

Focus on !! 10 Asian students experienced Iwate and did research!!

With support from the Japan Science and Technology Agency's (JST) Japan-Asia Youth Exchange Program in Science (SAKURA Exchange Program in Science), we invited Asian students to Iwate University again this school year. This time, the third, from October 23rd (Sun) to October 30th (Sun) in 2016, 10 graduate and undergraduate students were invited from Chungnam National University in Korea, Dalian University of Technology in China, Northwest A&F University in China, Thammasat University in Thailand, the National University of Mongolia, and the Mongolian University of Science and Technology. Under the theme of "supporting the disaster-affected areas while learning science and technology that supports the recovery and future of Iwate", students participated in a two-day study tour to the coastal area affected by the disaster, and PBL and a science and technology activity held at the Iwate University Faculty of Science and Engineering research.

★ 2-day study tour to the affected area

After arriving in Morioka, early the next morning, the group left on a chartered bus for the two-day study tour to the coastal area affected by the disaster. The purpose of the tour was for the students to directly experience the current conditions in those areas and the Sanriku landscape, and then later use this experience for PBL at research labs in Iwate Univ. After enjoying a boat ride at Jodogahama Beach, which is part of the Sanriku Geopark, the group went to the Taro area of Miyako, which suffered immense damage by the tsunami, and viewed the ruins of the Taro Kanko Hotel and the remains of the coastal levee up close to get a feeling for the force and immense destructive power of the tsunami. On the next day, the group visited Otsuchi, where they viewed the ruins of the former Otsuchi Town Hall, reconstruction sites (ground being leveled for residential construction and large coastal levee), and a reconstructed shopping street. All of the students listened attentively to explanations of the situation back when the great tsunami struck, and the current state of town reconstruction work. In the afternoon, at Iwate University's Kamaishi Satellite Office, the students learned about our university's engagement in the reconstruction through the fishery industry, and the new recycling molten materials processing technology at Iwate Southern Coast Clean Center that effectively utilizes the molten materials and gases produced when processing garbage.

★ Advanced research experience and PBL at Iwate Univ.

On the morning of the 4th, President Iwabuchi gave a keynote speech about endeavors that Iwate University has engaged in for the reconstruction after the disaster. From the afternoon of the 4th to the 5th, the guest students were divided into 3 different labs based on their field of specialty, and engaged in discussions with Iwate University Students about how to utilize technology for the reconstruction. On the morning of the 6th, a presentation on reconstruction technology was given that summarized the discussions in the lab and the tour to the coastal area affected by the disaster. The chemistry students presented on the generation and storage of renewable energy. The bioengineering students presented on predictive technology using the biological signals of animals, etc. The information studies students presented on ideas for the development of safe communities using 3D imaging technology. In the afternoon, the guest students and Iwate university students introduced their countries and universities. It was an excellent opportunity to learn about different cultures in 5 countries including Japan. After that, a ceremony for awarding certificates of completion was held, and the guest students headed to Tokyo to return to their countries.

★ Tokyo tour and returning home

On the 7th day, they visited the National Museum of Nature and Science in the morning and the National Museum of Emerging Science and Innovation in the afternoon. While sightseeing in Tokyo, the group enjoyed Japanese culture while shopping, taking pictures in photo booths, Japanese sweets, and more. On the 8th day, the 8 guest students with late departure times were shown around Naritasan Shinsho-ji temple. Everyone was very excited to see the traditional Japanese architectures and scenery. Then they went to Narita Airport and the guest students reluctantly departed, and returned safely home.

In the Taro district, they walked around for about an hour viewing the former city center. The photo on the right shows them climbing the evacuation route from the side of the former Taro Kanko Hotel to an area of higher land. From up on the higher area, the students got a real feel for how high the tsunami reached.



Together with Mrs. Iwasaki, the owner of the Houraikan, where they stayed in Kamaishi (on the left). They listened to Mrs. Iwasaki describe the disaster, and her energetic personality encouraged them.

Making lithium air secondary batteries at the Takeguchi/Ui Lab, Chemistry Course of the Department of Chemistry and Biological Sciences (on the right). Four students from Thailand and Korea participated.



At the National Museum of Emerging Science and Innovation in Tokyo (on the left). The Digital Content EXPO was being held right at this time, and hands-on displays of the latest technology including AR (Augmented Reality) were so interesting to the students that some students even forgot to go and see other exhibits.

Participants' voice



Ms. J. Kanokwan, Thailand: This program widened up my world not only as an engineer but also as a global citizen. I was able to meet up with different bright people from different countries, exchange unforgettable memories, and contribute solutions to improve the disaster-affected areas.



Mr. R. Jia, China: When I saw the building damaged by tsunami, I felt pity and compassion. The bad memory tsunami had brought we can't forget. We should do everything we can do to help the people to rebuild their home and make more and more people to focus on the place, the people and tsunami.

Focus on !!

Meet our young instructor at the Faculty of Science and Engineering!

Kenguro is regularly introducing research works by young faculty members to share their outstanding achievements with the rest of the universities and beyond. This time, we'd like to introduce four specialists: Associate Professor Korenaga at the Chemistry Course of the Department of Chemistry and Biological Sciences; Assistant Professor Ishikawa at the Civil and Environmental Engineering Course, Assistant Professor Matsuyama at the Computer, Intelligence and Media Technology Course, and Assistant Professor Sasaki at the Mechanical Science and Engineering Course of the Department of the Systems Innovation Engineering, will give easy to understand explanations on the topics they pursue.

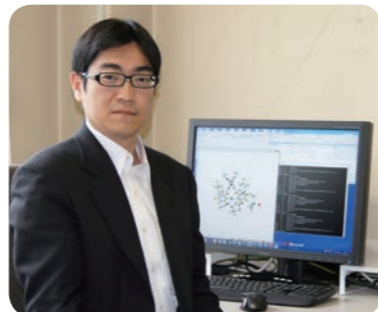
★ Assoc. Prof. Toshinobu Korenaga: Next generation catalysts for useful application

◎New transition-metal catalyst



A catalyst is a chemical substance that speeds up chemical reactions by helping non-reactive or slow reactive process. Its 80% of chemical products are synthesized using a catalyst. It is one of the most advanced fields that turns out many of the Nobel Prize winners including several Japanese scholars. While further development is necessary for more efficient synthesis of increasingly complicated medicine and functional chemical compounds, many of the catalysts use rare metal and other types of transition metals that could be depleted in the future. Our group develops homogenous catalysts for organic synthesis based on the "element strategy" in response to resource depletion. For example, we worked on minimizing the amount of catalysts and successfully developed a new transition-metal catalyst that even a tiny amount like 1/10,000 of the conventional transition-metal catalyst could speed up asymmetric carbon-carbon bond formation. Also, we used a concept that was newly proposed in this century that organic molecules are used as catalysts instead of transition metals and developed a new organic molecular catalyst. With the newly developed catalyst, we work with businesses on the industrial synthesis of medical compounds as well.

◎New organic molecular catalyst



Korenaga designing a catalyst with quantum chemical calculation

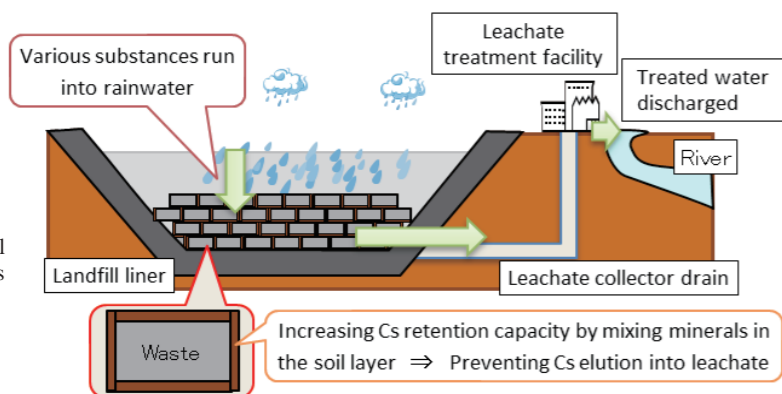


Staff and students of Korenaga's lab on synthetic organic chemistry

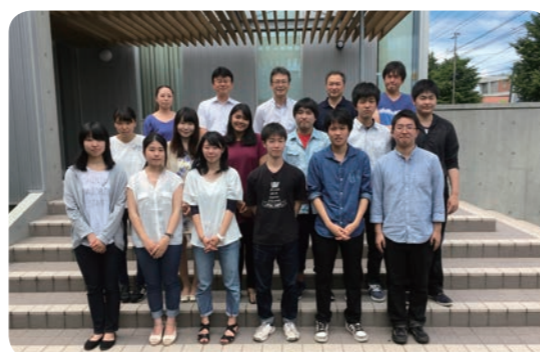
★ Assis. Prof. Nao Ishikawa: Safe disposal of radioactive waste

The nuclear disaster after the Great East Japan Earthquake caused deposits of massive amounts of radioactive substances, specifically radioactive cesium (Cs) in large parts of eastern Japan. Parts of the deposited radioactive substances moved to domestic waste and sewage sludge. This "radioactive waste" is now buried in landfills surrounded by a soil layer if it is in comparatively low concentration. My research aims to improve the radioactive Cs retention capacity of the soil by adding minerals that retain Cs in the soil layer powerfully and prevent leakage of radioactive substances from the landfill. Zeolite, illite, vermiculite and other minerals powerfully retain Cs in various mechanisms. We use radioactive Cs to check the retention capacity of minerals and find out how much the radioactive Cs retention capacity of soil layer increases if minerals are mixed in. Our findings will hopefully help ensure safe and secure disposal of radioactive waste.

Improving radioactive Cs retention of the soil layer with minerals (illustration)



At the RI lab. We wear yellow lab coats instead of white for radioactive lab work.



Staff and students of Ishikawa's lab on environmental sanitary engineering

★ Assis. Prof. Katsutsugu Matsuyama: Proposing the new computer media !!

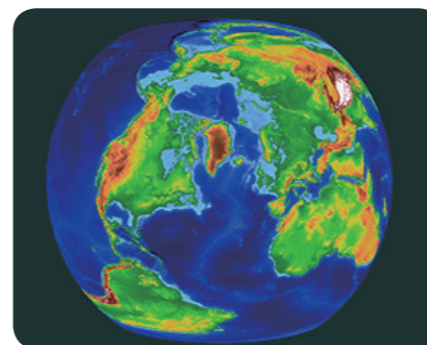


Image 1: Map software "MIKAN GLOBE" lets you see the globe from fresh perspectives.

I'm doing research on the methods of making software control more efficient and user-friendly with an aim to contribute to computer media (the relationship between people and information using computers). I also do research on the methods to present new understanding of stuff and matters. By combining the creation of ideas with creative thinking and information technologies including programming, I develop my research through production of actual work. The production involves computer graphics technology and I sometimes develop a new technology to actualize my idea. For example, I made a map called "MIKAN GLOBE" (Image 1) that lets you peel (expand) like an orange in an attempt to create a map that encourages new discovery and inspiration that a paper map cannot provide. Other examples include software (Image 2) that lets you control projected figures freely or media artwork (Image 3) that shows another image when a transparent plate is held over the display.

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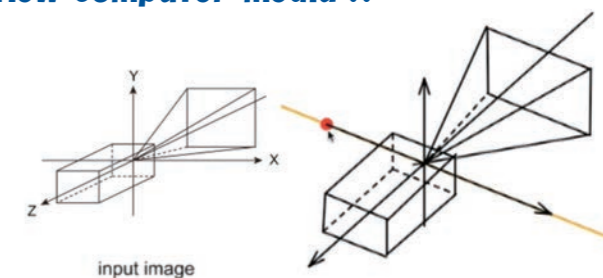


Image 2: "Co-Ordinate" software lets you control projected figures



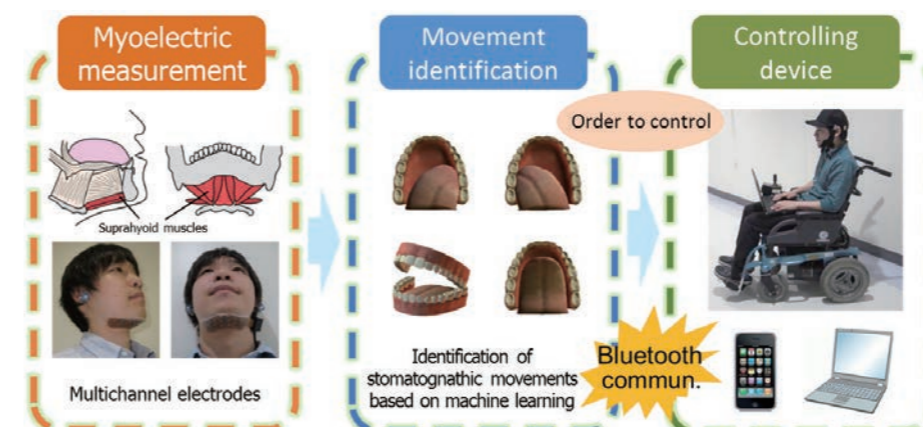
Image 3: Artwork "Dr. KM's desk". Matsuyama is on the screen.

★ Assis. Prof. Makoto Sasaki: Biorobotics focusing on tongue functions

The tongue is called "a hand in the mouth" and can make quick and accurate movements. Motor function of the tongue is likely to remain for people with severe limb paralysis due to spinal cord injuries. For this reason, various interfaces have been developed to allow control of electric wheelchairs or computers with tongue movements. However, conventional technologies accompany a number of safety and hygienic issues as they involve surgical operations on the tongue or installing measurement devices in the mouth. So, our lab developed a method to estimate voluntary movements, mandibular movements, and swallowing movements by observing activities of the suprahyoid muscles that support the base of the tongue using a film-like myoelectric sensor attached to the bottom of the tongue and analyzing the movements using machine learning, which is a type of artificial intelligence. I had this idea of knowing inside the mouth and controlling an electric wheelchair without putting anything in the mouth and my students actualized it. My next dream is to support people having difficulties in swallowing. If you have that, your tongue works down in speaking, eating, and swallowing. And the risk of death is increased due to accidental swallowing and suffocation. How we can address these problems using engineering technologies is my new research topic that I pursue in cooperation with medical institutions and companies in Iwate.



Sasaki discussing with students



Controlling device using tongue and jaw movements

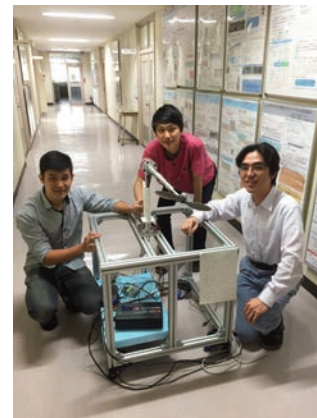


Students, graduates, and related people at the lab on stomatognathic robotics

★ Welcoming interns from partner universities overseas!!

From June 6 to July 29, 2016, the Faculty of Science and Engineering hosted two interns from King Mongkut's University of Technology Thonburi that Iwate University signed an academic exchange agreement with in June 2016. Unlike a conventional lecture-based internship, this was the first attempt of the faculty that let them engage in training at companies in addition to the research work at a lab. This report features an intern student, Songsomboon, a junior student specializing in the mechatronics engineering.

The Sato (Atsushi) Lab in the Mechanical Science and Engineering Course of the Department of Systems Innovation Engineering that Songsomboon is assigned to works on the control theory and its application in aerospace fields. They engage in research work to actualize autonomous flights of drones and other uninhabited aircrafts. Among them, Songsomboon picked a research topic, "Multicopter modeling and flight control" and carried out derivation of kinetic models for multicopter (rotorcraft with multiple propellers) and metering experiments of their propulsion in the former half from June 15-24 and made crafts and performed flight control experiments in the latter half from July 11-29. This was a collaborative research project with the Japan AeroSpace Technology Foundation and is expected to be applied to infrastructure testing of bridges and tunnels. In addition to research activities at Iwate University, he visited an auto parts manufacturing location, Mikuni's Odawara Plant and did training at the Simulation Division on control using Simulink software and at the Four-Wheeler Division on manufacturing mechanical parts.



With the device to measure propellers and motor characteristics for multicopter. Songsomboon is on the left and Associate Prof. Sato is on the right.

Interns' voice

Before I came to Japan, I really worried about my conversation with Japanese people. And most of all, I was afraid to do something wrong because there are many different things between my hometown and Japanese culture. When I arrived in Japan, I was very surprised because Japanese people are very kind. I have many friends in laboratory and we get along well. They had a welcome party for me. It's a best impression that I'll never forget it. Iwate is a peaceful and green prefecture. There are many interesting researches and technologies. I get many knowledges from this internship not only the knowledge from laboratory class, but also Japanese folk life. And I promise that I will keep all of them to develop my life and also my career in the future as best as I can.

★ Student exchange with Hanbat National University in Korea

Every year there is a two-way student exchange with Hanbat National University in Korea. More than 20 graduate and undergraduate students have been sent to that university. During the 2016 school year, student exchanges through the joint PBL were held on 22-23 in August and 13-16 in November, respectively, at Iwate University and Hanbat National University. Here are the reports.

● 8/22 to 8/23 (Iwate University)

After a bilateral student activity introduction by the 11 Iwate University students and 10 Hanbat National University students, they divided into 5 groups (each group consisting of 2 or 3 Iwate University students and 2 Hanbat National University students) and cooperated on a PBL activity. This school year's 5 PBL themes were summarized by the Hanbat National University students. These included: 1) "Utilizing the IoT (Internet of Things) for the elderly," 2) "Controlling air pollution," 3) "Energy harvesting (environmental energy generation)," 4) "Next-generation computers," and 5) "Technological development to reduce suicides." After the PBL, the students tried wanko soba to get a taste of Iwate culture. Including some Iwate University students, 6 were able to eat more than 100 bowls and receive a Wanko Soba Certificate. At the end of the research trip, they visited Hiraizumi.



Joint PBL (on the left). The group in front is discussing effective measures to control air pollution.



Success at eating more than 100 bowls!! (on the right). After eating wanko soba, the Hanbat students went to Don Quijote with the Iwate University students.

● 11/13 to 11/16 (Hanbat National University)

After the August Iwate University exchange, students exchanged information for PBL via the internet. At Hanbat National University, in continuation they divided into 5 groups to engage in joint PBL. On the morning of the 3rd day of the research trip the groups gave presentations on their results. Many very interesting ideas were suggested for problem-solving. After the presentation, the students went with the Hanbat National University students to Seoul by bus and were able to both observe and do hands-on work at cultural facilities at Seoul Tower and an antique shop area of Insa-Dong.



After the presentation, all students received certificates of completion from Hanbat National University (on the left).

Participants' voice



Mr. U. Lee, Environmental Engineering B4 (Hanbat National Univ.) : It was the most memorable project I have ever done! I'm so proud of myself and other schoolmates for the creative ideas. I really thank the professors and teachers for supporting us so we could enjoy our trip without any difficulties! I wish I could do this project again.



Ms. Ayaka Seto, Chemistry and Bioengineering B4 (Iwate Univ.) : At the previous tour in August, I felt how difficult it was to express opinions in English. This time, I discussed in English, summarized opinions of the group, and was able to successfully give presentations in English. This study tour was a great experience for me in using English to communicate with the Korean students, and I want to participate in another overseas tour if I have an opportunity.