Science and Technology in Japan 2023 Program Report

School of Science and Technology (SST) carried out a short-term program called "Science and Technology in Japan" from 6th to 14th July 2023. This is the program's fifth year, and 18 participants from overseas partner universities (*1) attended.

(*1) Participants' home universities: Srinakharinwirot University (Thai), Institut supérieur d'électronique de Paris (France), University of East Anglia (UK), National Kaohsiung University of Science and Technology (Taiwan), East China Normal University (China), Shenzhen University (China), Shanghai Jiao Tong University (China), King Mongkut's Institute of Technology Ladkrabang (Thai), University of Malayan (Malaysia)

- **Objectives and Features**
- The biggest goal is for participants to learn about industries and culture in Japan, the biggest economic and technical center in the Far East, and to achieve a better understanding.
- It will be of great help for students who hope to play an important role in the global society to deepen their understanding of the society, industry, and the underlying culture in Japan, which has a different philosophy and is widely recognized as being difficult to understand.
- The program operation was combined with a course at Graduate School of Science and Technology and master students supported participants throughout the program. This is also a big feature as students are able to improve their English language abilities by discussing the current situation of Japanese science and technology and their own research fields and making presentations.

- **Program Outline**

  This program mainly consists of lectures in the science and technology field and site visits to related research institutes or companies. Not only gaining knowledge from lectures but also opportunities were provided where participants could learn the real opinions of engineers and researchers and how the technologies were applied in the field.

■Lectures

(1)" Introduction to Japanese Language and Culture" by SST faculty

(2)" Introduction of Science and Technology in Japan 1" by SST faculty

(3) Lectures focused on fields of electrical Engineering, mechanical engineering, architecture, applied chemistry, and Physics.

[Lecture titles]

- Introduction to Mobile Robot Control: From Theory to Practice
- Lecture on Shape memory alloy and Lab. Tour in mechanical engineering
- Urban redevelopment of wooden densely built-up area in Japan
- Materials for Energy & Environmental Applications
- Optical Manipulation of Atoms and Microparticles

The abstract for each lecture is available at http://www.meiji.ac.jp/sst/international/stj.html

(4)" Introduction of Science and Technology in Japan 2" by master students

(5) Lecture by a graduated student from Graduate School of Science and Technology (GSST).

■Site-visits

Tour of Nippon Steel's East Japan Ironworks Kimitsu area factory

Program Report

■6 July

(1) "Introduction of Science and Technology in Japan 1" was given by Prof. Kaori Sekine from Department of Electronics and Bioinformatics. She gave overviews of current and past Japan's position in the science and technology field by showing statistics and indicators of population, economics, and environment. It concentrates some of the participants' attention on Japanese science and technology, including current Japanese information and communication systems and hardware such as biological information monitors.

(2) "Introduction of Science and Technology in Japan 1" was given by master students of GSST: Presentations on their own research topics, progress and results.

■7 July

(1) The lecture “Introduction to Japanese Culture and Society” was given by Prof. Yohei Yamamoto. To provide an opportunity for participants to start learning Japanese language and culture. While using Japanese animation, lectures were given on Communication, Culture and History.

(2) Prof. Mitso Notomi from the Department of Mechanical Engineering delivered “Lecture on Shape memory alloy”. What is shape memory alloy? It’s one of the strangest and most amazing materials on earth, can remember its original shape even after undergoing large deformation, plastic deformation beyond elasticity, and can recover its shape by heating. The mechanism of shape memory alloys was outlined with a video of a shape recovery experiment. The application of SMA in the most famous space project, the Hayabusa mission, was also highlighted.

Lab. Tour in mechanical engineering ↓

■8 July

“Urban redevelopment of wooden densely built-up area in Japan” was given by Senior Assistant Prof. Yutaro Muraji from Department of Architecture. Focuses on one of the urban challenges: the renewal of densely built-up areas. Urban areas in Japan are densely populated with wooden houses, known as 'Moku-Mitsu', and face various problems such as seismic resistance, deterioration and vacancies. We will discuss how architecture and design can approach urban issues such as Moku-Mitsu, which cannot be solved by engineering solutions only.

■10 July

Prof. Hajime Wagata from the Department of Applied Chemistry gave the lecture on “Materials for Energy & Environmental Applications” today. This lecture offered opportunities to help participants start thinking about environmental purification and new energy sources for the next generation. The aims of this course are to know recent research efforts in the field of materials science to solve the above problems and discuss the requirement of a new lifestyle to build up sustainable societies.

*Visit to Nippon Steel's East Japan Ironworks Kimitsu area factory ↓

■11 July

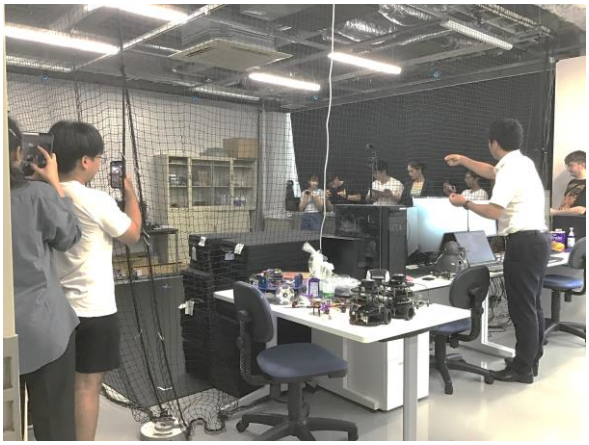
"Optical Manipulation of Atoms and Microparticles" was given by Prof. Maki Tachikawa from Department of Physics. The motion of atoms and microparticles can be controlled by the use of radiation pressure force exerted on the objects. This lecture introduces two types of optical manipulation, laser cooling and trapping, and interesting new physics brought by the techniques.

■12 July

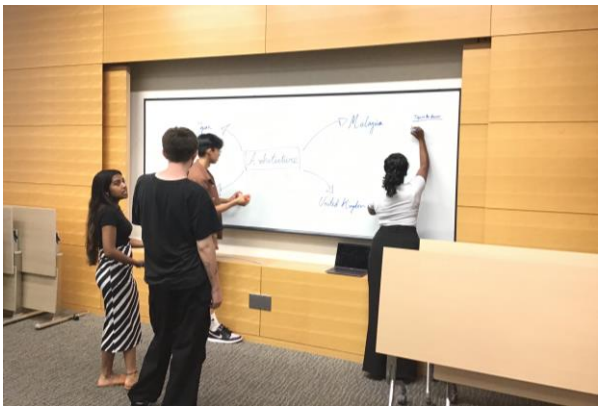
Lectures by alumni of the Graduate School of Science and Engineering: Ms. Akane Katayama (2018 alumnus of the Department of Mechanical Engineering, currently works for SONY Corporation) was invited to give the presentation about the working environment in Japan, including Japanese companies, systems, and employment of foreign nationals. A wide range of questions were received from the students and a lively Q&A session took place.

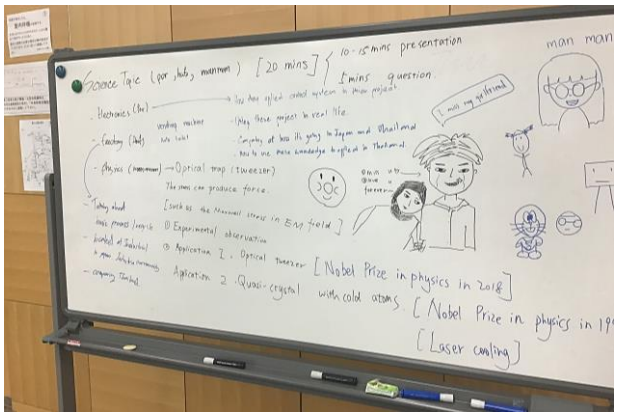
■13 July

(1) Senior Assistant Prof. Tatsuya Ibuki from the Department of Electrical Engineering delivered the lecture "Introduction to Mobile Robot Control: From Theory to Practice". This lecture offers opportunities to learn the basics of position/attitude control of mobile robots, such as quadrotors and ground vehicles.



(2) Preparation for the final presentation: five presentation groups are formed with participants presenting and discussing their interesting themes.





■14 July

Final presentations – Five groups set themes based on the knowledge and interests gained through the Program and their stay in Japan, and made presentations. A question-and-answer session was also held. Faculty, staff and students of GSST took part.

[Presentation Topics]

① Japanese Architecture
② Japanese culture: Life Style, Animation…
③ Japanese culture - Comparison with other Counties
④ Science topics
⑤ Architecture - Comparison with Home Counties

Student Voices

■I have learned a lot of things, first of all, the various science and technology researches carried out in the school, various notions about sciences, Japan's rich culture, traditions and history.
This program allowed me to have a new way of thinking and of apprehending things, and that I still have a lot of things to see and learn about Japan.
Thank you for this opportunity.

■I gained a lot, really :
- Scientific and technical knowledge
- Discovery of a culture that is now very close to my heart
- Challenge myself by going very far from my home country and have a completely immersive experience in a culture that is very different from mine
- Learn from teachers and students how they work, what are their topics and why do they like them
- Discover new cultures by sharing with different students
- Long time friendships! We are still in touch with some participants in the STJ program even if we are back to our own countries, and that is a very precious thing for me!

■I have learned all the different ways Japan has had an effect on the science and technology field and some new phrases and facts about the Japanese culture.

Thankful Acknowledgment

We are deeply indebted to the visited research facilities and companies, as well as the lecturers and the students who cooperated with us. We would like to take this opportunity to express our sincere appreciation towards all those involved. Thank you very much.

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