JAIST NEWSLETTER

No.2 2020 Autumn Edition www.jaist.ac.jp

Dear readers,

Welcome to the issue no.2 of JAIST Newsletter! This second issue will not only talk about the academic aspect of JAIST but also the daily life in JAIST. In this issue, we highlight a variety of things surrounding research and life in JAIST. We are introducing hot research papers, international activities, and overseas academic exchange, as well as a glance of life-in-JAIST story from our beloved alumni. In the end, we also introduce some of the facilities available at JAIST. All built for the comfort of the students.

We hope that you will enjoy reading the Autumn issue and looking forward to meeting you again in the coming issue no.3 that will be published in Winter.

Cheers!

JAIST Newsletter Editorial team.

JAIST Campus

JAIST Campus

ACADEMIC EXCHANGE AGREEMENTS *- In order to promote world-leading research and train students to contribute to international society, JAIST has actively worked on academic exchanges with overseas research institutes through exchanges of faculty and students and collaborative research. JAIST has concluded academic exchange agreements with 141 institutes from 29 countries and 1 region as of June 1, 2020.*

Asia (91):
China(25), Korea(14), Taiwan(8), Vietnam(11), Thailand(7), Malaysia(13), Bangladesh(2), Indonesia(4), India(6), Myanmar(1).

Europe (43):
Germany(6), Czech Republic(5), France(6), United Kingdom(4), Russia(6), Poland(2), Austria(2), Italy(3), Holland(1), Sweden(1), Finland(2), Ukraine(1), Slovenia(1), Malta(1), Romania(2).

North America (4):
United States of America(3), Canada(1).

South America (1):
Chile(1).

Oceania (1):
Australia(1).

Africa (1):
South Africa(1).

Mission and Goals of JAIST

Mission of JAIST

JAIST endeavors to foster leaders capable of contributing to the making of a future world by creation of science and technology through its most advanced research and education in an ideal academic environment.

Goals of JAIST

- JAIST develops leaders in society or industry who hold credible expertise in the frontier science and technology, broad perspectives, high level of autonomy and communication ability, through its systematic advanced graduate education.

- JAIST, to contribute to societies with research outcomes, creates a center of excellence for advancement of researches for solving problems of our world and society and develops new fields through a variety of basic researches.

- JAIST fosters active global human resources by promoting faculty and student exchanges with leading institutes overseas and globalizing its research and education.

-The First Independent National Graduate University without Undergraduate Division.

-Admission Criteria for People with Diverse Backgrounds.

-Systematic Graduate Education.

-Development of Human Resources for Society.

-Outstanding Faculty.

-Collaboration with Society and Industry.

JAIST International Symposium

JAIST holds international symposiums to share our great achievements with the world. Through the symposiums, JAIST aims at promoting discussion on the research and encouraging students to learn more in a global context.

JAIST Panorama Virtual Tour

We are pleased to announce you that JAIST Panorama Virtual Tour, has been released on JAIST homepage.
You can enjoy 360-degree sight of buildings and facilities of our institute. Our institute by accessing the following link: http://jaist.zenkei.net/campus/

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2020 International Conference on Solid State Devices and Materials

The 2020 International Conference on Solid State Devices and Materials (SSDM2020) was held online from September 27th to 30th, operated from the main control center at Japan Advanced Institute of Science and Technology.

SSDM 2020

With its 52nd annual conference being held in 2020, SSDM is one of the high reputation international conferences with a high reputation. SSDM covers a truly wide spectrum of topics related to solid state devices and materials, extended to those for the multidisciplinary and emerging research fields. Twelve areas have been set up to facilitate active discussion among academia, industry and government. SSDM is the largest international conference in Asia in this field, which has made a great contribution to the Japanese semiconductor industry. It covers a wide range of science and technology of solid-state devices and materials, and is one of the most traditional international conferences held in Japan. Initially, SSDM2020 was planned to be held in Toyama Prefecture for the first time in the Hokuriku region, but due to the influence of the new coronavirus, it has been changed an online conference. This time, more than 700 participants gathered from pre-registered users alone, including researchers and technologies from various fields such as information and communication technology (ITC) fields, energy innovation, such as solar power generation and batteries, and application fields of life innovation. Participants participated and more than 340 research presentations during the exhibition period. SSDM2020, which was held online, has a back office, which is a base for conducting and supervising, set up at the Japan Advanced Institute of Science and Technology, which is

SSDM 2020

a co-sponsor, The executive committee chairs are Professor Mizuta (environment and energy area) and Associate Professor Akahori (be applied). The faculty members and students of Japan Advanced Institute of Science and Technology and Kanazawa University, mainly in the field of physics, worked together to manage a large-scale international conference in which up to 10 sessions proceeded in parallel. Students from neighboring universities who operated the back office sometimes encounter problems that are different from the normal academic conference management, but they were able to overcome the problems with the help of faculty members and international students from other universities. The research presentations were able to be held smoothly. Satellite offices were also setup at Toyama University, Toyama Prefectural University, and Toshiba Corporation in Kawasaki City to manage academic societies and deal with problems. The next SSDM2021 will be held at the Sapporo Convention Center (Sapporo, Hokkaido) from September 6th to 9th, 2021.

Entrance Ceremony

October 2, 2nd year of Reiwa

On October 2nd (Friday), the entrance ceremony for the second year of Reiwa was held in the MS hall of the university. A total of 84 new students, 51 in the master's program and 33 in the doctoral program, vowed to "work earnestly as a member of JAIST and complete the student's duties", and a representative of the enrollee signed and handed it over to the president.

"I hope that the new students will grow significantly as global leaders who contribute to the development of science and technology and open up the future of the world through world-class research and education at our university."

JAIST 30th Anniversary

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JAIST was founded in October 1990 as the first independent national graduate school, to carry out graduate education based on research at the highest level in advanced science and technology. JAIST aims at establishing an ideal model of graduate education. In October 2020, JAIST has celebrated its 30th anniversary since the foundation in 1990. The ceremonial meeting took place on October 2nd.

"The Outline of Concept of Japan Advanced Institute of Science and Technology" issued in September, 1990 and called "The Yellow Book" was considered as a bible for the founding of JAIST. It set the purposes of the founding to "fostering university researchers and developing and reeducating researchers and engineers for industry" as well as "promoting advanced basic research in the fields of advanced science and technology." This spirit has been inherited in the current principle of JAIST established on March 22, 2012: "JAIST fosters leading human resources who can pioneer a new world with their scientific and technological innovation through its world-class research and education in a rich academic environment."

Based on the purposes of the establishment and the current principle, JAIST, the first national graduate institute with its own campus in Japan, considers promotion of world top-level research, development of human resources through it, and contribution to society through research and education as the most important missions.

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JAIST International Student News

Living in a foreign country can be challenging. Moreover, you have to take on different challenges such as starting new research and change in study patterns. In this edition, we introduce some formers of JAIST international students who are successfully working all over the world.

Dear international students who plan to enroll in JAIST

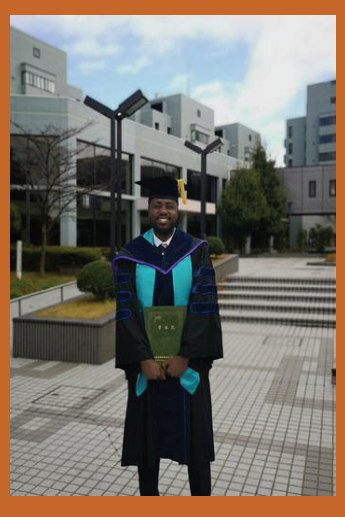
I have many pleasant memories of my time at JAIST. The campus was cosmopolitan-consisting of students from all over the world. I got to learn about cultures other than my country; food, clothing, and even way of life that were different. This experience broadened my perspective about life in general.

Some of the lectures on campus were taught in English. The student Affairs Department staffs were very helpful and solve problems during my stay on campus. They had a good command of English, therefore able to interact easily with me.

The weather in JAIST was unique, the winter was very cold and the summer was very hot. Spring and autumn were the best seasons for me. I was able to take amazing pictures during the brief cherry blossom season. Thanks to the University for having the initiative to grow such trees, thus beautifying the campus.

The education I got from JAIST was world-class. With the support of my supervisor, I was able to publish my research paper with a very good journal. With the exposure and academic rigor, I passed through during my time in JAIST, I am confident that the sky is just the limit. In the nearest future, I plan to do a post-doc to further or start a new research field.

I would admonish prospective students to pick JAIST. For Japanese students, I think it's a good place to learn the English language because of the diversity of students admitted to JAIST. Research is also very intense and rewarding because of the top-notch academics and world-class facilities students get to be exposed to.



Ogunleye,Olamikunre Osinimu
PhD in Material Science (2019)

Hi everyone, I am Hasan from Indonesia. I have been living in JAIST as a student for almost 6 years. I came to JAIST in February 2014 as a research student and then progressed to the master and subsequently to the doctoral program.

JAIST is a graduate institute (university) where only master and doctoral programs are available. It focuses more on advanced education and research. Thus, for those of you who want to learn advanced science, this is the right place for you. In addition to offering good facilities, JAIST also offers various support to help the students in their study and research. For example, in my case, I have traveled to several countries such as Poland, England, France, Singapore, and more, in order to present my research at some high-level conferences. I was also supported financially for my three-months research visit to Monash University, in Victoria, Australia. If you want to work hard on your research, JAIST will certainly support you. Furthermore, JAIST also provides career support to students so that they can find a job before finishing their studies. JAIST offers many good programs such as preparation seminars for job hunting, financial aid, career counseling, job interview training, and many more. I can say that the support from the university is very good especially for those who are willing to work in Japan. Thanks to JAIST that I could land a good job in a famous company located in Kanazawa city.

Even though located in a very rural area in Ishikawa, JAIST has a very good international environment. More than 50% of the students are international students coming from various countries around the globe. Thus, not only you can live and learn in a Japanese environment, but you can also experience studying in a very international environment. If you are a foreigner, you do not have to be worried about being a "foreigner", because here is a multi-culture environment. And if you are a Japanese, it is a perfect place for you to feel a more global environment.

JAIST International Activities

The fact that it is located in a rural area is also something that I appreciate. Not like in a big city, there is not much distraction in this area so that I can focus on my study and research. Moreover, there are many beautiful spots around here. I often go with my family to Shishiku park where we can see a beautiful view of Nomi and Hakusan city area from the top of the nearby mountain. In the winter, I usually enjoy snowboarding in nearby ski resorts; the university provides ski equipment rental and other stuff for free.

Another thing that I cannot miss about why I like this university is that I can play futsal freely every week in a newly built gymnasium. My main hobby is soccer, and I really love playing futsal. It was hard to find a community to play futsal with, but in JAIST you can find many students who like to play. They also support other extracurricular clubs such as basketball, badminton, music, flower arrangement, dance, astronomical, game development, international sports club, etc. It is also possible to register a new club if you want. Thus, besides study or research, you can also enjoy other interesting activities.

I hope you decide to come to the JAIST and enjoy your student life here. I wish you success in your future.

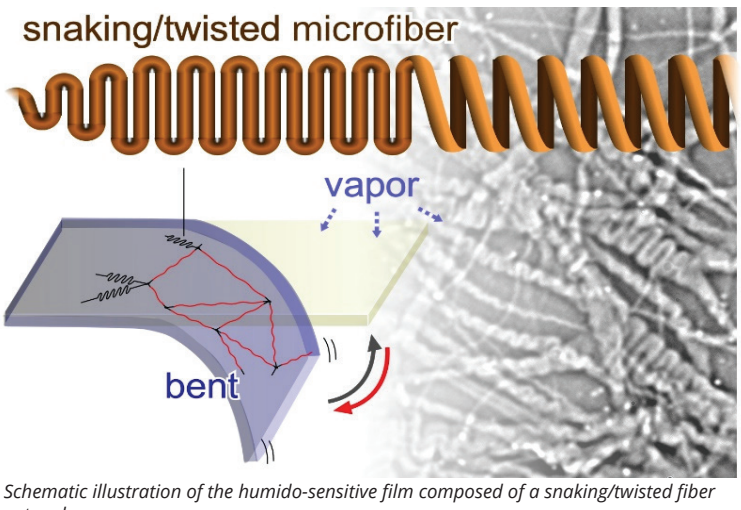
> *"I hope you decide to come to the JAIST and enjoy your student life here. I wish you success in your future."*

I have one last message which is specifically for prospective Muslim students. I am sure that you are worried about foods, praying, and others related to living as a Muslim. Please do not worry, I am a Muslim, and I feel JAIST has a good understanding of Muslim students. We have a big enough Muslim community (JAIST Muslim Circle) here that is ready to help you.

Hasan Mohammad Nur
PhD in Information Science (2020)

See more of our international alumni impression and their current where abouts at *https://www.jaist.ac.jp/english/studentlife/abroad/news/#no01.*

HOT RESEARCH TOPICS



Schematic illustration of the humido-sensitive film composed of a snaking/twisted fiber network.

Twisted Microfiber's Network Responses to Water Vapor

Researchers at Japan Advanced Institute of Science and Technology (JAIST): graduate student Kulisara Budpud, Assoc. Prof. Kosuke Okeyoshi, Dr. Maiko Okajima and, Prof. Tatsuo Kaneko reveal a unique polysaccharide fiber in a twisted structure forming under drying process which showed spring-like behavior. The spring-like behavior of twisted structures is practically used as a reinforced structure in a vapor-sensitive film with millisecond-scale response time. This work is published in Small Full Paper titled "Vapor-Sensitive Materials from Polysaccharide Fibers with Self-Assembling Twisted Microstructures".

Polysaccharides play a variety of roles in nature, including molecular recognition and water retention. Still, there is a lack of study in vitro microscale structures of polysaccharides because of the difficulties in regulating self-assembled structures. If the self-assembled structures of these natural polysaccharides can be reconstructed in vitro, it will lead not only to an increased understanding of the morphological changes involved in polysaccharide self-assembly in water but also to the development of a new class of bio-inspired materials, which exhibit regulated structures on a nanometer scale. In this research, it is demonstrated that a cyanobacterial polysaccharide named sacran, can hierarchically self-assemble as twisted fibers from nanoscale to microscale with diameters of ≈1 μm and lengths >800 μm. this is remarkably larger than polysaccharides previously reported. Unlike other rigid fibrillar polysaccharides such as cellulose, the sacran fiber is capable of flexibly transforming into two-dimensional snaking and three-dimensional twisted structures at an evaporative air-water interface (Fig.1). This twisted sacran fiber behaves like a mechanical spring under a humid environment.

To optimize the condition of the twisted structure is formed by controlling drying speeds. Actually, the drying speed and the capillary force are the dominant factors in creating these formations. To show the potential use of this spring-like polysaccharide fibers, a crosslinked polysaccharide film is prepared as a vapor-sensitive material and the effects of the microfiber's spring behaviors in an environment with humidity gradient are demonstrated (Fig.2). The film reversibly and quickly switched between flat and bent states within 300-800 ms. This repulsive motion displayed by the film is caused by the snaking and twisted structures of the fibers responding to the change of moisture. The sacran film shows a fast response to the water drop retreating, changing from the bent state to the flat state. Because the extended sacran fibers have extension stress like a spring, the network could quickly release water by shrinking. As a result, the bent film becomes flat immediately. Thus, the snaking and twisted fiber network enable millisecond bending and stretching responses to changes in local humidity.

From the simple method, JAIST researchers could create unique micro-spring from natural polysaccharide which is practically used as a vapor-sensitive material. Besides, by introducing functional molecules into the microfiber, it would be possible to prepare a variety of soft actuators responding to other changes in the external environment, such as light, pH, and temperature. The method for preparing vapor sensors developed by this study not only improves understanding of how the motion of self-assembled structures responds to stimuli. But also contributes toward the design of environmentally adaptive materials with a high potential for sustainable use.

"Vapor-Sensitive Materials from Polysaccharide Fibers with Self-Assembling Twisted Microstructures", Kulisara Budpud, Kosuke Okeyoshi, Maiko Okajima and, Tatsuo Kaneko*, Small, 2020 (DOI: 10.1002/smll.202001993)*

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Using Games to Study Law of Motions in Mind

Using Games to Study Law of Motions in Mind, Hiroyuki Iida, Mohd Nor Akmal Khalid, IEEE Access, 1 - 1, DOI: 10.1109/ACCESS.2020.3012597

At Japan Advanced Institute of Science and Technology, researchers have successfully established relationships between games and law of motions in mind through analogy of physics and game refinement theory.

Establishing several physics quantities (such as mass, speed, and acceleration) relative to the game progress model allowed for the player's entertainment experiences for a specific game to be determined through the Newtonian laws of motion, specifically the Force, Momentum, and Potential Energy. Such a law of motion reveals the feeling of a player in their mind. Mapping different games originated from different cultures to the state of the human mind; a measure of sophistication that leads to a natural yet pleasurable experience.

Uncovering the fundamental mechanisms of game playing mechanisms had been the primary goal in the IIDA laboratory. Game refinement theory is the fruit of labor for several years—the relationships between game progress and entertainment experience from the perspective of game design. Several sub-branch of the study had been explored through board games (e.g., Chess, Go, etc.), sports (e.g., Basketball, Table tennis, etc.), and video game (e.g., action games). From a non-game context had also been previously explored (such as business, education, and loyalty programs). Interestingly, all of those studies found that game refinement measure converges to approximately similar "zone" value (a region named as the noble uncertainty).

Based on the notion of the uncertainty of the game outcome and gamified experience, several models have been introduced to fundamentally capture the essence of game playing in a variety of contexts. The move selection model and scoring model were established for the board games and sports, via the ratio of solved uncertainty over the game's length. Hence, the game refinement (GR) measure can be obtained concerning the magnitude of gravitational acceleration felt in mind. Then, the notion of speed in the game was established. The difficulty of solving the outcome uncertainty defines mass in mind.

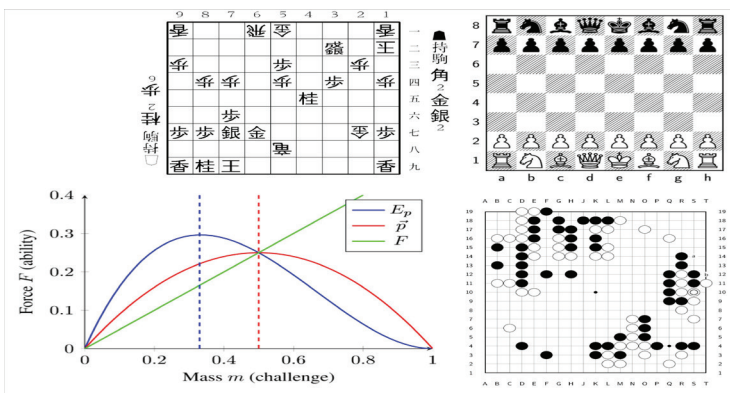
With mass, speed, and acceleration, the Newtonian laws of motion can be analogously measured, which mainly reflects motion in mind. Through games, the level of engagement, thrills, and competitiveness, can be successfully illustrated according to the interplays of the momentum, energy, and force in the game. The third derivative of the game progress model is also demonstrated from the jerk quantity (a derivative of acceleration), which is an essential measure in mechanical engineering and influences the force quantity, where the notion of effort, achievement, and discomfort felt in our mind is established.

"It is exciting to understanding how people think and feel inside (mind and body) when playing game, and it is especially curious as to why most game revolves around the established 'zone' value." Hiroyuki Iida, Trustee and Vice President for Educational and Student Affairs, Head of IIDA Laboratory, and Director of the Research Center for Entertainment Science, Japan Advanced Institute of Science and Technology.

Under the guidance of Dr. Mohd Nor Akmal Khalid and Prof. Hiroyuki Iida, colleagues in Research Center for Entertainment Science, as well as various interactions between current and previous students, the research frameworks through the game refinement theory had successfully been established as a multidisciplinary and emerging research field for design and analysis of games.

At present, the IIDA laboratory opened its arm to various multi-national students from multiple backgrounds. Also, current design and development are focused on expanding the notion of game refinement theory to a variety of game types, related fields of education, business, engineering, system design, artificial intelligence in games, search algorithms, and many more.

"The establishment of the link between game refinement theory and flow theory is a start, where we hope the current framework will open-up more opportunity for collaboration and at the same time generalizes as a cross-disciplinary field while contributes to the society at large in a more meaningful ways. At present, most work is still fundamental in nature." Mohd Nor Akmal Khalid Assistant Professor.



The link between GR theory and Flow theory. The force is normalized over various mass with momentum and potential energy.

Estimated Cost for Solving Generalized Learning with Errors Problem via Embedding Techniques


表彰状

Yuntao Wang, Weiyao Wang, Atsushi Takayasu, Tsuyoshi Takagi 殿

貴殿の論文
「Estimated Cost for Solving Generalized Learning with Errors Problem via Embedding Techniques」は、2019年度本論文賞委員の結果、貴殿の賞に決定致しましたので、ここに副賞を添えて表彰します。

2020年6月吉日

大木英二郎

The article proposed a Half-twisted embedding method that includes the Bai-Galbraith and Kannan embedding methods. The difficulty of the LWE problem with a private key sampled from an arbitrary distribution using the Half-twisted embedding method. Furthermore, it analyzed the difficulty of the LWE problem when the number of LWE samples was limited. It was shown that the proposed method has parameters that can be solved faster than the conventional method.

■ *Researchers and authors:*

Weiyao Wang, Yuntao Wang, Atsushi Takayasu, Tsuyoshi Takagi

■ *Contents of the award-winning research*

In the award-winning paper, we propose a new analysis method in the security evaluation of lattice-based cryptography, which is a candidate for next-generation cryptography. We believe that the results of this research will contribute to the standardization of next-generation cryptography.

■ *A few words from the awardee:*

Encouraged by this award, we will devote ourselves to further research activities, and we look forward to your continued guidance and encouragement.

More information about researchs in JAIST can be accessed at https://www.jaist.ac.jp/english/research/ (ENG) and https://www.jaist.ac.jp/research/ (JP)

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RESEARCH & LIFE SUPPORTS


JAIST Library

JAIST LIBRARY

http://www.jaist.ac.jp/library/

The library at JAIST is administered based on the three principles of "Open 24 hours a day", "Research library" and "Electronic library". We are confident that the quality of our library is appropriate for a graduate school in terms of accessibility and the contents of its collection.

***Open 24 hours a day** - Since research is being carried out throughout the day, the library is open 24 hours a day, seven days a week, and books and other materials can be viewed freely whenever it is necessary. Books can be checked out anytime by using an automatic lending machine.*

***Research library** - The library's collection is focused on academic materials that are highly professional and advanced in order to support research in state-of-the-art science and technology.*

***Electronic library** - We are promoting a digital system of academic materials. Users can use the online public access catalog, e-journals and various databases of academic information through JAIST's well-developed information network. You can also connect your PC to the network via wireless LAN in the library.*

***JAIST Repository** is a digital collection providing access to JAIST's research outputs, including journal articles, theses and other research papers.*

In addition, the library is open to the general public. The library user's card can be issued for people who want to use the library for a long time and they can use the library anytime throughout the year with it.

For all the students to be able to enjoy their students' life, JAIST provides a lot of facilities. Here are some of the highlights:

Student Counseling Services

Studying can be tough at times, to ensure that the student's mental health is cared for, JAIST provides a Student Counseling Service. The service is given by professional counselors. If there is anything that troubles you, students can feel free to try this service and to visit the Anything/Everything ADVICE Room and make small talk with the members of this room.
https://www.jaist.ac.jp/english/studentlife/institution/healthcare.html#soudan


Counseling Room

Emergency Medical Agency Designated by JAIST

General health care services including health examinations, first aid and health consultation are provided.

Student Housing

For the comfort of the students, JAIST has eight five-story Student Housing located on the Ishikawa campus. The rooms are divided into three kinds, single room, double room, and family room. It is an affordable living place for students' who wish to not be hassled with the need to find separate housing.


Student Housing(Single Room)

Amenities

Students can peruse the following amenities to make sure their physical body stay fit. Our convenience store is also stocked full of foods and snacks to fulfill your midnight cravings.

Gymnasium

JAIST newly built gymnasium can be transformed into Volleyball, badminton, tennis, basketball, and futsal courts. It also has locker rooms equipped with showers for the students.
https://www.jaist.ac.jp/english/studentlife/institution/recreation


Gymnasium

Tennis Courts

The on-campus lighted tennis courts offer day and night opportunities to relax and recover from the fatigue of research work.


Tennis Court

Training Room

The JAIST training room is equipped with Treadmill (Running Machine), Chest Press (Training Machine for Chest Muscle, Lat Pulldown (Training Machine for Back Muscle), Smith Machine (Assistive Device for Bench Press), aero bike in the training room.

Cafeteria and Convenience Store

A wide variety of dishes are available in a comfortable and relaxed atmosphere. You can see the seasonal changes of nature through the windows.

The New Yamazaki Daily store offers a wide array of items to fulfill student's needs, such as groceries, stationery supplies, and magazines. It also offers a home delivery service and dry-cleaning agent.


Training Room


Cafetaria


JAIST Campus

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