

JAIST NEWSLETTER



Hot topic **Soft robot hand can grasp wet tofu**

Challenge to grab food

Handling fragile, deformable objects like food products has been benefited by applications of soft robotics, a new frontier with harmonic combination of materials and robotics. However, for objects in wet condition, such as a slippery tofu in a soy-sauce dish, they pose a challenge to robotic grippers, since they should accomplish stable grasp and manipulation with low squeeze force applied to the wet objects.

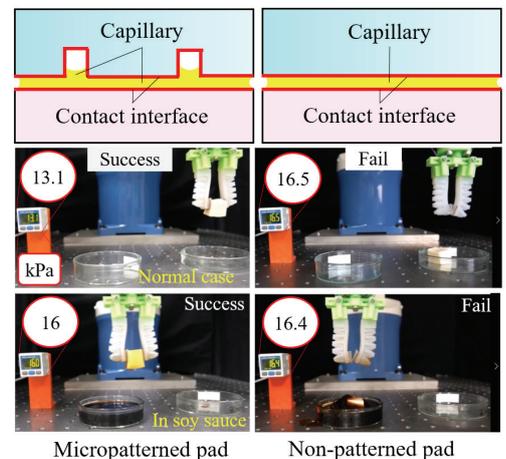
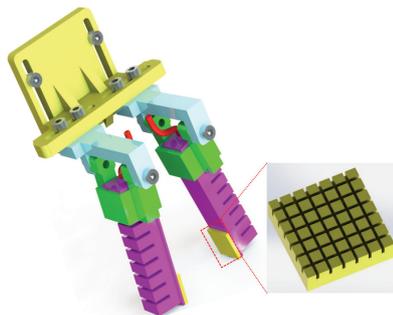
Bio-inspired solution

Our study investigated the role of a micropattern with $85\ \mu\text{m} \times 85\ \mu\text{m}$ squared cells, inspired by the wet adhesive structure of a tree-frog toe [1]. Such patterns are then deposited on pads of a soft robotic hand/gripper for gripping and manipulation of food products. Compared to the non-patterned (flat) pad, the capillary actions occur at narrow grooves of the wet micro-patterned pad, thus increasing the wet adhesion of the contact interface.



Slip suppression

The potential of the micropattern pad to prevent slippage between a robotic gripper and a fragile deformable object in wet conditions without a complicated control method was demonstrated. Results showed the micropatterned pad required less squeeze force than did that without a micropattern, resulting in less deformation of a grasped object such as a piece of tofu. This research is applicable in the food service, and medical industries.



[1] P. V. Nguyen, Q. K. Luu, Y. Takamura, and Van Anh Ho, "Wet Adhesion of Micro-patterned Interfaces for Stable Grasping of Deformable Objects", IEEE International Conference on Intelligent Robot and System (IROS 2020), pp. 9213-9219, 2020.

Background of the topic

Utilization of materials softness in development of novel robotic mechanisms



Associate Professor
HO Anh-Van
Vietnam

He graduated from Hanoi University of Science and Technology in 2007. He received the Ph.D. degree in Mechanical Engineering with major in robotics from Ritsumeikan University in 2012.

Career

He completed the JSPS Post doctoral Fellowship in 2013 before joining Advanced Research Center Mitsubishi Electric Corp., Japan. From 2015 to 2017, he worked as Assistant Professor with Ryukoku University, where he led a laboratory on soft haptics. From 2017, he joined the JAIST for setting up a laboratory on soft robotics. His current research interests are soft robotics, soft haptic interaction, tactile

About Soft Haptics Laboratory

Soft Haptics Lab. is led by Prof. Ho since 2017. Our lab focuses on science and technology of soft robotics, bio-inspired mechanism, and soft sensors. Currently, we have balanced numbers of Japanese and foreign students. In our lab, we encourage mutual communication, free exchange of ideas, and respect among members. Students are divided into groups, where they collaborate everyday toward accomplishment of specific goals in research.

Message from Prof. Ho

Covid-19 pandemic has changed the way for interaction to each other. Online lectures, tele-operation, digital interaction now became new normals, but also opened new challenge and opportunities for research communities. In JAIST, we encourage students to quest for new problems, propose ideas, and collaborate to find the ultimate solution at various perspectives. Students can enjoy the academic freedom, state-of-the-art facilities, international environment, and quietly beautiful four seasons at our campus. Please join us, and conquer yourself here!



Voice of the oversea collaborator

Prof. Trung Ngo

Director of MORE Lab, Univ. of Prince Edward Island, Canada

“ I have privilege to know Prof. Ho and his research for a long time. His work is featured by interesting but high-impact ideas on soft mechanisms, such as soft robotic hands and soft sensing interfaces. We also now have collaboration on development of a novel robotic swarm system. ”



Voice of International Students



Athchaya Suwansoontorn

Materials Science
Thailand

“Discovering and learning by yourselves is the best, and you can do it here.”

Initially, I got to know JAIST from my professors and seniors at my university in Thailand. Afterward, supported by the MEXT scholarship and my professor, I got a chance to come to JAIST then my first staying abroad life started. JAIST is not in a big city but in the countryside surrounded by nature, where you can enjoy the beautiful scenery and fresh air all year. JAIST will be covered with snow during winter, so this is your place if you are a fan of skiing. Even though autumn is my favorite, the sakura festival in spring and the firework festival in summer are also recommended! While staying here, discovering and trying local restaurants is my favorite activity. Just nearby, you can travel all year round without getting bored.

There are many international students here, and JAIST supported us very well, so we don't have to worry about staying in Japan. One of my impressions of doing research at JAIST is the accessibility to scientific equipment. We can proceed with the projects smoothly since JAIST provided most of the necessary instruments and facilities. In addition, students can operate by themselves after training and got permission. This is an excellent chance to learn and gain valuable experience. And I believe that you will have precious time at JAIST.



Hasan Md Mahmudul

Materials Science
Bangladesh

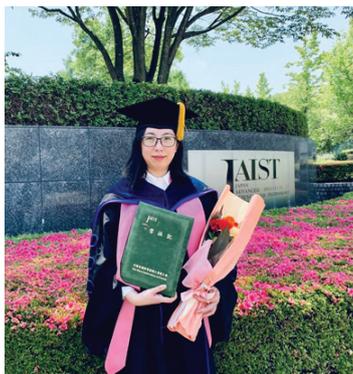


“JAIST is place for big dreamers”

JAIST has a strong collaboration network all over the world. I came to know about JAIST from world-class researchers through their excellent research works. I love the natural environment combined with the advanced technology system, and JAPAN is the perfect country for that. I came to JAIST from Bangladesh in September 2018 as a MEXT Scholar at the School of Materials Science. We can enjoy all four seasons in JAIST along with the beautiful hillside.

JAIST has an excellent research atmosphere. I am currently investigating the development of environment-friendly energy sources for a sustainable society. I choose Ascorbic Acid (AA), known as Vitamin C, for fuel to generate electricity. We have already successfully developed an AA-based fuel cell system that generates power without releasing toxic chemicals or gases into the environment. This could solve two problems at a time. We can reuse the waste of citrus fruits to extract AA and use it for generating clean energy without damaging the environment. JAIST always helped me conducting my research and promoting research findings. Recently, one of our research works was selected as one of the most discussed articles in the top 5% of all research outputs scored by Altmetric. JAIST already promoted this work. This inspires me to explore more deeply into my research work to find good results for the benefit of our society.

Letter of Graduated student



Associate Prof. Dr. FANG Yuan

Dalian Polytechnic University

China

“JAIST is a place formed a big family”

Former Ph.D. Student in Information Science
(Prof. Lim laboratory)

I started my Ph.D. study when I was 36 years old. My goal is to obtain a Ph.D. degree before 40 years old. My major is computer science. Since I have a deep interest in the novel research area of Cyber-Physical Systems, then I joined the WiSE laboratory that is headed by Prof. Lim. Because of Dalian Polytechnic University has concluded academic exchange agreements with JAIST since 2008, I can pursue my Ph.D. study at JAIST. In the first year, I was smoothly completed various offered courses by JAIST, in which these courses really helped me to quickly carry out my major research. JAIST has the minor research project, in which I was conducted it as an internship program at NAIST. I learned additional knowledge of human-centric technology with artificial intelligence that was very useful for my major research. In JAIST, all the professors that I met are thoughtful and responsible people. My husband had also completed his Ph.D. degree in School of Knowledge Science. My daughter had reached the fourth grade in Nomi Elementary School. JAIST provides us with various facilities and environments such as high-quality and cheap dormitories to ensure our study goes efficiently. Our family spent a very memorable three and a half years at JAIST, and I also successfully completed my goal. JAIST is a place formed a big family, where we are sharing and loving each other besides conducting our research activities.

Club activity

JAIST Badminton club

To become a good student and researcher, one must need to maintain mental and physical fitness. JAIST is a place where you can get various club activities running each day of a week. Among those, the badminton club is very popular among students, teachers, and JAIST staff. No matter how good or novice you are, JAIST playground will give you an equal opportunity to improve yourself. Besides, you will get an environment where so many foreign students from different parts of the world will share their playing style along with skilled Japanese players. It is a place where you can also share your culture, thoughts, motivations, or even your difficulties related to research or life. JAIST badminton club arranges badminton tournaments for all JAIST members through which you can judge yourself or get in touch with the most advanced player. This club has also a trainer who will help you to learn quickly and effectively. Moreover, you will have the chance to get so many foreign friends. Then why not you enjoy your life with us! Come to JAIST, play with us, take our challenge, and give us feedback.



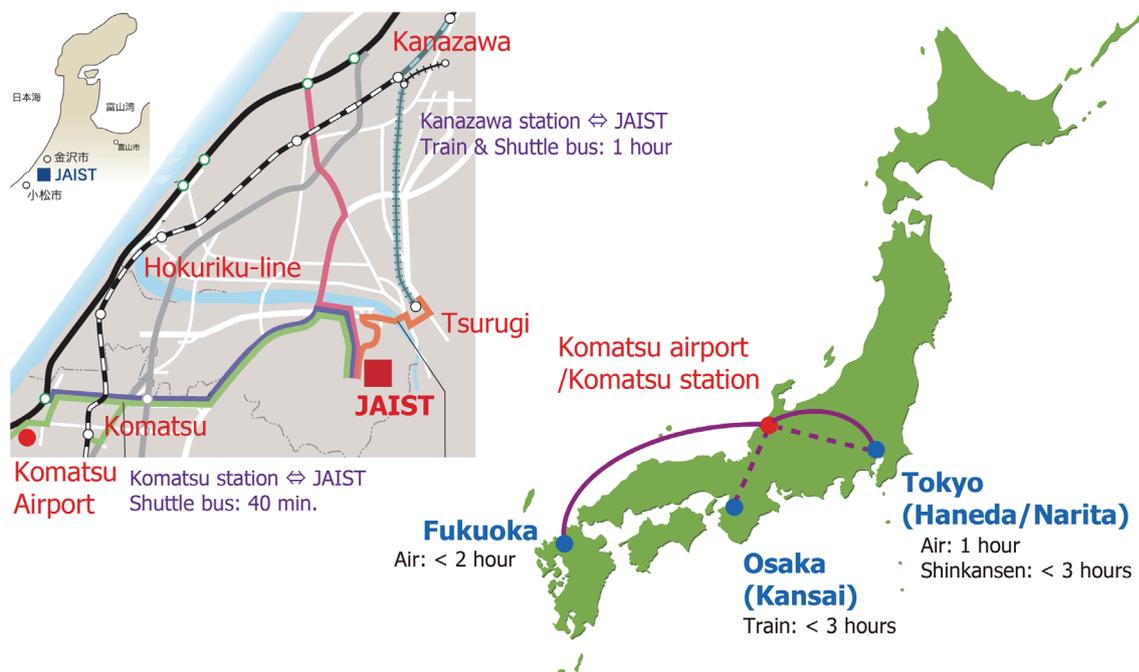
Introduction of JAIST

“JAIST is Japan’s first national postgraduate university with its own campus and without undergraduate”

JAIST celebrated its 30th anniversary in October, 2020. Since its establishment, JAIST has produced world top-level research achievements in a wide range of the fields of advanced science and technology, and has developed excellent human resources.

Location

JAIST resides in the center of Ishikawa Science Park at Nomi city, which also lies mid-way between the two largest cities in Ishikawa – Kanazawa and Komatsu. University shuttles regularly run between the campus and local train stations, making it easy for students to reach both Kanazawa and Komatsu. In addition, JAIST has a satellite facility in Shinagawa, Tokyo, which offers advanced technological and managerial education to students of working professionals who are unable to attend classes at the JAIST campus in Ishikawa.



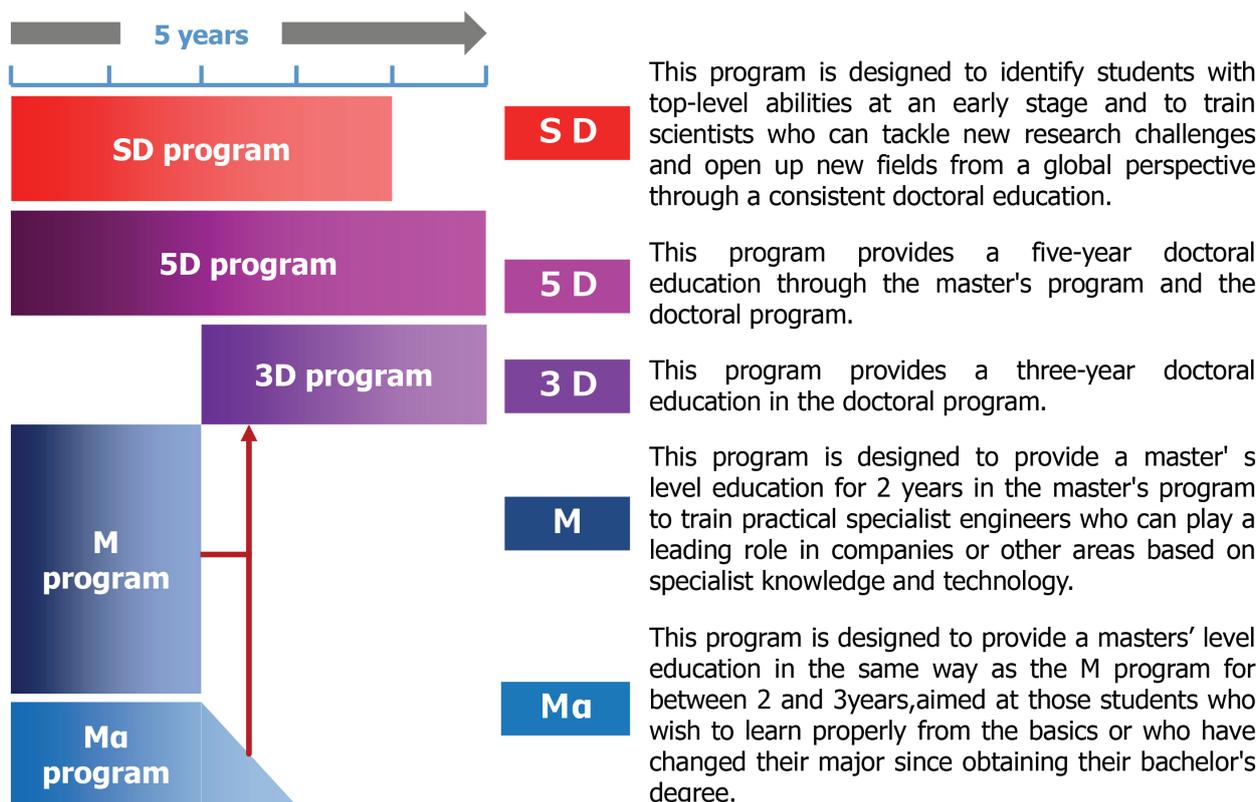
Number of students, number of teachers

JAIST has 1189 students, 41% of its students from 18 countries around the world, students can study and do research in an international atmosphere of JAIST. JAIST has 164 faculty staffs, and 39 are international faculty.

Small group education

JAIST is committed to educating and training world-class scientists and engineers by accepting a wide range of enthusiastic international students and working professionals regardless of their undergraduate major. JAIST provides support working professionals. Students are possible to fulfill degree requirements for both the master’s and doctoral program by taking courses in English. Multiple advisor system is offered to students. Three advisors of (a supervisor, a second supervisor, and an advisor for the minor research project or internship) are assigned to each student and provide guidance and advice on student’s study and research and on general academic activities.

Choose the education program that suits you



Advanced research equipment

At JAIST, experts come together from around the globe to discuss, discourse, and give life to the latest innovations in fields from next-generation digital infrastructure to biotechnology. Here, students and faculty can avail state-of-the-art facilities to build their research from the concept stage to fruition. JAIST provides the world class facilities and equipment for common use, such as massively parallel processing systems, high-speed and large-volume storage systems, electron probe micro-analyzer, transmission electron microscope, cutting-edge microscopies.

Support for research activities

The JAIST Foundation was established in August, 1990 mainly by the business communities of Ishikawa Prefecture and Hokuriku area, with purposes of making grants to JAIST for education and research as well as of promoting industry-academic-government interactions. The foundation expands its activities by its endowment's investment income. Its amount has reached about 3.3 billion yen (as of March, 2021), and has become one of the largest foundations of its kind in Japan. The Foundation arranges and sponsors the following activities: Education and Research, Collaborative Research, Technical Guidance and Consultation, Scholarship Programs, and Industry-Academic-Government Interactions.

Rich nature

JAIST Ishikawa campus offers natural beauty, with views of nearby counties and the city of Kanazawa to the north, the Sea of Japan to the west, forests and pastures to the south, and the spectacular Mt. Hakusan to the east. The area provides a variety of recreational facilities for every season, including several nearby ski resorts, beaches and seaside parks, golf courses, hot springs and athletic and recreational parks. The area affords easy access to natural scenery, wilderness and outdoor recreation.

<https://www.jaist.ac.jp/english/>

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Date of issue: November 8, 2021

