

Report on Workshop for Interdisciplinary Global Engineers at MIT (2015)



September 13th - 19th



東京大学大学院 工学系研究科
SCHOOL OF ENGINEERING, THE UNIVERSITY OF TOKYO

Contents

Preface		p.2
Schedule		p.3
Individual Reports		
Civil Engineering	Shunichiro NAKAMURA	p.4
Architecture	Seiyo WARITA	p.5
Urban Engineering	Takahisa MINAMI	p.6
Mechanical Engineering	Kazuki MIYAHARA	p.7
Precision Engineering	Yuta TAMURA	p.8
Aeronautics and Astronautics	Kaito ARIU	p.9
Electrical Engineering and Information Systems	Koya NARUMI	p.10
Applied Physics	Yuji NAKAGAWA	p.11
Systems Innovation	Eiji TSUKIYAMA	p.12
Materials Engineering	Yoichiro KOZAKI	p.13
Applied Chemistry	Shogo MORI	p.14
Chemical System Engineering	Shojiro SHIBAYAMA	p.15
Chemistry and Biotechnology	Toshiki MURAYAMA	p.16
Nuclear Engineering and Management	Kazuhiro NAKASHOJI	p.17
Bioengineering	Raiji KAWADE	p.18
Technology Management for Innovation	Hiroya GORAI	p.19

Preface

This workshop program was carried out as a part of the “Re-Inventing Japan Project” by the Ministry of Education, Culture, Sports, Science and Technology of Japan. The student delegation, composed of 16 participants from each department of the Graduate School of Engineering, visited MIT and Harvard University. Through this program, all participants had a great time visiting laboratories, attending classes, and having exchanges and discussions with students there, including students from Japan. This document is the report of our activities during our stay from September 13th to 19th.

In the exchange meeting with MIT students, we talked about our research and differences of culture between Japan and the U.S. At Harvard University, we attended a Japanese language class and discussed the responsibilities and possibilities of artificial intelligence in the future. We also had conversations with students from Japan, and heard about the differences between universities in the U.S. and Japan.

During each laboratory visit, we got to know the researchers and students, and we saw their enthusiasm for their work. We enjoyed the chance to have meaningful discussions with them and to look around the facilities.

We would like to take this opportunity to thank all the people who made this program possible, especially Ishihara-san, Furuichi-sensei, Su-sensei, and Morishita-san, for all their help in realizing this exciting opportunity.

In this program, we had the privilege of visiting what is regarded as the world's highest level research, and we expect it will help us make decisions for our future. We hope this report will contribute to improving future workshop programs, and furthermore, promoting international student exchanges at the University of Tokyo.

Schedule

September 13th

- 16:15 Meet at Narita International Airport
- 18:10 Departure from Narita International Airport (Flight: JL 008)
- 18:00 Arrival at Boston Logan International Airport
- 19:00 Arrival at Holiday Inn Express Hotel & Suites Boston-Cambridge

September 14th

- 10:00 Participation in Japanese language class at MIT
- 11:00 MIT campus tour
Lab visits and lectures
- 18:30 Meeting with MIT students

September 15th

- Lab visits and lectures
- 18:30 Meeting with Japanese students studying at MIT

September 16th

- 10:00 Participation in Japanese Language class at Harvard
- 11:30 Lunch with Harvard students
Lab visits and lectures

September 17th

- Lab visits and lectures

September 18th

- 06:00 Departure from Holiday Inn Express Hotel & Suites Boston-Cambridge
- 09:40 Departure from Boston Logan International Airport (Flight: AA2253)
- 11:34 Arrival at Chicago O'Hare International Airport
- 12:35 Departure from Chicago O'Hare International Airport (Flight: JL009)

September 19th

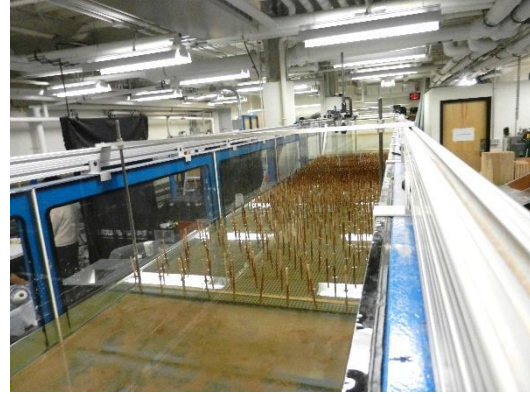
- 15:35 Arrival at Narita International Airport

Civil Engineering

Shunichiro NAKAMURA

1. Visit to MIT laboratories (16th, 17th)

I visited Prof. Nepf, who specializes in my major, coastal engineering; and Ms. Yang, who studies under her. Prof. Nepf was a member of the same committee as my current mentor when he was an MIT student. She and I discussed my study, “wave physics on coasts with fringing reefs,” for about an hour. On the next day, Ms. Yang showed me around an experiment room in a basement. (Right Figure)



2. Exchange meetings with Japanese learners (14th, 16th)

We had exchange meetings with students taking Japanese courses at MIT and Harvard. We had an especially great time in Harvard talking about artificial intelligence. I was impressed with their attitudes.

3. Visit to Japanese students studying at MIT

-MIT Sloan

I visited two Japanese students studying on company expense to get MBAs at MIT. We talked about their life at MIT, the objectives of their studies, and their future career plans. Then I had the opportunity to attend a real class conducted there.

-Dinner with MIT Japanese students

We had dinner with Japanese Ph.D. candidates who belong to laboratories at MIT. They talked about the differences between Japanese universities and MIT, and the challenges they experience living in the US.

-A graduate from the dep. of. civil engineering

One of the students who attended the dinner was a graduate from the department of civil engineering. I asked her about her study area, hydrology, and her future plans after getting a Ph. D.

4. Impressions

This program was meaningful in that we were afforded a chance to visit professors and students from around the world at MIT and Harvard. In addition to that, it was exciting to make friends with U-Tokyo students with different backgrounds.

Finally, I would like to express my appreciation to all the staff from the program, professors in my laboratory, and the department of civil engineering.

1. Activities in Boston

1.1 Architecture Visit

As a student from the Department of Architecture, I visited 10 famous buildings located in Boston and Cambridge. I saw the MIT chapel and Auditorium (designed by Eero Saarinen), Stata Center (by Frank Gehry) and so on. I was happy to visit those buildings, which I had previously only seen in magazines. The MIT media lab (by Fumihiko Maki, Fig.1) and Carpenter Center of Visual Arts (by Le Corbusier, Fig.2) were my favorites.

1.2 Lab Visit

There are few laboratories and researchers at MIT tackling disaster risk and management research, so I made an appointment with Dr. Mardavij Roozbehani, a principal research scientist at LIDS who is doing research on the robustness and fragility of networked systems. Since he was not available at the last minute, I met Dr. Dmitry S. Yershov, a postdoctoral associate at LIDS. He explained his research theme of robotics control and its optimization. After that, he showed me the LIDS lab and a robot used for research.

1.3 Other Activities

We met Japanese students/researchers at MIT and I became more conscious of study abroad opportunities. Also, communicating with Japanese language class students at MIT/Harvard motivated me to improve my ability to speak a foreign language.

2. Summary and Acknowledgements

Since I've never studied abroad, this workshop was exciting for me and broadened my horizons. Moreover, it was a great opportunity to talk with 15 representatives of each department from the Graduate School of Engineering.

Finally, I would like to express my appreciation to all the people involved in this workshop.

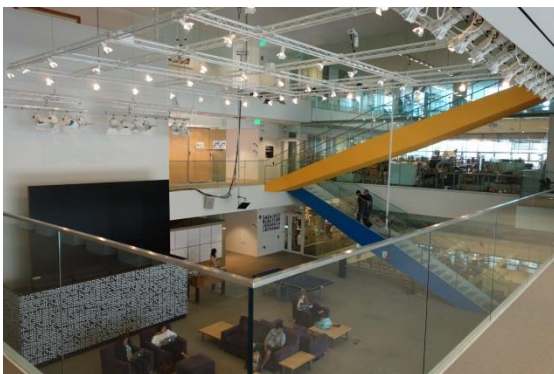


Fig.1 Media Lab (interior)



Fig.2 Carpenter Center (exterior)

Urban Engineering

Takahisa MINAMI

I belong to KATO Takaaki Lab (studying social safety systems) in the Institute of Industrial Science, specializing in urban disaster management. Since my lab often focuses on disasters which take place in Asia, I had had no chances before joining this program to be involved in Western research fields. I decided to take this opportunity to observe research activities in the U.S., discuss with researchers and students there, and broaden my horizons of study.

■ Timeline/Activities

- 9/14 Lab visit : MIT Department of Architecture / Prof. James Wescoat

I talked with Prof Wescoat, who was involved in a design workshop in areas struck by the 2011 Great East Japan Earthquake, and who majors in water management and landscape architecture. He gave me a lot of information on the current situation of disaster research conducted in the U.S.

- 9/15 Lab visit : MIT LIDS / Dmitry S. Yershov

Postdoctoral Researcher Dmitry introduced to me LIDS, where researchers in the fields of robotics, computer science, network systems, risk management, etc. were doing cross-sectional research on information and decision systems. I thought it was MIT's open atmosphere that made this kind of cross-disciplinary study possible. I realized that "decision making" was one of the topics which was shared in each field of engineering.

- 9/16 Lab visit : Harvard Graduate School of Design / Prof. Ann Forsyth

I visited Prof Forsyth, who studies urban planning theory, and discussed with her the role of planning in our society. I felt her consideration of suburbs and the concept of the "health" of the city were very important when thinking about the future's cities, especially in developed countries.

- 9/16 Museum of Fine Arts, Boston

In the museum, most of the works were visible directly without being covered with glass cases, and we were also allowed to take pictures or sketch. It's open until late at night and is even free on Wednesday evenings. These environments might enable citizens casual access to art. It blends well into the city of Boston.

- 9/17 Lab visit : MIT Urban Risk Lab / Prof. Miho Mazereeuw

I met Prof Mazereeuw, who was introduced to me by Prof Wescoat, and heard about the Urban Risk Lab she founded 2 years ago in which she conducts synthetic research on disaster management. She was interested in the studies in my lab, so I would like to continue academic exchanges with her lab.

- 9/17 Walk in Boston downtown

I walked the Emerald Necklace, the greenbelt designed by Olmsted, and a water amenity space along the Charles River. I also took the oldest American subway system "T," but felt that Tokyo's subway system was far more sophisticated.

■ Summary

At MIT, there is somewhat open atmosphere. For example, glass walls make labs visible from the corridor, and there is a lot of collaboration between branches. This might be one of the sources of their interesting studies.

During this program, I had some opportunities to talk about research with other participants from various departments, and we found we had something in common with each other. I would like to broaden my horizons of study, starting with these micro-level exchanges among branches.

Mechanical Engineering

Kazuki MIYAHARA

1. Itinerary

Sep. 13	Afternoon	Arrive in Boston
Sep. 14	Morning	Visit Japanese Class at MIT
	Afternoon	Visit Electrochemical Energy lab
Sep. 15	Morning	Meet MBA program Japanese student
	Afternoon	Visit Laboratory for information and decision system
Sep.16	Morning	Visit Japanese Class at Harvard University
	Afternoon	Sightseeing in Cambridge
Sep.17		Sightseeing in Boston
Sep.18	Morning	Departure from Boston

2. Workshop review

It was my first time visiting Boston, so the workshop program was very productive. I visited the Electrochemical energy lab, which is related to my on-going research field, on Sep. 13 in the afternoon. Building safety systems and efforts to alleviate the influence caused by different experimental environments were the most interesting parts for me. I would like to do the same thing after I go back to my lab. On Sep. 14, I met Japanese students in the MBA program in the afternoon. It was a good chance to think about my future career. I also visited a laboratory exploring information and decision programs, which are related to my undergraduate research topic. Although I was not prepared for a discussion with a laboratory member, he explained his optimization method to me, the research he deals with, and the devices in the laboratory. The day was a very productive day for me. I walked around Cambridge on Sep. 15 and Boston on Sep. 16. A Japanese ramen restaurant near Harvard University serves tasty ramen. I recommend it.

What I was most surprised about during the workshop was how students became able to speak in fluent Japanese in a few years. Their enthusiasm for learning something new is something that I did not have until this experience. I want to keep this in mind and also would like to be like those students.

Lastly, I appreciate the help of the staff members from the University of Tokyo, and the students from MIT and Harvard, who I met during the workshop. Thank you for giving me this wonderful opportunity.



At a Japanese ramen restaurant near Harvard.

Precision Engineering

Yuta TAMURA

First of all, I would like to thank the professors in my department, all staff, and Prof. Mitsuishi for choosing me for such a wonderful program and supporting our visit. I'm sure that this experience will become a priceless memory.

<Sep.14th>

I visited Prof. Voldman's laboratory, one of the most famous bio MEMS laboratories in MIT. Mr. Su, who is one of the doctoral candidates in Prof. Voldman's lab, explained some devices to me, including a pairing device and a separating device, which are used for cell engineering. I was surprised that a lot of the research which is related to bio MEMS is not biological, but mechanical. This visit was very interesting because I researched MEMS techniques last year. That night, we had dinner with students from the Japanese class at MIT and talked about many topics. I heard that many students joined internships to practice Japanese and better understand Japanese culture.



With Mr. Su in Bio MEMS Lab.

<Sep. 15th>

We had lunch with two MIT business school students. They attend MIT on a company-assisted program to work towards MBA degrees. These days, many companies recommend students go abroad to study to become global business people. At night, we had dinner with Japanese MIT students from The Univ. of Tokyo and other universities. They said that to improve English speaking skill, it is important to go abroad and practice English hard.

<Sep. 16th>

We went to Harvard University and discussed robotics with Harvard students. Students there are also taking part in internships to learn about jobs in companies and practice Japanese. I learned that American students tend to join groups for activities other than studies at universities. They actively learn many topics.

<Sep. 17th>

We went to the Media Lab at MIT to visit the Tangible Device Lab. They are researching remote controlled technologies and some wonderful interfaces which are very artistic. At night, we went to a Japanese ramen shop called "YUMEWO KATARE." After dinner, we gave speeches about our dreams.

In conclusion, it was difficult for me to adjust to English, so I would like to study the language harder. Many experiences in this program became precious memories! Thank you!

Itinerary

Sep. 14: MIT Japanese language class

Strategic Engineering Research Group

Sep. 15: Microsystems Technology Lab

Space Propulsion Lab

Sep. 16: Model-based Embedded and Robotic Systems lab, MIT CSAIL

Sep. 17: Man Vehicle Lab

ARES Group, MIT LIDS

Strategic Engineering Research Group

I was really looking forward to visiting this lab as their research has significant impact on the manned space expedition policies of NASA and other agencies. I met with the director of the lab and joined a lab meeting at the Space Systems Laboratory. Space logistics as a research topic seems quite impressive as it poses academic evaluation for the space mission design.

Space Propulsion Lab

I met the director of the lab. Students gave me a lab tour of SPL. I got to see the research facilities of the ion Electro Spray Propulsion System for CubeSats (iEPS). It was quite suitable for trajectory control of small satellites because iEPS is compact and modularized. It can easily be applied to CubeSats of different sizes and missions by changing the number and configuration.

Model-based Embedded and Robotic Systems lab

CSAIL's lab, Model-based Embedded and Robotic Systems (MERS), aims to make robots which can act and think like human beings. They are thinking of applying artificial intelligence to marine fields, space probes, and the manufacturing industry. They treated me quite courteously in spite of my terrible English skill and differences in field of study. I also participated in a graduate lecture on autonomous systems. Compared to a Japanese graduate course, the lecture was like a conversation with the professor. Students asked quite a few questions. It will serve as a good example in my research life when conducting things like lab meetings.

Man Vehicle Lab

I toured the experimental equipment Man Vehicle Lab where I saw non/small gravity environment simulation system, robots simulating human motions and an artificial gravity generator.

Aerospace Robotics and Embedded Systems Group (ARES)

I talked with a postdoc member of the ARES lab. He shared his research about path planning algorithms. His algorithm can avoid moving obstacles and obstacles which appear suddenly. He told me that there are some problems with the application of such a clever algorithm into real car driving.

Summary

Through this program, I experienced unforgettable moments. I really appreciate every person who supported me, recommended me, and gave me opportunities in this wonderful workshop.

Electrical Engineering and Information Systems

Koya NARUMI

I took advantage of the wonderful tour and lab visits at MIT.

Lab Visits

I visited professors and students at the Media Lab.

Prof. Hiroshi Ishii (Tangible Media Group)

We talked about the mindset for researchers.

Jie Qi (Responsible Environment Group)

We discussed circuits implemented on paper and books.

Prof. Sputniko! (Design Fiction Group)

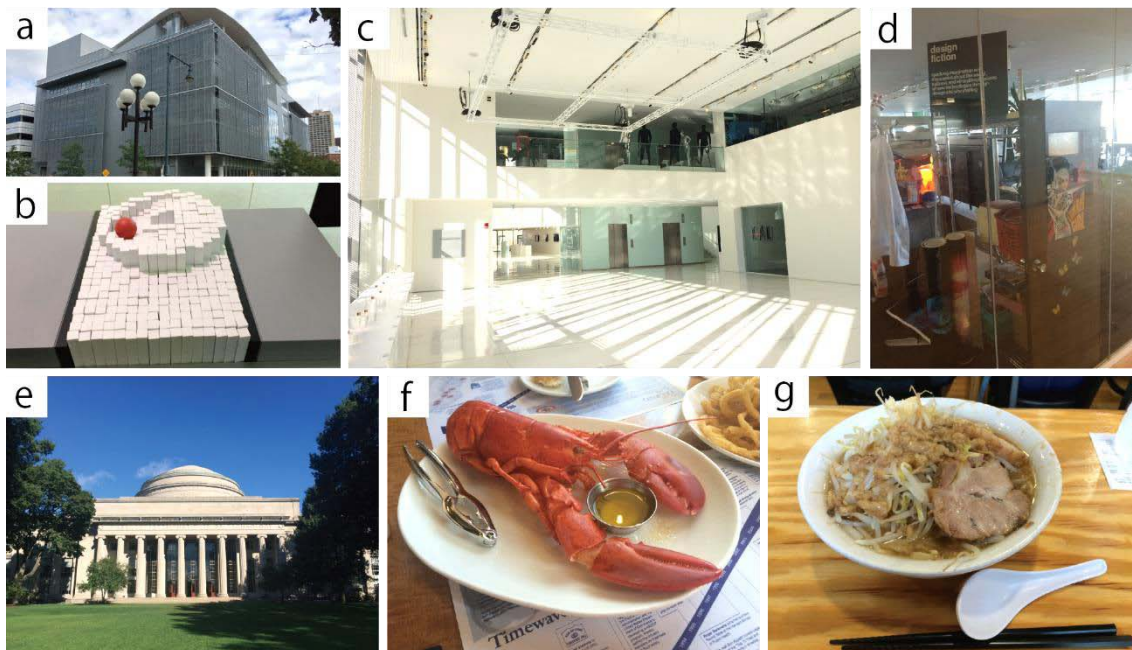
She told me about the latest topics and artistic attitudes for research.

Ken Nakagaki (Tangible Media Group)

He showed us several demos to explain the vision of Tangible Media Group.

Other Events and Activities

- MIT Japanese class, Harvard Japanese class
- Dinner with MIT Japanese students
- Sightseeing at the Waterfront
- Lobster and clam chowder at Legal Seafood
- Ramen at Yume wo Katare



a: Media Lab exterior, b: transForm at Tangible Media Group, c: 1st floor of Media Lab, d: The Moonwalk Machine at the Design Fiction Group, e: MIT's Great Hall, f: Lobster, popular in Boston, g: Jiro style Ramen at Yume wo Katare (I forbid the reproduction and manufacturing of these photos without permission)

Applied Physics

Yuji NAKAGAWA

My major is condensed matter physics, which is one of the biggest fields in science. Because my professor has many friends in the US, I was able to visit many laboratories at MIT, Harvard, and Boston College.

> Lab Visits at MIT

First, I visited Checkelsky group. Prof. Checkelsky is familiar with Japan because he was a postdoc in Japan. Linda, a graduate student, took me around their experiment rooms and kindly introduced me to graduate students in other laboratories: Yafang in Jarillo-Herrero group, Edbert in Gedik group, and Spencer in Ashoori group. Their equipment is similar to ours, but they are more careful about noise. Unfortunately, we cannot install their system to avoid noise due to a limited amount of space.

After that, I had a talk with Prof. Checkelsky. He was very frank and he asked me about my future plan as well as my research. He seemed disappointed because there are few Japanese students at MIT. I had dinner with the group as shown in the picture on the right. The next day, I visited Gleason group with Mr. Kozaki from the department of Materials Engineering.



Dinner with Checkelsky group

From left: me, Mr. Suzuki, Prof. Checkelsky, and Linda.

> Lab Visits at Harvard

When I asked Prof. Kim to let me visit his laboratory, he assigned Frank to coordinate my visit. I had met Frank before at a meeting in Japan. I was very glad to meet him again and to find that I could understand his English better than before. The Kim Lab office is very smart. They discuss their research on glass walls. Thanks to Frank, I met Dennis in Hoffman group and Monica in Yacoby group, listened to a lecture by Prof. Gedik, and attended the Kim group meeting. Their meeting was very long, but they continued their discussion without a break.

> Lab Visits at Boston College

The last place I visited was Boston College, which is located in a suburb of Boston. Prof. Burch and his group members explained their research to me in turns, and it took the whole day. Marcel is a postdoc, and Gavin, Mason, and Erin are graduate and undergraduate students. I was happy because they looked like they enjoyed doing their research and hearing about my research. Their equipment is very creative, and I am now planning to install similar equipment in our laboratory.

> Acknowledgements

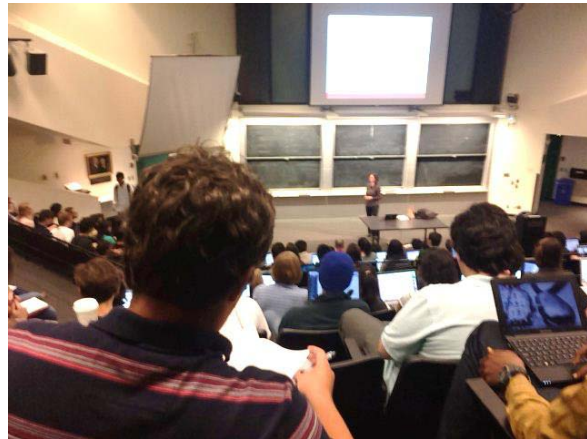
This was my first time going abroad, and I had a great experience. I am grateful to all the people who assisted me.

■ Campus Tour, Class, Interaction with MIT students

We had a campus tour. MIT and Harvard are big and have great facilities. There are many benches and tables where the students study and rooms where students can talk, so many students utilize them.

I attended some classes with Raymond, who is an MIT student and Computer Science major. The teacher sometimes asked students if they understood, and then the students answered or questioned. The class was not a discussion, but I felt that it was more of a bidirectional lecture. The teacher gave sweets to students who answered correctly. It was so fun!

In the advanced Japanese class at Harvard University, the discussion theme was co-existence and co-prosperity with artificial intelligence. Although it is a very difficult topic, even in one's native language, Harvard students were able to discuss it with us in Japanese. My motivation for learning English increased. During the discussion, we talked about robots with artificial intelligence within the context of Japanese culture, where all things have a mind. The discussion was very interesting.



Class scene at MIT

■ Laboratory Visit

I visited Prof. Bathe's laboratory, where they research fluid-structure interactions, mesh-less methods, and so on. I introduced my research to them and we discussed it. After that, a Ph.D. student guided me around the laboratory. I really sensed the motivation of the lab students. I was surprised that some of the research facilities at our university are better than MIT's.

■ Summary, Acknowledgements

This experience not only broadened my knowledge by interacting with people at MIT and Harvard University, but I also learned a lot by spending time with and talking about research with other members of this program.

I am thankful to all the University of Tokyo, MIT, and Harvard University people I met during this program.

-Itinerary

Sep. 13	Afternoon	: Arrival in Boston
Sep. 14	Morning	: Japanese Class Visit at MIT
	Afternoon	: Johnson Research Group Visit
Sep. 15	Morning	: Downtown Boston Visit
	Afternoon	: Gleason Research Group Visit
Sep. 16	Morning	: Japanese Class Visit at Harvard
	Afternoon	: Lauffenburger Research Group Visit
Sep. 17	Morning	: Boston Museum Visit
	Afternoon	: Wrap-up
Sep. 18	Morning	: Departure from Boston

-Introduction

The goal of the Boston Workshop was that every member continue on to be a scientist who is active on a worldwide scale. I really appreciate that UTokyo and the staff members gave me such a wonderful opportunity.

-Report

This workshop was my first time visiting the east coast of America. However, I seldom felt that I was a foreigner. In Japan, or even in Europe and other Asian countries, a foreigner is always treated as such. However, on the other hand, nobody is “foreigner” in America as all Americans have roots from overseas. “American” does not mean “American” as a race. Therefore, Americans have rules, services, and ideas which are accepted all over the world.

This matter, surprisingly, may be related to the reason why the people are active on a worldwide scale. When you focus on the actual research conducted in America, a great deal of it is expected to solve “global” problems, which may be applicable to everyone. The research is then applied to small cases. At UTokyo, however, I suppose that researchers often focus on one “special” case (often a small problem within Japan or in developed countries) and then develop or select materials and techniques. For example, at MIT, Lauffenburger Group has the “global” goal of an artificial living body for universal drug tests. In Japan, in contrast, researchers generally develop artificial units for each drug or disease. In order to take the initiative in global standards, we have to study and research “global” matters that are focused on and applied by greater numbers of people. I think that this worldwide top-down thinking makes research at MIT successful.

During my stay in Boston, my main activities were to visit laboratories and a lecture presentation in order to learn the difference in attitudes toward research and study between UTokyo and MIT, which are representative universities in Japan and the U.S.A., and experience the atmosphere of the city in which the Boston Marathon bombing occurred.

I really appreciated that everyone welcomed me when I visited their laboratories. It was a great opportunity for me to visit laboratories which deal with similar research themes, since I could learn about their technologies. I also learned that how they improve and optimize their experimental equipment depends on their objectives. I heard from the students in the laboratories that they are required to take fewer classes to graduate than I am. Depending on the situation, they are sometimes assigned to do TA work and teach classes for undergraduates, which is totally different from the rules at UTokyo, where only professors or doctors with similar appointments can give classes. I guess this is how they ensure the amount that graduate students will learn. The possibility that they will have fewer opportunities to learn what neighboring laboratories are researching is compensated by holding many networking events with other laboratories. I believe learning this was one of the main goals of this workshop, and it was a great opportunity to learn such policy differences between universities.

I also attended the CIS Starr Forum, which is a regular presentation by journalists, academics, and policymakers held in MIT and sponsored by Starr Foundation. The one I attended was given by Ayaan Hirsi Ali, who was born Muslim and became an atheist after seeking political asylum. She works to support Muslim women. The lecture hall and the area around it were guarded by many security officers, which was beyond the expectations I had, especially when compared to the bombed area of the city which was much more sparsely populated than the nearby shopping street where "Boston-Strong" T-shirts were being sold. The lecture itself was as I had imagined; the rights which citizens have struggled to obtain in western nations are the greatest idea and should be given to all humanity. In the question and answer session, I found it different from those in Japan. One person emphasized the value of Islamic traditions, another criticized her imperialistic way of thinking about western values, and the presenter claimed the priority of freedom of speech. All of them received great reactions like applause or boos. Although it is difficult to identify which size of community is represented by this, it was quite a new experience for me to encounter an atmosphere in which they can openly talk about sensitive themes despite jeering.

1. Motivation

My purpose for participating in this workshop was to gather information for my career. My research area, data-driven modelling, is not so popular in Japan. My interest was in learning how popular the research area is and how the area is utilized in America.

2. What I did

First, I tried to make appointments with MIT professors who are engaged in Data-Driven Modeling research. However, I got in touch only with one professor who was abroad at the time I visited MIT. The professor introduced to me a professor who works at Tufts University and researches Data-Driven Modeling. I visited the laboratory in Tufts University and two groups in Media Lab with Mr. Narumi.

Activities other than lab visits were exchanges with MIT and Harvard students studying the Japanese language. They were more serious than Japanese students and sincere about studying. One of them was a 5th generation Japanese American. The fact that various types of students communicate with each other on equal terms shows America's cultural generosity.

3. Discussion

Data-driven modelling is very popular and many chemical and pharmaceutical companies are interested in it, while cheminformatics is not so popular in America. Data-driven modelling research is also popular in universities such as MIT. Tufts Univ. Professor Georgakis, who was an MIT professor, employs one Ph.D. student and a post-doctoral researcher. They told me that the number of students is increasing and they have several projects in which they collaborate with companies. When I visited the Media Lab, I was also impressed that members in Media Lab start from a vision, not a problem, and conduct research focusing on ideas and creativity.

Japanese students in Boston and a postdoctoral student in MIT spoke to me about Ph.D. candidates as a profession and the system surrounding Ph.D. candidates. Ph.D. candidates ask professors to be lead teachers for them, and professors choose and employ some of the applicants. Students who are not employed work as TAs for tuition. This system reflects a competitive society in which smart students are engaged only in research while other students have to work as TA in addition to conducting their own research. "Ph.D. candidate" seems to be regarded as a profession in this way. The system for Ph.D. holders in which they can be project leaders just after graduating from a Ph.D. course works well and motivates people to try to be trained professionally.

4. Conclusion

Though this workshop, I have overcome barriers for work or study abroad. The difference between Japan and America is just systems which encourage people to study and work hard, I guess. Daily life in Japan and America is not so different, so the only barrier is language skills. I'm going to build my career taking this experience into account. I want to say thank you very much to the staff members working on this program.

Chemistry and Biotechnology

Toshiki MURAYAMA

Before the trip

The most important and difficult thing about this program is the selection of laboratories to visit and appointment making. This was very difficult for me since I had no such experience before, however, this will be a very valuable experience for my future.

September 14th

On the MIT campus tour in the morning, I found that there were many places for students to have lunch, read books, or just relax, such as on benches or in large grass areas. In the afternoon, I visited Johnson laboratory in the Department of Chemistry, and the graduate students showed me around their laboratory and building.

September 15th

I visited Harvard Museum of Natural History in the morning, and I was surprised by an overwhelming number of exhibits. In the afternoon I moved to MIT and visited Collins laboratory in the Department of Biological Engineering with a fellow student, and we saw a Japanese postdoc who obtained his PhD at UTokyo and now works on synthetic biology. His talk about the difficulties he faced after he joined MIT and how speedy research in synthetic biology is developing was very impressive.

September 16th

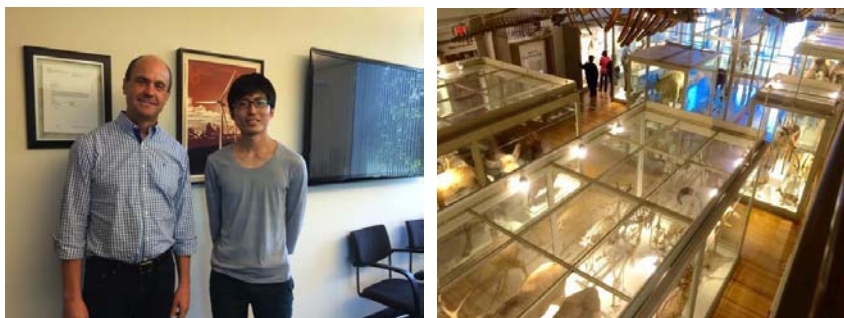
After attending the Japanese language class at Harvard and having lunch with the students, I visited Van Humbeck laboratory in the Department of Chemistry. I had an hour-long discussion with Prof. Van Humbeck, who obtained his PhD in 2011 and launched his own group last year. As their research concept is similar to mine, it was very interesting and valuable talking with him.

September 17th

On the last day of my stay in MIT, I visited Jamison laboratory in the Department of Chemistry. Several graduate students in the laboratory are working on projects related to my research and they gave us a brief presentation about their research.

Concluding remarks

I had the impression that each graduate student was independent and immersed themselves into their research more deeply than Japanese students; perhaps they had already decided to finish their PhD. Another thing I noticed was that many students were involved in activities other than research, and they spent a lot of time on such activities.



(Left) A photo with Prof. Jamison; (Right) A room in the Harvard Museum of Natural History

Nuclear Engineering and Management

Kazuhiro NAKASHOJI

1. Research and Lecture at MIT

I visited a laboratory which studies the development of γ ray detection systems and its applications. One of the representative applications is a detection system that can sense nuclear weapons in ships or cargo. Fig.1. shows a student in Prof. Areg's laboratory. He told me about his major study and future works.

I felt that the research level at MIT was not so different from the University of Tokyo, however, I realized that there were many videos explaining their work, and it was easy to see inside the laboratory through the glass wall. Based on these things, I felt that the researchers and students at MIT are really good at showing others what they do.

I took some nuclear physics lectures at MIT. The contents of the class were quite similar to UTokyo, but I learned two new important things. First, the professor prepares well before class. Second, students in MIT study hard before they take classes.

2. Campus and students

I thought the students at MIT and Harvard were ambitious and they study in university to materialize their goals. The MIT campus was quite big and many students sit on the grass (Fig.2.).

3. Acknowledgement

It was my pleasure to have such a great opportunity to visit MIT and Harvard for a week. I learned so many things from the students at both schools.



Fig.1. Student in Prof. Areg laboratory



Fig.2. A view of MIT

Lab Visit

I visited MIT from September 13th to September 19th. Though the length of my stay was a little bit short, it was full of new experiences and was very stimulating.

Through this program, I visited some laboratories and learned many things.

I sincerely appreciate everyone's kind support.

• Wittrup Lab

I am studying the analysis and improvement of antibody molecules. In this program I had a great chance to have a discussion with Prof. Wittrup (who works on drug design using antibody molecules and immuno therapy) for 1 hour, in person. At that time, I did a presentation about my research for the first 20 minutes, and received some comments and advice; I was very thankful and excited. However, through this discussion, I had some difficulties in being understood. It was mortifying, and I felt the need to study more English.

• Runstadler Lab

I visited Runstadler Lab, where they study many kinds of viruses and diseases. At that laboratory, I talked with a postdoctoral researcher, and heard about the structural difference between the Japanese Colleague System and that of America's.

• Langer Lab

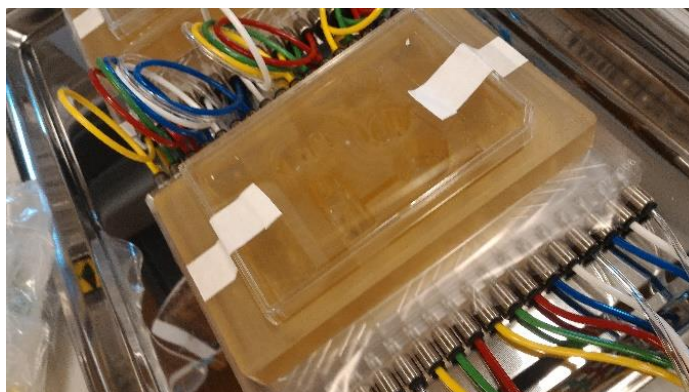
I had lunch with one postdoctoral researcher who belongs to the Langer Laboratory, and discussed the things that are required to be a good researcher.

• Collins Lab

I visited Collins Laboratory, where they study the construction of synthetic genes and reveal mechanisms for antibiotic resistance. At that time, I was very surprised to hear that this equipment (left picture) was made by a lone undergraduate student.

• Lauffenburger Lab

I was very excited about their research. They use this plate (right picture) to try to simulate drug metabolism.



Technology Management for Innovation

Hiroya GORAI

Places and People

- ✓ Japanese language class at MIT
- ✓ MIT campus tour
- ✓ Japanese students at MIT Economics
- ✓ Japanese students at MIT Sloan
- ✓ MIT Sloan Class (Pricing, Prof. C. Tucker)
- ✓ MIT Sloan Class (Global Entrepreneurship Lab, Prof. S. Johnson & Prof. M. Jester)
- ✓ Japanese students at MIT and Harvard
- ✓ Japanese language class at Harvard

In this program, I visited mainly MIT Sloan because I wanted to understand the difference between lectures in our department and that of an MBA program. At the department of technology management for innovation (TMI), we study innovation management, business management, and intellectual property management. The course is designed to foster policy makers, system organizers, and executive engineers. On the other hand, the MBA course is focused on business management. However, I was told that lecture contents and the actual career of alumnus are similar, so I wanted to understand the difference between the TMI course and the MBA course.

This visit showed me that MBA students have a much higher awareness about their career than us. They concentrate on lectures, express their opinions, and discuss with professors, something that is different from the Japanese lecture style. The MBA students study very hard to put their education from the MBA program to practical use in management or in job hunting.

I feel strongly about studying abroad in my career. When I considered studying abroad, I felt that a campus visit would be needed. The atmosphere on campus and among students is different between MIT and Harvard, and the climate of Boston is different from that of San Francisco, where I visited last year. Therefore, I would like to visit many campuses before I decide which university I'll apply for. Most importantly, however, I have to strive to improve my English. I could understand topics in MBA lectures and materials, but I couldn't keep up with the discussion between the students and the professor.

Finally, I sincerely appreciate the support of the international education team. Thank you all very much.