q-factor micro-lasers or lasers with exceptional points apparent in non-hermitian systems.

Q. Please tell us in detail about your career path after graduating from DGIST.

After graduating I sought career paths related to my research experience in optical simulation. I am currently in charge of OLED optic simulations at LG Display. Specifically, I am responsible for proposing and examining high optical extraction efficiency structures through wave and ray optical simulations in the structure between OLED elements and substrates. My research experience as a doctoral candidate was immensely helpful not only in my determining and adapting to my work responsibilities, and in taking on opportunities to engage in more indepth and interesting work.

Q. What sets DGIST apart from other universities?

DGIST affords students more opportunities to develop expertise in their areas of study and has a great research environment. Students also have access to various measuring equipment and well-equipped and well-staffed fabs. No tuition burden means students can focus solely on academics. There is a liberal atmosphere of exchange among labs, in which students can engage other students involved in other fields of research to broaden their horizons.

Q. Any words of advice to would-be DGIST graduates?

If you have an interest in academics and want to accumulate research experience, I strongly recommend graduate school. In graduate school, one learns how to carry out research in a proactive and self-initiated manner. Honing your professional skills in graduate schools will be helpful in choosing a career path that is right for you, and for adapting to your work environment. Making the most out of the methodologies available to you as you carry out your research – simulation tools and experimental/measuring equipment, for example – will increase your employment or further study opportunities after you receive your degree.

Dr. Song Sang-Yong
Post-doctoral researcher,
Oak Ridge National Laboratory, U.S.

The research facilities are excellent and the joint research facilities are easy to use.

Q. Welcome. Please introduce yourself.

Hello, I am Song Sang-Yong, a graduate of the combined masters-PhD program in the Department of Physics and Chemistry at DGIST. I studied in Professor Seo Jungpil's laboratory. As a graduate, I used scanning tunneling microscopy to carry out research on superconducting phenomena. I am currently a post-doctoral researcher at the Oak Ridge National Laboratory in the United States, engaged in high-temperature and topological superconducting phenomena research.

Q. What were your reasons for choosing the DGIST graduate school, and your department and lab here?

I first considered graduate school when discovering that quantum phenomena work in a manner different from that of the macroscopic world our eyes see. I wanted to explore the area myself. Tuition would have been a major hurdle, but at DGIST there is no tuition, and a nominal salary is paid to researchers. It was an opportunity I could not miss. As a new material sciences major, I had access to labs spanning a range of disciplines, from physics to chemistry and biology.

Q. Please tell us about your area of research and research goals.

As a graduate, I participated in the production of a tunneling quantum microscope, which I used to research molecular adsorption, high-temperature superconducting phenomena, and topological superconductivity. The tunneling quantum microscope is a piece of equipment where a probe is placed just a few nanometers from the surface of a specimen, and a tunneling current between the probe and specimen is used for analysis. It provides atom-level resolution, and by varying the voltage between the specimen and probe and measuring resulting changes in the tunneling current, the energy structure of materials can be observed spatially. Currently, I am using tunneling quantum microscopes and atomic force microscopes to observe and analyze vortex dynamics in topological superconductors.

Q. Please tell us in detail about your career path after graduating from DGIST.

Choosing a career path is always hard. In my area of study, post-doctoral research at an overseas institute is crucial if a researcher is serious about continuing and making progress in research. Thankfully, my professor helped me interview with a number of national laboratories in the U.S., and as a result I was given the opportunity to study where I am now. I believe hard work always opens up better opportunities.

Q. What sets DGIST apart from other universities?

DGIST is a research-focused university, with a small undergraduate population and a large research division. DGIST has outstanding research facilities and affords easy access to joint research facilities. The school also has a great faculty and researchers, offering much needed guidance and learning to students.

Q. Any words of advice to would-be DGIST graduates?

While I had childhood dreams about my future, just like everyone else, the school curriculum never interested me. I only really started studying in university, where I first encountered an area of study that truly motivated me. I was concerned that I simply wasn't sufficiently prepared to make it in graduate school. Yet it was what I wanted to do, and I took on the challenge. And I ended up at the graduate school at DGIST. We all have our insecurities and may be lacking in some areas. But if you are serious about research, graduate school is a serious option. The DGIST graduate school offers a number of intern opportunities. Getting a taste of graduate school life through internships may be a good way of exploring various career path options.

II.

Electrical Engineering and Computer Science

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Embracing the next generation through convergence of Electrical Engineering and Computer Science ICT industries that are dependent upon electrical engineering and computer science technology are one of the fastest growing ones in the world. For the future knowledge-based society, electrical engineering and computer science technology takes the key role in converging BioTechnology (BT), CultureTechnology (CT), EnergyTechnology (ET), NanoTechnology (NT), RobotTechnology (RT), and many more. We are seeking for ambitious, passionate, and enthusiastic students who have a vision for creative engineering research and development.

The goal of Electrical Engineering and Computer Science department is to foster these students to have : 1) creativity for seeking new research and directions 2) practicality for solving real world problems 3) global networking to embrace international perspectives 4) social entrepreneurship for generating new value in existing and novel applications to advance the future industry.

In the Department of Electrical Engineering and Computer Science, we offer various education and research opportunities in electrical engineering, electrical engineering systems, and computer science. We are primarily focusing on core research areas such as Intelligent Computing Systems, Connected Smart Systems, Advanced Semiconductor, Bio-Medical Systems, Cyber-Physical Systems, and Artificial Intelligence (AI) techniques. Beyond traditional information and communication engineering areas, we are actively collaborating with other departments for diverse interdisciplinary research. With innovative education and research efforts, we aim to train leaders in academia and industry who develop core technologies in the future.

Vision
- Becoming the department of excellence with international academic recognition
- Advancing core technologies needed for the development of future industries
- Educating professionals equipped with both the ability of global research & development and the sense of technology management
- Opening up new fields through information and communication convergence with other fields of study

Research and Education Focus
- Select specialized major research areas and support them intensively
- Cluster the related specialized major research areas as centers
- Conduct convergence research between each field of information and communication and other fields of study

Specialized Research Fields

Intelligent Computing Systems
- Big Data/Cloud Computer
- Computer Architecture
- Operating Systems
- Storage Systems

Connected Smart Systems
- Internet of Things
- 5G Mobile Communication
- Satellite Communication
- Wireless Sensor Network

Advanced Semiconductor
- Sensor Semiconductor IC
- Next Generation Transistor
- Neural Interface
- Nano-electronic Device

Bio-Medical Systems
- Brain-Machine Interface
- Smart Healthcare
- Bioinformatics
- Bioelectronics

Cyber-Physical Systems
- Realtime Embedded System
- Resilient Transport System
- Intelligent Transport System
- Self-driving Car

Department Cooperated Research Center

CPS Global Center

- The CPS Global Center at DGIST, established in 2012, performs both fundamental research to develop new principles, models, and theories for CPS and inter-disciplinary research to apply CPS to a number of areas including automobiles and transportations.
- It is one of the biggest center in Korea dedicated to CPS research. The CPS Global Center has built a strong global research network with world-class researchers in CPS, actively collaborating with four participating institutes in USA : University of Virginia, University of Michigan, University of Pennsylvania, and Carnegie Mellon University.

Resilient Cyber-Physical Systems Research Center

- DGIST research proposal on CPS resiliency won Korean government funding
- Resilient Cyber-Physical Systems Research Center has begun 8 year journey of R&D for safe, convenient and energy-efficient future society
- The center focuses on Real time Resilient Cyber-Physical Systems Software Technology that enables continuous operation despite external attacks or internal faults, reduced capacity operation if the severity of faults and attacks is too high to maintain full operation and graceful degradation if failure is inevitable
- The outcome will contribute to the economic growth of local and national economy as well as technology based, safe, convenient and energy efficient society

Brain Engineering Convergence Research Center

- Selected by the Ministry of Science and ICT for the Biomedical Technology Development Project
- The Center has developed a medical device source technology for treating various brain diseases such as Parkinson's disease, ementia, and cognitive disorders

Research Center for Extreme Exploitation of Dark Data (EEDD)

- Selected as an Engineering Research Centers (ERC) of the Ministry of Science and ICT and the Korea Research Foundation (KRF) in 2018
- The center is doing research about the nation-wide next generation information platform that can extremely exploit dark data in the entire process of collection, storage, management, and analysis

Academic Events

International Workshop on Cyber-Physical Systems (IWCPS) : For developing collaboration research with the highest levels of national and international research institutions, CPS Global Center hosts annual workshop with the theme of the Cyber-Physical Systems.

Student Events

- EECS Student Conference : Gives opportunity to students to convey information about their thesis and research plans with sharing background knowledges. The workshop also cultivates paper writing and presentation skills.
- Wook Hyun Kwon Outstanding Research Award / Kyu-Young Whang Outstanding Research Award : Based on exemplary academic skills and excellent research achievements of the students, give Wook Hyun Kwon/ Kyu-Young Whang Outstanding Research Award and prize.
- EECS Happy Hour : Along with pursuing healthy activities with all the department members, the event cultivates humanity through culture programs and promotes unity between the members.

Convergence with Other Departments

- Convergence with Physics and Chemistry : Research on electronic devices based on new materials
- Convergence with Robotics and Mechatronics Engineering : CPS and brain mapping based rehabilitation robot technologies, Machine-learning based brain machine interface, Sensor and actuator wireless interface
- Convergence with Energy Science and Engineering : Energy IT convergence technologies including smart grid and renewable energy
- Convergence with Brain Sciences : Medical imaging, Biomedical signal processing, Nano devices with possible application to human body, Database and data mining for medical applications, Biomedical wireless communications and network
- Convergence with New Biology : Next Generation Sequencing (NGS) genome data analysis, Largescale protein mass spectrum data analysis

Alumni Career Pathways

- Faculty
- Government research institutes including Agency for Defense Development (ADD), Defense Agency for Technology Quality (DTaQ), Korea Testing Laboratory (KTL), Korea Airports Corporation
- Research centers of conglomerates companies including Samsung Electronics, LG Electronics, Samsung Display, Hyundai Motor Company, and Hyundai Mobis
- Prospective foreign and mid-sized industries including UL Korea, SL and Innowireless
- Ph.D. Course

Interview Contents

- Oral examination about foundations and applications of information & communication, computer, electronics, mathematics, physics, chemistry, attitude, personality, and vision as an engineer
- English Presentation of up to 5 minutes (5 slides) about an important concept that you learned through your undergraduate core courses for MS degree applicants, and that is related to your future Ph.D. research for Ph.D. degree applicants
- A part of the interview will be conducted in English
- Online interview can be arranged for students residing outside Korea, upon early request.

Student Conference

In the Department of Electrical Engineering and Computer Science, students take the initiative to plan and carry out programs, cultivating their leadership and teamwork skills. They also share knowledge among researchers and provide opportunities for feedback on research by communicating research findings through academic events.
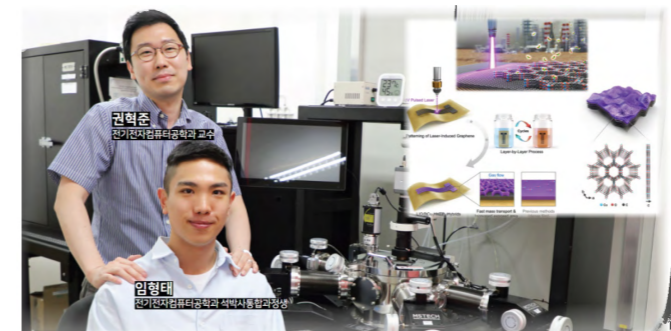
Development of Hybrid Structures for Graphene-Metallic Organic Structures with Hierarchical Porous Structures

- Professor Kwon Hyuk-joon's team at DGIST develops a "graphene-metal organic structure hybrid gas sensor" that can monitor the main culprit of fine dust in real time with a sensor that resembles "human lungs."
- Published online in May in the world-renowned journal Nature Communications

Professor Hwang Jae-youn's Team at DGIST : Drawing Characters with Ultrasonic Beams! Development of Deep Learning-Based Real-Time Ultrasound Hologram Generation Technology

- Proposal of a deep learning network and learning framework that allows real-time flexible configuration of ultrasonic beam shapes.
- Featured as the cover paper in the February issue of the international academic journal "IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control."
- It is expected to lead to the development of patient-specific precision stimulation techniques in the field of ultrasound brain stimulation and therapy, targeting conditions such as Alzheimer's disease, depression, and pain.

What topics are studied in the department of Electrical Engineering and Computer Science?

What do students study in the Department of Electrical Engineering and Computer Science?

Electrical Engineering and Computer Science department has a goal of fostering internationally competitive researchers and leaders. In order to pursue such a goal, we educate students with existing core technologies, such as information and communication, electronics, data processing, and electrical engineering to have fundamental skills sets. Furthermore, we ami to apply convergence technology in order to generate new ideas for technological transformation. To achieve these goals, we are researching various future convergence technologies through mutual cooperation with domestic and international institution sand researchers. Ultimately, Electrical Engineering and Computer Science department embraces various research areas that will impact the development of convergence technology.

What are the prerequisites for applying to the Department of Electrical Engineering and Computer Science?

Electrical Engineering and Computer Science department emphasizes on converging various disciplines by fostering research that requires diverse technologies. Therefore, we encourage students not only from IT related fields, but also from other natural science and engineering fields to apply. Please do not hesitate applying to our department although you may not taken many IT related courses. However, you must have suitable knowledge and skill sets for your specific research interest.

What career opportunities are there after graduating?

Based on the fact that Korea leads the IT industry in the world, graduated students will have various career opportunities. You may consider Samsung, LG, Hyundai, IBM and other prestigious companies, as well as international and domestic research institutes, public enterprise and universities. Moreover, various job opportunities overseas may be provided through our international networks.

I'd like to know more about the labs at the Department of Electrical Engineering and Computer Science.

Prof. Jin Ho Chang

Medical Acoustic Fusion Imaging and Therapy
• Wearable & Flexible device
– New signal and image processing algorithms to improve the efficiency of disease diagnosis
– High intensity focused ultrasound (HIFU) for cancer treatment
• Molecular imaging using photo acoustic effect
• Combined ultra sound and light techniques for imaging and therapy
– Improving the performance of optical imaging and treatment using ultrasound energy
• Deep learning algorithms for improvement of medical image quality
– New signal and image processing algorithms to improve the efficiency of disease diagnosis
• Ultrasound sensors
– New ultrasound sensors for ultrasound therapy, photoacoustic imaging, cell imaging, etc

Prof. Ji-Woong Choi

Communication System and Signal Processing/Machine Learning Research on communication theory and signal processing/machine learning technologies for advanced communication systems and biomedical system
• Future mobility system and communications
– Next-generation vehicle/robot/UAM (in-vehicle network/V2X) communications and security
– Physical layer security technologies including RF scanner, jamming/anti-jamming
– Core technologies for 5G/6G system
• Biomedical system based on brain-machine/computer interface (BMI/BCI)
– Sensing/stimulation control system design for treatment of neurological disorders
– Functional brain connectivity based biomarker detection & diagnosis/screening algorithm
– Artificial five senses based on bio-mimic artificial sensors and signal processing/AI technologies

Prof. Hongjun Choi

Software and Systems Security/Cyber-Physical Systems
• Cyber-Physical Systems Attack and Defense
– Realtime Attack Detection
– Attack Resilient Control
• Control Software Vulnerability Analysis
– Cyber-Physical System Integration Test
– Cyber-Physical Security Vulnerability Analysis and Patch CPS Forensics
– Efficient Log Collection
– Automatic Root-cause Analysis

Prof. Hoon Sung Chwa

Real-Time Systems/Cyber-Physical Systems
• Advancing multi-core scheduling for real-time embedded systems
– Heterogeneous multi-core scheduling for smartphones
– Parallelism-oriented real-time multi-core scheduling for embedded systems
– Optimal real-time multi-core scheduling techniques
• Supporting real-time AI services for safety-critical systems
– Real-time scheduling platform design for multi-DNN real-tme inference in embedded systems
• Developing new computing resource management for cyber-physical systems
– Physical-state-aware dynamic cyber resource management for mixed-criticality systems
– Control-schedule co-design and new task model for cyber-physical systems
• Developing new thermal management for automotive systems
– Context-aware thermal management for automotive vision systems
– Thermal-aware adaptive resource management for real-time automotive systems

Prof. Yongsoon Eun

Cyber-PhysicalSystemsandFeedbackControl
• We carry out research on modeling of dynamic systems, advancing control theory and the applications to cyber-physical systems (CPS).
– Resilient CPS design methods
– Controls for systems with nonlinear actuators and sensors
– Geometric Control of UAVs
– Networked Control Systems
– City metro precision stop control

Prof. Jae Youn Hwang

Advanced Multimodal Biomedical Imaging System/Analysis and Mobile Healthcare Systems
• Multimodal biomedical imaging and Mobile Health-care Systems
• Mobile health-care systems and image/bio-signal processing
– Smart phone-based imaging system and image analysis for early detection of various diseases
– Wearable sensor systems and signal processing for mobile healthcare
– Advanced Multimodal imaging system and image analysis for detection of various diseases
– High-frequency ultrasound imaging system and signal processing
– Biomedical optical imaging system and image analysis

Prof. Sunghoon Im

Computer Vision and Machine Learning
• Computer vision research & Machine learning for computer vision
• Computer vision: Scene understanding, 3D reconstruction, Image synthesis
–Scene understanding: Segmentation, Optical flow, Motion estimation etc.
–3D reconstruction: Mutli-view stereo, SLAM, Sensor fusion etc.
–Image synthesis: GAN-based image/video synthesis, etc.
• Machine learning for computer vision
–Unsupervised/Weakly-supervised learning
–Transfer learning
–Multi-task learning
• Computer vision applications
–Autonomous driving
–Augmented/Virtual Reality

Prof. Jae Eun Jang

Advanced Electronic Devices
• Advanced transistor structure
– High performance tunneling transistor
– Next-generation vertical transistor structure
• Electronic devices for bio-applications
– Artificial tactile system
– Electronic nose system
• Artificial Intelligence (AI) devices
– Neuromorphic device based on ferrolectric materials
– Flexible neural probe
– Wireless transmission with micro-antenna

Prof. BaekGyu Kim

High Assurance Software Systems
• Foundation of Systems and Software Assurance
– Model-based development
– Software Verification
– Automatic code and test generation
• Virtual Environment-Based Autonomous System Development
– Virtual test scenario generation
– Hardware/software interface design for virtual-in-to-loop test
– Automatic code and test generation
• QoS-Aware IoT Service Software Development
– Distributed computation models
– Workload characterization for Resource provisioning
– Fault-tolerance systems

Prof.Gain Kim

Communication Circuits/Hardware Accelerator/FPGA
• Wireline/wireless communication circuits
– Low-power ultra-high-speed wireline transceivers for chip-to-chip interfaces
– High-performance 6G digital baseband modem
– Design of new modulation scheme for wireline transceivers
– Crosstalk cancellation for ultra-high-bandwidth chip-to-chip dense interconnects
– High-performance ADC design for wireline and wireless communications
• Multi-chip Hardware accelerators
–System architecture and circuit design for scalable multi-chip AI accelerators
– Design framework and compiler design for multi-chip AI accelerators
• Programmable System-on-Chip (SoC), FPGA
– Design automation of embedded FPGA for programmable SoC
– Beyond 5G/6G baseband modem design
– Real-time lost signal reconstruction algorithm and its design for wireless communications
– Programmable accelerator for homomorphic encryption

Prof. Kyoung-Dae Kim

Autonomy/Reliability/Cooperation of Cyber-Physical System
• Cyber-Physical Transportation System
– Control theories and computational methods for autonomous driving and navigation.
– Reinforcement learning for reliable and cooperative autonomous driving decision.
– Collision-free and higher throughput intelligent intersection management.
– Planning and control of autonomous vehicle for high speed racing
• Robotics and Autonomous Multi-Agents Systems
– Theories for cooperative decision making of multi-agents system.
– Motion planning and control for cooperative collision avoidance of multi-agents system.
– Modeling, analysis, and control for acrobatic and high speed maneuvers of UAV.
– Software framework for distributed realtime control system

Prof. Sunjun Kim

Human-Computer Interaction and Interfaces/Smart Input Devices
• Quantitative performance measurement for Human-computer interaction system
– Performance metric development and measurement for human input/output interface devices
– Information throughput measurement methodology between human and computer systems based on information theory
• Smart interface optimization
– Design and implementation of interfaces with plasticity
– Optimization algorithm design concerning human factors
– Context-aware and personalized user interface performance optimization

Prof. Yeseong Kim

Next-Generation Embedded Systems/HDComputing for Cognitive learning/Machine Learning
• Next-Generation Embedded Systems
– Efficient machine learning and applications for the Internet of Things (IoT) systems
– Self-learning embedded systems using reinforcement learning
• Hyperdimensional (HD) Computing
– Machine learning algorithms based on brain-inspired HD (High-Dimensional) computing
– Hardware acceleration using parallel computing platforms
– Low-power, high-efficiency intelligence systems based on cognitive science
• Machine Learning
– Deep learning acceleration using emerging computing technologies (e.g., processing in-memory, approximate computing)
–Performance/power prediction of learning algorithms on heterogeneous platforms
– HW/SW Co-design of Secure & Fault-Tolerant Computer Systems

Prof. Young-Sik Kim

Applied Cryptography/AI Security/Privacy Enhancing Technologies/Smart Car Security
• Applied Cryptography
– Post-Quantum Cryptography(Lattice/Code-based) Design and Cryptanalysis
– Efficient Implementation of Post-Quantum Cryptography (SW/HW/PIM)
– Side-Channel Attack and Countermeasures
– Quantum Cryptography
• AI Security
– High-speed Implementation of Fully Homomorphic Encryption and Libraries
– Efficient Computation of Fully Homomorphic Encryption
– FHE-based AI(CNN/Transformer) Inference and Training
– FHE-MPC hybrid AI Security
• Privacy Enhancing Technologies
–Secure multi-party Computation and Secret Sharing
–Zero-knowledge proof
• Smart Car Security
– Vehicular Intrusion Detection/Tolerance Technology
– Security of Next Generation Vehicular Networks

Prof. Jeongho Kwak

Intelligent Computing and Network Systems
• Mobile AI
– Mobie Deep Learning Model and Resource Optimization
– Mobile-Edge Co-Optimization for AI Services
– Multi-resource Management for Real-time AI in IoT Network Systems
• Resource Allocation in Cloud/Edge Computing
– Code/Data Offloading Systems
– Edge Contents Caching Systems
– Resource Management Systems leveraging Reinforcement Learning
• Resource Allocation for 5G+/6G Wireless Networks
– Interference Management in Heterogeneous Networks
– Satellite Communications/Network Resource Optimization

Prof. Hyuk-Jun Kwon

Next Generation Electrical Devices and Sensors/Pulsed Light Process/Flexible and Wearable Electronics
• Next Generation Devices and Sensors
– High performance transistors by using new materials (e.g.2Dmaterials)
– Sensors to augment human's five senses
• Intense Optical Pulsed Process
– New advanced fabrication process through ultra short pulsed light for nanoscale electrical devices (e.g. memory)
– Thermal analysis of the pulsed light process and their applications
• Flexible and Wearable Electronics
– Flexible/wearable and multi-functional monitoring system in real time
– Electrically and mechanically robust flexible platform
• Artificial Intelligence(AI) Devices
– Neuromorphic devices

Prof. Byeongmoon Lee

Skin Electronics/Intelligent Prosthetic & Bioelectronics/Additive Manufacturing
• Skin Electronics
– Functional soft nanocomposites
– Skin-like, implantable circuits and electronics
– Skin-like energy materials and devices
– Freeform display devices
• Intelligent Prosthetic & Bioelectronics
– Intelligent prosthesis based on machine learning for unconscious perception
– Neuromorphic sensorimotor systems
– Neural and bio-interfaces
• Additive Manufacturing
– Additive manufacturing for advanced semiconductor packaging
– Personalized skin electronics tailored for organs

Prof. ByungKun Lee

Computational Optics and Biophotonic Imaging
• 3D wide-field/super-resolution/real-time laser imaging system
– Ultrahigh-speed wavelength-swept laser source
– Scan optics and scan patterns for blood flow imaging
– RF interference signal acquisition and digitization
• Three-dimensional complex-valued image processing
– 3D k-space image processing: computational defocus and aberration correction, aperture synthesis, angular compounding
– Spectral estimation for super-resolution
– Improving 3D k-space image processing speeds with machine learning
• Human and animal studies
– Retinal diseases: age-related macular degeneration, diabetic retinopathy
– Studying neurodegenerative diseases through retinal ganglion cells

Prof. Junghyup Lee

Integrated Circuits and Microsystems
• Low-power biomedical microsystems
– Neural stimulation and recording systems
– Wearable biomedical devices
• Analog & mixed-signal circuits ands systems
– On-chip reference frequency generation systems
– Smart sensor interface ICs
– Low-power, high-precision current and voltage references
– Low-power, high-efficiency wireless communication microsystems
– Wireless communication systems using a human body channel
– Wireless power transfer through a human body channel

Prof. Kijoon Lee

Quantum and Biomedical Optics
• Noninvasive Deep Tissue Imaging and Spectroscopy
– Diffuse Optical Tomography, Functional Near-Infrared Spectroscopy
– Diffuse Correlation Spectroscopy, Diffuse Speckle Contrast Analysis
• Nonlinear Optics
– Random lasing and coherent backscattering in highly scattering medium
– Stimulated Raman Scattering, Spontaneous Parametric Down-Conversion
• Complexity Analysis of Biosignal
– Use of Sample Entropy for vascular health assessment
• Quantum Optics
– Use of Entanglement in Optical Coherence Tomography
– Fundamental study of Bell-type inequality violation

Prof. Kyoungtae Lee

Integrated circuit based sensor circuits and systems
• Implantable sensors
–Wireless power transfer and communication algorithm and system
–Mm-scale in vivo dosimeter for cancer radiotherapy
–Implantable in vivo signal monitoring (e.g., electrical, oxygen, protein) system
• Li-ion battery monitoring and managing system
–Optimal charging/discharging scheduling and protocol
–Mm-scale Li-ion battery monitoring and controlling IC
–Li-ion lifetime maximization algorithm
• Low power analog/digital sensor IC design
–Analog front end (e.g., amplifiers and filters)
–Mixed-signal circuit (e.g., ADC/DAC)
–Power management circuit (e.g., AC-DC, DC-DC, and LDO)

Prof. Sungjin Lee

Operating System/System Software/Storage Systems/Machine Learning Systems
• Operating system support for high-performance storage systems
• Operating System and System Softweare
– Linux kernel, memory managment, file system, I/O management, and firmware
• Non-volatile Memory System
• Resilient CPS design methods
– System software for next-generation non-volatile memory (e.g., Flash SSD and Optane)
• Machine Learning for Data Storage
– Machine learning for high-capacity data storage
– Maching learning for efficient data retrieval
• High-performance, High-capacity, and Reliable Storage Systems
– Distributed storage systems (e.g., OpenStack, Ceph, and KVS)
– All flash array (AFA) systems
– Distributed caching systems

Prof. Gyeongsik Moon

Computer vision / Computer graphics / Machine learning / AI Designing artificial intelligence to perceive, model, and represent human-centric 3D worlds through computer vision, computer graphics, and machine learning
• 3D human reconstruction
– 3D human pose estimation
– High-fidelity 3D human reconstruction
• 3D human avatar
– Instant creation of animatable 3D human avatars from a short phone scan
– Effective and efficient rendering of 3D human avatars
• 3D human generation
– Generation of 3D humans using generative AI
– Generation of 3D humans using multi-modal AI

Prof. Kyung-Joon Park

Cyber-Physical Systems / Industrial Communication / Smart Manufacturing
• Industrial Cyber-Physical Systems
– Production optimization and risk reduction in smart manufacturing.
– Leak prediction and detection strategies in water supply systems.
– Efficiency and explainability in predictive analysis using industrial AI.
• Autonomous Cyber-Physical Systems
– Communication optimization in UAV networks based on Software-Defined Networking (SDN).
– SDN-based data transmission efficiency between satellites and ground networks.
– Communication and control optimization in UGV systems using ROS2.
• Vehicle Cyber-Physical Systems
– Enhancing network performance and security for vehicular platooning.

Prof. Daewon Seo

Machine learning/statistical inference/information theory
• Machine learning theory
– Theoretical analysis of machine learning and deep learning systems
• Social learning theory
– Decision-making process over networks using statistical inference and information theory

Prof. Donghoon Shin

Theory of Computation/Networks/Security
• Theory of Computation
– Research on efficient algorithms with performance guarantees based on graph theory and computational geometry : Applying to various application fields(networks, security, graphics, etc.)
• Wireless Sensor Networks
– Research on improving network performance using the geographical characteristics of wireless sensors in Home IoT, Smart Factories, and Smart Cities
• Security for Critical Infrastructure
– Standardization for CIIP(Critical Information Infrastructure Protection) and research on security technologies

Prof. Jinhyun So

Distributed AI/Federated Learning/On-device AI
• Study how multiple data-owners can jointly train an efficient, scalable, and trustworthy artificial intelligent model
• Federated Learning algorithm/system
– Trustworthy AI
– Federated learning for Low Earth Orbit (LEO) satellite network
– Federated learning for 5G/6G Cellular System
• On-device AI
– AI Model Compression
– Split Learning
– Small Language Model for Mobile/Edge Devices

Prof. Jean Young Song

Human-Computer Interaction and Artificial Intelligence
• Efficient Imitation Learning for Autonomous Vehicle Using Crowdsourcing
– Imitation learning algorithm that can learn high-risk examples
– Crowdsourcing workflow and pipeline for collecting high-risk dataset
– Web-based UI for labeling high-risk examples
• Content Moderation System for Online Community and Crowdsourcing Platforms
– Efficient content moderation tool for online communities using ML systems
– Personalized crowdsourcing pipeline and workflow based on worker modeling
• Efficient and Complementary Human-AI Collaboration Model
– Modeling expert's task completion to create efficient work assignment algorithm
– Efficient hybrid workflow for crowd-AI collaboration
– Crowdsourcing UI for efficient task completion

Prof. Minyoung Song

Wireless Integrated Circuits and Systems I Analog/RF/Mixed-Signal Integrated Circuits
• Design of Low-Power /High Energy-Efficient RF Integrated Circuits (ICs)
– Ultra-Low-Power RFIC design for Short-Range Radios(Bluetooth, WiFi, UWB)
– Energy-Efficient Wireless Transceiver IC Design
– IC Based High Integrated Wireless System Design for Internet-of-Things (IoT) and Biomedical Applications
– Research on Next-Generation Low-Power Wireless
• Communication System
– High Integration and System Miniaturization for Wireless Systems
– Radio Miniaturization for Tiny Sensor Nodes and Bio-Implanted Sensors
– Optimization of Communication Links in Various Environments
– Antenna-IC Co-Design
– Highly Efficient Wireless Power Transfer
• Analog/RF/Mixed-Signal Core Circuit Design
– Design of Oscillators, Clock Generators and Frequency Synthesizers
– Design of Low-Noise Amplifier (LNA), Mixers, Power Amplifier (PA), Filters

Prof. Insik Yoon

Artificial Intelligence(AI) hardware acceleration
– lightweight Large Language Model
– custom hardware for AR/VR algorithm acceleration
– hardware design for neuromorphic computing algorithm acceleration using new memory devices and in-memory computing techniques

Prof. Jong-Hyeok Yoon

Intelligent Integrated Circuits and Systems Lab.
• Circuits for artificial intelligence (AI) systems
– Neuromorphic circuits and systems for automotive navigation
– Energy-efficient computing circuits for edge intelligence and tinyML
• Processing-in-memory (PIM) circuits and systems
– Resistive RAM (RRAM)-based compute-in-memory (CIM) circuits and systems
– Mixed-signal circuits for MAC accelerators
• High-speed wireline transceiver designs
– Multi-standard clock and data recovery architectures for backward compatibility
– Transceivers to support forthcoming Ethernet standards

Faculty

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Career & Major achievements. Assistant Professor, Inha University, Incheon, Korea (2016.03-2017.06) | Postdoctoral Associate, MIT CSAIL, USA (2013.09-2016.02) | Microsoft Research Asia Fellowship, Microsoft (2010)

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Research interests. Intelligent · Information Service | Database | Search Engines
Career & Major achievements. Senior Engineer, Agency for Defense Development (ADD), Korea | IBM T.J. Watson Research Center, Research Staff Memeber | Chairman, Computer Science Department, KAIST | Director, Academic Information Management, Computing, and Science Library, KAIST | Director, Advanced Information Technology Research Center (AITrc) – an Engineering Research Center (ERC) of Excellence supported by Korea Science and Engineering Foundation (KOSEF) | Professor, Computer Science Department, KAIST | KAIST Distinguished Professor

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Research interests. Intelligent Network Systems | Cloud Computing Systems
Career & Major achievements. achievements. Researcher, National Research Institute of Science (INRS), Canada (2015-2017) | Researcher, Trinity College Dublin, Ireland (2017-2019) Samsung HumanTech Paper Award, Gold Prize (2015, 2017), Silver Prize (2014, 2016), Bronze Prize (2013) | EU Marie-Sklodowska Curie Research Fellowship (2017)

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Research interests. Wired/Wireless Communication Circuit | Hardware Accelerator | Reconfigurable Semiconductor Circuit
Career & Major achievements. chievements. Postdoctoral Researcher, KAIST | Senior Researcher, Samsung Research | IEEE CASS Pre-doctoral schorlarship Award(2018)

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Research interests. Embedded Software | Software Verification | Autonomous Systems
Career & Major achievements. Principal Researcher, Toyota Motor North America R&D | Top Inventor Award, Toyota InfoTechnology Center, U.S.A | SAE Vincent Bendix Automotive Electronics Engineering Award (Best Paper Award)

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Degree. Ph.D., Brown University, USA
Research interests. Predictive control | Time-delayed system | Industrial applications of digital control
Career & Major achievements. Korea Highest Scientist Award (2007) | Vice-President of Korean Academy of Science and Technology | President of IFAC | Vice-President of National Academy of Engineering of Korea | President of the Korean Institute of Electrical Engineers | Fellow of IEEE, TWAS, IFAC

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Degree. Ph.D., University of Maryland, College Park, MD, USA
Research interests. Real-time systems | Wireless sensor network | Cyber physical system | Data and event services | Information security
Career & Major achievements. IEEE Fellow | The President of Korean Computer Scientists and Engineers Association | Chair of the IEEE Computer Society Technical Committee on Real-Time Systems | WCU Chair Professor, Sogang University | Outstanding Contribution Award, IEEE RTCSA | Outstanding Contribution Award, ACM/IEEE Cyber Physical Systems Week | Professor, Department of Computer Science at the University of Virginia, USA (1986-2012) | DGIST 3rd President (2017-2018)

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Research interests. Next Generation Electrical Devices and Sensors | Laser Process | Flexible/Wearable Electronics
Career & Major achievements. Process Engineer, Lam Research, USA | Postdoctoral Fellow, UC Berkeley, USA | R&D Staff, Samsung Advanced Institute of Technology (SAIT) | Gold Award, IMID (2013) | Outstanding Contribution Award, Samsung Electronics (2010)

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Degree. Ph.D., University of Illinois at Urbana-Champaign
Research interests. Autonomy | Reliability | Cooperation of Cyber-PhysicalSystem
Career & Major achievements. Assistant Professor, University of Denver, USA | Postdoctoral Research Associate, Texas A&M University, USA)

Sunjun Kim
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Degree. Ph.D., KAIST, Rep. of Korea
Research interests. Human-Computer Interaction (HCI)
Career & Major achievements. Postdoctoral researchers in Aalto University, Finland | ACM CHI honorable mention awards (2013, 2018) | ACM ISS best application paper (2018) | NAVER Ph.D. fellowship (2016) | ACM UIST student innovation contest awards (2011, 2012, 2014)

Young-Sik Kim
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Degree. Ph.D., Seoul National University, Rep. of Korea
Research interests. Post-Quantum Cryptography | Fully Homomorphic Encryption | Applied Cryptography | AI Security | Privacy Enhancing Technology | Smart Car Security
Career & Major achievements. Chair of The Interdisciplinary Studies of Artificial Intelligence and Super-Computing AI Education-Research Center | Professor, Chosun University | Senior Engineer, Samsung System LSI Division | Leader of Future Technology, National Academy of Engineering of Korea | The recipient of Prime Minister's Commendation (2024)

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Degree. Ph.D., Seoul National University, Rep. of Korea
Research interests. Computer vision | Computer graphics | Machine learning | AI
Career & Major achievements. Postdoctoral Research Scientist at Meta (2022-2024) | Google Ph.D. Fellowship (2020)

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Degree. Ph.D., University of Illinois Urbana-Champaign, USA
Research interests. Artificial Intelligence | Social networks | Information theory
Career & Major achievements. Postdoctoral Researcher, USC | Postdoctoral Researcher, UW-Madison

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Research interests. Low-Power WIreless Integrated Circuits and System for IoT and Biomedicines (Communication and Radar) | Low-Power, High-Performance Analog/RF Core CIrcuit Design
Career & Major achievements. IEEE Senior Member / Researcher, imec, Europe (Tech. lead of low-power RFIC design) / Senior Engineer, Samsung System LSI Division / 2022 IEEE Brain and Solid-State Circuits Joint-Society Best Paper Award Honorable Mention

Donghoon Shin
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Research interests. Theory of Computation | Networks | Security
Career & Major achievements. NHNKCP | Senior Researcher, National Security Research Institute

Yeseong Kim
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Career & Major achievements. Samsung Research America | Intel, US

Kyung-Joon Park
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Research interests. Cyber-physical systems and networks
Career & Major achievements. Senior Engineer, Samsung Electronics | Postdoctoral Research Associate, UIUC | Editor, IEEE Trans. on Industrial CPS | Gold Prize, Samsung Inside Edge Paper Competition (2008)

Jinhyun So
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Degree. Ph.D., University of Southern California, USA
Research interests. Distributed AI | Federated Learning | On-device AI
Career & Major achievements. Staff Research Engineer, Samsung Cellular & Multimedia Lab, USA (2022-2024) | Ph.D. Research Intern, Microsoft Research, USA (2021) | Engineer, Samsung Model Development Team, South Korea (2013-2017) | Best Paper Award, 2022 NeurIPS Workshop

Jean Young Song
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Degree. Ph.D., University of Michigan, Ann Arbor, USA
Research interests. Human-Computer Interaction | Artificial Intelligence | Human-AIinteraction | Crowdsourcing
Career & Major achievements. Research Professor, KAIST, Rep. of Korea | Best paper and honorable mention awards (ACM IUI 2018, ACM CSCW 2019, ACM AAMAS 2020)

Insik Yoon
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Degree. Ph.D from Georgia Institute of Technology
Research interests. Artificial Intelligence Hardware Research
Career & Major achievements. Senior Hardware Engineer at Apple (2022.06 ~ 2024.01) | Senior Hardware Engineer at Microsoft (2019.09 ~ 2022.06)

Jong-Hyeok Yoon

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Research interests. Edge intelligence | Processing-inmemory (PIM) architecture | Clock and data recovery | Mixed-signal circuit design
Career& Major achievements. Postdoctoral fellow, Georgia Institute of Technology

Kyoungtae Lee

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Degree. Ph.D., UC Berkeley, USA
Research interests. Biomedical sensor system design | Low power sensor IC design | Li-ion management system design
Career& Major achievements. Researcher, KAIST IT Convergence Center | Postdoctoral researcher, University of California San Francisco

ByungKun Lee

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Degree. Ph. D. in EECS, MIT, USA
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Career& Major achievements. Postdoctoral Research Scientist at Meta (2022-2024) | Google Ph.D. Fellowship (2020)

Junghyup Lee

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Research interests. Integrated circuits and microsystems
Career& Major achievements. Scientist, Institute of Microelectronics, A*STAR, Singapore | Best Design Award, KCS (2009) | Outstanding Paper Award, IDEC (2011, 2009) | Best Design Award, Samsung Electronics (2000)

Jae Eun Jang

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Research interests. Nanotechnology applications for advanced electrical devices
Career& Major achievements. Principle Senior Researcher, Samsung Advanced Institute of Technology | Outstanding Paper Award, IMID (2010) | Innovative Invention Award, Samsung Electronics (2009) | Samsung Best Paper Award (2008)

Yongsoon Eun

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Research interests. Control theory for cyber-physical systems | Resilient cyber-physical systems | Control systems with nonlinear sensors and actuators | Cyclic control | Performance improvability of control systems | Variable structure control
Career& Major achievements. Senior Research Scientist, Xerox Research Center Webster, Xerox Corporation | Co-author of the book <Quasilinear control> (2011) | Xerox Innovation Group Excellence in Research and Technology Award (2011) | 2nd Asian Control Conference Young Author Award (1997)

Kijoon Lee

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Research interests. Biosignal Processing and Bio Imaging | Diffuse Optical Tomography | Diffuse Correlation Spectroscopy
Career& Major achievements. Postdoc at Univ of Pennsylvania | Assistant Professor in Bioengineering at Nanyang Technological University, Singapore | Best Teaching Award at DGIST (2015)

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Research interests. Skin Electronics/Intelligent Prosthetic & Bioelectronics/ Additive Manufacturing
Career& Major achievements. Postdoctoral Scholar, KIST | Postdoctoral Scholar, Stanford University | Samsung Humantech Paper Award (2020) | Doyeon Academic Paper Award (2021) | Sejong Science Fellowship (2021) | MRS Best Oral Presentation Award (2023)

Sunghoon Im

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Career& Major achievements. Vising Scholar, Carnegie Mellon University, USA | Microsoft Research Asia Fellow (2018) | Samsung HumanTec Paper Award (2016) | Qualcomm Innovation Award (2016) | Best Design Award, Samsung Electronics (2000)

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Research interests. Medical Ultrasound Imaging & Therapy Photoacoustic Imaging Ultrasound Sensors Biomedical Signal & Image Processing
Career& Major achievements. Postdoctoral Research Associate, NIH UTRC Center, USC | Associate Editor of IEEE TUFFC | Board Member, the Acoustic Society of Korea | Board Member, the Korean Society for Therapeutic Ultrasound

Hoon Sung Chwa

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Career& Major achievements. IBM Korea Researcher | CPS Rising Stars 2022

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Career& Major achievements. Sr. Engineer, Nvidia Graphics | Postdoctoral Researcher, DGIST | Analog and Mixed Signal Design Engineer, Morse Micro

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Research interests. Communication theory and signal processing techniques for wired and wireless communication systems | Bio-medical signal processing for brain machine/computer interface (BMI/BCI)
Career& Major achievements. Staff Engineer, Marvell Semiconductor, 1111111 CA, USA | Postdoctoral Researcher, Stanford University | IEEE Senior Member | Silver Award, Samsung Human-Tech Paper Competition (2005)

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Interview

Bahareh Behboodi
Department and Program | Electrical Engineering and Computer Science, M.S
Nationality_ Iran
Assigned Lab | Lab of Communication and Signal Processing (Prof. Ji-Woong Choi)

The scope of the field of view is broadened by convergence research with researchers in various fields.
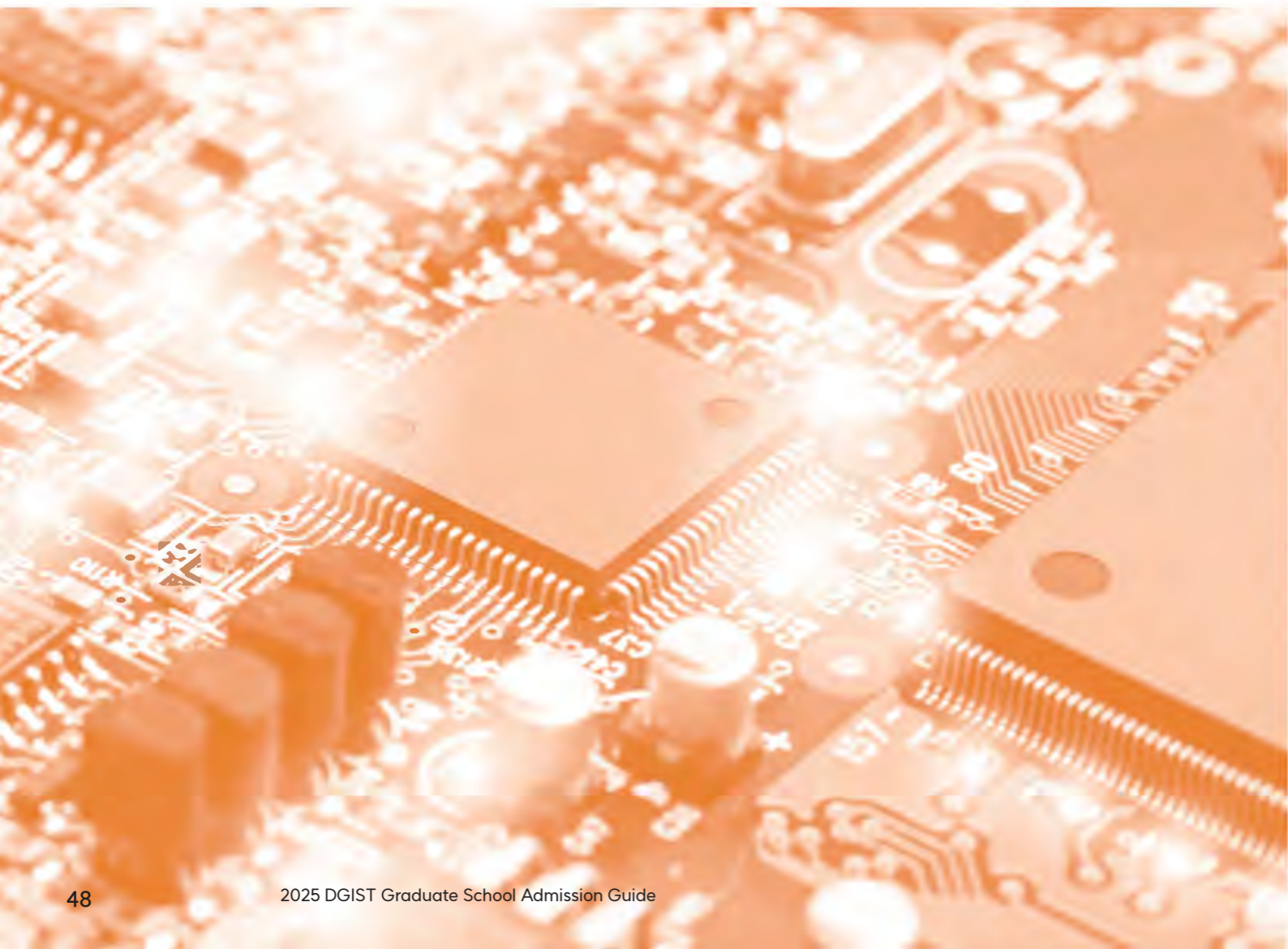
Q. Welcome. Please introduce yourself.

The most important considerations were finding scholarships and an open position in a laboratory whose research focus is aligned with my interests. DGIST was a suitable option for me as I got a fully funded Master student position that covered both my tuition and living expenses. These days, it is getting increasingly difficult to find funded master degree positions in many parts of the world. Furthermore, I was lucky to find a laboratory in neuroimaging, which is a field that I love. In a nutshell, I had a fully funded position in a field I loved, so I just went for that and applied to DGIST.

Q. What are the strong points of DGIST and the department of Electrical Engineering and Computer Science?

DGIST has a great amount of available facilities. At DGIST, you can easily have access to any device that you may need in your filed of research. Especially, in the lab I am working in, we have a yearly allocated budget for buying new devices that we need for research. We are encouraged to submit papers to reputed international conferences and journals. If our papers are accepted, we get the opportunity to attend that conference, all expenses paid. I had a chance to attend a conference in Paris in the first year I joined DGIST and it was an amazing learning experience.

Q. Explain your research field and purpose at DGIST.

My background is in biomedical engineering and my research interest is neuroimaging using functionalmagnetic resonance imaging (fMRI) as well as functional near-infrared spectroscopy (fNIRS). At DGIST, I am working on signal processing of fNIRS based brain computer inter faces (BCI), which is a promising neuroimaging modality useful for patients suffering from motor impairments.

Q. What are you planning to do after graduation?

My goal is to become an expert in my field of research. For this reason, I would like to pursue further education. After I graduate from DGIST, I would like to find a Ph.D. position and continue my research in the area that I am studying now.

Q. Please advise our applicants.

As a friendly suggestion, for attending DGIST, first you need to find a laboratory with a research field compatible to yours, then just make contact with its supervisor. Supervisors at DGIST have strong backgrounds in their fields and kindly consider international attendees as well as Korean students. I hope you will find the most suitable laboratory for your study and get scholarship benefits at DGIST.

III.

Robotics and Mechatronics Engineering

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Robotics and Mechatronics Engineering is a multidisciplinary field of study that converges core technologies from Mechanical, Electrical, Biomedical, and Computer Science and Engineering. Our research topics ranges from intelligent robots to nano technology with various applications areas. Of course, our strength also lies on bio-medical applications as well as artificial intelligence.

Department of Robotics and Mechatronics Engineering focuses on conducting field-leading researches as well as educating highly motivated students with strong multifisciplinary fundamentals. We cover a broad rage of research areas in Robotics, Electrical and Mechanical engineering, Materials science, and Biomedical engineering. Our goal is to develop new technology that can impact our daily lives.

Vision

We aim to research core technologies of future robotics toward human-centered services in the 4th Industrial Revolution Era, and to educate interdisciplinary experts in robotics who understand the challenges in the fields and define the problems by one's own, and solve those problems actively and collaboratively.

Strategie

Research
- Understand the challenges in various fields and apply basic theories and technologies appropriately
- Develop quality-of-life technologies by integrating mechanical/electrical/electronic/material/biomedical engineering
- Extend the developed core technologies to other research and industrial fields

Education
- Intensive on-site education and training
- Strengthen the fundamental courses and forster multidisciplinary convergence education
- Encourage care and communication, and strengthen research ethics
- Self-motivated learning to promote logical thinking and creativity

Specialized Research Fields

Robotics and Mechatronics Engineering Department conducts robotics researches to develop creative fusion technologies by converging conventional engineering subjects (Mechanical, Electrical, Electronics Engineering, Mechatronics, etc) with advanced high technologies such as Biotechnology (BT), Information Technology (IT) and Micro& Nanotechnology (MT/NT). With this fusion technologies, the department will focus on robotics fundamental research on Robot Mechanism Analysis and Design, Precision Actuator and Sensor, Biometric sensing (bio-sensors), Control System, Biomodeling, Medical Simulation, Optical System Design, Biomeadical Imaging and Micro/Nano Systems Design & Fabrication

Robotic Systems

We study dynamics and control of emerging robots. Specifically, we focus on intelligent robots, sensors and actuators, robot dynamics, and machine vision. Our main goal is to improve the quality of living.

Biomedical Devices

With strong emphasis in biomedical and micro/nano engineering, we are developing various types of devices. We are running a research center focused on Microrobotics that can travel inside human body to deliver drug and treat blood vessel diseases. Other research interests are neural interfaces, wearable healthcare devices, and MEMS/NEMS.

AI & Image Processing

We are developing a state-of-the-art medical imaging techniques, vision systems, machine learning, and big data systems. Our main goal is to enable a next generation perception systems that can be implemented in robots as well as image processing algorithms for rapid and accurate diseases and brain abnormalities. We also develop hardware accelerator for artificial intelligence and quantum machine learning hardware.

Research and Education Focus

- Advanced robotics to combine robotics engineering with various service applications.
- Major research areas : Robotic System, Biomedical Devices and AI & Image processing
- Converged robotics engineering through interdisciplinary education, system integration education, team based working process, and project-based practical learning process.
- Training opportunity in the world's leading class research team
- Summer school for medical robotics with top class lecturers

Convergence with Other Departments

- Although DGIST is still at its growing stage, the Robotics and Mechatronics Engineering Department will conduct an international education-research program called "Global Alliance Program" that collaborates with world leading universities.
- The department will invite world renowned professors to give lectures, co-supervise student thesis, and conduct cooperative research.
- The department will promote exchange of visits at the level of professor/research staff, and students' internship programs in order to encourage thir international experience.

Interview Contents

- Questions on fundamental knowledge of the robotics related subjects or courses, enthusiasm for research, potential ability to be a scholar, communication ability, etc. in both English and Korean.
- A short presentation in English on the research experience, achievements, research plan, etc. for about 3minutes and 5 minutes for M.S. and Ph.D. respectively.
- Online interview can be arranged for students residing outside Korea, upon early request.

Who should apply to graduate studies in the department of Robotics and Mechatronics Engineering?

The field of robotics and mechatronics engineering is very broad and multidisciplinary. This is why our department members are from many different majors, such as mechanical, electrical, and biomedical engineering, as well as computer science and materials engineering. Even though the student is from different majors or has less-experience in robotics and mechatronics, our department offers a wide range of courses to bolter your academic basics. If you are a type of person who enjoys an active collaboration and wants to work on real-life problems, the department of Robotics and Mechatronics is the right place to be.

Why DGIST Robotics and Mechatronics is the right career decision?

Our department offers very competitive financial support to graduate students, including full tuition waiver, monthly stipend, national scholarships, and department fellowships. In addition, our department owns one of the best research facilities for manufacturing, microfabrication, robot prototyping, etc. Many students attend international conferences to present their work. After graduation, our alumni became faculty members in top-level universities around the globe. Also, many students went to national research labs as well as companies, including Samsung, Hyundai, SK, etc.

What topics are studied in the department of Robotics and Mechatronics Engineering ?

Robot Design and Manipulation

Robot technology has been recognized as the most potential future technology. It is required to develop novel robot system and control that can understand human motions and collaborate/assist humans properly. To answer these requirements, our department develops the design and control technology for the intelligent robot manipulation. The technology to integrate AI and robot techniques in order to conduct tasks such as manipulation/assembly/disassembly of irregular/soft objects and to achieve physical intelligence as high as human intelligence are main research goals of our department.

Micro-/nanorobots and magnetic control system

Medical micro-/nanorobots have been widely studied for biomedical applications, including targeted drug delivery, biopsy, hyperthermia radioactive therapy, scaffolding, in-vivo ablation, stenting, sensing, and marking. These applications can be performed by magnetically activated micro-/nanorobots which provide accurate, minimally-invasive and localized operations. Bio-microrobotics Lab and DGIST-ETH Microrobotics Research Center have been striving to develop such medical micro-/nanorobotic systems. The micro-/nanorobotic system consists of micro-/nanorobots, magnetic actuation, and imaging The micro-/nanorobots are fabricated by various novel micro-/nano-fabrication methods. One example is scaffold-type microrobot fabricated for transporting stem cell and drug. Another example is world's first ciliary stroke motion microrobot pioneered by our research center. Various magnetic field generating (MFG) systems are developed for actuating the micro-/nanorobots. The MFG generates a wide range of static and dynamic magnetic field. The versatile MFG system produces gradient field, rotating field, and stepping field. It, also generate the magnetic intensity.

Artificial Intelligence

We develop machine learning and deep learning algorithms to recognize the current situation and to navigate the robot. Specifically, we develop algorithms for image segmentation, object tracking, detection, and classification from images. We also develop a signal processing technology to detect the intention from the human brain signal and control the robot for interaction between human and robot. To address these issues, we develop the latest artificial intelligence algorithms such as supervised learning, unsupervised learning, semisupervised learning, and reinforcement learning.

Autonomous vehicle and flight robotic control system based on the diverse sensors and analysis tools

Based on the accurate perception of diverse environments of ground and aerial robotic systems by using many sensors (e.g., LiDAR, Radar, Camera, IMU, GPS and others), the new types of path planning and tracking algorithms will be developed and validated through both 3D simulators and real self-driving cars / drones.

Surgery Robot

Robot system that assists precise surgery is developed. Single incision laparoscopic surgery (SILS) or single port surgery (SPS) is a next generation surgical method that can substitute the conventional laparoscopic surgery. It provides less incision, less scar, and the shorter hospitalization period for the patient. However, SILS demands many surgical experiences and skills of surgeons due to the highly limited vision and operation space during the surgery. Our department develops a compact, precise and dexterous master slave type SILS robot to enable more safe and efficient surgery. Microsurgery which requires precise and safe manipulation of the medical robot in a small and dark volume like a human eye, is also an important research topic. Here, this study does focus on the applications of advanced control schemes based on a precision piezo motor and a distance sensor, optical coherence tomography known as precise biomedical diagnosis system.

Neural interfaces

For brain-machine interfaces (BMI) or neuroprosthetic devices for the recovery of motor/sensory functions, neural interfaces at the boundary between a biological system and an artificial system are essential. They need to be in micrometers scale in order to interact with neurons, and thus, are fabricated using MEMS (microelectro-mechanical system) technologies. We develop such neural interfaces based on polymers or polymer/silicon hybrid structures for better biocompatibility and compliance with neural tissues. Also, we research novel implantable optical and magnetic neural stimulation methodologies in addition to traditional electrical stimulation, because light at specific wavelengths and magnetic fields can also elicit neuronal responses.

Intelligent Imaging and Vision Systems

Intelligent Imaging and Vision Systems (IIVs) laboratory is developing deep learning models, holographic imaging systems, image analysis algorithms, and next-generation cryptosystems: Specifically, 1) Lowcost, portable and practicable holography in multimodal platforms with deep learning, 2) Intelligent systems with fusion of multimodal holography and deep learning models for biomedical applications, 3) Design of phenotypic high throughput screening (HTS) & high contents screening (HCS) systems based on multimodal imaging and deep learning, 4) New design of privacy preserving cryptosystems for information security applications, 5) New analysis of digital cryptosystems with deep learning models.

Soft Actuator

Soft actuator, recently, draws attention from robotic engineers as a driving system that can provide strong and smooth force/torque. Series Elastic Actuator(SEA) which consists of a motor, reduction gears and a spring is the most widely accepted soft actuator, and our research is on the analysis of its dynamics and design based on the dynamic model. Since soft actuators are the integration of the mechanical design and control design, our research focuses on the mechanical design in terms of control engineering and the control design taking into consideration the mechanical properties of soft actuators.

Stretchable/wearable sensor

Bio opto-mechatronics is a biomedical studies using a mechatronics technology based on an optical laser system. Here, an endoscopy system which was already used in a hospital can support the diagnosis of a medical doctor by artificial intelligence.

Bio opto-mechatronics

Bio opto-mechatronics is a biomedical studies using a mechatronics technology based on an optical laser system. Here, an endoscopy system which was already used in a hospital can support the diagnosis of a medical doctor by artificial intelligence.

Medical Image Processing

We are interested in enhancement of health care system by creating algorithms for automatically extracting and analyzing useful information latent in medical images and signals. Specifically, we are developing techniques for medical image enhancement & visualization, segmentation of interest organs or vessels, registration of multimodal and multi-time series images, classification & pattern recognition of diseases, longitudinal studies & quantitative analysis.

Biorobotics and Mechatronics

Bio mimetic (or Nature inspired) technology aims to investigate and analyze the structure and the motion of animals or plants on the earth, which evolved for a long period, and tries to extract the valuable information from the procedure to design the engineering system. The main objective of this research is to conduct research and development of the creative robot and mechatronics system. To do this, soft robot technology using soft/smart materials as well as conventional robot technology based on machining is used to build multi-functional and diverse robot. Elementary and essential technologies such as sensors and actuators are also studied for robot/mechatronics application. Application of the developed technology to the medical and industrial robot/mechatronics field based on the above research is our research goal.

Implantable microdevices

Active implantable microdevices, different from passive implants such as dental or knee implants, are demanded for the purpose of health monitoring, diagnosis, treatment, or rehabilitation for patients with chronic diseases and for future preventive healthcare services. For active microdevices to be implanted in the body, they need to be small in size, require wireless power supply/data exchange, and robust packaging. We develop strategies to improve long-term performance of thin-film polymeric encapsulation in physiological environments and wireless powering technologies. Also, we carry out computer simulation studies based on finite element method (FEM) to systematically analyze the interaction between the implanted devices and the body.

Next-generation Medical Imaging

Image reconstruction techniques can visualize information on the cross section of an object of interest using mathematical modeling (system of imaging modality) and measurements (raw data). The physical meaning of the information depends on the imaging modality, and fast and accurate recovery of the information is critical especially in medical diagnosis. Our current interest is the development of accurate and computationally efficient reconstruction techniques for 1) imaging of densities of basis materials of a human body using spectral CT and 2) imaging of absorption and scattering coefficients of a brain using NIRS, and their clinical applications.

Surgical navigation

This study is to use medical images, such as MRI, CT, ultrasound as a map for guide during the surgery, which are originally taken for diagnosis. The tumors, vessels, and major nerves that are located in or under the organs are visualized and presented to the surgeons through the virtual and augmented reality environments Ambiguous boundaries between tumors and normal tissues are identified, and invisible vessels and nerves can be detected by using this techniques. The accurate, fast and noninvasive registration of patient to image, or image to image is important technical issues of this topic.

Nano materials and Devices

Nanomaterials have shown great potential for future robots and electronics with their outstanding materials properties. We work on developing advanced manufacturing processes for emerging nanomaterials and functional materials for device, energy, and robot applications. Key thrust areas include : 1) Utilization of Nanoscale Thermal Energy for Manufacturing and Materials Characterization. 2) Batch Fabrication of Nanomaterials and Functional Materials Integrated Devices. 3) Development of Multi-physical Smart Sensor Devices for Robotic Systems.

Robot Gripper and Manipulator

In order to grip objects and move them to a desired place, or to perform various tasks using robots such as parts manipulation, assembly, surgery, and rehabilitation, technology related to a robot gripper (robot hand) and a robot manipulator (robot arm) is essential. Our department actively conducts research on analysis, design, manufacturing, and control of robot grippers and manipulators for application in various fields such as industry, defense, medical care, rehabilitation, rescue, detection and so on.

Neural Devices & Neuro-interfaced Robotics

We develop neural/muscle interfaces and robotic systems for neuroprosthetics that replaces sense, motor, and cognitive modalities of human. Such devices on robotic systems provide bidirectional communication between human body and prosthesis, which enables to achieve advanced neuroprostheses. Furthermore, we develop neurodevices based on the modulation of peripheral nerves for electronic medicine or electroceuticals. This provides not only the modulation of autonomic nervous system, but the modulation of motor and sensory system, so that we control bodily function or treat disease. We aim multi-interdisciplinary research between robotic and nervous/muscular systems.

Neural prostheses

Basilar membrane and hair cells are the key parts for passive hearing in the cochlea. Hair cells generate bioelectrical signal by the vibration of the basilar membrane and the generated bioelectrical signal is transferred to the auditory nerve system. In this research, piezoelectric artificial basilar membrane (ABM) will be studied to mimic the functionality of the basilar membrane and hair cells. We also study Brain-Machine interface for neural interfaces between the brain and our ABM. The results will be the key technology for a next generation of artificial cochlea. Biomedical Micro/Nano Robotics Recently, various type of biomedical micro/nano robotics have been widely developed and actively studied for real clinical applications. In this research, we focus on the following areas : biomedical microrobots using miniaturized mechanisms and magnetic actuations, therapeutic drug/cell delivery micro/nanorobot system using external actuating forces, cell based microrobots, and bioinstruments for biomedical researches.

AI hardware accelerators, quantum computers, automotive sensors based on photonic integrated circuits

AI hardware accelerators are developed based on photonic integrated circuits. Also, we develop quantum computers based on quantum nature of photons. In addition, we are developing ultrahigh-precision automotive sensors (e.g. LiDAR, gyroscope, inertial sensors) on silicon chip based on optical semiconductors.

Microfluidics

Microfluidics is a field that seeks to fundamentally understand the fluid behaviors at the microscale and utilize it to develop new technologies. At this microscopic level, the influence of interfaces on microfluids is significant, so interactions between solids and fluids are important and exhibit unique physical phenomena that are not observed at the macroscopic level. Such phenomena are also closely linked to various biophysical phenomena observed in plants and animals. Microfluidics finds wide applications in areas such as biomedical technologies and micro-manufacturing processes. To develop advanced technology in these applications, we conduct creative research based on a deep physical and mathematical understanding of microfluidics-related phenomena.

Precision medical robot

Microsurgery requires precise and safe manipulation of the medical robot in a small and dark volume like a human eye. Here, this study does focus on the applications of advanced control schemes based on a precision piezo motor and a distance sensor, optical coherence tomography known as precise biomedical diagnosis system.

AI-based Image Processing

Biomedical imaging modalities include magnetic resonance imaging (MRI), computed tomography (CT), ultrasound, and optical microscopy images. We plan to develop deep learning-based biomedical imaging systems and establish biomedical imaging research by the fusion of biomedical imaging modalities and informatics with the fusion of biomedical image processing, artificial intelligence-based image processing techniques for various biomedical applications such as early diagnosis in various diseases, new cancer markers identification, drug target discovery, and assessment of disease progression as well as of treatment outcome.

Muscle-inspired Walking Assistive/Rehabilitation Robot

Many of recent walking assistive/rehabilitation robots are designed and controlled based on the joint torques. The main target of this research is development of walking assistive/rehabilitation robot based on human's musculo-skeletal system, which is different from human's musculo-skeletal system. At first, we analyze the characteristics of human's musculo-skeletal system in terms of dynamics and robotics. Then the results are reflected in the development of mechanism and control algorithms so that they can realize human motions in a more natural way and provide better assistance and rehabilitation ability.

Combined biomedical multi-modal ultrasound and photoacoustic molecular imaging and therapeutics

Based on the understanding of fundamental wave physics, a synergistic combination of multi-modal ultrasound and photoacoustic imaging is utilized to derive solutions to complementary challenging problems in biomedical imaging and diagnostics, image-guided therapy, and bio-nanoceuticals. The state-of-the-art hybrid imaging system will provide a powerful platform for translational theranostics (therapeutics + diagnostics) research towards a clinical utility.

Imperceptible Robotics

Conventional robotic technologies hold many promises to advance disease diagnosis and therapeutic research by enabling precise sensing and actuation in small scale, leading to implantable, portable, or even wearable biomedical systems. Current medical devices interfaced with our body are still rigid, bulky, and remains permanently. However, biological organs and systems are soft and curvilinear, timedynamic. To bridge this gap we are challenging to create soft robotics that provides intimate, minimally invasive, electrically stand-alone, and biocompatible interfaces with the human body so that people cannot feel the existence of the device.

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Career & Major achievements. University of Illinois at Urbana-Champaign Postdoctoral Researcher(2011-2016) I Frontispiece for October issue of Advanced Functional Materials, 2016 I Cover for June issue of Advanced Functional Materials, 2015 I Feature image fo r the September issue of Nature Communications, 2014

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W. https://www.intelligent-photonics.com
Degree. Ph.D., UC Berkeley
Research interests. Photonic integrated circuits I Quantum computing I Photonic AI accelerators I Autonomous sensors(LiDAR, gyroscope)
Career & Major achievements. Postdoctoral researcher, KAIST(2016-2020) I Bronze medal, Collegiate Inventors Competition at USPTO, 2015(Featured on Daily Californian) I Finalist, Corning Outstanding Student Paper Competition, 2014 I Recipient of Korea Foundation for Advanced Studies(KFAS) Scholarship(2010-2015)

Jae sung Hong
Professor
T. +82-53-785-6210 E. jhong@dgist.ac.kr
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Degree. Ph.D., University of Tokyo, Japan
Research interests. Medical Imaging I Surgical Robot I VR and AR Visualization
Career & Major achievements. Vice-president of KSMR I Cochair of IEEE RAS TC Surgical Robotics I International network director of ASCAS I JSPS researcher of The University of Tokyo I Associate Professor of Kyushu University I Best paper awards of CARS 2011, ACCAS 2007, JSCAS 2007, etc

Minho Hwang
Assistant Professor
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W. https://sites.google.com/view/surglab
Degree. Ph.D., KAIST
Research interests. Robot Grasping and Manipulation I Robot/AI-Assisted Surgery I Next Generation of Surgical Robot System I Robot Learning and Control
Career & Major achievements. Postdoctoral Fellow, University of California, Berkeley(2019-2021) I Top 10 Mechanical Engineering Technology of Korea(2019)I Overall winner and Best Application Award at International Surgical Robot Challenge(2018) I Best Paper Award at ACCAS(2018) I Best Paper Award at ISCAS(2015) I Finalist for the Best Paper Award at ACCAS(2013)

Kyungseo Park
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Degree. Ph.D., KAIST
Research interests. Robotics I Physical Human-robot Interaction I Tactile perception system
Career & Major achievements. Postdoc, University of Illinois Urbana-Champaign(2022-2023) I Visiting Researcher, Max Planck Institute for Intelligent System(2018)

Jeon Il Moon
Adjoint Professor
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Degree. Ph.D., Syracuse University, USA
Research interests. Bio-Signal based Rehabilitation Robotics I Tele-operation Robotics I Embedded Control & Intelligence Control
Career & Major achievements. President's Award [Semiconductor Design Contest 2005] I Head of LG Industrial systems Research Center(2004~2006) I Dean of Robotics Engineering Department(2007~2010) I Chairman of KOROS(Korea Robot Standard) Medical Robot Committee (2010~present) I Korean Delegation of ISO Medical Robot Standardization(2009~present)

Interview

John David Prieto Prada
Department and Program I Robotics and Mechatronics Engineering Ph.D.
Nationality I Colombia
Assigned Lab I Intelligent Bio-optomechatronics Lab.(Prof. Cheol Song)

Graduate School with strong environmental and institutional support to focus on research

Q. What made you choose DGIST?

I was attracted to DGIST based on both its academic reputation as well as a well-rounded education. I have found that with the DGIST energetic purpose of research, I am able to have opportunities for personal growth and development not only academically, but also to expand beyond the classroom knowledge. Also, I wanted to enhance my skills in intelligent systems and Virtual Reality, fortunately, the Robotics and Mechatronics Engineering department was the correct choice for me.

Q. What are the strong points of DGIST and the department of Robotics and Mecha-tronics Engineering?

DGIST has a large number of research areas, in which is easy to find research topics where two or three departments are involved and collaborate between each other at the same time, this is thank to the convergence that DGIST supports day by day. In the Robotics and Mechatronics Engineering department, you can find any kind of lab aiming to research from macro to microrobots, software, and hardware, and the most important thing is that DGIST offers top class facilities in which is easy to grow as a researcher.

Q. Explain your research field and purpose at DGIST.

My field of research is based on virtual reality technologies. We want to minimize the involuntary tremor in microsurgeries by integrating sensor fusion techniques, virtual reality, and intelligent systems.

Q. What are you planning to do after graduation?

I want to keep growing in my research field and go for a post-doc position. In addition, I want to use my expertise to improve the quality of our society.

Q. Please advise our applicants.

I invite all the applicants that have a passion to grow and learn academically to come and join us and work as a team. Our department has multiple fields and together we can improve our skills and enrich knowledge.

IV.
Energy Science and Engineering

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https://www.dgist.ac.kr/energy/

The limited supply and detrimental environmental effects of fossil fuels is seriously intimidating human survival. In order to solve such issues, ESE pursuits the education and research for the next generation sustainable energy sources and their applications.

Securing sustainable and environmentally friendly energy resources is an important task to accomplish human survival in future. Frontier science and technology are extensively searching for such power sources as well as systems utilizing the renewable energies. With this wide range of social movement, it is required to shift the conventional education paradigm innovatively to have students handle new forms of the energies. The Department of Energy Science & Engineering in DGIST aims at educating graduate students to contribute to the new generation of renewable energies with the creative mind.

Vision
- Advanced courses fostering competent scientists and engineers for the beyond conventional energy sources
- Creation of core academic areas and policies for future green energy society
- Education of graduate students for future-oriented and creative R&D capability

Research and Education Focus
- Cultivation of international leaders or the convergence energy devices through closely interconnected interdisciplinary system of DGIST.
- International exchange (including double-degree program) and team projects with global top institutes
- Solution searching education and research experiences to technical challenges

Specialized Research Fields
- Key materials and system design for the advanced hydrogen and bio fuel cells
- Production and storage of hydrogen and practical applications of renewable energy systems
- Core-material and fabrication technology for the next generation photovoltaic cells
- Photo-electrochemical water splitting and recycle of the waste products such as CO_2 and waste water
- New materials for high energy density Li secondary batteries
- Post-Li batteries including multivalent (Mg, Zn, Ca) ion, metal-air batteries
- New materials for low-energy-consumption electronic devices
- Multi-scale molecular modeling of materials for clean energy
- Energy harvesting materials and devices

Convergence with other Departments
- Electrical Engineering and Computer Science : Electricity storage devices and sensor network system for smart grid to improve the efficiency of renewable energies
- Robotics and mechatronics Engineering : Small batteries for micro-robots for medical application and large batteries for human care/industrial robots
- Brain Sciences/New Biology : Bio-energy systems for the treatment of brain signals and processing and biocompatible power sources

Interview Contents
- Personal interview in English with the concerned professors
- Self-introduction (5 Min. presentation)
- Questions on fundamentals and specialized knowledge about application of Energy Science and Engineering such as Physics, Chemistry, Mathematics, Biology, Thermodynamics and Transfer phenomenon according to the applicant's specialty background and on culture, personality and vision as engineering students.
- Online interview can be arranged for students residing outside Korea, upon early request

What topics are studied in the department of Energy Science and Engineering?

What are we going to study in the Department of ESE?

The Department's core courses are thermodynamics, electrochemistry and fundamentals of materials science & engineering. After completing the core courses, students are supposed to choose a major track among solar cell, fuel cell, battery, and molecular modeling and battery and take the in depth courses within the track. In addition, you will extend your textbook knowledge through various R&D activities in the relevant research sectors in DGIST. You will be trained to be a creative and challenging personnel to lead the global future energy fields.

Specific subject of each track?

The R&D fields of the major tracks are as follows :
- Solar cell : Core-materials and fabrication technology for the next generation photovoltaic and catalysts
- Fuel cell : Key materials and system design for the hydrogen/bio/ solid-oxide fuel cells.
- Battery : Mastering the present Li-ion battery technologies and exploring the innovative post-Li chemistry
- Molecular modeling (computational chemistry) : Virtual experiments using supercomputers (complementary to real world synthesis, fabrication, and measurements) to get the basic understanding of molecular-level mechanisms and design principles underlying the above three tracks

I'm worried about my English skills and hesitate to apply for DGIST since all the classes are delivered in English.

English communication skill is a prerequisite for the "World Top Class" university that DGIST aims at. Our Department is providing various English education programs to improve the students' English proficiency. With those courses you are encouraged to substantially mature your English communication capability.

Possible career path after graduating the Department of ESE?

I want to keep growing in my research field and go for a post-doc position. In addition, I want to use my expertise to improve the quality of our society.
- Private R&D institutes (Samsung, LG, SK, Hyundai, POSCO, BASF, etc.)
- Universities and Government R&D institutes
- Renewable energy fields (solar & hydrogen fuel cells)
- Battery and energy conversion
- Energy and environment policy

International network being built so far?

The world's greatest scholars are invited to offer the firm background and the world class education on the future energy issues to DGIST students. We have, at present, Professor J. Caton at the Mechanical Engineering in Texas A&M University, Nobel laureate Professor J. Byrne at the Energy & Environmental Policy in University of Delaware, world leading Professor M. Watanabe in Yamanashi University in the fuel cell. We are also collaborating with world renowned research groups (e.g., Waseda university, Uppsala university). In addition, the department will continue to invite outstanding full-time Professors from all over the world and take off to the "WorldTop Class" Department in the future energy field.

Department Chair and Administration office

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Faculty

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O/L. E6-412/404/418
Degree. Ph.D.(Materials Science and Engineering) / Seoul National University
Research interests. Electrochemical CO2 reduction catalysts | Electrochemical water splitting catalysts | Functional hybrid nanomaterials | In-situ X-ray absorption spectroscopy
Career & Major achievements. Postdoctoral Researcher, University of Toronto

Sangaraju Shanmugam
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O/L. E6-314/305/320
Degree. Ph.D.(Chemistry), Indian Institute of Technology Madras, India
Research interests. Fuel Cells | Metal-Air batteries | Biosensors | Multifunctional Magnetic materials
Career & Major achievements. Assistant professor, Waseda Univ. Japan | Guest Scientist, RWTH Aachen Univ. Germany | Postdoctoral Fellow, Bar-Ilan Univ. Israel | Best Ph.D. thesis Award (2005), Chemistry, IIT Madras, India

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Degree. Ph.D. (Chemical & Biological Engineering), Seoul National University
Research interests. Nanomaterials chemistry | Quantum dot solar cells | Quantum dot displays | Liquid-phase transmission electron microscopy | Wearable electronics
Career & Major achievements. Postdoctoral researcher, Lawrence Berkeley National Lab., USA

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O/L. E6-410/406/423
Degree. Ph.D.(Metallurgical Engineering), Chonbuk National University
Research interests. Synthesis and Surface Engineering of Nanomaterials | Display and QLED based on Quantum Dots | Optoelectronic Devices | Photo and Image Sensors | Nanodevices based on 2D Nanomaterials.
Career & Major achievements. Research Specialist, University of Chicago,USA | Postdoctoral Researcher, Lawrence Berkeley National Lab. & University of California, Davis, USA | Research Assistant Professor, Korea University

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O/L. E6-512/504/519A
Degree. Ph.D.(Polymer Science and Engineering), Inha University
Research interests. Green electronics and energy materials | Carbon and supramolecular photocatalyst | Electrolytes | Polymer mechanochemistry
Career & Major achievements. Macromolecular Research,Publishing Editor | Assistant Professor, Pukyong National University | Senior Researcher, Korea Institute of Science and Technology

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Degree. Ph.D.(Chemistry), University of Houston, USA
Research interests. Materials chemistry | Nanomaterials | Electrochemistry | Carbon and porous materials | Fuel cell | Battery | Water splitting photo- & electrochemical catalysts | Supercapacitor | Sensor
Career & Major achievements. Professor, Korea University | Research Associate, Northwestern University & Pennsylvania State University, USA

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O/L. E6-409/405/419
Degree. Ph.D.(Chemistry), University of Chicago, USA
Research interests. Organic Solarcell | OLED | Printed Electronics
Career & Major achievements. Senior Engineer, Samsung Electronics | King Sejong Patent Award (2004) | Research Scientist, LG Chem Research Park (OLED R&D)

Lee, Ju-Hyuck
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O/L. E6-411/403/420
Degree. Ph.D. (Nano Engineering), Sungkyunkwan, University
Research interests. Piezoelectric/Triboelectric based energy harvesting materials and device | Hybrid energy generator | Biocompatible energy materials
Career & Major achievements. Postdoctoral researcher, University of California, Berkeley

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O/L. E6-513/507/519B
Degree. Ph.D.(Chemical & Biomolecular Engineering), KAIST, Korea
Research interests. Next-generation batteries (Li-metal, Li-air, Li-sulfur) | Interfacial chemistry/engineering | Functional battery materials & devices | Battery failure analysis & diagnosis
Career & Major achievements. Postdoctoral Researcher, Pacific Northwest National Laboratory (PNNL)

Jang, Yun Hee
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O/L. E6-313/304/323
Degree. Ph.D.(Chemistry), Seoul National University
Research interests. Multiscale molecular modeling | Quantum mechanics | Molecular dynamics simulation | Material design at the molecular level
Career & Major achievements. Associate professor, GIST | Visiting professor, ENSCP & University of Tours, France | Postdoctoral scholar, Caltech, USA

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O/L. E6-310/306/319
Degree. Ph.D.(Chemistry), Seoul National University
Research interests. All-solid-state batteries/ Ca, Mg, Zn-ion batteries/ solid state chemistry/ crystallography
Career & Major achievements. Project Leader of Innovative Battery R&D team, LG Chem Research Park | Research Associate, Iowa State University & Oregon State University, USA

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Degree. Ph.D.(Chemistry), University of Illinoisat Urbana-Champaign, USA
Research interests. Electrochemistry | Fuel cell Electrochemiluminescence
Career & Major achievements. Vice-president, Seoul National University | President, International Society of Electrochemistry | Chairman, Korean National Research Resource Center | Fellow, International Society of Electrochemistry

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O/L. E6-311/307/318
Degree. Ph.D.(Chemistry), KAIST, Korea
Research interests. Lithium-ion Batteries | Post Lithium-ion Batteries | Electrochemical Energy Conversion & Storage
Career & Major achievements. LG Chem Battery R&D | Postdoctoral scholar, Brookhaven Nat'l Lab, USA

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Degree. Ph.D.(Chemistry), University of Cambridge, UK
Research interests. CO2 conversion to hydrocarbon fuels | Water splitting for hydrogen generation | Microbial fuel cell | Nuclear battery | Biomedical devices
Career & Major achievements. Visiting scholar, University of California. Berkeley, USA | Postdoctoral associate, Technical University of Denmark & Pennsylvania State University, USA

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O/L. E6-509/505/522
Degree. Ph.D.(Physics), Yonsei University
Research interests. Membrane Proteins Structure & Function | Protein-lipid Interactions | Biopolymers, Polyelectrolytes | Light-harvesting & Energy Transfer | Quantum Information
Career & Major achievements. Postdoc, Univ. of Pittsburgh, USA | Postdoc, Univ. of Michigan, USA | Postdoc, Johns Hopkins Univ., USA

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O/L. E6-510/506/520
Degree. Ph.D.(Chemical Engineering), POSTECH
Research interests. Multifunctional Energy & Electronic Materials | Metal Oxides Nanomaterials | Quantum Dot & Perovskite Solar Cells | Catalytic & Environmental Materials
Career & Major achievements. Postdoctoral Researcher, University of Toronto

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O/L. E6-511/503/516
Degree. Ph.D. (Chemical and Biomolecular Engineering), KAIST, Korea.
Research interests. Heterogeneous Catalysis, CO2 conversion for Sustainable Chemical & Fuel Production, Electrosynthesis, Design of Catalytic Microenvironment.
Career & Major achievements. Postdoctoral Research Fellow, Lawrence Berkeley National Laboratory (LBNL). Postdoctoral Researcher, Korea Institute of Science and Technology (KIST)

Adjoint DGIST Professors

- Prof. Kim, Seong Kyun (Emerging Materials Science)
- Dr. Kim, Jae Hyun (Energy Convergence Research Group)
- Prof. Park, Jinhee (Emerging Materials Science)
- Prof. Seo, Jungpil (Emerging Materials Science)
- Prof. Woo, Hye Ryun (New Biology)
- Prof. Lim, Pyung-Ok (New Biology)
- Prof. Choi, Gyeung Ho (Interdisciplinary Engineering)

Interview

Setiawan Dedy
Department and Program | Graduated Energy Science and Engineering, Ph.D.
Current Position | Postdoctoral Researcher, Energy Science and Engineering Research Lab
Nationality | Indonesia
Assigned Lab | Discovery Lab(Prof. Hong, Seung-Tae)

Enjoy the moment of actively conceiving new experiments.

Q. What made you choose DGIST?
Being involved in technology and innovation growth, particularly as a scientist, is a dream for such motivated students. DGIST has been considered as one of the best young universities globally, which uniquely prioritizes scientific discoveries, innovations, and convergence in its education system. There are world-renowned professors whom I can share and expand my scientific ideas with to be directly involved in technology development globally. Additionally, the institution is also full of cultural diversity judging from its international community, allowing us to gain unforgettable experiences.

Q. What are the strong points of DGIST and the department of Energy Science and Engineering?
DGIST has a clear vision regarding its education system, which focuses on convergence. It trains students to not only innovate in one particular area but also be able to grab some aspects from other related areas through collaborations. Many notable alumni are recognized and have been involved directly in the technology commercialization in industry and academia. In particular, the Department of Energy Science and Engineering has a solid mission to lead in energy innovation with a future-oriented education system. It consists of reputable faculty members worldwide known for their experiences and publications. Many collaborations with industries also allow students to face real challenges in technology commercialization, which is a marvelous experience.

Q. Explain your research field and purpose at DGIST.
Ultimately, my research purpose is to pursue a new, low-cost, and sustainable battery chemistry that has the potential to surpass the theoretical energy density of the current lithium-ion battery for a future electric vehicle or large-scale energy storage applications. My current research is to demonstrate the rechargeability of magnesium and calcium metal batteries, which are kind of early-birth energy storage systems. Moreover, our laboratory expertizes in advanced powder X-ray diffraction studies on battery electrode materials behavior during charge and discharge to better understand the mechanism. My group, including me, are also eager to discover new-to-the-world inorganic materials using what-so-called exploratory synthesis.

Q. What are you planning to do after graduation?
As a doctoral student, I desire to continue doing research in the field which has an enormous impact on society. Therefore, after my doctoral degree, I plan to expand my research skill in academia, particularly on battery electrode characterization. Moreover, I have set my long-term plan to contribute to the energy storage research and development in my home country either in academia or industry in the future.

Q. Please advise our applicants.
Becoming a DGISTian is a unique opportunity that does not come every time in your life. DGIST does provide high-quality education and diverse research opportunities with advanced facilities and a scholarship package to support your study and research. You will gain an unforgettable experience conducting research with sincere, enthusiastic, and highly motivated colleagues in a globally recognized environment. Therefore, I strongly believe that the experiences in DGIST ESE prepare us to beat challenges, particularly in technology development and innovation. If you want the chance to give everything you've got, with no limits on what you can achieve; If you're passionate about making a big, bold difference in science and advancing your own career; If you want to push the boundaries of what's possible, please join us!

V.
Brain Sciences

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Brain Sciences is the study of the fundamental principles of brain structure and function, based on neurobiology and cognitive science. The Department of Brain Sciences provides interdisciplinary convergence and global networking that is becoming so important not only in science and industry but also in authropology and social science fields.

The brain is the last great frontier in the exciting field of research. Brain Sciences is the study of the fundamental principles of brain structure and function.The integration and convergence of Brain Sciences with others disciplines is rapidly expanding. With interdisciplinary approaches, Brain Sciences research will contribute to not only the field of science but also humanities. social science, and industrial fields.

Vision

We aim to create a world-class research and teaching environment to facilitate Brain Sciences discovery and education, and to achieve the improvement of brain health and human life based on this knowledge. This is accomplished through the training of global practice leaders, technology partnerships, and the establishment of a neuroscience knowledge community.

Research and Education Focus

Specialized education for Brain Sciences by performing cutting-edge research on the structure and function of the brain as a common theme without interdisciplinary barriers.

Convergence with Other Departments

Brain Sciences can readily converge with other science and technologies like Physics, Chemistry, NT, BT, and IT. The department of Brain Sciences will pursue cooperation with other divisions at DGIST through a project-based learning model.

Interview Contents

• Presentation in English : Ph.D.course applicants should present their M.S.thesis work. M.S.course applicants and M.S.-Ph.D. combined course applicants should choose one option from the two options below.

Option 1.
You should present one paper chosen from the provided list of recommended research papers(please check the papers on our website at https://brain.dgist.ac.kr) using PowerPoint within a 10-minute time frame(5-10 slides), followed by an additional 10 minutes for Q&A.

Option 2.
You should present a research paper that has been published in renowned scientific journals(e.g., Nature, Cell, Science, Nature Neuroscience, Neuron, or other journals of similar caliber) using PowerPoint within a 10-minute time frame(5-10 slides), followed by an additional 10 minutesfor Q&A.

• Personal Essay : Presentation of motivation and interests on a suggested topic
• Online interview can be arranged for students residing outside Korea, upon early request.

5 Major Research Areas

Molecular and Cellular Brain Science

- Applying the latest technologies of neuroscience to elucidate the core principles of neuronal and synaptic generation, degeneration, function, and plasticity at the molecular and cellular levels.
- Studying the fundamental principles of the central nervous system's development, differentiation, and cell death through molecular and cellular approaches.
- Developing new technologies to control neuropsychiatry, developmental, and neurodegenerative disorders through the discovery of molecular and cellular signaling involved in the diseases.
- Conducting research from single molecules and cells to genomics, proteomics, and metabolomics to elucidate the pathogenesis of neurodevelopmental and degenerative diseases and metabolic disorders and develop early diagnostic techniques.

Molecular and Cellular Brain Science

Systems Brain Science

- Interoception and behavioral plasticity
- Neurobiological understanding and overcoming techniques of mental illness
- Neuron-glia interactions underlying emotional behaviors
- Circadian rhythm and behavior
- Functional evo-devo study of locomotor neural circuits
- Behavioral disorders and psychiatric illnesses by dysregulation of behavioral/ cognitive plasticity
- Identification of plastic-degrading bacteria and enzymes

Systems Brain Science

Brain Engineering

- State-of-the-art tools and methods for fundamental understanding of the brain
- Large-scale brain interface and high-resolution neural imaging
- Neural modulation techniques for manipulating brain signals
- Brain signal processing, encoding, and decoding
- Engineering approaches to rehabilitate, repair, and replace neurological deficits and disorders

Brain Engineering

Cognitive Brain Science

- Understanding the neural correlates of high-level cognition through convergent approaches of brain sciences
- Interrogating brain mechanisms of mental processes embracing memory, attention, problem-solving, decisionmaking, inference, and language
- Exploring the relationship of mind-brain-behavior by imaging, recording, and manipulating neural activity
- Investigating brain maps and brain networks using brain big data

Cognitive Brain Science

Computational Brain Science

- Deciphering proteomic structures and functions at an atom level through statistical and computational physics and investigation of physicochemical fundamentals of life science in Bio- Neuro-Brain system
- Mechanisms of protein fibrillization and proteomic principle of neurodegenerative diseases
- Supercomputing of dementia-predicting big-data and complex network analysis
- Supercomputing-based modeling of protein structure in the brain and nervous system
- Structure analysis of membrane proteins and receptor proteins in the view of signal transduction mechanisms through the cell membrane

Computational Brain Science

Research Centers

Research Centers(Dept. Brain Sciences)	DGIST Centers

- Neurometabolomics Research Center
- Center for Synapse Diversity and Specificity
- Animal Core Facility
- Core Protein Resources Center
- Supercomputing and Big Data Center

Research Topics

Brain Sciences	Neurocognition
Elucidating the fundamental principles of brain function at the molecular, cellular, tissue, and system levels	Identification of the brain regions responsible for higher cognitive functions and understanding of the network mechanism of cognitive processes
Brain Disease	**Neural Engineering**
Investigating the pathogenesis of brain diseases and its therapeutic mechanism	Understanding the structure and principles of information processing in the brain and developing technologies to implement them into AI systems

What curriculums does the Department of Brain Sciences provide to the students?

- Intensive courses for the basics of physiological and pathological mechanisms of the brain
- Courses centered on the experimental methods for the study of the brain function and structure
- Internships and seminars for in-depth as well as broad knowledge and thinking
- Taking courses from other departments, such as IT, RT, and ET, as a prerequisite for brain convergence science.
- Study the theoretical and computational biophysics in order to understand the fundamental physico-chemical principle behind the brain-cognitive phenomena

What are the goals of the Department curriculums?

- To provide creative and systemic education, research focused, inter-disciplinary training, and global networking in education and research
- Individual meeting with faculty for deeper one on one conversations
- To produce global leaders who will lead application of our knowledge for mankind on the basis of professional knowledge and research ability of the brain convergence science

What is the educational philosophy of the Department?

- Integrity : responsibility and honesty in performing and reporting research
- Collegiality : scientific interactions and communications
- Collaboration : sharing of knowledge and resources for mutual development
- Collective wisdom : sharing of knowledge for the pursuit of truth
- Social responsibility : the accountability of science to society
- Translation : conduct of research for clinical and practical application
- Partnership : partnership between faculty and students

What are extracurricular activities on-going in the Department?

- Student Symposium : At this student-run annual symposium, the students invite speakers for seminar and present their research work.
- Seminar : The Department invites renowned speakers for seminar.
- Convergence seminar : This seminar is co-hosted with other departments to facilitate convergent research and collaboration between the departments.

What topics are studied in the department of Brain Sciences?

Prof. Yong-Seok Oh (Department Chair)
My research is mainly focused on the molecular mechanism underlying major depression and its reversal by long-term antidepressant medication. We are pursuing the specific aims as follow.
- Identification of neuronal subtypes and molecules regulating mood/anxiety and their roles in the context of the neuronal circuit and behaviors.
- Neuro-adaptive responses to the prolonged antidepressant treatment, with a focus on cell-type specific transcriptional change.
- Serotonin-dopamine interaction and its relevance to depression and antidepressant actions.
- Exploration about molecular mechanisms underlying the comorbidity of metabolic diseases and the mood disorders.

Prof. Sukkyoo Lee (Associate Chair)
The overall broad goal of my work is to investigate biodegradation of plastics and the effect of microplastics on metabolism.
- Investigation of biodegradation of plastics includes identification of new bacterial species which can degrade plastics, and identification of genes and enzymes for plastic degradation. Plastic degrading enzymes function and structure with genetic engineering promotes development of new bacterial species for protein degradation
- Investigation of the effect of microplastics on metabolism is to study how microplastics function inside body in vitro and in vivo. My research focuses on identifying the metabolic changes caused by absorption of microplastics in the body and developing inhibitor for microplastics absorption. These studies will allow us to better understand the mechanisms how microplastics affect human health and develop a novel strategy to prevent microplastics absorption in the body.

Prof. Jaewon Ko
Neurons communicate with each other through synaptic transmission at specialized intercellular junctions called 'synapses'. Synapses form not only during development, but also throughout life. Synapses transmit, process, and compute neural information in the brain. During synaptic transmission, a presynaptic neuron releases a chemical neurotransmitter that is recognized by the postsynaptic neuron. Neurotransmitter release is triggered when an action potential opens voltage-gated calcium channels and calcium flows into the presynaptic nerve terminal. Released neurotransmitters elicit a postsynaptic response by binding to specific postsynaptic receptors. My laboratory is interested in how synapses form and function during development and in adulthood. Our work focuses on (1) the role of synaptic cell-adhesion molecules in shaping synapse properties, (2) pre and postsynaptic mechanisms of synaptic development, and (3) impairments in synapse formation and function in neuropsychiatric disorders. To address these questions, my laboratory employs multiple, interdisciplinary approaches ranging from biochemical and biophysical studies to physiological and behavioral analyses of mutant mice deficient in key synaptic adhesion molecules and their associated proteins. We are currently working on problems related to social cognitive processes at synaptic and circuit levels.
- Synapse formation and function by key synaptic cell-adhesion molecules
- Synapse formation and function by synaptic cell-adhesion associated scaffolds
- Neural circuit mechanisms mediating complex social behaviors in mice

Prof. Kyuhyung Kim
The overall broad goal of my work is to investigate the circuits and molecules that integrate environmental cues with internal signals to drive specific developmental and behavioral outcomes.
- dentification of the intra and intercellular signaling pathways that transmit pheromone (an environmental cue) signals and the molecular mechanisms by which food signals are integrated with pheromone signals to regulate neuroendocrine signaling and development.
- Investigation of the mechanisms and neuronal circuits underlying proprioception. My research focuses on identifying the neuronal and molecular mechanisms that underlie proprioceptive behavior using the C. elegans model system. These studies will allow us to better understand the mechanisms and neuronal circuits in higher animals including human.

Prof. Eun-Kyoung Kim
The goal of my research project is to elucidate the mechanisms by which the brain regulates energy homeostasis to prevent or treat metabolic diseases such as obesity, diabetes and neurodegenerative diseases.
- Appetite control for obesity and diabetes therapies : Identification of compounds or hormones to modulate hypothalamic regulation of food intake helps understand their cellular and molecular mechanisms of action for developing therapeutic strategies
- Autophagy in diabetes and obesity : Understanding of the role of hypothalamic autophagy and investigating the interplay between autophagy and apoptosis in the pancreatic beta-cells and neuronal cells using viral expression systems and in vivo experimental design holds the promising potential to develop new compounds targeting autophagic pathways
- Insulin actions on obesity, diabetes and neurodegenerative diseases : Characterization of central roles of brain insulin in neuroendocrine neurons of hippocampus and hypothalamus provides new insights on linking metabolism and neurodegeneration

Prof. Cheil Moon
My laboratory is studying the chemical senses of the brain, inparticular studying the processes of the olfaction using molecular, cellular, morphological and behavioral approaches & translating these knowledges into the biomedical fields.
- Structure and functions of olfactory systems : My laboratory is trying to understand the signal processes of olfaction in the brain. This includes the detection processes at the level of odorant receptors and networking of olfaction-related neurons in the brain and the molecular mechanisms underlying the signal transduction pathways of chemical sensation
- Translational research using olfactory systems : In this topic, we will determine the fundamental mechanisms of neuronal development by using the olfactory sensory neurons as a regeneration and neuroprotection model system and perform translational research to overcome numerous neural disorders including early detection kit development for neurodegenerative diseases, neuronal protection drugs against stroke and glaucoma etc.
- Olfactory cognition : In this topic, we are trying to understand how the brain processes various olfaction-related signals using various brain signal detection devices including the EEG device and fNIRS.

Prof. Myungin Baek

Movement is one of the key components of our lives. During movement motor neurons display rhythmic and patterned activities, which are determined by inputs to motor neurons including sensory inputs, local interneuron inputs, and descending inputs from the supraspinal centers. The local motor neuron activities are reported to higher brain centers through ascending pathways. The deeper understanding on what locomotor circuits are composed of and how the neuronal circuits become properly wired will allow us to take diverse approaches to help people with motor function defects. With this goal my research aims to :
– Identify molecular mechanisms that regulate motor circuit connectivity by testing the function of genes involved in the development of motor neuron morphology.
– Identify neuronal substrates comprising locomotor circuits and understand the role of each component in animal behaviors
– Understand gene regulatory mechanisms underlying motor circuit development through interspecies comparative approaches.

Prof. Byung-Chang Suh

My research goal is to understand the molecular mechanism and biophysical properties of ion channel modulation by membrane phospholipids in neuronal excitability and synaptic transmission, and then to examine the functional significance of membrane lipids and proteins in physiological and pathophysiological activities of neurons.
– KCNQ K+Channels and Epilepsy from Molecules to Medication :
To investigate the fundamental functions of membrane phosphoinositides (PIs) in the regulation of KCNQ channels and neuronal excitability in peripheral and central nervous systems. The results will provide new insight into the physiological significance of phospholipids in the regulation of cell excitability.
– Ca2+-Permeable Channels and Pain Signaling in Nociceptive Neurons :
To understand the effects of receptor-mediated modification of membrane phospholipids on nociceptive channels, such as VGCCs, TRPV1. and ASICs. This knowledge will contribute significantly to understanding the biophysical properties of lipids in pain transmission.
– Lipidomics : Modification and Functions of Phosphoinositides (PIs) :
To define the functional actions of PI turnover on signal transduction pathways in living cells, focusing mainly on voltage-gated ion channels. I will utilize several PI-specific modifying approaches including chemically inducible dimerization, voltage- sensitive phosphatases, and optogenetics which permit observation of PI modulation of channel activity without activating any other signaling pathways.

Prof. Jinsoo Seo

– Searching key factors and the underlying mechanisms mediating or accelerating age-associated cellular dysfunction and cognitive impairment
– Studying the pathological role of genetic and environmental risk factors associated with age-associated neurodegenerative diseases including Alzheimer's disease.
– Elucidating underlying mechanisms of neurodegenerative diseasecausing risk factors to develop novel therapeutics for preventing or ameliorating pathology.
– Utilizing patients or healthy individuals-derived induced pluripotent stem cells (iPSCs) and the CRISPR/Cas9 genome-editing tool to establish human model systems for studying aging brain and neurodegenerative diseases.

Prof. Ji Won Um

The goal of my research is to understand the pathophysiological mechanisms underlying neurological diseases(i.e. Alzheimer's disease, autism spectrum disorders, or schizophrenia) that may be caused by various forms of synaptic dysfunctions. To better understand how synaptic genes associated with those neurological disorders impact brain functions at synaptic, cellular and systems levels, we have aspired to alter the activity of specific neuronal circuits and to evaluate the consequences on pathology, network activity, and animal behaviors. To achieve our goals, we are using a combination of protein biochemistry, cell imaging, electrophysiology and mouse genetics. Three major research programs are currently ongoing in the laboratory. First, we are investigating how mutations of synaptic genes associated with autism spectrum disorders or schizophrenia alter synaptic functions. Second, we are studying molecular and cellular mechanisms through which synapses are formed and eliminated in health and disease conditions. Third, we are exploring the role of specific synaptic signaling proteins to elucidate mechanisms underlying the maintenance of excitation/inhibition balance at various synapses and circuits.

Prof. Seong-Woon Yu

My research interests are focused on neuronal cell death mechanisms in neurodegenerative diseases. A fundamental gap in our understanding of molecular mechanisms of non-apoptotic cell death and plasticity in switching between distinct cell death pathways hinders development of novel strategies for treatment of neurodegenerative diseases.
– Autophagic cell death mechanisms : The role of autophagy and its molecular mechanisms in neurodegeneration remain to be elucidated. Our study will bring to light the role of autophagy in neurodegenerative diseases, such as Alzheimer's disease, stress and psychiatric disorders.
– Neuroinflammation and microglia activation in the brain
 : This study will contribute to anti-inflammatory therapeutic design for neurodegenerative diseases. All these research programs will lead to a better understanding of the pathogenic mechanisms of neurodegenerative diseases, and thereby provide strategies for self-repairing of damaged human brain.

Prof. Wookyung Yu

My research agenda is to identify neural correlates which support highlevel cognition in humans. Main research topics are described as follows.
– Understanding the neural correlates involved in time estimation, implicit sequence learning, and cognitive control
– Modeling human cognitive functions with neuroimaging and behavioral data
– Big data analysis of the brain network and functions.
– Methods: psychophysics, magnetic resonance imaging (e.g., fMRI, dMRI, rsfMRI), and transcranial magnetic stimulation (TMS).

Prof. Kwang Lee

Neural Dynamics Lab addresses the fundamental principles underlying the functional brain with behavrial animal. Our missions are to discover the neural dynamics from a single neuron to large-scale neural circuits in the temporal and spatial conditions.
– Brain working mechanism in behavior, emotional memory, and decision-making
– Dynamic reconfiguration in neural population and brain network
– Dopamine dynamics in reward and locomotion
– Neural circuits and brain function in health and brain diseases
– Repairing learning deficits and neurological disorders using brain signal processing and neuromodulation techniques
– The next generation brain interface and neural imaging

Prof. Sung Bae Lee

The primary goal of our research is to reveal the cellular and molecular basis of neurodegenerative diseases such as Huntington's disease and Parkinson's disease that are often associated with protein toxicity or defective intracellular organelles. Our three major questions are listed below.
– What is the "cellular basis" of neurodegenerative diseases?
We aim to characterize specific neuronal abnormalities preceding cell death, such as mitochondrial defects or cytoskeletal alterations in these late-onset neurological disorders.
– How can we ameliorate the toxicity of aggregated proteins associated with neurodegenerative diseases? We are working on three possible strategies such as chaperone activation, autophagic clearance, and the use of structural inhibitors.
– What's the relationship between neuronal cellular aging and late-onset neurodegenerative diseases? It is of interest to see the changes in neuronal cellular vulnerability with aging against protein toxicity.

Prof. Hyosang Lee

The ultimate goal of our research is to understand the neurobiology of emotional behaviors, such as pain, itch, fear, and depression. We are interested in revealing the molecular and neuronal circuit mechanisms by which those behaviors are generated in response to external stimuli, and modulated and altered by competing external stimuli and internal states. Our approach to accomplish this goal combines molecular biology, biochemistry, histology, electrophysiology, and mouse genetics. We also use in vivo recordings and functional manipulations such as fiber photometry and optogenetics in combination with a battery of behavioral assays to measure the correlation and causal relationship between neuronal activity and behavioral changes.

Prof. Yongcheol Cho

While injuries to the central nervous system damage neurons resulting in degeneration and death, some sensory and motor neurons in the peripheral nervous system activate the axon regeneration program to regenerate axons and recover the original functions. Multiomics comparative analysis enables us to understand the molecular mechanism of the axon regeneration program for developing therapeutic applications.
– Manipulating axon regeneration program : Identifying potential players regulating axon regeneration program with understanding injury-responsive neuroepigenetics to manipulating axon regeneration program.
– Engineering regenerative potential : Screening injury-responsive factors from high-throughput in vitro axon regeneration assay platforms and developing therapeutic applications by engineering neuronal regenerative potential.
– Protecting neurodegeneration by understanding the biology of axonopathy
 : As axon degeneration is a hallmark of neurodegenerative disorders, identifying epigenetic players activating the axonal self-destructive program to develop methods for protecting neurodegeneration.

Prof. Han Kyoung Choe

• Control of higher brain functions by circadian rhythm and sleep
• Innovating behavioral studies by AI-assisted behavior measurement and analysis
• Generating mouse model of psychiatric, neurological disorders by genome editing of disease risk genes
• Revolutionizing viral vector for optimal gene delivery in industry- academia collaboration
• In our arsenal :
– Circadian measurement of physiology and molecular signatures, along with sleep measurement o Custom behavioral rig, behavioral monitoring sensor, and AI-assisted analysis
– Mouse genetics-stereotaxic brain surgery-opto / chemogenetics
– Fiber photometry, in vivo microscope, Neuropixel recording
– Circuit-specific genome editing with tailored AAV viral vector

Prof. Jung Ho Hyun

My lab's research focuses on decision-making processes in the brain, the role of neuromodulators as well as neuronal malfunctions in psychiatric diseases. Also, my lab's research seeks to define neural mechanisms to control how internal states of the brain are reconfigured when animals make flexible decisions that use different underlying computations. To meet our goals, we use several behavioral models in rodents in combination with various cutting-edge techniques such as miniaturized micro-endoscopy (miniscope) calcium imaging with multiple in vivo recording in freely-moving animals. Main projects are described below :
– Demystifying cognitive flexibility at single cell resolution
– Neuromodulatory role in structural learning using in vivo imaging and computational approach
– Neural correlates of inference in rodents
– Develop novel technology to selective labeling and control of emotion state of the intact brain

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Career & Major achievements. Postdoctoral fellow and research scientist at Picower Institute for Learning and Memory, MIT I Infinite K Award, MIT School of Science I POSCO T.J. Park Award I Many publications on the subiect of synaptic plasticity and Alzheimer's disease

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Interview

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Nationality I Republic of Korea
Assigned Lab I Laboratory of Neurobehavior and Neural Circuits (Prof. Kyuhyung Kim)

After a hard study, I'm going to show you happiness and sense of accomplishment Experience.

Q. What made you choose DGIST?
During my undergraduate studies, I engaged in research activities to investigate the impact of natural substances on brain activity. The process of proving hypotheses by using various experimental techniques appealed to me, leading me to decide to pursue graduate studies. Thanks to DGIST's state-of-the-art experimental equipment and its high reputation for excellent brain science research, I thought DGIST is the ideal environment for neuroscience research. While interning in Professor Kyuhyung Kim's lab during the summer, I realized the utility of C. elegans as a model organism and its high reputation for research. C. elegans shares similarities with mammals in terms of neurotransmitters and receptors responsible for synaptic transmission, and its short lifespan and ease of genetic manipulation makes it an ideal model for neuroscience research. Taking these advantages into consideration, I decided to pursue neuroscience research using C. elegans as a model organism and joined the Neurobehavior and Neural Circuits lab in Brain Sciences Department.

Q. What are the strong points of the department of Brain Sciences?
The educational program offered by the Department of Brain Sciences is highly well-coordinated. It begins with introductory classes that provide a general approach to neuroscience, covering basic concepts, which is beneficial for students with minimal background knowledge. Furthermore, the advanced courses focused on specific neuroscience fields allow students to select courses aligned with their research interests. These comprehensive curriculums facilitate the development of expertise in neuroscience. Additionally, weekly department seminars featuring renowned speakers enrich the academic experience and provide opportunities to explore new research areas. Furthermore, the department's close association with the Korea Brain Research Institute (KBRI) offers students numerous opportunities to collaborate on research projects in a diverse range of laboratories.

Q. Explain your research field and purpose at DGIST.
I am researching the molecular mechanisms of the brain's response to sensory perception and physiological changes through neuropeptides. Neuropeptides are neurotransmitters secreted by neurons to transmit signals, regulating synaptic transmission by binding to G protein-coupled receptors. As the nervous system utilizes neuropeptides to adapt and respond to physiological changes, I believe this research is essential for understanding brain function mechanism. To comprehend the brain's communication methods, I am investigating the receptors that neuropeptides bind to activate downstream signals. Based on this, I aim to deepen the understanding of the relationship between neuropeptides and receptors, elucidating the mechanisms by which the nervous system responds and adapts to external stimuli.

Q. What are you planning to do after graduation?
Understanding the mechanism of action of neuropeptides is crucial for uncovering how the brain operates. Based on the experimental results obtained during my master's and doctoral studies at DGIST, I plan to conduct more in-depth neuroscience research as a postdoctoral researcher. While neuropeptide research is actively conducted worldwide, there are still many challenges to be addressed. Therefore, I aim to go beyond simply elucidating the behavioral consequences of specific neuropeptide defects and strive to build a comprehensive understanding of their impact on the neuropeptide-receptor connectome within the nervous system. Ultimately, I hope to contribute to expansion of human knowledge by becoming an independent researcher based on these research experiences.

Q. Please advise our applicants.
It's important to consider one's areas of interest and the problems they wish to address through research before entering graduate school. Seeking tips from senior graduate students and professors through consultations can be helpful in making career decisions. DGIST offers a summer and winter internship program for students considering graduate school, which I personally participated in and highly recommend. Additionally, through the open lab program held in each graduate department, you can take lab tours and consult with professors and graduate students. Participating in these programs can provide valuable indirect experience in labs that interest you. While conducting research, there may be times when positive results are not achieved, but overcoming challenges and exploring more effective ways to validate hypotheses brings great satisfaction during graduate school. I am confident that by making careful decisions, you will experience the sense of accomplishment that I felt during the research program.

VI.
New Biology

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The department of New Biology aims to generate the world best creative knowledge, technology, science cilture, and talents to pave the way for new civilizaions through the realization of the New Biology based on holistic convergence education and research

The Department of New Biology aims to pioneer unexplored research areas and address long-standing fundamental questions to establish a new paradigm of biological sciences, thereby contributing to sustainable humanity.

Vision
Pioneer unexplored research areas in current biology and address societal issues

Goals
- Become the world's top 30 departments in biological sciences
- Research and graduate programs in three research clusters (DAC, CEP, MAB) contributing to sustainable humanity
- Fostering next generation scientists who can perform analytical thinking, independent research, and multidisciplinary collaboration

Research Clusters

FEP Food Security & Eco-Plants	DAC Disease & Aging Control

MAB Multi-omics & AI & Biotechnology
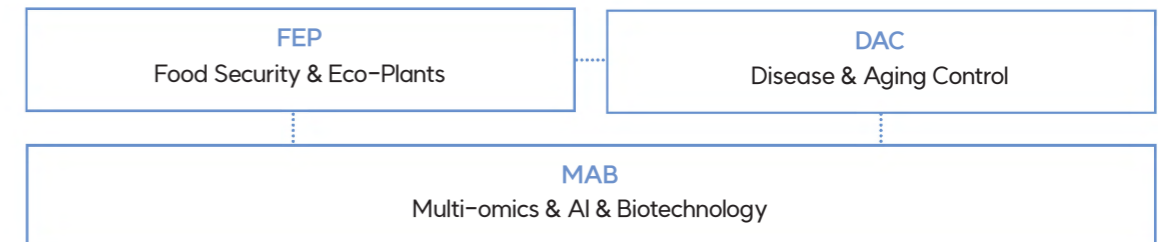
Graduate Program
- We foster future-oriented next-generation scientists who can mature into global leaders within an average duration of 5.5 years for degree completion
- We emphasize multidisciplinary research experience of graduate students through extended scientific training and collaborative research among faculty members and with leading international groups

Specialized Research Fields

Food Security & Eco-Plants (FEP) Cluster
- Goal : Elucidating the adaptive and developmental changes of living organisms in response to climate change and for a contribution to food security
- Professors : June M. Kwak, Hye Ryun Woo, Sang-im Lee, Pyung Ok Lim, Min-Sik Kim, Jin Hae Kim, Jong-Chan Lee
- Outlines
- Growth of human population and climate change threaten the sustainability of nature and humanity, thereby creating new challenges.
- It is necessary to secure sustainable agriculture by clarifying the principle of development and/or adaptation of living organisms(animals and plants) to climate change.
- FEP cluster focuses on investigating metabolism and function of organisms in response of climate change and for food securty in collaboration with the DAC cluster in the department
- Specialized Programs
- FEP1 : Studies of plants on the principles spatiotemporal development and adaptation to environmental changes and evolutionary strategy
- FEP2 : Studies on metabolism and function linked to vitality and aging
- FEP3 : AI-based studies on plant growth and functional enhancement

Disease & Aging Control (DAC) Cluster

- Goal : Studying diseases and aging for better human life
- Professors: Jaehyung Koo, Younghoon Kee, Minseok Kim, Yoori Kim, Chang-Hoon Nam, Kyung moo Yea, Byung Hoon Lee, Young Sam Lee, Jae Min Lee, Chang-Hun Lee, Youngtae Jeong, Chan Chung, Il Kyu Choi, Min-Sik Kim, Jin Hae Kim, Jong-Chan Lee
- Outlines
- Early disease diagnosis, customized precision medicine, and new drug development are key areas for securing global competitiveness and creating new bio-industry in the future life sciences field.
- The need for researches of vitality and healthy aging has increased as social, economic, and health care costs increase due to rapid growth of aged population.
- DAC cluster contributes to human permanence through the development of technologies for disease and aging control.
- Specialized Programs
- DAC1 : Studies on pathology, early and precise diagnosis of disease, precise control and prevention
- DAC2: Studies on the development of new drugs linked to new convergence technologies
- DAC3: Studies on cell aging, reverse aging, aging disease mechanism, and aging control technologies
- DAC4: Studies on reorganization of biomolecular structures induced by aging and disease

Multi-omics & AI & Biotechnology (MAB) Cluster

- Goal : Developing core technologies in multi-omics, artificial intelligence, and biotechnology
- Professors : Minseok S . Kim, Min-Sik Kim, Yoori Kim, Kyungmoo Yea, Jong-Chan Lee
- Outlines
- Multi-omics, AI, biotechnologies are at the core of the biohealth industry innovation strategy in the era of 4th industrial revolution.
- MAB cluster develops multi-omics, AI, biotechnology as core underpinning technologies to establish the basis for an original and distinguished new biology research program.
- Specialized programs
- MAB1 : Studies on building multi-omics data production platform
- MAB2 : Studies on new artificial intelligencec onvergence technologies for multiomics bio big data analysis
- MAB3 : Development of core technologies for life science and biomedical engineering

Convergence with Other Disciplines

- Participation in education and research aimed at acquiring groundbreaking technology to contribute to sustainable humanity (food, energy, medicine, environment, etc.) based on matrix-structured interdisciplinary pursuits with other departments at DGIST
- Engagement in convergence research projects across various disciplines including nanobio, IT convergence, robot systems and energy (Example: Nerve Aging and Regeneration Research(DGIST Flagship)/ Space Farm/Quantitative Measurements and Control of Human Body Activities Including Aging/Habitat)

Interview Process

- Interview (10 min) : Qualification evaluation of personality, leadership and communication skills including English, creativity, and knowledge required for study of convergence biology.
- Oral Presentation : Each applicant will be asked to give a 30 min presentation, which includes a 10 min Q&A. Presentation topic will be announced a few days before the presentation.
- Online interview can be arranged for students residing outside Korea, upon early request.
  ※ Applicants should arrive 30 min before the interview.
  ※ Detailed guidelines will be provided prior to the interview.

Major research facilities

Bio-imaging Core Facility
- State-of-the-art fluorescence microscope and confocal microscope
- Super-resolution optical microscope (STED, PALM)
- Nano-bio imaging (TOF-MEIS, SR-CARS, SPRIE-TIRF, bio -SIMS/MALDI/PADI)
- Single-molecule fluorescence measurement platforms
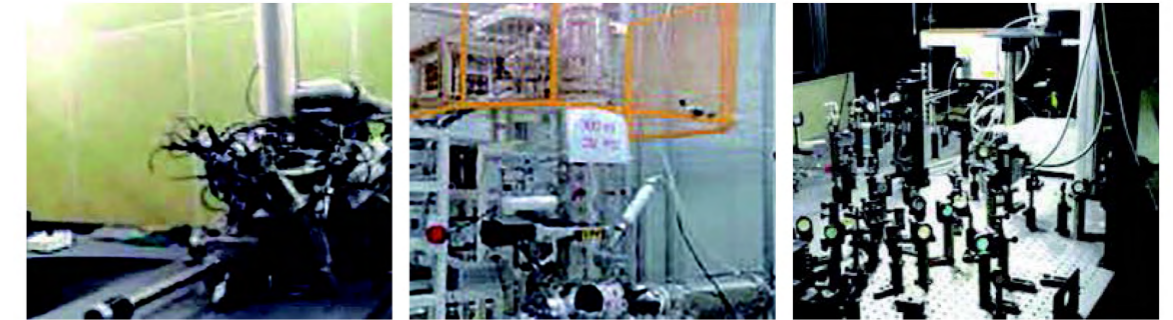
Automatic Multi-Omics Facility
- High-tech multi-omics facility for automated transcriptomics, proteomics and metabolomics analysis

Physiological Phenome Facility
- World-class plant growth control system
- Non-invasive and real time monitoring system for plant physiological phenome
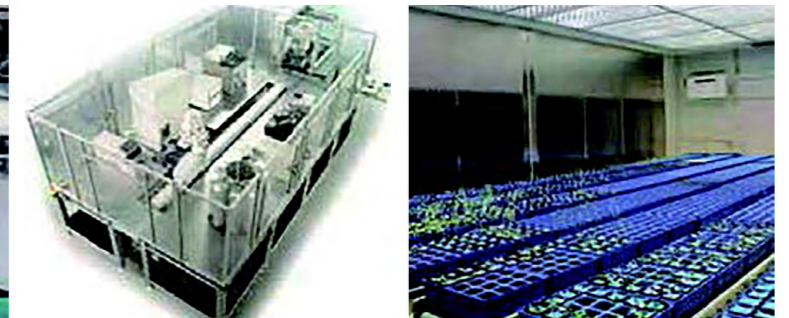
Laboratory Animal Resource Center
- Pathogen-free growth environment
- Isolated experimental areas

Central Equipment Center
- Top-notch infrastructures and research support for biological analyses

Mice   Rats

Guinea pigs   Rabbits   Mini pigs

What topics are studied in the department of New Biology?

What kind of interesting researches are going on in New Biology?

The Department of New Biology aims to integrate the various sub-disciplines of biology and other disciplines of science (physics, chemistry, engineering, and computer science) to establish a new paradigm of biological sciences and pioneer unexplored research areas. We thereby seek to tackle scientific and societal problems in health, food, and environment that humans are currently facing. To this end, the following education/research programs are in operation.
• Food Security & Eco-Plants : Elucidating the adaptive and developmental changes of living organisms in response to climate change and for a contribution to food security
• Disease & Aging Control : Studying diseases and aging for better human life
• Multi-omics & AI Bioinformatics : Developing core technologies for life science and biomedical engineering

The Department of New Biology offers a specialized curriculum.

The Department of New Biology offers its own curriculum to nurture future-oriented, next-generation scientists to have them grow as global leaders. Students are expected to complete their graduate studies within five and half years. To enhance the multidisciplinary research experience of graduate students, the Department provides graduate students with the opportunities to extend their scientific training through collaborative research among faculty members as well as with international leading groups. Graduate students will have the opportunities to attend international conferences, which helps to gain academic experience, international awareness and to secure competitiveness.

Who are the right students for New Biology?

The New Biology department is looking for creative and talented students who are capable of not only raising new issues instead of merely solving given problems but also creating knowledge and technologies. Students shall be outstanding scientists through a holistic curriculum with various topics such as scientific creativity, logic, ethics, the history of scientific discoveries, business administration, philosophy and communication.

Who can apply for New Biology?

Undergraduate students from any disciplines with an interest in convergence biological science are welcome to apply to the New Biology department at DGIST. Students majoring in New Biology are expected to enjoy confronting challenges and creative thinking, which are characteristics required for student-led learning and research.

How is the research environment in New Biology?

Instead of the typical laboratory-based environment, the New Biology department integrates education and research in a matrix structure, and maximizes research and learning capacity for largescale projects. Students will be offered diverse opportunities to participate in major research groups during their course of study and expected to produce world-class results.
– Translational Responsive Medical Center
Development and commercialization of precise biomedical technology for diagnosis and treatment of intractable diseases. Vitalization of start-up in fields of personalized targeted therapeutic drugs and diagnosis. Synergy maximization with Daegu Gyeongbuk hightech medical complex and contribution to companies in local community.
• Disease mimic biochip, disease model animals
• Precision biomedical stimulation, Precise cell separation, Precision tissue engineering
• Antibody therapeutics and Cancer immunotherapy

Are there extracurricular activities in the department?

Various extracurricular activities help the development of students in the department of New Biology by stimulating open discussions and knowledge exchange.
• New Biology Research in Progress (NBRiP) semina : Research exchange meeting led by graduate students and researchers in the department.
• Inter-lab social activities including the Year-end lab festival and research photo exhibition
• DGIST Post-Graduate Research Abroad Awards : a program for graduate students in the department which supports international lab visits and research exchange

How can we learn about the department of New Biology in more detail?

You can apply for the following programs to learn more about the department
• Summer and winter internship program
• DGIST graduate school open lab
• New Biology Boot Camp

Faculty

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Degree. POSTECH, Ph.D.
Research interests. Development of Antibody Drugs I Devebpment of Antibody Selection Tech I Antibody enneering I Cellular Communication
Career & Major achievements. The Scripps Research Institute (Lo Jolla), Assistant Professor I Shanghai Tech University, Research Associate Professor I Development of Anti-cancer, Antiretinopathy Antibodies I Establishment of New Method for the Agonist Antibody Selection

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Degree. POSTECH, Ph.D.
Research interests. Systems Genetics and Environmental Interactions
Career & Major achievements. Professor University of Maryland, College park I Editorial Board member, J.Plant Biology

JaeHyung Koo
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Degree. Yonsei University, Ph.D.
Research interests. Infection/Inflammation I Brain-Immune Crosstalk in Cancer I Brain-Metabolic Control I Unraveling Brain-Microbiota-Gut Interactions I Exploring/Therapeutically Exploiting
Career & Major achievements. Assistant Professor, University of Maryland School of Medicine I Associate Professor, Brain & Cognitive Sciences, DGIST I Visiting Professor, Johns Hopkins Medicine I Associate Vice-President for Research Affairs, DGIST I DGIST Best Research Award('17) I 1st DGIST Way Award('16) I General Secretary for KSBNS('17) I Editor for BMB Reports

Younghoon Kee
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Degree. University of Texas at Austin, Ph.D.
Research interests. Genomic instability, DNA replication stress I DNA damage and repair I Tumor Suppressive mechanisms
Career & Major achievements. Postdoc fellow, Dana-Farber Cancer Institute / Harvard Medical School I Tenured Associate Professor, University of South Florida. I Academic Editor, PLOS One journal

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Degree. KAIST, Ph.D.
Research interests. Nanobiotechnobgy I Nanomedicine I Aging recovery technology I In vitro diagnostics I Biomimetic system I BioMEMS
Career & Major achievements. Director, DGIST Translatrnal Responsive Medicine Center I Assistant Professor, Konyang University I Senior researcher, Samsung Advanced Institute of Technology I Director of The Korean BioChip Society (KBCS) I Gold prize in Samsung Human Tech Paper Competition ('10)

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Degree. Johns Hopkins University School of Medicine, Ph.D.
Research interests. Mass Spectrometry I Proteomics I Proteogenomics I Precision Medicine I Biomarker
Career & Major achievements. Postdoctoral fellow, Istitute of Genetic Medicine, JHUSOM ('13-'16) I Albert Lehninger Award('14) I Assistant Professor, Kyung Hee University('16-'18) I Young Analytical Chemist Award from Korean Chemical Society('20)

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Research interests. Genome organization I Singlemolecule/cell imaging and protein dynamics I microfluidics
Career & Major achievements. Postdoctoral fellow, UT Southwestern Medical Center ('19-'21) I HHMI international research fellow ('15-'18)

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Degree. University of Wisconsin-Madison, Ph.D.
Research interests. Aging-induced structural changes of proteins I Protein misfolding & aggregation I Protein structure and dynamics
Career & Major achievements. Senior Researcher, Samsung Advanced Institute of Technology I Humboldt Research Fellow, Germany ('14)

Chang-Hoon Nam
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Degree. Institut Curie(UTC), Ph.D.
Research interests. Senescent immune remodeling I Inflamm-aging I Microbiome evolution during host aging I Phage engineering
Career & Major achievements. MRC-LMB (Postdoc) I KIST- Europe (Group leader) I DGIST School of Undergraduate Studies(Associate Prof.) I Lady Tata Memorial Trust International awards for research in leukaemia('04)

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Degree. POSTECH, Ph.D.
Research interests. Plant senescence & stress response I Plant stem cells I Epigenomics
Career & Major achievements. Assistant Professor, Chungnam National University I The Blue Ribbon Lecture Award ('10) I Academic Editor of Plants

Byung-Hoon Lee

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Degree. University of Texas Southwestern Medical Center at Dallas, Ph.D.
Research interests. Ubiquitin-proteasome system I Protein homeostasis I Chemical induced proteolysis I Small-molecule chemical screening and drug discovery in human disease
Career & Major achievements. Postdoctoral Scientist, Harvard Medical School & MIT I Scientific consultant, Proteostasis Therapeutics Inc ('11) I Alfred Gilman Award

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Research interests. Animal Ecology I Evolutionary Ecology I Ornithology
Career & Major achievements. Research Associate Professor, SNU Institute of Advanced Machinery & Design I Researcher, Ewha Womans University EcoScience Research Institute I Currently belong to the Editorial Boards of Frontiers in Ecology and Evolution and of European Journal of Ecology

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Degree. University of Texas at Austin, Ph.D.
Research interests. Restoration of cellular senescence I Structural and functional relationship of age-related proteins I DNA replication and repair
Career & Major achievements. Senior research staff, Samsung Advanced Institute of Technology

Jae Min Lee

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Degree. University of Michigan, Ph.D.
Research interests. Metabolism, diabetes and obesity I Endocrinology, hormonal regulation of metabolism I Cellular stress and signal transduction responses
Career & Major achievements. Research fellow, Harvard Medical School and Boston Children's Hospital

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Research interests. Single molecule Biophysics I Advanced Bioimaging I Cellular Liquid-Liquid Phase Separation
Career & Major achievements. Postdoctoral Researcher, Johns Hopkins University / School of Medicine

Chang-Hun Lee

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Degree. Johns Hopkins University, School of Medicine, Ph.D.
Research interests. Skin Physiology I Skin Diseases I Protein Biochemistry I Structure-based Drug Design
Career & Major achievements. Professor in the School of Undergraduate Studies I Post-Doc (Bloomberg School of Public Health, JHU) I DGIST Education Award ('19)

Pyung Ok lim

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Degree. Michigan State University, Ph.D.
Research interests. Long noncoding RNA-mediated regulatory network in plant aging I Plant aging and circadian clock I Coordination of subcellular organelles I Improvement of plant quantity and productivity
Career & Major achievements. Associate Professor, Jeju National University I Vice-Director, Subtropical Horticulture Research Institute I Rural Development Administration Adjunct Researcher

Youngtae Jeong

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Degree. Johns Hopkins University, Ph.D., Seoul National University, M.D.
Research interests. Stem cell biology I Cancer biology I Precision medicine, Organoid
Career & Major achievements. Instructor, Stanford University I ECFMG (US Medical License) certified

Chan Chung

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Degree. University of Michigan, Ph.D.
Research interests. Epigenetic changes in carcinogenesis I Metabolic regulation and genetic alteration in cancer I Interplay between Metabolism and Epigenetics I Targeting epigenetic modification for cancer therapies.
Career & Major achievements. Research Investigator, University of Michigan, Medical school

Il-Kyu Choi

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Degree. Yonsei University, Ph.D.
Research interests. Tumor immunology & immunotherapy I CD4+ cytotoxic T cell I Epstein-Barr virus as the human virobiota
Career & Major achievements. Instructor, Dana-Farber Cancer Institute & Harvard Medical School ('20-'21) I Claudia Adams Barr Award ('20)

Interview

Shirley Nguyen Ngoc Chau Thy
Nationality I Vietnam
Lab I QBIO and Precision Medicine lab

Experience happiness and a sense of accomplishment when the results are presented as papers after difficult research.

Q. What made you choose DGIST?

I first know of DGIST as a research-orientated institution with a strong emphasis on creativity and interdisciplinary collaborations. I was impressed by the well-equipped facility, alongside a multitude of innovative research themes that DGIST offered. Moreover, for an international student such as myself, studying abroad is not merely for acquiring knowledge but also to immerse oneself in cultural exchange. I discovered that DGIST's International Affairs team would organize excursions to explore the heritages alongside other engaging activities for students to adapt to Korean customs or simply to unwind after work. To top it all off, DGIST's generous financial benefits, which scholarships and stipends would be endowed to enrolled students, allow individuals to be engrossed in academic excellence without the monetary concerns.

Q. What are the strong points of DGIST and the department of New Biology?

DGIST presents an environment that is exceptionally conducive to scientific research. The campus harbors cutting-edge technologies and sophisticated systems which serve an array of purposes. For instance, the Laboratory Animal Resource Center provides invaluable management for research organisms, whereas the Supercomputing and Big Data Center supports interdisciplinary studies that offer multifaceted insights into overcoming pressing biological challenges. Moreover, New Biology students can work with fellow researchers from diverse departments such as Robotic Engineering or Brain and Cognitive sciences to elevate their research output's caliber, as shown by the prolific publications in distinguished journals annually. The seminars and lectures, delivered in English by renowned professors, ensure that international students can seamlessly follow along and stay abreast of the latest developments in the field. The Post-Graduate Research Abroad Awards also enable students to broaden their horizons and experience top-tier education at universities worldwide. With the opportunities that DGIST affords, individuals can unlock new avenues for their future endeavors.

Q. Explain your research field and purpose at DGIST.

In general, we employ state-of-the-art mass spectrometry to comprehend the alteration of proteomic and metabolomic profiles of ample diseases, including but not limited to cancers, neurodevelopmental disorders, and cardiovascular disease. Our objective is to translate the scientific knowledge into clinical utility. We are at the forefront of discovering the putative lung cancer biomarkers from patients' bronchoalveolar lavage fluid, and detecting the neoantigens for immunotherapy in gastric cancer and calcific aortic valve disease. Coming from a biomedical background, I am intrigued by the core regulation of pathogenesis, the protein interaction networks, and how they can be disrupted to halt disease progression. My own research focuses on peripheral neuropathy, aiming to unravel its molecular mechanisms for developing therapeutic regimes. By implementing the advanced multi-omics approach, we have justified the effectiveness of several drugs that can prevent the exacerbation of nerve damage and potentially reverse it. This will be of significance to diabetes patients and the aging cohort who have to endure chronic pains and debilitating conditions stemming from nerve degeneration.

Another aspect I invest most of my time in is characterizing the "toggle switch" of proteins, termed post-translational modification (PTM). A small perturbation in these switches might drastically lead to chaotic signals within and between cells. I have optimized the mass spectrometer-compatible methods to depict the holistic overview of the phosphorylation status of thousands of proteins and infer their contributions to cancer development. In the impending future, I aspire to transcend the understanding of other PTMs, such as nitrosylation, acetylation, and ubiquitination, to grasp the intricacy of their harmonized cross-talks.

Q. What was the best moment in your DGIST life?

It was a humbling experience for me to witness the discussion between experts in the medical and proteomic fields at an international conference regarding the application of artificial intelligence to biomarker discovery. I was indeed astounded by the study they devised, the opposing perspectives they raised, and their ability to efficiently process complex information to tackle potential shortcomings on the spot. All of which I would have missed if it were not for the financial support from DGIST that encouraged me to attend the event. In terms of life experience, I have lived a few delightful moments with my local friends. We assimilated the Korean tradition of viewing the sunrise on New Year's Eve by embarking on a 3-hour hike to the summit of the Biseul mountain, which is in the close vicinity of DGIST. Cliché, but I always think of it as an analogy of the postgrad journey – there will be a time that you are burnt out and question the meaning of it all. Yet, you can rest, adjust the gears, and return to the trail. The moment you are mesmerized by the dawn atop the mountain while catching your breath and saying to your companions, "we made it", all the perseverance will be worthwhile.

Q. What are you planning to do after graduation?

My experiences participating in multiple projects at DGIST have substantially cultivated my scientific mindset and myriad transferable skills that will ultimately pave my path toward success in academia and industry settings. My unwavering passion for combatting diseases is constantly kindled throughout the rigorous Ph.D. program. I consider it a great honor to have been inspired and mentored by numerous elites in the field. Therefore, I am compelled to pay it forward and bring out the best in the next generation through teaching and sharing the sheer wonder of scientific discovery with them. As such, I have planned to pursue an academic track, commencing with a postdoctoral position.

Q. Please advise our applicants.

Selecting a research focus that aligns with one's interests is crucial for postgraduate students. To this end, a short internship is advantageous for prospective applicants to explore personal inclinations, get the gist of the research routine, and acquaint themselves with critical thinking in a research-intensive milieu. Furthermore, adequate biological knowledge is a prerequisite for admission interviews and academic assignments. The notion that one should be curious to thrive is also particularly accurate in the New Biology research discipline. Building a habit of perusing scholarly articles is a good way to stay updated with the latest scientific advancements and expand one's intellectual horizons.

VII.
Interdisciplinary Engineering of Interdisciplinary Studies

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Interdisciplinary Engineering Major in Interdisciplinary Studies is designed for studies and research on intelligent mobilities and emerging devices, the key elements for the fourth industrial revolution, through interdisciplinary and multidisciplinary education. The main goal is to foster science and technology professionals with creative problem-solving skills through education and research at Convergence Research Institute in collaboration with other departments at DGIST Graduate School.

Interdisciplinary Engineering combines various fields of study and technologies that can respond to the rapidly changing industrial and social structure to seek creative convergence of science and technology for the future. We provide interdisciplinary education. Through the curriculum, we aim to nurture talents who have comprehensive design thinking capability and convergence research capacity on the fields drawing attention in the era of the fourth industrial revolution such as future autonomous mobilities, high-tech materials, components, and devices.

Vision

- To cultivate problem building and solving skills in the emerging technology fields
- To foster competences in creative, innovative science and technology for the future industries

▶ To nurture creative leaders in convergence science and technology

Research and Education Focus

- Cultivation of international leaders for the convergence energy devices through closely interconnected interdisciplinary system of DGIST.
- International exchange(including double-degree program) and team projects with global top Institutes
- Solution searching education and research experiences to technical challenges

Specialized Research Fields

- Interdisciplinary Engineering has pioneering curriculums that cover creative and interdisciplinary areas of research in convergence technology for intelligent mobilities and emerging devices, and in biotechnology
- Education system focused on core research fields by participating in R&D projects

Key Research Fields

Intelligent Mobilities
Autonomous Driving Technology/Human Mobility Interaction/High-Performance Radar Signal Measurement Technology

Emerging Materials and Components
Energy Conversion Materials & Technology/Functional Material for Carbon-neutral technology/ Sensors & Packaging Technology

Advanced Biotechnology
Practical Technology for Translational Medicine (Therapeutics, Diagnostics)/ Convergence Technology for Quality of Life(Medical Device & Services)

Career Opportunities after Graduation

- DGIST Convergence Research Institute
- National Research Institutes such as CRI of DGIST, ETRI (Electronics and Telecommunications Research Institute), ADD(Agency for Defense Development), KITECH(Korea Institute of Industrial Technology), etc.
- Research institutes of conglomerate, foreign companies, or promising middle-market enterprises such as Samsung Electronics, LG Electronics, and Hyundai Motor Group, SKT, Hyundai Heavy Industries, etc.
- Entering domestic and international graduate school doctoral programs and academic circles

Interview Contents

- Individual interviews to evaluate the essential background and professional knowledge.
- Oral presentation on self-introduction, experience or achievement of research, study or research plans, plans after graduation, etc. in both Korean and English
- The online interview can be arranged for students residing outside Korea, upon early request.

What topics are studied in Interdisciplinary Engineering Major in Interdisciplinary Studies?

What do you study at Interdisciplinary Engineering Major in Interdisciplinary Studies?

- Students learn about the world's leading convergence science and technologies and develop the emerging technologies, mainly focused on intelligent mobilities, intelligent robots, advanced materials and devices and biotechnology, the key technologies of the fourth industrial revolution.
- Like other departments at DGIST, students have opportunities to experience interdisciplinary and multidisciplinary research, and convergence R&BD (Research and Business Development), which cannot be provided in a traditional single major.
- Students will acquire advanced convergence knowledge and technologies by participating in government or industrial research projects conducted at DGIST Convergence Research Institute (CRI) as well as taking range of related courses offered at other departments.

What lecture courses and research projects are offered?

- Students acquire basic interdisciplinary knowledge by taking common courses offered at Convergence Science and other departments.
- After taking the basic common courses, students will take advanced interdisciplinary courses specialized in autonomous mobilities and emerging devices.
- Students perform Project-Based-Research (PBR), the program where students participate in a variety of interdisciplinary research projects in CRI.
- Students are focused more on carrying out research projects to acquire practical knowledge than on learning basic principles, which distinguishes IE from other departments. The main advisor can be chosen from the adjunct faculties of CRI. If needed, co-advisors can be selected from the faculties at IE or other departments, to conduct in-depth multidisciplinary research projects successfully.

Are there any specific undergraduate majors or mandatory courses required to apply for admissions into the graduate programs of IE?

- As the title of 'Convergence Science' itself implies, we welcome ambitious students who have the basic knowledge required for the Convergence Science programs with an academic background in the fields of science and engineering, not limited to computer, electric, electronic, mechanical, materials, or device engineering.

What are the expected fields for students to work in after graduation?

- After graduation, students would be able to work in most industries and academia related to the fourth industrial revolution, including the areas of IT, automobile, robotics, energy, device, and materials engineering.
- What makes this program better is that DGIST has cooperative networks of international and domestic research institutions where students can get further opportunities to work.

What is the difference in benefits between Interdisciplinary Studies and other departments?

- Students of the Interdisciplinary Studies department will receive the DGIST scholarship and should pay the tuition. However, they will receive a decent amount of stipend that is enough to cover the tuition fee. Since the full stipend comes from the external funding sources, participation in the related research projects is obligatory. Besides, Convergence Science students are not eligible to be a Technical Research Personnel (Convergence Science students are not exempt from military service).

Please introduce divisions of DGIST Convergence Research Institute (CRI).

- **Division of Future Automotive Technolog**
Division of Future Automotive Technology leads the development of convergence technology to create innovative value for the automotive industry. It aims to open a new era of automotive research that will address environmental issues by securing convergence technology of automotive with AI, Smart Sensor, and Iot for unmanned and accident-free smart cars.
  – Core Sensor and Element Technology for Smart Cars
  – Practical Technology for Autonomous Driving

- **Division of Electronics and Information System**
Division of Electronics and Information System conducts researches focusing on the following fields:
- High precision positioning/cognition technology and system based on multiple types of sensors to enhance the core cognitive performance of human support system in the future
- Bio-based Big Data analysis and diagnosis-treatment system based on AI (Artificial Intelligence)
- Display technology & Conformal electronics
- Open innovation research based on data science, system dynamics, and qualitative research-based business model
  – Multi-Sensor-based Cognitive Technology and System
  – Diagnosis-treatment system based on Big Data
  – Display & Conformal electronics

- **Division of Intelligent Robot**
Division of Intelligent Robot pursues excellence in research by securing the leading robotics technology. It plays a crucial role in making the domestic robotics industry competitive in the global market through the steady commercialization of its technology. The ultimate goal is to lead technology commercialization to build a welfare society where humans and robots coexist.
  – Collaborative Robotics
  – Human Cognitive and Physical Augmentation
  – Complex Information Processing Platform based on Life-log

- **Division of Energy & Environmental Technolog**
Division of Energy Technology focuses on next-generation thin-film solar cells, efficient hydrogen energy technology, and smart textile technology for energy conversion and storage, which is versatile, eco- friendly, and highly reliable. It aims to promote key research areas and commercialize its research performance.
- Eco-friendly and High-Performance Solar Energy
- Materials and Devices of Hydrogen Energy
- Energy Harvesting and Storage Technology for Wearable Electronics

- **Division of Nanotechnology**
Division of Nanotechnology focuses on new functional materials using nanotechnology and structure control technology. It includes synthesis and application technology of inorganic and organic composite materials.
- High-Performance Thermoelectric Energy Conversion
- Next-generation Extreme Low-power Semiconductor Materials/Devices
- Self-luminescent Nanomaterials and Colloidal Semiconductor Nanocrystals (Quantum Dots)

- **Division of Biomedical Technology**
Division of Biotechnology aims to improve human life quality through the combination of applied life science and biomaterial technology development. It conducts research on disease-related mechanisms and therapeutic targets, development of the molecular diagnostic index, which is a key technology to realize personalized precision medical care, and development of molecular and non-molecular diagnostic indicators, including drug-susceptibility.
- Establishment of the Biological and Computational Model for Controlling and Revealing the Mechanism of Incurable Diseases
- Application and Practical Use of Precision Medicine
- Functional Biomaterials and Bioplastics

Faculty

Intelligent Mobility

Choi, Gyeung-Ho
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Research interests. VILS | ADAS
Career & Major achievements. Distinguished Advisor Professor(KMUTNB) | KASA President | Korean Vehicle Safety Defects & Recalls Committee Member | Editor-in-chief KSEE | Adjunct Professor, University of Louisville

Kim, Sangdong
Adjunct Professor / Principal Researcher of Division of Automotive
T. +82-53-785-4561 E. kimsd728@dgist.ac.kr
Degree. Kyungpook National University Ph.D
Research interests. Multimodal sensor signal processing(Deep learning, Vital sign, Radar/Lidar)
Career & Major achievements. Pennsylvania state university Visiting scholar | Institute of Embedded Engineering of Korea Director | Minister of Science, ICT and Future Planning Award(2024)

An, Jinung
Adjunct Professor / Principal Researcher of Division of Intelligent Robot
T. +82-53-785-4610 E. robot@dgist.ac.kr
W. http://bri.dgist.ac.kr
Degree. KAIST Ph.D
Research interests. Robotics | Haptics | Brain-Machine Interface | Artifical Intelligence
Career & Major achievements. Researcher, Robotics & Mechatronics Institute, German Aerospace Center | Professor, Dept. of Robotics, Kwangwoon Univ. | Adjunct Professor, Purdue Polytechnic Institute, Purdue Univ. | Adjunct Professor, Dept. of Biomedical Science & Engineering, GIST

Lee, Jong-Hun
Adjunct Professor / Principal Researcher of Division of Automotive Technology
T. +82-53-785-4580 E. jhlee@dgist.ac.kr
Degree. Sung Kyun Kwan University Ph.D
Research interests. Radar Sensor | Signal Processing | AI(Machine/Deep Learning) | Sensor Fusion
Career & Major achievements. Samsung Electronics Principal Researcher | Georgia Institute of Technology visiting scholar | IEEE senior member | Director of DGIST radar lab | IEMEK Vice President

Lee, Hyunki
Adjunct Professor / Principal Researcher of Division of Intelligent Robotics
T. +82-53-785-4654 E. hklee@dgist.ac.kr
Degree. KAIST. Ph.D
Research interests. Machine Vision | Intelligent Robot | Optomechatronics | Optical Metrology
Career & Major achievements. Koh Young Technology Inc. Sensor Team Leader | International Journal of Optomechatronics, Editorial Board Member

Choi, Byeongdae
Adjunct Professor / Principal Researcher of Division of AI, Big Data and Block Chain
T. +82-53-785-3420 E. bdchoi1@dgist.ac.kr
Degree. Tokyo Institute of Technology Ph.D
Research interests. Electronic devices | Display
Career & Major achievements. LG-Phillips LCD(LG Display) | RIST, Senior Researcher

Future Materials

Kim, Dae-Hwan
Adjunct Professor / Principal Researcher of Division of Energy & Environmental Technology
T. +82-53-785-3720 E. monolith@dgist.ac.kr
Degree. Ph.D. (Chemical Engineering), POSTECH
Research interests. Thin film solar cells | CIGS/CZTS solar cells | ALD for high-k dielectrics
Career & Major achievements. Highest efficiency of CZTS solar cells, DGIST | Inventor of DRAM-MESH Process, Samsung Electronics

Kim, Dong Hwan
Adjunct Professor / Principal Researcher of Division of Nanotechnology
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W. kim.dgist.ac.kr
Degree. Japan Advanced Institute of Science and Technology. Ph.D
Research interests. Thermoelectric technology | Energy conversion device | Permanent magnet
Career & Major achievements. Senior Researcher/ Research Professor, Gyeongsang National University | Scholarship Researcher, Japan Advanced Institute of Science and Technology

Kim, Soonhyun
Adjunct Professor / Principal Researcher of Division of Energy & Environmental Technology
T. +82-53-785-3410 E. sh2358@dgist.ac.kr
Degree. POSTECH. Ph.D
Research interests. Photocatalysis | Advanced Oxidation Process | H2 Production | Nanomaterials for Photoenergy Conversion
Career & Major achievements. CALTECH Visiting Scholar

Kim, Cham
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W. https://scholar.dgist.ac.kr/researcher/profile?ep=1081
Degree. Ph.D.(Chemical Engineering), Postech
Research interests. Nanochemistry | Thin films and bulk structures for energy conversion materials | Thermoelectric materials | Electrode materials for LIBs
Career & Major achievements. Principal researcher, DGIST | Visiting professor, University of Arizona, USA

Sung, Shi-Joon

Adjunct Professor / Director of Division of Energy & Environmental Technology
T. +82-53-785-3721 E. sjsung@dgist.ac.kr
Degree. Ph.D., KAIST
Research interests. Thin Film Solar Cells | Compound Semiconductor Materials & Processes | Interfacial Engineering of Energy Devices
Career & Major achievements. Principal Engineer, Samsung Electronics | Courtesy Faculty, Oregon State University

Lim, Sang-Kyoo

Adjunct Professor / Principal Researcher of Division of Energy & Environmental Technology
T. +82-53-785-3510 E. limsk@dgist.ac.kr
Degree. Yeungnam Univ. Ph.D
Research interests. Wearable Sensor & Materials | Functional Fiber Materials | Carbon based Hydrogen Storage Materials
Career & Major achievements. Senior Researcher of SAMSUNG Cheil Industries | Researcher of Shizouka University, Japan | Adjunct Professor Kyungpook University | The Minister of Science & Technology Award(2007)

Jung, Minkyung

Adjunct Professor / Principal Researcher of Division of Nanotechnology
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Degree. University of Tokyo Ph.D
Research interests. Nanoelectronic device | Nanomaterials | Spintronics | Quantum hybrid system
Career & Major achievements. Postdoc, University of Basel (Switzerland) | Postdoc, Princeton University (US) | Postdoc, KRISS (Korea)

Chung, Seok-Hwan

Adjunct Professor / Senior Researcher of Division of Nanotechnology
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Degree. Maryland Univ. Ph.D
Research interests. Nano-magnetic materials & devices | Thermal interface material | Display materials
Career & Major achievements. Research Scientist, NIST/UMD Nano-Center | Post-doc, Argonne Lab.

Jeong, Soon Moon

Adjunct Professor / Principal Researcher of Division of Energy & Environmental Technology
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Degree. Tokyo Institute of Technology Ph.D
Research interests. Photonic/Optical materials | Luminescent devices | Stretchable devices
Career & Major achievements. Visiting Researcher, UCSD | Senior Researcher, Central Technical Research Laboratory, Nippon Oil Corporation | Researcher, Deparatment of Organic and Polymeric Materials, Tokyo Institute of Technology | Prime Minister's Citation (Ministry of Science and ICT, 2018), Achievement award (DGIST, 2016), "DGISTian of the year" award (DGIST, 2013)

Biotechnology

Kim, Hyunmin

Head of Department of Interdisciplinary Engineering / Principal Researcher of Division of Biomedical Technology
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Degree. UC-Irvine Ph.D
Research interests. Label-free nonlinear bioimaging | SHG/SFG microscopy | Ultrafast carrier dynamics | Quantum physics of low dimension materials
Career & Major achievements. Research associate National institute of standards and technology & KRICT

Kim, Tae-Wan

Professor
T. +82-53-785-6810 E. taewan79@dgist.ac.kr
Degree. Seoul National Univ. Ph.D
Research interests. Stem Cell, Epigenetics, Neuron Development and Degeneration, Neurodegenerative Disease, Cell Replacement Therapy
Career & Major achievements. Medical Researcher, Seoul National Univ | Senior Researcher, Memorial Sloan-Kettering Cancer Center

Kim, Jin-Young

Adjunct Professor / Principal Researcher of Division of Biomedical Technology
T. +82-53-785-2555 E. jy.kim@dgist.ac.kr
Degree. Imperial College London. Ph.D
Research interests. Body-on-a Chip | 3D Micro-organs | Microfluidic chips | BioMEMS
Career & Major achievements. Post-doc ETH Zurich, Switzerland

Kim, Hojeong

Adjunct Professor / Senior Researcher of Division of Biomedical Technology
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Degree. Ph.D. University of Alberta
Research interests. Motor control | Computational neurophysiology | Neuromodulation
Career & Major achievements. Research Associate Northwestern University | Researcher Agency for Defense Development

Lee, Yun-Il

Adjunct Professor / Director of Well Aging Research Center / Principal Researcher of Division of Biomedical Technology
T. +82-53-785-3313 E. ylee56@dgist.ac.kr
Degree. Seoul National Univ. Ph.D
Research interests. Aging Neuroscience | Neurodegenerative Disease (Parkinson's Disease) | Neural disease in PNS | Aging-related disease
Career & Major achievements. Team Leader of Well Aging Research Center, Samsung Advanced Institute of Technology(SAIT) | Instructor, Johns Hopkins Univ. School of Medicine | Postdoctoral fellow, Johns Hopkins Univ. School of Medicine

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Interview

GyeongHo Choi
Professor of Interdisciplinary Engineering Major

Don't decide on your limits, but grow your intellectual curiosity..

Q. What does the new beginning of DGIST Interdisciplinary Engineering mean?

With the rapid development in information and communication, disruptive innovation of technology is becoming more common, while the conventional concepts and technologies have been reinterpreted and converged throughout the whole history of the Industrial Revolution. The life cycle of technology is getting shorter as the creation and replacement of the emerging technologies take place in the short term. Moreover, knowledge acquired in school is likely to become obsolete. The researchers are being forced into a fierce competition of research and development. Our degree program is pursuing project-based research through systematic thinking about complex realities and interdisciplinary convergence in the curriculums rather than merely acquiring knowledge. Students are expected to acquire creative competences to respond to future needs based on practical issues, not limited to basic principles.

Q. What do you expect from the students of DGIST Interdisciplinary Engineering?

Through the project-based research, students are expected to clarify concepts of basic science and engineering learned in classes and to establish a foundation communicating with adjacent disciplines effectively. Students are encouraged to build critical and creative thinking skills to respond quickly to rapid changes in the technological revolution of the 21st century. I also encourage them to maximize their intellectual curiosity through seminars in various fields. Please pay attention to the history and the development of civilization by studying history, humanities, and so forth. I hope students cultivate qualities to be a creative, socially respectful, and influential leader with whom colleagues feel comfortable to work.

Q. Through Interdisciplinary Engineering, what kind of scientist should students be?

I hope students gain balanced thinking skills by cultivating extensive academic competency both in their specialized and adjacent fields so that they can respond to rapid changes in technologies and complex practical issues. It would be the best if you were a scientist capable of creating new concepts and or finding important issues for the future through endless intellectual curiosity. Keep in mind that being a pioneer or a follower depends on your performance to collect and utilize knowledge around you.

Q. What advice would you give to students who are considering their career?

If you are considering graduate school, you are the ones who obviously benefited from humanity and society. You are all obligated to contribute to society after graduation. As you are responsible for raising the next generation, your choice is undoubtfully important. Take your time to think about what you genuinely like to do. Imagine how it would be helpful for society and then choose the most significant thing you can make it possible. Sometimes the outcome may be delayed. However, trust on yourself and keep on it. The effort won't betray you.

VIII.
Artificial Intelligence of Interdisciplinary Studies

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The AI department aims to produce advanced AI experts who can perform world-class AI development and research in practice by convergence of multidisciplinary studies based on the best AI faculty and infrastructure. It provides a differentiated curriculum that converges AI with smart city, manufacturing/innovation, bio/medical fields, which is attracting attention in the era of the 4th industrial revolution, and operates a convergence research program that meets the needs of domestic and local industries.

The AI major aims to produce advanced AI experts who can perform world-class AI development and research in practice by convergence of various disciplines based on the best AI faculty and infrastructure. We provide a differentiated curriculum that converges smart city, manufacturing/innovation, bio/medical and artificial intelligence, which is attracting attention in the era of the 4th industrial revolution, and operates a convergence research program that meets the needs of domestic and local industries.

Vision

- To discover AI problems through close industry-university collaboration projects
- To provide creative and innovative AI education curriculum

▶ **Cultivating practical advanced AI convergence innovation talent**

Research and Education Focus

- Provide AI-specialized curriculum
- Securing convergence education program tied with key AI research fields
- Provide personalized project courses for student's career
- Convergence industry-university joint education track provided: AI-Startup, AI Industry-University Linkage, AI Industry-University Cooperation

Key Research Fields

ML Theory
Explainable AI/Efficient AI/AI Optimization Human-AI Interaction/Learning Data Optimization

Vision & Imaging
Visual Recognition and Video Processing/Real-time Deep Learning Network Weakly supervised Learning/ Video Inverse Problem/Medical Image Analysis

AI Robotics
Robot Automation/Surgery Robot Vision System/ Unstructured Data Analysis Edge Computing/ Personalized Service

AI System
AI Accelerator Design/Real-time Training and Inference/Cyber Physical System/AI Security ML-based Data Recovery/Brain Interface

Applications
Bio/Medical/Manufacture/Industry/Smartcity

Career Opportunities after Graduation

- DGIST Convergence Research Institute
- National Research Institutes such as CRI of DGIST, ETRI (Electronics and Telecommunications Research Institute), ADD(Agency for Defense Development), KITECH(Korea Institute of Industrial Technology), etc.
- Research institutes of conglomerate, foreign companies, or promising middle-market enterprises such as Samsung Electronics, LG Electronics, and Hyundai Motor Group, SKT, Hyundai Heavy Industries, etc.
- Entering domestic and international graduate school doctoral programs and academic circles

Interview Contents

- Individual interviews to evaluate the essential background and professional knowledge.
- Oral presentation on self-introduction, experience or achievement of research, study or research plans, plans after graduation, etc, in both Korean and English
- The online interview can be arranged for students residing outside Korea, upon early request.

Faculty

Young-Sik Kim
Department Chair, Professor
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W. https://sites.google.com/view/pacl/
Degree. Ph.D., Seoul University
Research interests. Post-Quantum Cryptography | Fully Homomorphic Encryption | Applied Cryptography | AI Security | Privacy Enhancing Technology | Smart Car Security
Career & Major achievements. Chair of The Interdisciplinary Studies of Artificial Intelligence and Super-computing AI Education-Research Center | Professor, Chosun University | Senior Engineer, Samsung System LSI Division | Leader of Future Technology, National Academy of Engineering of Korea | The recipient of Prime Minister's Commendation (2024)

Jeongho Kwak
Associate Professor
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Degree. Ph.D., KAIST
Research interests. Mobile AI | Reinforcement Learning
Career & Major achievements. Researcher, National Research Institute of Science (INRS), Canada (2015-2017) | Researcher, Trinity College Dublin, Ireland (2017-2019) | EU Marie-Sklodowska Curie Research Fellowship (2017)

Gain Kim
Assistant Professor
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W. http://sites.google.com/view/gainkim
Degree. Ph.D., EPFL, Switzerland
Research interests. Wired/Wireless Communication Circuit | Hardware Accelerator | Reconfigurable Semiconductor Circuit
Career & Major achievements. Postdoctoral Researcher, KAIST | Senior Researcher, Samsung Research | IEEE CASS Pre-doctoral schorlarship Award(2018)

Kyung-Joon Park
Professor
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W. https://csi.dgist.ac.kr
Degree. Ph.D., Seoul National University
Research interests. Cyber-Physical Systems | Robot Operating System (ROS) | Smart Manufacturing
Career & Major achievements. Senior Engineer, Samsung Electronics | Postdoctoral Research Associate, UIUC | Associate Editor, IEEE Trans on Industrial CPS | Top 100 Outstanding Achievements in National R&D (2023)

Yeseong Kim
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Degree. Ph.D., UC San Diego, USA
Research interests. Next-Generation Embedded Systems | Hyperdimensional (HD) Computing | Machine Learning
Career & Major achievements. Samsung Research America | Intel, USA

Gyeongsik Moon
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W. https://sites.google.com/view/3dvg-dgist/home
Degree. Ph.D., Seoul National University
Research interests. Computer vision, Computer graphics, machine learning
Career & Major achievements. Postdoctoral Research Scientist, Meta

Inkyu Moon
Professor / Associate Vice President for Information and Library Services
T. +82-53-785-6223 E. inkyu.moon@dgist.ac.kr
Degree. Ph.D., University of Connecticut, USA
Research interests. Image Processing & Optical Imaging | Deep Learning | AI-based Cryptography/Cryptanalysis
Career & Major achievements. Adjunct Faculty, Univ. of Connecticut | Professor & Director, Chosun University Exchange Professor Program Award, LG Yonam Culture Foundation | Director of Global Research Lab (GRL) Program, National Research Foundation of Korea | Nomination for Distingushed Alumni Award, Univ. of Connecticut | Director of BK21Four Program | Ministry of Science and ICT Award

Kyungseo Park
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Degree. Ph.D., KAIST
Research interests. Robotics | Physical Human-Robot Interaction
Career & Major achievements. Visiting scholar, Max-Planck Institute | Postdoc, University of Illinois Urbana-Champaign

Sang Hyun Park
Associate Professor
T. +82-53-785-6222 E. shpark13135@dgist.ac.kr
Degree. Ph.D., Seoul National University
Research interests. Medical image analysis | Computer vision | Machine learning
Career & Major achievements. SRI International at Menlo Park, Postdoctoral fellow (2016~2017), University of North Carolina at Chapel Hill, Postdoctoral fellow (2014-2016)

Daewon Seo
Assistant Professor
T. +82-53-785-6340 E. dwseo@dgist.ac.kr
Degree. Ph.D., University of Illinois Urbana-Champaign, USA
Research interests. Artificial Intelligencel | Social networks | Information theory
Career & Major achievements. Postdoctoral Researcher, USC | Postdoctoral Researcher, UW-Madison

Jinhyun So
Assistant Professor
T. +82-53-785-6343 E. jinhyun@dgist.ac.kr
W. https://sites.google.com/view/distributed-ai-lab
Degree. Ph.D., University of Southern California, USA
Research interests. Distributed AI | Federated Learning | On-device AI
Career & Major achievements. Staff Research Engineer, Samsung Cellular & Multimedia Lab, USA (2022-2024) | Ph.D. Research Intern, Microsoft Research, USA (2021) | Engineer, Samsung Model Development Team, South Korea (2013-2017) | Best Paper Award, 2022 NeurIPS Workshop

Jean Young Song
Assistant Professor
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Degree. Ph.D., University of Michigan, Ann Arbor, USA
Research interests. Human-Computer Interaction | Artificial Intelligence | Human-AIInteraction | Crowdsourcing
Career & Major achievements. Research Professor, KAIST, Rep. of Korea | Best paper and honorable mention awards (ACM IUI 2018, ACM CSCW 2019, ACM AAMAS 2020)

Cheol Song
Associate Professor
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Degree. Ph.D., KAIST
Research interests. Metaverse human-robot interaction | Intelligent mechatronics system | Intelligent biomedical system
Career & Major achievements. KAIST Postdoctoral Researcher | Johns Hopkins University Postdoctoral Researcher | KROS Young robot scientist award(2016) | KROS Best paper award(2021)

Sehoon Oh
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Degree. Ph.D., University of Tokyo
Research interests. Motion control | High precision control and application | Electric vehicle control | Novel Actuator and control | Learning and control of manipulator | Quadruped robot and control
Career & Major achievements. Project Assistant Professor, University of Tokyo | Visiting Scholar, University of Texas at Austin | Senior Engineer, Samsung Heavy Idustries | Guest Professor at Osaka University | German Aerospace Center (DLR) Guest Scientist | Best Paper award(IEEE TIE)

Jae sok Yu
Assistant Professor
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W. https://ultrasound.dgist.ac.kr
Degree. Ph.D., University of Pittsburgh
Research interests. Biomedical multimodal ultrasound and photoacoustic molecular imaging system and technologies | Ultrasound and photoacoustic based therapeutics | Translational research towards a clinical utility
Career & Major achievements. Postdoctoral Fellow, Georgia Institute of Technology & Emory University | Predoctoral Fellow, University of Pittsburgh Medical Center & University of Pittsburgh | Cover for August issue of IEEE Transactions of UFFC (2017) | The Alavi-Mandell Award, Society of Nuclear Medicine and Molecular Imaging (2018)

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Degree. Ph.D., KAIST
Research interests. Biomimetic Robot | Soft Robotics | Robot elementary technology : Sensors and actuators | Study on the medical application | Study on the industrial application
Career & Major achievements. Researcher, Agency for Defence Development (ADD) | Senior researcher, Korea Institute of Machinery and Materials (KIMM) | Post-doc, UC Berkeley | KSME conference Paper Award (2007) | KSME conference Poster Award (2010) | KSPSE conference Paper Award (2015) | KIMM Achievement Award (2008, 2015) | KIMM Academic Award (2015)

Yongsoon Eun
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Degree. Ph.D., University of Michigan, Ann Arbor, USA
Research interests. Control theory for cyber-physical systems | Resilient cyber-physical systems | Control systems with nonlinear sensors and actuators | Cyclic control | Performance improvability of control systems | Variable structure control
Career & Major achievements. Senior Research Scientist, Xerox Research Center Webster, Xerox Corporation | Coauthor of the book 〈Quasilinear control〉 (2011) | Xerox Innovation Group Excellence in Research and Technology Award (2011) | 2nd Asian Control Conference Young Author Award (1997)

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Degree. Ph.D., KAIST, Rep. of Korea
Research interests. Edge intelligence | Processing-inmemory (PIM) architecture | Clock and data recovery | Mixed-signal circuit design
Career & Major achievements. Postdoctoral fellow, Georgia Institute of Technology

Sang-Chul Lee
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Degree. Ph.D., Hanyang Univ., South Korea
Research interests. Recommendation Systems | Social Network Analysis | Machine Learning | Smart Factory
Career & Major achievements. Postdoctoral Researcher, Computer Science Dept., Carnegie Mellon Univ. | Senior Data Scientist(Researcher), Bigdata Analytics Team, Hyundai Heavy Industries

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Associate Professor
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Degree. Ph.D., Seoul National University
Research interests. Computer Systems | Data & Storage Systems | AI for Systems | Systems for AI | System Software
Career & Major achievements. Assistant Professor, Inha University, Incheon, Korea (2016.03-2017.06) | Postdoctoral Associate, MIT CSAIL, USA (2013.09-2016.02) | Microsoft Research Asia Fellowship, Microsoft (2010)

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Research interests. Computer Vision | Machine Learning |
Intelligent System
Career & Major achievements. Vising Scholar, Carnegie
Mellon University, USA | Microsoft Research Asia Fellow
(2018) | Samsung HumanTec Paper Award (2016) |
Qualcomm Innovation Award (2016)

Kyung In Jang
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Degree. Yonsei University
Research interests. Skin-mountable and body implantable
health care system | Embedded system for wireless power
transmission, communication, and bio-signal processing
Smart cloth with artificial intelligence
Career & Major achievements. University of Illinois at
Urbana-Champaign Postdoctoral Researcher (2011-
2016) | Frontispiece for October issue of Advanced
Functional Materials, 2016 | Cover for June issue of
Advanced Functional Materials, 2015 | Feature image for
the September issue of Nature Communications, 2014

Jin Ho Chang
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Degree. Ph.D., University of Southern California, USA
Research interests. Medical Ultrasound Imaging &
Therapy Photoacoustic Imaging Ultrasound Sensors
Biomedical Signal & Image Processing
Career & Major achievements. Postdoctoral Research
Associate, NIH UTRC Center, USC | Associate Editor
of IEEE TUFFC | Board Member, the Acoustic Society
of Korea | Board Member, the Korean Society for
Therapeutic Ultrasound

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Research interests. Real-Time AI Services | Real-Time
Systems | Cyber-Physical Systems | Mobile Systems
Career & Major achievements. Research Fellow,
University of Michigan, USA | Best Paper Award, IEEE
RTSS 2012 | Best Paper Award, IEEE CPSNA 2014

Ji-Woong Choi
**Professor/Director of Research Center for Brain
Engineering Convergence**
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Degree. Ph.D., Seoul National University, Rep. of Korea
Research interests. Communication theory | Signal
processing techniques for wired and wireless communication
systems | Bio-medical signal processing for brain machine/
computer interface | Bio-mimic artificial 5-senses
Career & Major achievements. Staff Engineer, Marvell
Semiconductor, CA, USA | Postdoctoral Researcher,
Stanford University | IEEE Senior Member | Silver Award,
Samsung Human-Tech Paper Competition (2005)

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W. https://sites.google.com/view/surglab
Degree. Ph.D., KAIST
Research interests. Robot Grasping and Manipulation |
Robot/AI-Assisted Surgery | Next Generation of Surgical
Robot System | Robot Learning and Control
Career & Major achievements. Postdoctoral Fellow,
University of California, Berkeley (2019-2021) | Top 10
Mechanical Engineering Technology of Korea (2019) |
Overall winner and Best Application Award at International
Surgical Robot Challenge (2018) | Best Paper Award at
ACCAS (2018) | Best Paper Award at ISCAS (2015) | Finalist
for the Best Paper Award at ACCAS (2013)

Jae Youn Hwang
Professor
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Degree. Ph.D., University of Southern California, USA
Research interests. Intelligent Multimodal Imaging System
| Mobile Edge AI Healthcare System | High-frequency
Ultrasound/Optical Imaging System | AI for Ultrasound
and Optical Image Analysis | AI for Remote Sensing.
Career & Major achievements. Outside Director, Dabeeo
(2023-2024) | Research Associate, NIH Resource
Center for Medical Ultrasonic Transducer (2012-2014)
| Postdoctoral Researcher, Cedars-Sinai Medical Center
(2009-2011) | KOSOMBE Convergence Director | IEEE
IUS TPC|SPIE BIOS TPC

Interview

Hyukjoon Kwon
Department and Program | AI Major in
Interdisciplinary Studies, M.S.,
Working Lab | Computation Efficient
Learning Lab. (Prof. Yeseong Kim)

An environment is provided to focus on convergence research and research with experts in various fields.

Q. What made you choose DGIST?
During the undergraduate course of DGIST, we researched UGRP with a topic related to computer engineering. While conducting the study, I aimed to enter graduate school with an interest in computer science and related fields. In particular, I wanted to study more about the subject of alternative computing for AI. So, I participated the internship program in DGIST graduate labs and learn about the research process in graduate school or graduate life. When I heard the news of the opening of the artificial intelligence major at the time of graduation, I entered the artificial intelligence major master's program

Q. What are the strong points of DGIST and the department of AI Major in Interdisciplinary Studies?
I think DGIST's biggest advantage is its excellent research facilities, faculty, and research support. The pleasant research environment and supporting system allows me to focus more on research, which is the best aspect as compared to other graduate schools.

Q. What was your most rewarding moment in the graduate school?
I organized the topics I studied during the undergraduate and master's programs and published the paper in a top-tier international academic conference. I also had a chance to attend the conference happening in San Francisco.I think it was a good experience to meet other researchers in related fields and expand my knowledge. This experience was a good motivation for my research and made me decide to keep doing research with great vision.

Q. Explain you research field and purpose at DGIST.
I am studying alternative computing for more efficient artificial intelligence. Recently, the size of models and data used in machine learning are increasing significantly, and the computing resource is not capable anymore to run AI on the current computing systems. We are studying both theoretical approaches and system designs to improve the efficiency of AI for various systems, from servers to edges.

Q. What are you planning to do after graduation?
Since I am still at the beginning of my master's program, I think my plans could change even during my graduate school life. But one of the career paths I'm considering is to continue research at research institutes and industries after graduation.

Q. Please advise our applicants.
Before going to graduate school, you should experience and decide about graduate life through undergraduate research or intern programs. In the process, it is important to make sure that research fits your aptitude and interest. Also, if you are interested in entering graduate school but are not sure about the research field or topic, I think it is important to participate in open labs or related events to obtain as much information as possible.

CAMPUS MAP

E1 Main Administration Building	**E8** Central Library	**R4** Robotics System and IT Convergence Research Building
E2 Department of Physics and Chemistry	**E14** Green House	**R5** Center for Next-Generation Convergence Research
E3 Department of Electrical Engineering and Computer Science	**E15** Outdoor Concert Hall	**R6** Institute of Next-Generation Semiconductor Convergence Technology
E4 Department of Brain Sciences	**E16** Student Clubs Building	**R7** University-Industry Cooperation Center
E5 Department of Robotics and Mechatronics Engineering	**R1** Research Administration Building	**S1** Sports Complex
E6 Department of Energy Science and Engineering	**R2** Nano-Bio Technology Research Building	**H201-207** Student Dormitory
E7 Consilience Hall	**R3** Energy Research Building	**H501** Global Residence

**2025 UNDERGRADUATE
ADMISSIONS GUIDE
FOR INTERNATIONAL STUDENTS**

INNOVATIVE UNIVERSITY CHANGING THE WORLD THROUGH CONVERGENCE

Contents

DGIST at a GLANCE

ADMISSIONS GUIDE

DGIST at a GLANCE

DAEGU

A science and engineering
university to benefit society

2004

**Founded as a
Research Institute**

2011

**Opened
Graduate School**
[M.S. & Ph.D. programs]

2014

**Opened
Undergraduate School**
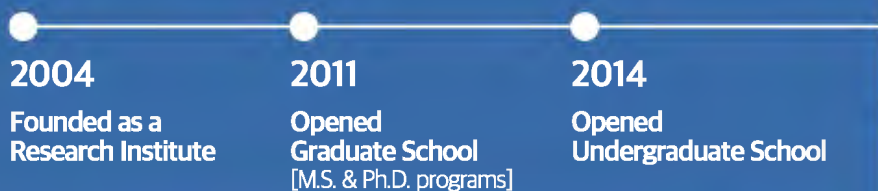
SCHOOLS and RESEARCH INSTITUTES/CENTERS

College of Transdisciplinary Studies
School of Undergraduate Studies
Semiconductor Engineering

Graduate School
Physics and Chemistry
Electrical Engineering and Computer Science
Robotics and Mechatronics Engineering
Energy Science and Engineering
Brain Sciences
New Biology
Interdisciplinary Studies

Major Research Institutes & Centers
Brain Engineering Convergence Research Center
Magnetics Initiative Life Care Research Center
Research Center for Extreme Exploitation of Dark Data
DGIST-LBNL Research Center for Emerging Materials
Research Center for Resilient Cyber Physical Systems
DGIST-ETH Microrobotics Research Center
Core Protein Resources Center
Global Center for Bio-Convergence Spin System
Convergence Research Center for Microlaser Technology
Well Aging Research Center
Center for Proteome Biophysics
Research Center for Thin Film Solar Cells
Convergence Research Advanced Centre for Olfaction

- Digital Innovation Research Institute
  Institute of Next-generation Semiconductor Convergence Technology
  Center for Digital Productivity Innovation Cluster / Sensorium Institute

- ICT Research Institute
  Division of Electronics & Information System
  Division of Automotive Technology / Division of Intelligent Robot

- Materials Research Institute
  Division of Energy Technology / Division of Nanotechnology / Division of Biotechnology

- Korea Brain Research Institute

Office of University-Industry Cooperation
Center for Technology Commercialization
Center for Technology Startup Education
Collaborative center for AI

FACTS & FIGURES

Members

Faculty & Staff

740
- Faculty 213
- Administrative Staff 340
- Researcher 187

Student

2,079
- Bachelor's 1,093
- Master's 316
- PhD 202
- Integrated MS–PhD 408
- Combined UG–G 60

Alumni

2,162
- Bachelor's 956
- Master's 844
- Ph.D. 362

Gender Ratio

2.2 : 1
(Male : Female)

International Members

8.3% of graduate students are international

7.5% of faculty members are international

Student-Faculty Ratio Statistics

9.7 : 1
(Student : Professor)

YOUNG UNIVERSITY RANKING 2024

THE WORLD UNIVERSITY RANKINGS

World 33rd
Korea 3rd

Field-Weighted Citation Impact

1.38
(2019~2023)

Citation per Publication

15.6
(2019~2023)

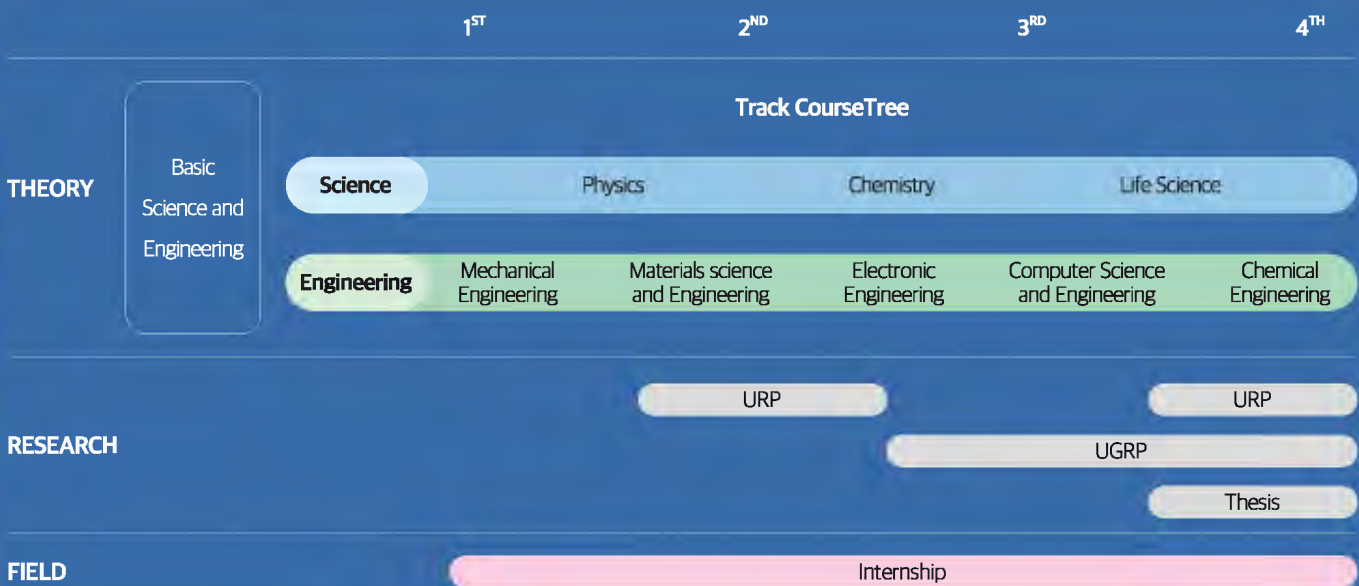# AN INNOVATIVE UNIVERSITY CHANGING THE WORLD

We are entering an era of unprecedented innovation and rapid change that will reshape the ways we live and work. DGIST will empower students to lead this change and make a positive impact on the world

UNDERGRADUATE PROGRAM

DGIST holds 'single-major' system. At the first year, students study basic subjects on science and engineering. Then students get to design their own curriculum depending on '8 Tracks'. 8 Tracks indicate eight fields of science, and the tracks provide students with guidance for making their own academic plans.

CURRICULUM

		1ST	2ND	3RD	4TH
			Track CourseTree		
THEORY	Basic Science and Engineering	**Science**	Physics	Chemistry	Life Science
		Engineering	Mechanical Engineering / Materials science and Engineering	Electronic Engineering	Computer Science and Engineering / Chemical Engineering
RESEARCH			URP	URP	
				UGRP	
					Thesis
FIELD			Internship		

Flexible Major Selection
Enroll in major courses that align with your career plans.

Double Major for All Students
Within the 130 credit graduation requirement, you can complete up to two majors.
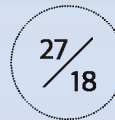
Major Recognition
27/18
A major is recognized upon completion of 27 credits, and a minor is recognized upon completion of 18 credits.

- **Undergraduate Research Program (URP) : Faculty-directed individual research program on topics of students' interest**
- **Undergraduate Group Research Program (UGRP) : Student-led group research program on topics of students' choice**
  - Learning through hands-on projects
  - Key areas : Robotics and Mechanical engineering, Information Technology(Software), Information Technology(Hardware), Bioscience and Biotechnology, Materials science and engineering

GLOBAL PROGRAM

FGLP
(Freshman Global Leadership Program)

FGLP allows students to take regular classes in various fields at the prestigious universities around the world during summer vacation. The program will provide students with opportunities to experience different cultures, as well as unique chances to strengthen their global capabilities.

※ Support worth 10,000,000KRW(around 7,600USD) will be provided

DURA
(DGIST Undergraduate Research Award)

DURA is a research internship program allowing students to experience world-renowned research institutes and universities, which will be helpful for career design.

※ Subsidies (1,000,000KRW(766USD) ~ 3,000,000KRW (2,299USD)) will be provided, depending on the program

Credit Exchange Program

Students can study at universities in other countries (one semester ~ one year), with successful transfer of the credits to DGIST for timely graduation.

※ Subsidies (1,500,000KRW(1,130USD) ~ 3,000,000KRW (2,299USD)) will be provided, depending on the period of the program

RESEARCH PROGRAM

UGRP
(Undergraduate Group Research Program)
UGRP is a student-driven research project. Students make a group of five students at third/fourth-year, to decide, plan and complete the project by themselves.

INTERNSHIP PROGRAM

GIIA
(Global Industry Internship Award)
GIIA is a program that provides on-the-job training opportunities at companies in other countries.
Participation is also counted as credits.
※ Subsidies (1,000,000KRW(766USD) ~ 3,000,000KRW(2,299USD)) will be provided

Domestic Internship Program
The program offers opportunities to experience at DGIST Graduate School and research institutes, including other local research-based companies during winter and summer vacation (five weeks approx.).
The program will allow students to participate in their desired field of study and to further gain practical experience for their future career.

SCHOLARSHIPS & STUDENT SUPPORT

1. SCHOLARSHIPS

Four-Year Full Scholarship

Provision of Student Support Expenses for All Students

Full Tuition Waiver :
3,845,000KRW(around 2,800USD)
per semester

Monthly Support :
Up to approximately 660,000KRW(around 470 USD)
per month

• Granted total amount can vary from a student's GPA, credits, etc.
• Tuition fee is fully waived, and will not be refunded individually

* SCHOLARSHIP SPECIFICS

TYPE	BENEFITS	CONDITIONS & REQUIREMENTS
Tuition Fee	Fully Waived • 3,845,000KRW / Semester	• For all international students without special conditions • Granted for 8 semesters only
Student Financial Aid & Scholarships	1. Financial Aid • 328,500KRW / Month	• Granted for 8 semesters only, excluding vacation periods • Granted when gained credit is more than 10 credits 　※ Not granted during school disciplinary periods imposed school due to improper behavior, etc. 　※ Not granted if academic probation is granted for the previous semester
	2. Int. Student Scholarship (DGISTep) • 330,000KRW / Month	• Granted for 8 semesters only, including vacation periods 　※ Not granted when gained credit is below 10 credits or granted with academic probation for the previous semester
	3. Academic Excellence Scholarship (DGISTep-S) • 1,500,000KRW / Semester	• Not granted for the first semester of freshman year • Granted when achieved GPA for previous semester is above 3.7 out of 4.3 scale (Freshman) or above 4.0 out of 4.3 scale (Sophomore or above) and gain at least 15 credits in the previous semester
Settlement subsidy	500,000KRW	• Granted for one time only • Granted to all international undergraduates

2. HEALTH INSURANCE

Foreign students qualify for the same insurance benefits as Korean citizens	**DGIST provides 100% of monthly insurance contributions individually paid by international students(70,000KRW / Month)**

3. HOUSING

• DGIST will reserve a room in on-campus student dormitory after receiving information on the estimated date of arrival at DGIST and departure from DGIST of each student
• Dormitory fee is NOT covered by scholarship. Students must pay for dormitories individually
　※ fees are subject to change, depending on the admission year

Admissions
Guide

ADMISSIONS GUIDE

ADMISSIONS CRITERIA

Admission acceptance will be made on an overall evaluation based on the submitted application & supporting documents by assessing the applicant's academic abilities and potential, communication skills, personal accomplishments, extracurricular activities, etc.

ADMISSION QUOTA

The specific quota is not predetermined. Information related to the number of applicants and the acceptance rate will not be disclosed.

ELIGIBILITY

Applicants must meet both requirements mentioned below;

(Requirement#1) Applicants who have graduated or will graduate from his/her high school by the registration deadline

(Requirement#2) Applicants with foreign citizenship and satisfy one of the following requirements;

       1. Neither of the applicant's parents is a Korean citizen

       OR

       2. For applicants of Korean Origin, he/she must have received his/her entire elementary, junior high, and high school education OUTSIDE OF KOREA at a comparable and equivalent level of the provided in Korea.

IMPORTANT NOTES

- Applicants who hold Korean citizenship (dual citizenship) are NOT ELIGIBLE to apply as international students.
- DGIST does not acknowledge alternative qualification examinations and programs such as GED, home schooling, online courses and other such qualifications for the international student admission process.
  - Students who have participated in cyber learning from their school due to COVID are eligible if they submit explanatory letter and evidence)
- If an applicant has only one guardian, the legal guardian's citizenship will be considered for the applicant's eligibility
  - Evidential documents must be submitted to prove the legal guardianship and custody for the guardian)
- DGIST does not have transfer program for international students. All applicants must apply as a freshman
- If the applicant of non-Korean origin meets the eligibility requirements, the applicant from high school in Korea is eligible to apply
  - i.e. a foreign student attending a Korean high school / 국내고교 출신 외국인 학생)
- International schools located in Korea are NOT acknowledged as foreign schools.
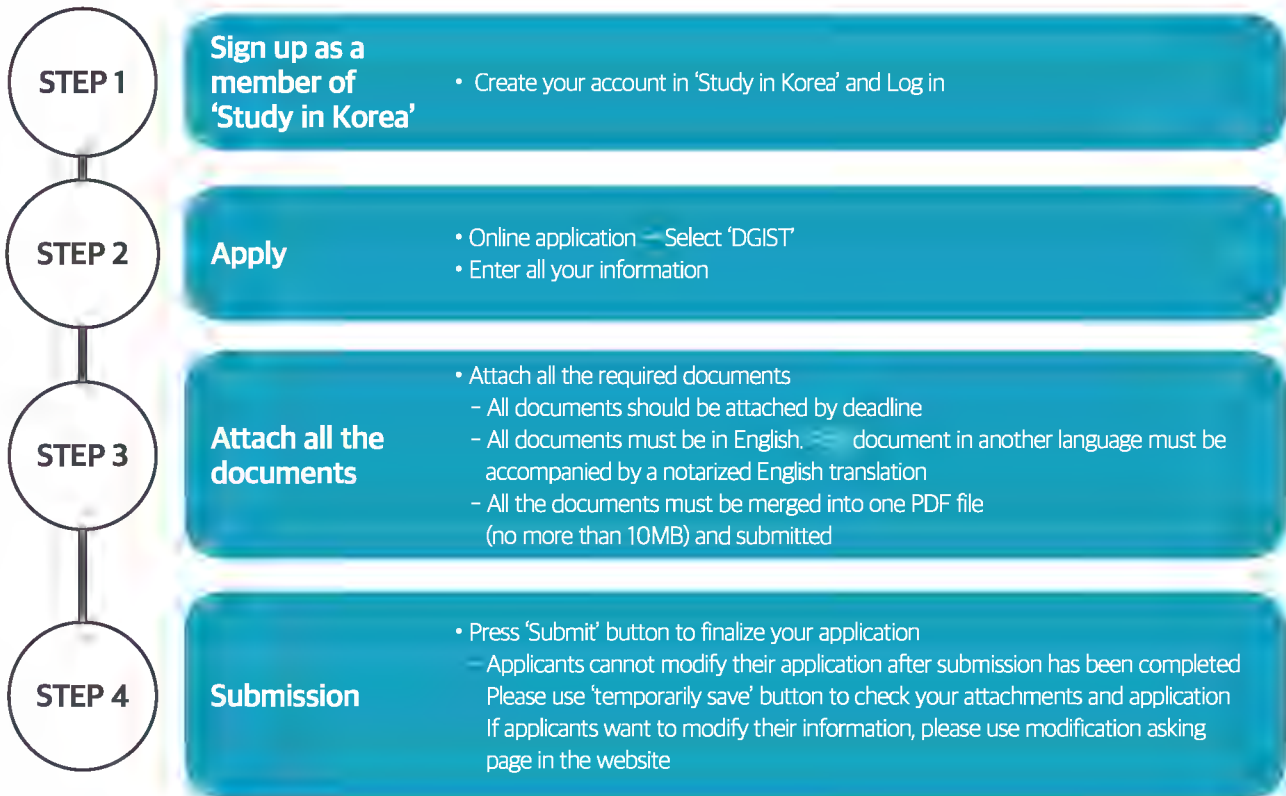
ADMISSION TIMELINE

CLASSIFICATION	TIME PERIOD	REMARKS
Online Application	10:00 December 4, 2024 ~ 18:00 February 3, 2025	• Admission: studyinkorea.go.kr • No modification is allowed after application deadline
Document Submission		• Document submission is only possible via online
Application Evaluation & Interview	Until April 2025	
Announcement of Acceptance & Enrollment	April 24, 2025	
Academic year start	Fall (Late August or Early September)	

※ For specific schedule of the application, check our official website(https://dgist.ac.kr/en/)

IMPORTANT NOTES

- All mentioned times and dates are based on Korean Standard Time(KST).
- All applicants must read the detailed instructions in the Application Guide. Applicants are solely responsible for any disadvantages caused by providing incorrect information
- Applicants may be required to submit additional documents during the review period. Applicants are solely responsible for any disadvantages caused by providing incorrect contact information or not responding in a timely manner to the mails sent by DGIST
- All information must be entered correctly on the application form. Admission can be revoked if written items differ from facts, or in the case where the applicants have failed to disclose any fact which may have a significant impact on their admission
- Applicants who do not participate in the admission interview will be disqualified
- Applicants who have received acceptance notification from more than one university, must choose only one university. If not, the admission will be revoked
- Admitted students are not permitted to defer admission to a later semester
- Any matter not specified in the admission guide is subject to the decision of DGIST Admission committee

APPLICATION PROCESS

STEP 1

Sign up as a member of 'Study in Korea'
- Create your account in 'Study in Korea' and Log in

STEP 2

Apply
- Online application – Select 'DGIST'
- Enter all your information

STEP 3

Attach all the documents
- Attach all the required documents
  - All documents should be attached by deadline
  - All documents must be in English. A document in another language must be accompanied by a notarized English translation
  - All the documents must be merged into one PDF file (no more than 10MB) and submitted

STEP 4

Submission
- Press 'Submit' button to finalize your application
  - Applicants cannot modify their application after submission has been completed
  - Please use 'temporarily save' button to check your attachments and application
  - If applicants want to modify their information, please use modification asking page in the website

REQUIRED DOCUMENTS

Mandatory Documents: For All Applicants

1. High School Diploma (or Certification of expected graduation)
2. High School Transcript
3. Standardized Official Test Score Report
4. Passport Copy (of both applicant & parents)
5. Official Document of Parent-Child Relationship

Mandatory Documents: For Korean-Origin Applicants only

1. Certificate of Entry & Exit
2. Elementary & Middle School Diploma
3. Elementary & Middle School Transcript
4. Loss of Korean Nationality

Optional Documents: For All Applicants

1. English Proficiency Test Score Report
2. Honors & Awards
3. High School Profile
4. Recommendation Letter

DOCUMENT SUBMISSION GUIDELINE

Mandatory Documents: For All Applicants

1 **High School Diploma (or Certification of expected graduation)**

- If a certificate of (expected) graduation is unavailable, applicants may submit a certificate of enrollment or an official document from their school (confirmed by a school authority, e.g. principal) showing the applicant's (expected) graduation date

2 **High School Transcript**

- Submit official transcripts from every high school attended
- Transcript must contain academic records of each semester or each year from all years of high school
  ※ If applicants do not yet have grades from the last semester of the final year of the high school, applicants must submit a transcript updated to first semester of the last year including the last semester of coursework underway
- Transcripts may include a statement of personal rank in class or school, if available

3 **Standardized Official Test Score Report**

- SAT 1, AP, IB, GCE A-Level, ACT, Certificate of International Olympiad, relevant country's qualifying test for high school graduation or college entrance exam

4 **Passport Copy (of both applicant & parents)**

- Copies must show the personal information of the passport holder
- Expired documents will not be accepted
- If parent(s) do not hold valid passport, a copy of Certificate of Nationality or national ID card can be submitted.

5 **Official Document of Parent-Child Relationship**

- Birth certificate, Certificate of Family Relations, Citizenship Certificate, etc. can be submitted
  (Both the applicant's parents' name must be indicated)
  ※ Example of Family Census Register
  – China: 户口本或是亲属关系公证
  – Philippines: Family Census
  – Indonesia: KARTU KELUARGA
  – Bangladesh: Birth Certificate(점머 까꺼즈 or 점마 싸이드티켓)
  – Vietnam: So Ho Khau or Giay khai sinh
  – Mongolia: Family Registration Certificate
  – Pakistan: Family Certificate
  – Sri Lanka: Birth Certificate(빠울러)
  – Myanmar: Family Certificate(잉타옹수사옌)
  – Nepal: Birth Certificate(전마달다)
  – Kyrgyzstan, Kazakhstan, Uzbekistan, Ukraine, Thailand: Birth Certificate
  – Documents must be no more than six months old at the time of the application deadline.
  – In the case that an applicant has a single guardian, evidential documents must be submitted to prove that the legal guardian and custody for that guardian

Mandatory Documents: For Korean-Origin Applicants

1 Certificate of Entry & Exit

- The certificate of Entry & Exit must be issued by the Korean Immigration Office within 90days from the application deadline
- The certificate must contain the complete records from the applicant's date of birth to the date of submission
- Admission may be disadvantaged or rescinded if the submitted materials contain false information or if entry and exit records cannot be verified due to the use of dual passport
  ※ In cases where applicants encounter difficulty in obtaining the Certificate of Entry & Exit, applicants may ask third party living in Korea to obtain it

2 Elementary & Middle School Diploma

- Official Diplomas must be issued by the school, which must not be located in Korea

3 Elementary & Middle School Transcript

- Official transcripts issued by the applicant's elementary and middle school, which must not be located in Korea

4 Loss of Korean Nationality

- Loss or renunciation of Korean citizenship has to be proven in the documents with dates, and other details.
  ※ Family relation certificate, Family census register, certificate of loss/renunciation of Korean nationality, etc.
- The document must contain explicit note on the loss of Korean citizenship and its date

Optional Documents

1. English Proficiency Test Score Report	• TOEFL(iBT), IELTS, TEPS(New), TOEIC, Cambridge English Test(CAE, CPE), PTE Academic, Duolingo ※ No minimum score is required • Tests taken within two years prior to the deadline of the online application are valid
2. Proof of Honors / Awards	• Applicants may submit up to five honors and awards obtained during high school years • The list will be valid only when testimonials or evidence are presented
3. High school Profile	• Profile, brochure or any official introductory materials published by the applicant's high school or Ministry of Education must be submitted • The profile may contain school's website address, GPA rating system, college acceptance ratings, or any other relevant information that would help DGIST understand the applicant's school • The profile must be a maximum of five pages
4. Recommendation Letter	• One recommendation letter will be accepted • The letter should be written by an academic advisor(school homeroom teacher, math or science teacher, etc.) • The letter must be written in either Korean or English, and be submitted via postal service • The letter must arrive DGIST before the submission deadline, otherwise it will not be accepted

IMPORTANT NOTES

1. Submission must be done through online application system, 'Study in Korea'

2. All documents must be notarized original copies that are certified as true copies of the original by a notary

   ※ Original copies which are not in Korean or in English must be accompanied by a notarized English translation

3. If the applicant's name does not match with the name on any of the documents, the applicant will be excluded from the evaluation without notice

4. All documents must be merged into one-PDF file for the submission

5. Uploaded files must be in PDF Form and legible. DGIST does not hold responsibilities on the consequences occurred due to submission of PDF file that is unable to open

6. For the applicants who have graduated or will graduate high school in Korea (국내 거주하는 국내고교 출신 외국인 학생), the Specific Student Record(학생기록부) issued from the high school must be submitted

7. Any applicant, who submits a provisional graduation certificate at the time of application, must submit the official graduation certificate of their high school before the enrollment deadline

8. Admitted applicants must submit an Apostilled certificate including the official graduation certificate and other documents requested by DGIST before the deadline that will be announced

9. Admission will be rescinded if the application form or submitted documents are found to be false regardless of its time of the discovery

FAQ

Q

[Online Application]

Should I pay the application fee?

We do not charge any application fee.

Q

[Online Application]

I am having trouble with the online application system. Can I submit my application by email or post?

No, we only accept online applications through Study in Korea. If you encounter any problems with the application system, please send us an email with a screenshot to 'iug@dgist.ac.kr'.

Q

[Online Application]

How can I submit documents?

All documents must be submitted as a single-merged PDF file; otherwise, your submission will be considered 'not submitted'.

Q

[Recommendation Letter]

How can I submit the recommendation letter?

We accept recommendation letters from the recommender. Submission is possible post, and the letters must arrive before the application period deadline.

Q

[Online Application]

Do I have to choose my major at the time of my application?

When students are first admitted to the DGIST undergraduate program, they will be inducted into the College of Transdisciplinary Studies. This program begins with basic science and engineering subjects and then progresses into specific fields of science, which are categorized into '8 tracks'.

Q

[Recommendation Letter]

I cannot get a recommendation letter from high school teacher because I graduated long time ago.

You can get a recommendation letter from your supervisors or professors if you are employed or studying at a

Q

Since I am in my final semester now, I do not have grades from the 2nd semester of the final year of high school.

You may submit a ██████ updated to 1st semester of the final grade including the last semester of coursework ██████. If you get admitted, you have to submit your final ██████ that includes 2nd semester ██ your final year.

Q

[School Documents]

What is a school profile?

It is an official high school profile/introduction/ brochure published by the ████████ high ████ ████████ of ████████ or ██████ of Education. It should contain information about your ██████ not about ██████. If your school does not have a profile, you can create a document with confirmation from your school ████████. ████████ we encourage you to submit your school's English website, GPA rating system, college acceptance statistics, or any other relevant information that would help us better understand your school ████████ of 5 pages).

Q

[Standardized Official Test]

Can I submit IGCSE and AS Level Exams as Standardized Official Test Scores?

N█ IGCSE and AS ███I Exams are not recognized as Standardized Official Test Scores. Please submit other certified test scores.

Q

[Standardized Official Test]

I don't have my final IB or GCE A-Level score yet. What should I do?

We accept IB or GCE A-Level predicted score report written by counselor or teacher at the school. Once ████████ are ████████ ███ must submit IB ████████ or GCE ██████ as soon as ███ receive it. If there are significant discrepancies between predicted scores and final scores, admission may be rescinded.

Q

[English Proficiency Test]

What is the minimum requirement for EPT score?

There is no minimum score requirement for EPT. ███ you must submit EPT result which is taken within 2 years prior to the deadline of the online application.

Q

[Other Requirements]

My parents and I do not have passports. What should I do?

Applicant should prepare ~~his/her~~ passport and submit it before the application deadline. If parent(s) does not hold a valid passport, a copy of Certificate of Nationality or national ID card which must be in English, can be submitted instead.

Q

[ETC]

I took TOEFL this month. Can I submit the result after the application deadline?

We do not accept application documents after the deadline.

Q

[ETC]

How many people will be admitted this year? Are there admission quotas by nationality?

The number for international undergraduate admission is not predetermined and we do not set quotas by nationality.

Q

[ETC]

Do you admit transfer students? by email or post?

No, we do not have the transfer program. You have to apply as a freshman student.

Q

[ETC]

What is the medium of instruction of DGIST? Should I learn Korean?

All lectures including basic science subjects and major courses are provided in English. However some General Elective lectures (Korean, liberal arts etc.) will be provided either in Korean or English.

Q

[ETC]

Does DGIST provide scholarships for international students?

All international undergraduate students are granted with scholarship without any separate application process. However there are some scholarships which are also available when certain conditions are fulfilled.

E6

E5

E4

E3

E2

E1

E7

E8

Guest House

R6

R3

R2

R4

R5

R1

Rear gate

R7

Main gate

S1

Main Administration Building	**E1**
Department of Physics and Chemistry	**E2**
Department of Electrical Engineering and Computer Science	**E3**
Department of Brain Sciences / New Biology	**E4**
Department of Robotics and Mechatronics Engineering	**E5**
Department of Energy Science and Engineering	**E6**
Consilience Hall	**E7**
Central Library	**E8**
Laboratory Animal Resource Center	**E9**
Student Clubs Building	**E16**
Research Administration Building / ICT Research Institute	**R1**
Division of Nanotechnology / Biotechnology	**R2**
Division of Energy Technology	**R3**
Division of Electronics & Information System / Automotive Technology / Intelligent Robot	**R4**
Institute of Next-generation Semiconductor Convergence Technology	**R6**
University-Industry Cooperation Building	**R7**
Sports Complex	**S1**
Biseul Village (Dormitory Building)	**H**
Global Residence (Hotel)	**H501**