

# KENGURO Quarterly vol.7



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## Sakura Science Plan

# Focus !! Supporting Tsunami-Affected Areas through R&D in Robotics!!

The Special Committee on the Globalization of Education and Research (KENGURO) is actively seeking out programs for inviting students from overseas in order to attract outstanding international students. As a continuing effort from August 2015, the program welcomed a graduate student from the Dalian University of Technology in China and three undergraduate students from Chulalongkorn University in Thailand from January 18 to February 6, 2016 with the support of the Sakura Science Plan under the Japan Science and Technology Agency (JST). The students stayed at a lab at the Department of Electrical Engineering and Computer Science for three weeks to engage in a joint R&D project to develop cutting-edge robots for post-disaster support.

### ★ Field trip to Kamaishi and Ofunato!!

The students visited Kamaishi and Ofunato from January 21 to 23 to learn about the current situation and problems that motivated them to carry out their research work. On the first day, they enjoyed a Japanese ryokan and delicious Japanese dishes, explored the World's Camellia Museum, and went on a cruise trip on a fishing boat while engaging in talks with locals at the Kamaishi Forest Owner's Association and the Kirikiri Fishing Port to learn why their research topic is needed. The second day took place in Ofunato where students heard stories about the damage and the state of reconstruction from Mr. Miura, Director of Commercial and Industrial Port and Harbor Department at the Ofunato City Hall. They continued on to the Ofunato Tsunami Museum. The students were shocked by the fact that a number of people are still living in temporary housing even now. The field trip was followed by a two-week research project on campus.



Students took a boat tour to observe local fisheries and heard stories on the post-disaster reconstruction from local fishermen (photo on the left).

During the break from the research project at Iwate University, the students enjoyed skiing at Iwate Kogen Snowpark (photo on the right), and went hiking on snowy Iwayama with Iwate University students.



### ★ Final Debriefing Session!!

On February 4, the Final Debriefing Session was held to wrap up the program. Zheng from China designed a timber harvesting machine for foresters in the Kamaishi area who were affected by the disaster. If the harvester is put to practical use, it could reduce work-related accidents as workers would be able to keep their distance from trees. Three Thai students did research on introducing image processing to automatic ship handling for local fishermen catching sea urchin and abalone. If this is actually used, beginners and elderly fishermen would also be able to help with the work.

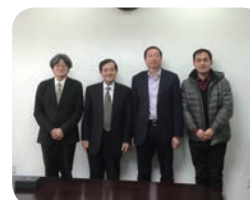


Mr. Zheng gave a presentation on his research under the title, "The design of a boring machine and ejecting device."

### ★ Feedback on the Program

The guest students had an opportunity to learn about the current state of post-disaster reconstruction directly from locals and engage in activities with other lab students to learn from different perspectives. It was also a great opportunity to get them interested in Japanese culture. We are also having a forward-looking talk with Prof. Cong (Zheng's supervisor) on a potential joint research project in the future and have received inquiries from the two participants from Thailand on studying at Iwate University.

They received a collection of messages at the exchange party after the debriefing session (photo on the right). Associate Prof. Kim (on the far right) from the Department of Electrical Engineering and Computer Science was in charge of this program.



Prof. Yoshizawa, Chair of KENGURO, and Prof. Kobayashi visiting Dalian University of Technology in early March for a consultation on student exchange (photo on the left). They met Zheng (on the far right) again. Prof. Cong is second from the right.

### Participants' Voice



**Mr. H. Zheng, China:** Many foreign friends I met are friendly and many things I should learn from them. I hope my research in Japan is useful for Prof. Kim. I believe that our friendship is everlasting. If there is any opportunity I will come back again.



**Takuma Kaneko, Department of Electrical Engineering and Computer Science M1:** What I remember most is our ski trip with the international students as a lab event. Many of them had never seen snow and I think they were able to experience something new. It was a great opportunity for me, too as I was able to communicate in English.



**Miss J. Boonjing, Thailand:** Morioka is a very beautiful city. There is a good environment and there are many activities on snow that I cannot do in Thailand. I have a very good time here. I got a great experience. I would like to say thanks for everything you done for us.



**Shohei Hama, Department of Electrical Engineering and Computer Science B4:** This exchange made me realize that it was actually rather exciting that I could not use Japanese at all. I was mainly in charge of the welcome party and the ski trip. I will never forget the day I taught them how to ski without using any Japanese.

## ★ Meet our Young Instructor at the Faculty of Engineering (Part 1)!!

The Ginga Seminar was held twice this academic year with the aim of discovering outstanding research work done by a young instructor. This year, Eriko Sugano, Associate Professor at the Department of Chemistry and Bioengineering, and Tomoyuki Naito, Associate Professor at the Department of Materials Science and Engineering, talked about their research topics. They described the topics they pursue in their research work in an easy-to-understand way for our readers.

### ★ Associate Prof. Eriko Sugano: Optically Controlling Genes to Restore Vision!!



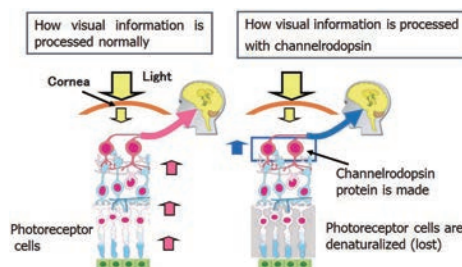
Sugano writing a paper(?)

Dreams come true when you wish for them, but not if you don't



Faculty members and students at the Laboratory of Visual Neuroscience that Sugano is affiliated with.

Imagine being told that you would lose your sight. How terrifying would that be? Your daily life would become very difficult and you wouldn't even be able to see your own face. We are doing research under the theme, "Restoring the sight of patients who have lost their vision" as there is no treatment for vision loss. A disease called retinitis pigmentosa causes a reduction of photoreceptor cells in the retina that receive information first and prevents visual information from being delivered. The disease will eventually lead to vision loss. However, even though the photoreceptor cells are lost, other nerve cells remain in the retina. So, we applied optogenetic technologies to enable the remaining cells to receive optical information and convert it to neural information. This is how we are attempting to recover lost vision (see the figures on the right). More specifically, we let the retinal cells make channelrodopsin, a protein from green algae that receives light and converts it to neural information that works as photoreceptor cells. We successfully developed channelrodopsin, which receives visible light by itself, and now own the patent in Japan, the United States, and Europe.



With this technology we developed, Astellas, a pharmaceutical company, will start the preparation steps for treating people officially!!



Maki Takahashi

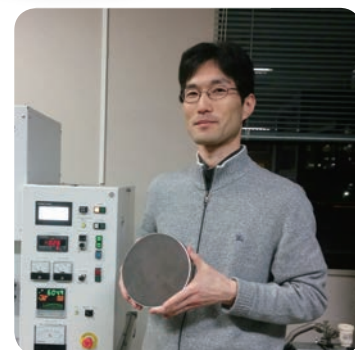
### ★ Associate Prof. Tomoyuki Naito: Controlling Substances with Superconducting Magnets!

When you hear the word superconductor, you might think of "zero electrical resistance" first. Another feature of superconductors is "flux pinning" in which a superconductor is pinned in space above a magnet (quantized flux). By utilizing this flux pinning, you can turn a chunk of a superconductor (bulk) into quasi-permanent magnet (I say quasi-permanent because the superconductor needs to be continuously cooled).



Moses effect (top). That's right. The famous episode in the Old Testament inspired the name.

In order to maintain this captured magnetic field, supercurrent, as much as 1,000-10,000 amps per square centimeter, needs to be flowing within the superconducting material with zero electrical resistance. A magnetic field exceeding 10 tesla that is generated by a superconducting bulk magnet a few centimeters in diameter (earth's magnetism is 50 microtesla) is strong enough to lift a linear motor car (magnetic levitation) and repel water (Moses effect). I'm especially interested in material development based on the MgB<sub>2</sub> superconductor and microscopic mechanism of flux pinning in my research.



Naito looks happy with the MgB<sub>2</sub> bulk in his hand. It measures as much as 20cm in diameter.



Faculty members and students at the Laboratory that Naito is affiliated with.

## Bulletin

### ★ Academic cooperation between faculties !!

The agreement on academic exchange with the National University of Mongolia will be renewed. Two students from the National University of Mongolia will join Prof. Konno's lab as Ph. D. students at the department of Design and Media Technology. We look forward to meeting them at various events!

### ★ Lecture by Prof. Herbert Yang from the University of Alberta, Canada!!

The 29th Ginga Lecture will be held on April 20, 2016. We will have a guest lecturer, Prof. Yang from the University of Alberta in Canada who talks about his country, his university and his field of specialization. Professor Yang specializes in computer graphics and computer vision. Please come and enjoy.

## Editor's Note

This issue featured not only an international exchange program but also the research topics of two instructors. Although we hardly get to hear about fields outside our own specialties, various events like international exchange and lectures remind us that meeting new people sparks new interests and gives us reasons to try new things. We continue to host activities to provide these kinds of opportunities on campus.

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