ASPIRE Forum 2018 Student Workshop
Student Report

ASPIRE FORUM 2018
Smart Cities
Student Workshop, 8-14 July 2018

Programme

8 July 2018 (Sun)		
Time	**Programme**	**Venue**
Whole day	Arrival and check-in Each student is assigned with NTU student helper to assist in the check-in. Please remind the student helper to show you the function hall where the welcome party will hold.	NTU Pioneer Hall Blk18B Address: 156 Nanyang Crescent, Singapore 637125
6:00 pm – 6:30 pm	Registration ***Please wear the NTU logo T-shirt placed in your room***	Function Hall, Pioneer/Crescent Hall
6:30 pm – 7:15 pm	Presentation on NTU Overview and Briefing on the ASPIRE Forum Student Workshop overall programme by **Prof Chan Siew Hwa**, Co-Director, Energy Research Institute@NTU	
7:15 pm– 8:00 pm	Buffet Dinner	
8:00 pm – 9:00 pm	Icebreaker games	
9:00 pm	End of Programme	

9 July 2018 (Mon)		
Lectures 1 & 2		
Time	**Programme**	**Venue**
7:45 am – 8:00 am	Transfer from Pioneer Hall to the Hive	
8:00 am – 9:00 am	Breakfast in the Hive	Level 2, the Hive
9:00 am – 10:30 am	**Lecture 1: Realistic Immersion with Virtual Humans** By Dr Nisha Jain *Research Fellow, Institute for Media Innovation*	LT+47, Level 2, the Hive
10:30 am– 11:00 am	Tea Break	
11:00 am – 12:30 pm	**Lecture 2: Critical Technologies and Underlying Drivers for a Smart Nation** By Prof Lam Kwok Yan *Programme Chair (Secure Community), Interdisciplinary Graduate School*	
12:30 pm – 1:30 pm	Lunch	Level 2, the Hive
Visit Robotics Research Centre and Google Singapore		
1:30 pm – 2:00 pm	Walk from the Hive to the Robotics Research Centre	
2:00 pm – 3:00 pm	**Visit Robotics Research Centre**	Robotics Research Centre N3-01a-01
3:00 pm – 3:10 pm	Walk to Admin Building	
3:10 pm – 3:30 pm	**Campus Model Introduction** by Ms Sophia Li, Assistant Manager, Office of International Affairs	
3:30 pm – 5:30 pm	**Campus Tour (stopping at the Wave, ADM, the Arc, Hive)**	
5:30 pm – 6:30 pm	Dinner	LT+47, Level 2, the Hive
6:30 pm Onwards	Student Group Discussion	

10 July 2018 (Tue)		
Lectures 3 & 4		
Time	**Programme**	**Venue**
7:45 am – 8:00 am	Transfer from Pioneer Hall to the Hive	
8:00 am – 9:00 am	Breakfast	Level 2, the Hive
9:00 am – 10:30 am	**Lecture 3: Human-AI Interaction in Smart City Applications** By Asst Prof Yu Han *Nanyang Assistant Professor, School of Computer Science and Engineering*	LT+47, Level 2, the Hive
10:30 am– 11:00 am	Tea Break	
11:00 am – 12:30 pm	**Lecture 4: Exploring Indicators for Smart Cities: Making Smart Smart** By Prof Theng Yin Leng *Acting Director, Ageing Research Institute for Society and Education*	
12:30 pm – 1:30 pm	Lunch	Level 2, the Hive
Visit Smart Mobility Lab, Smart Nation Translational Laboratory, CETRAN		
2:15 pm– 2:30 pm	Walk from the Hive to Smart Nation TRANS Lab (SNTL)	Smart Nation TRANS Lab S2-B4b-05
2:30 pm– 3:15 pm	**Visit Smart Nation TRANS Lab (SNTL)**	
3:15 pm – 4:00 pm	**Visit Smart Mobility (SMTB) Lab**	Smart Mobility Lab S2-B3b-10
4:30 pm – 5:00 pm	Transfer from North Spine to **Centre of Excellence for Testing & Research of Autonomous Vehicles NTU (CETRAN)**	
5:00 pm – 6:00 pm	**Visit CETRAN and experience the Autonomous Vehicle Navya**	
6:10 pm – 6:30 pm	Transfer from CETRAN to the Hive	
6:30 pm – 7:30 pm	Dinner	Level 2, the Hive
7:30 pm onwards	Student Group Discussion	

11 July 2018 (Wed)

Lectures 5 & 6

Time	Programme	Venue
7:45 am – 8:00 am	Transfer from Pioneer Hall to the Hive	
8:00 am – 9:00 am	Breakfast	Level 2, the Hive
9:00 am – 10:30 am	**Lecture 5: Autonomous Vehicles in a Car-lite Singapore** By Mr Niels De Boer *Programme Director* *Future Mobility Solutions (Autonomous Vehicles), Energy Research Institute @ NTU*	LT+47, Level 2, the Hive
10:30 am– 11:00 am	Tea Break	
11:00 am – 12:30 pm	**Lecture 6: Super Low Energy – Advancing Net Zero in the Tropics** By Mr Noel Chin *Principal Manager, BERII (Built Environment Research and Innovation Institute), Building and Construction Authority*	
12:30 pm – 1:30 pm	Lunch	Level 2, the Hive

Visit Changi Airport Living Lab

Time	Programme	Venue
2:00 pm – 2:50 pm	Transfer from the Hive to Changi Airport Living Lab	
3:00 pm – 5:00 pm	**Visit Changi Airport Living Lab** **Remarks** Visitors have to bring **identification** (passport/ national ID) for security verification.	
5:00 pm – 6:00 pm	Transfer from Changi Airport Living Lab to NTU Alumni House @ Marina Square	6 Raffles Blvd, 02-27/28, Singapore 039594
6:00 pm – 6:30 pm	Pre-dinner Cocktail Session	
6:30 pm– 8:00 pm	Dinner hosted **by Prof Alan Chan**, Vice President (Alumni and Advancement), NTU	
8:00 pm – 8:30 pm	Transfer from Alumni House @ Marina Square to Pioneer Hall/ the Hive	
8:30 pm onwards	Student Group Discussion	

12 July 2018 (Thurs)

Symposium on "Smart Cities"

Time	Programme	Venue
7:30 am – 8:00 am	Bus transfer from Pioneer Hall to NTU@One North	<u>NTU Coordinator:</u> Sophia Li
8:00 am– 8:45 am	Breakfast	Level 3, NTU@One North
8:45 am– 9:00 am	Registration	LT301, NTU@One North
9:00 am – 9:05 am	Welcome Address by Chairperson of ASPIRE League **Prof Alan Chan**, Vice President (Alumni and Advancement), NTU	
9:05 am – 9:35 am	Presentation by **Prof Hong Kam LO,** Head and Chair Professor, Department of Civil and Environmental Engineering, HKUST *Title: Smart Transport in a GREAT Smart City*	
9:35 am – 10:05 am	Presentation by **Prof Young Chul KIM,** Assistant Professor of Department of Civil and Environmental Engineering, KAIST *Title: Real-Time 3D Isovist*	
10:05 am – 10:15 am	Group Photo	Outside the front door of the Alumni House
10:15 am – 10:40 am	Coffee break	Outside the LT301
10:40 am – 11:10 am	Presentation by **Prof GAN Woon Seng** Director, Centre for Infocomm Technology (INFINITUS), NTU *Title: Cyber-Physical Systems to Support Singapore as a Smart Nation*	LT301, NTU@One North
11:10 am – 11:40 am	Presentation by **Prof Masamichi SHIMOSAKA**, Associate Professor, School of Computing, Tokyo Tech *Title: Human Mobility Sensing Towards Urban Computing*	
11:40 am – 12:00 nn	Introduction to ASPIRE League Research Grant by **Prof Takafumi UENO**, Professor, School of Life Science and Technology, Tokyo Tech *Title: Design of Hybrid Protein Cage for Sustainable Bionanomaterial*	
12:00 nn – 1:00 pm	Buffet Lunch	Outside the LT301
1:00 pm – 1:30 pm	Transfer from NTU@One North to the Hive	
1:30 pm Onwards	Student Group Discussion	
6:00 pm	Dinner	Level 2, the Hive

13 July 2018 (Fri)		
Student Presentations to Vice Presidents and Senior Staff ***Dress code: NTU logo T-shirt***		
Time	**Programme**	**Venue**
7:30 am – 8:00 am	Bus transfer from Pioneer Hall to NTU@One North	NTU Coordinator: Sophia Li
8:00 am – 8:30 am	Breakfast	Level 3, NTU@One North
8:30 am – 9:00 am	Student Registration (to submit presentation)	Function Hall, Level 3, NTU@One North
9:00 am – 9:05 am	Introduction by Chairperson of ASPIRE League **Prof Alan Chan**, Vice President (Alumni and Advancement), NTU	
9:05 am – 9:30 am	Presentation by Students – *Group one*	
9:30 am – 9:55 am	Presentation by Students – *Group two*	
9:55 am – 10:20 am	Presentation by Students – *Group three*	
10:20 am – 10:40 am	Coffee break	
10:40 am – 11:05 am	Presentation by Students – *Group four*	
11:05 am – 11:30 am	Presentation by Students – *Group five*	
11:30 am – 12:00 nn	Evaluation by Judges (Vice Presidents)	
12:00 am – 12:10 pm	Presentation of Certificates to All Participants	
12:10 pm – 12:30 pm	Judges' Comments & Prize Presentation	
12:30 pm – 12:35 pm	Closing Remarks by Chairperson of ASPIRE League **Prof Alan Chan**, Vice President (Alumni and Advancement), NTU	
12:35 pm – 2:00 pm	Closing Lunch	
2:00 pm – 8:00 pm	Half-Day Singapore City Tour	
15 July 2017 (Sat)		
Time	**Programme**	**Venue**
8:00 am- 12:00 nn	Check-out and departure Standard check-out time: **before 12:00nn** ***Please hand over your key and linen items to NTU Coordinators.*** ***Packed breakfast can be collected from the NTU Coordinators from 8:00am.***	NTU Coordinator: Ms Cheam Yu Juen +65 92458958

Report of Aspire Forum Student Workshop 2018

◆ J.D., M1, Department of Mechanical Engineering, School of Engineering

◆ Overview

During 2018/7/8-2018/7/14, I went to Nanyang Technology University in Singapore to attend the 2018 Aspire Forum Student Workshop, it was my first time in Singapore and also an amazing experience to me. The program schedule is shown in the picture below:

	8 July, Sun	9 July, Mon	10 July, Tue	11 July, Wed	12 July, Thurs	13 July, Fri	14 July, Sat
	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
0800 – 0830		Breakfast	Breakfast	Breakfast	Breakfast	Breakfast	Breakfast
0900 – 1200	Arrival of Students to NTU Campus	Workshop	Workshop	Workshop	ASPIRE Symposium (ASPIRE Students to Attend As Well)	ASPIRE Students' Presentation to VPs & Senior Staff	Check-out
1300 – 1330		Lunch	Lunch	Lunch	Lunch	Closing Lunch (for VPs, SS & Students)	Depart for Home Country
1400 – 1730		Visit	Visit	Visit	ASPIRE Students' Preparation for Presentation	Half-day Singapore City tour	
1800 – 1830	Welcome dinner & Icebreaker games	Dinner	Dinner	Dinner	Dinner		
1900 – 2130		Student Group Discussion	Student Group Discussion	Student Group Discussion	Student Group Discussion		

◆ Preparations

I'm an IGP student, so the language requirement is not a problem for me, and I have talked a lot with many students from other universities, we had a lot fun chatting during the program. The topic of this program is Smart City, it's a hot and big topic, I have some relative experience on ICT and IOT, which are two main concepts of Smart City,

and that helped me a lot during the group discussion. As for the visa, I applied for the visa by myself with the help of Sophia who is the manager of this program in NTU through VFS Tokyo, the application fee is about 9750 yen. During the program, I lived in the dormitory provided by NTU, which is a small but comfortable single room.

◆ Impressions

During the program, we have done a lot of things in such short time, we have learned a lot, experienced a lot, but at the same time, we were so tired and can't get enough rest. Usually we start with breakfast, and then attend some courses related with Smart City. The most impression activity for me is the short visit to Google Singapore, Google is my favorite company, and to get the opportunity to visit Google is not that easy for me, the staff there showed us around the working environment in Google, we also talked with several engineers there, I have learned a lot from them.

Except the short visit to Google, the breaking games as shown in the picture below are also very interesting. In the beginning, each group needs to choose one topic, and I'm the representative of my group, we started with a race to pick our first preference, which is "Smart Mobility". All group members get closer with each other after the breaking games, and we all had a great time there.
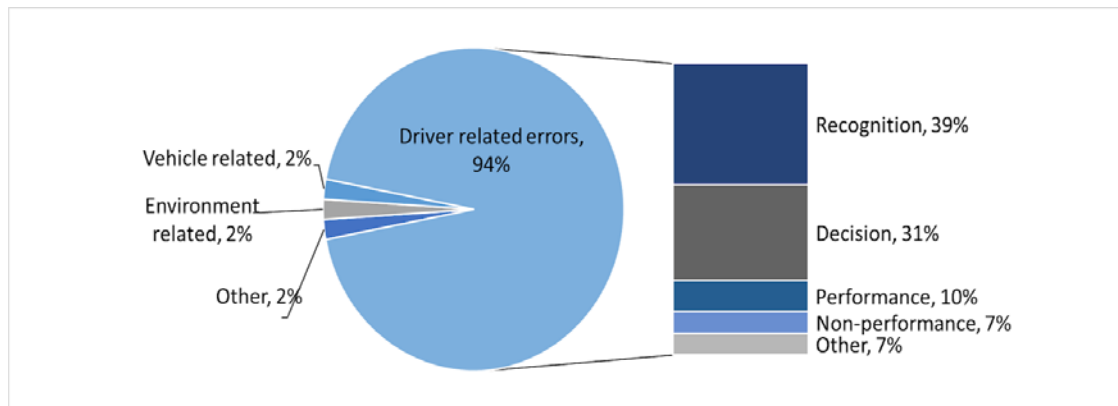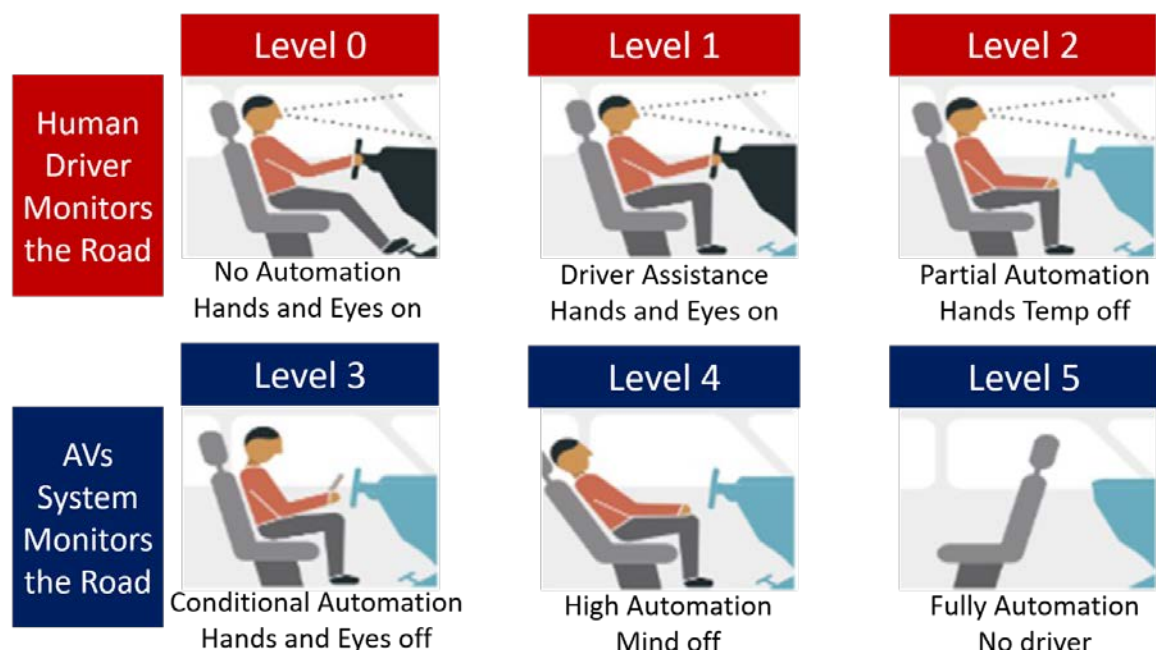
◆ **Personal growth**

I'm a student who always seeks new adventures in my life, so I always have great passions on this kind of international communication programs. After attending the program, I meet some new friends who have same passions with me, I have a deeper understanding of Smart City, I know more about NTU and Singapore, I have practiced more as a group leader, I have also extended my personal limitation on many things, I have seen more of the world, all of these experiences help me to grow as a better man. In this program, the most important part is the final group presentation, because we

work hard everyday to show our ideas of our topic—"Smart Mobility". In the preparing stage, as the group leader, I came up with the structure of our presentation, and allocated tasks to each group member. As for my part, I mainly talked about safety in "Smart Mobility", because as we can see in the report of critical reasons for crashes investigated in the national motor vehicle crash causation survey, the main critical reason was assigned to drivers in an estimated 2,046,000 crashes that comprise 94 percent of the crashes. And in the driver related critical reasons, recognition is the most frequency critical reason, which take about 40%,and the second critical reason is decision, which take about 30%. so generally, even all the car company are trying their best to develop new technology to make the car safe, but as long as the car is controlled by a driver, the transportation will not be much safer than now. To solve this problem, assistant driving system or autonomous-driving technology is quite necessary.
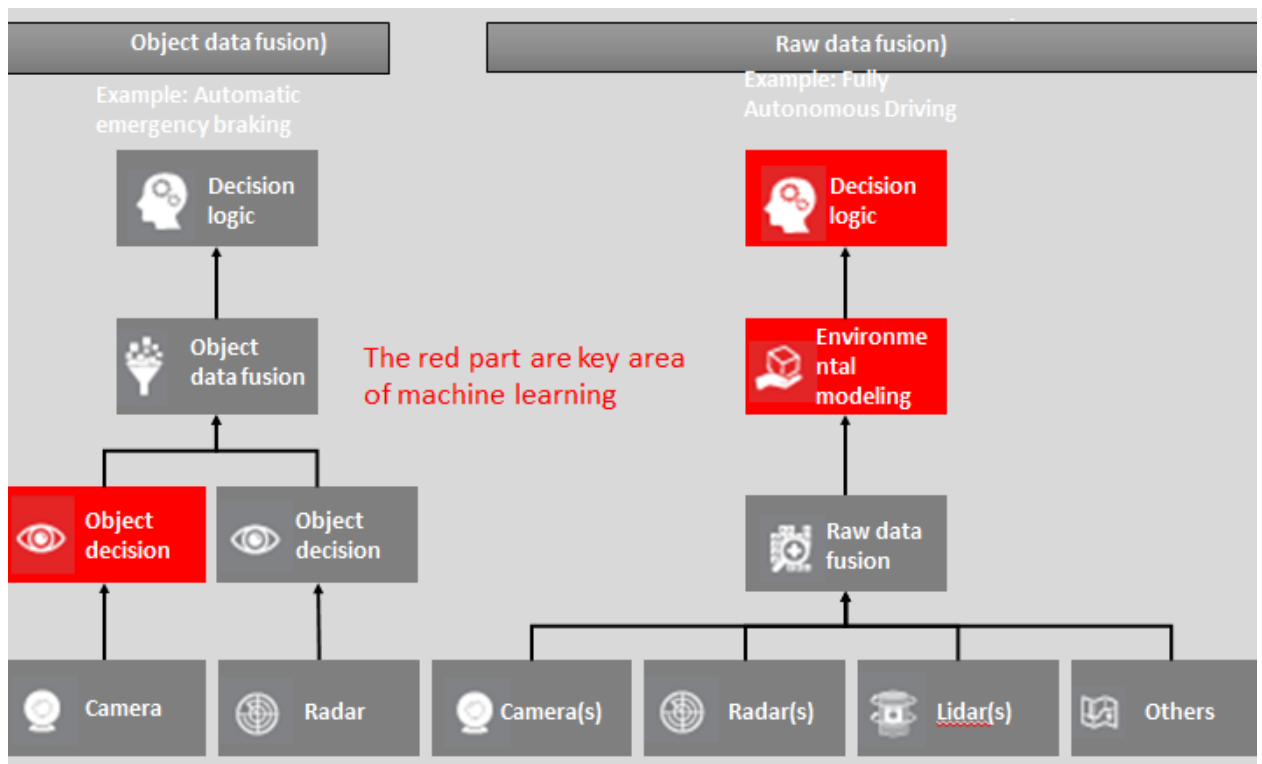

Singh, S. (2015, February). Critical reasons for crashes investigated in the National Motor Vehicle Crash Causation Survey. (Traffic Safety Facts Crash Stats. Report No. DOT HS 812 115). Washington, DC: National Highway Traffic Safety Administration.

This picture shows the level of autonomous, from level 0 to level 5. Self-driving will make the roads exponentially safer by taking the automobile's weak link — its human driver — out of the equation.
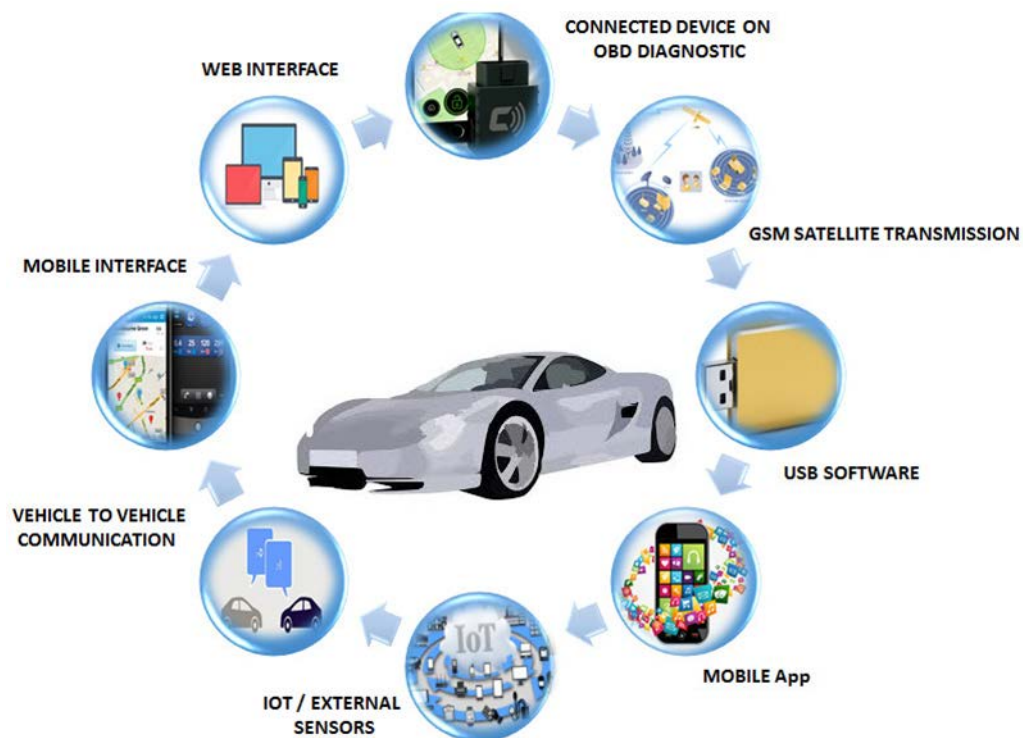

During the development of AV, based on the market necessary as well as the limitation of technology. It can be mainly divided into two parts, the first part is called assistant driving system, while the second part is called autonomous driving system. In this process, sensors and cameras using AI technologies make things smarter.
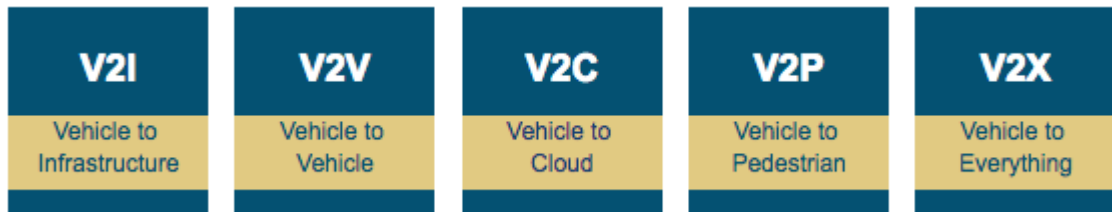
Each different parts has their own tasks: Camera: close and far view; Radar: monitor surrounding; Lidar: 360degree model of surrounding environment; others: Gps, ultrosonic, sensors.

In the future smart mobility systems, autonomous car are quite important, because they are working like a fully completely small platform, but transportation is something that all parts get connected, so only autonomous vehicles are not enough, we also need a system that can be used to optimize traffic patterns, reduce congestion and make transportation systems, roads and highways safer for drivers, pedestrians and emergency crews.

The SCAV is mainly about connection, there are also some different levels of connection, from V2I to V2x. I believe if we can combine autonomous car and connection system together, most of the safety problems will be well solved.

After the presentation, all the judges are very satisfied with our work, and Prof Alan Chan, Vice President (Alumni and Advancement), NTU asked me a question: When we talk about Smart Mobility, why don't we talk air planes? I study aircraft design and engineering in my bachelor university, so my answer is that: The system of aircraft is very mature, and it's actually an individual part of our daily transportation, in our current situation, we should pay more attention on the transportation that has a very close relationship with most people everyday, so we now mainly talk about cars or public transportations. Prof Alan Chan agreed with my answer.

◆ **Cost:**

   1: Visa application fee: 9750 yen;
   2: Air tickets fee: 40000 yen;
   3: Insurance fee: 2800 yen;
   4: Other expenses in Singapore: 10000 yen
   In total: 62500 yen

◆ **Living arrangement**

When I was in NTU, I live in the student dormitory provided by NTU, it was a small but comfortable single room.

◆ **Language**

As I mentioned before, I'm an IGP student, so language is not a problem for me, I have

taken a TOEIC test before, my score is 870 and because I speak English everyday, so I'm proficiency enough to attend the program.

◆ Experience

I have gained many good experiences from this program and I will move on my road in the future using these experiences to help me be a better man.

◆ Problems

Singapore is very similar with China, so I did't meet any problems during my stay as a Chinese student.

◆ Advices

If you want to study abroad, you need to open your mind and break your personal limitation, do not be shy, do not be afraid of making mistakes, just go, just try, just do it!

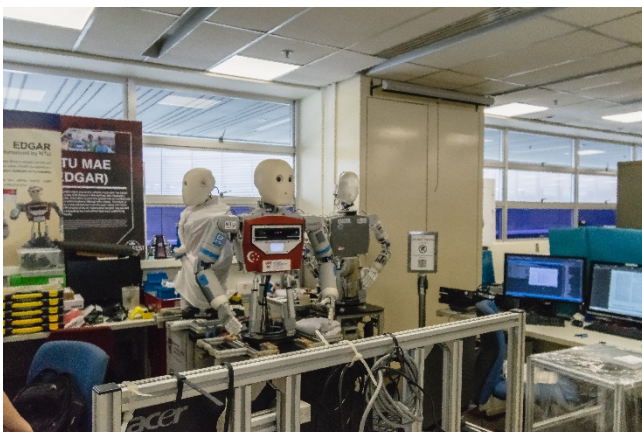# Report on the Completion of ASPIRE Forum 2018

Y.J

M1

Department of Architecture
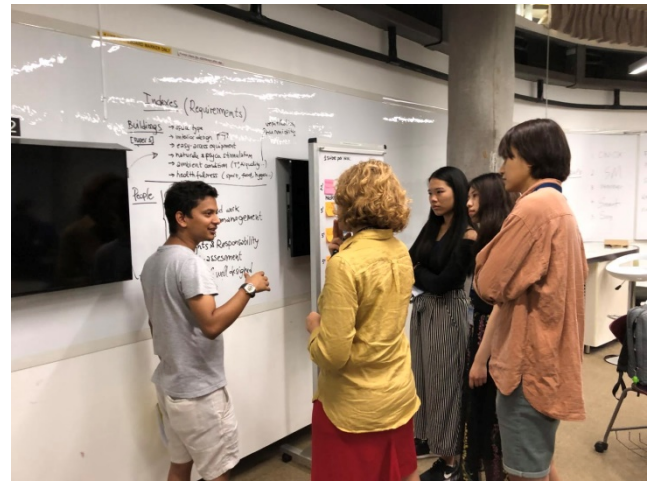
School of Environment and Society

From 2018/07/07 to 2018/07/13, I attended the ASPIRE Forum 2018 hosted by Nanyang Technological University.

Firstly when I saw the information of the ASPIRE Forum on the Tokyo Tech website, I was very interested in the program for the topic 'Smart City'. Then I used a whole day to prepare for the application form, explaining my motivation. After the tense interview 2 weeks later, I was honoured to be chosen as the representative student of Tokyo Tech. Thanks to Mrs Sai, the procedure was quite clear to me, so it did not occupy too much of my time to prepare for the Forum, such as filling the documents, purchasing for insurance, applying for visa and so on. And thanks to Sophia from NTU, our dormitory and schedule was arrange well. By the way, As Chinese, we need to apply for visa to enter Singapore. It takes one day to fill in the form and submit to VFS. And in most cases, we can get the visa in one working day. I made one mistake in my visa application form, so I waited for around one week and received the visa after all the forms was corrected.
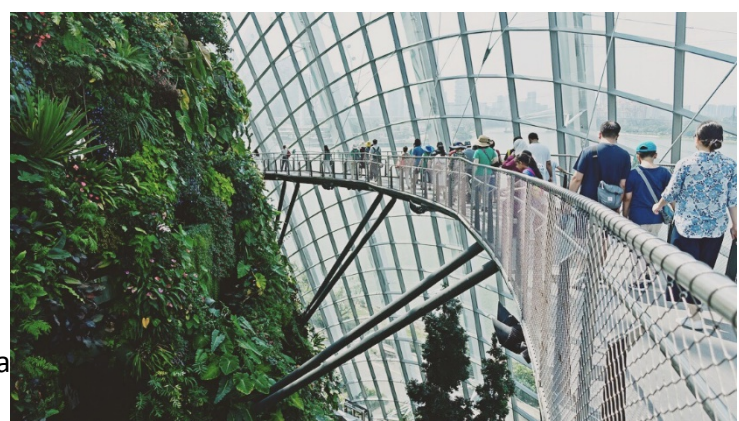
I was really impressed by the Forum. The six lectures addressed by professors and government officers both give us a profound understanding of the situation of "smart city" in Singapore and a broader vision of the development of smart city in the whole world. The site visits in the afternoon are also very interesting. We visited the frontier labs in NTU related to the topic, such as Robotics Research Lab, Smart Nation TRANS Lab, Smart Mobility Lab and its testbed field for the automatic vehicle. Google Singapore is also impressive for its new concept of workplace by human-centered design with flexible and extremely comfortable working environment. During the Symposium at the 3rd day, professors from 5 universities addressed interesting presentation about their most frontier researches or the current situation of their country and university, which was very inspiring. The most impressive thing about NTU is that it uses its campus as a testbed for all kinds of researches doing in the university, by which I think that NTU is truly care about the their students and researchers, and they are willing to provide all the possible support for researches.

After the symposium, my overall understanding of smart city, its related research and problems its facing is greatly deeper, which is what I was expected before attending the Forum and Workshop. In the end day of the workshop, I was awarded as the best presenter, which is something I did not expect at all. I am happy to bring the award back to Tokyo Tech.

What's more, I see great personal growth in my ability to work and communicate with people from different universities and different majors. I met people from 5 universities in Asian and 5 students from Europe, speaking Chinese, English, Japanese, Korea, Italian and German. During the program, main language we use is English. And the majority of the students could speak fluent English, so we were smoothly talking with each other. We all have different background which means we have different thinking way, different working pace. So in the beginning, the discussion become difficult because we cannot understand with each other simple. I also keep introspecting myself if my performance in the team is good enough or not, through which, my communication skills improved greatly. We solve the problem of disagreement and work very good as a team. For example, I learned how to do a presentation in the perspective of an engineer, the technical skills of presentation to catch the audience's attention through a friend studying social science, how to do research on the literature view and current technology from PhD Students and so on. Everyone has a lot of great value for me to learn from. After the 5-day workshop, we really become close friends. We teach each other languages and share interesting games during resting time. I really enjoyed communicating and group working with them. I believe in the future, it will be easier for me to establish friendship with people from other countries and I hope our friendship will last forever. It was an honour for me to win the best presenter and I owe it as the outcome of wonderful group work.

ticket, 10 thousand for local transportation and 5 thousand for living goods and snacks. And for accommodation, we live in personal dormitory in NTU, named Pioneer Hall, for which we do not need to pay.

Form the workshop, my experience with smart city was broadened. Now, I recognize smart city as a broader field related to mobility, energy, workplace productivity, water distribution and any other related field. I believe the thought behind the smart city is possible to be applied to other field. In the future, there is certain trend that technology will infiltrate every perspective and change our life greatly. And also after communication with people coming from other department, I have clearer view of my career plan as a designer for future. On the other hand, And also I will, and I have started to share the valuable experience with people in my lab and other friends from different fields. Because it is not only my personal experience, but also a chance for students in Tokyo Tech to know what kind of research is going on in other university.   I believe it may be also interesting for them, and in the future, more students will be willing to join events like this.

In general, with the help of staffs and other students from Tokyo Tech and NTU, everything was going on smoothly. For me, the biggest problem I face was to balance the studying mission and jobs in both NTU and Tokyo Tech. For preparing to go to NTU, I need to finish my assignment in Tokyo Tech in advance, which means I was busy with my work before the departure time to Singapore. So I did not manage my work in Tokyo Tech perfectly. The workshop was quite intensive, which means we did not have too much time for relaxing and sleeping. My sleeping time for every day was around 6 hours. So it may be tired for us to deal with the workshop in NTU and other things happened in Tokyo Tech at the same time. I advise other students who want to study abroad to balance their work in two universities and arrange the time properly in advance. And also to take enough sleep. Otherwise, it will be a tough week.

In all, it was a wonderful week for me, not only because of the lectures and experience I got from the workshop, but also the friendship formed with people from different countries and universities.

Last but not least, I am grateful for giving me the opportunity to attend ASPIRE League Student Workshop in representation of Tokyo Tech. I really appreciate the chance, and I hope to have chance to win more titles for Tokyo Tech in the future.

Our group's topic is "workplace productivity" and main point is to make a smart integration of human, building and technologies. Our group focus on three main topics: workplace, in other words physical environment, people, which related to productivity from people's perspective, and technologies.

Firstly, our group give the definition of workplace productivity as a term referring to how much work is accomplished in a work environment and how efficiently workers complete tasks at their workplaces.

After that, we researched on the overview of development of workplace, researches related to people and their productivity, and the development of related technology.   And then based on the overview, we proposed our design in two parts: hardware and software. In the hardware part, we proposed two types of layout for workplace, open-plan office layout and smart concentrate booth. The open-space office is arranged with flexible furniture equipped with intelligent sensor and indicator lights. And for the Private Smart Booth for Concentration, which has Smart No-disturbing Mode to help users to concentrate on their own work. And also use a lot of sensors and AI to help the users to arrange their work smarter and keep healthy. And then for the software part, we proposed an integrated app system with three different layers: Work-life management, Communication and Space interaction, which is connected with hardware design.

The judges and professors affirmed our presentation that they was impressed by us and our presentation. During the question time, the judges asked some question and gave us some suggestions. The question I remember most is the one for us to think whether a flexible open space could increase the productivity. We answered that the workplace should develop following the time change. And we think differently from the past industry that workers do not need to communicate with others so much that in current situation, the collaboration between people is becoming more and more important so that providing a flexible and usable group-work place is in line with the development of time. In all, I think our group still need to improve our design to be more technique and integral, but we did a very good job.

Aspire League Student Workshop 2018 Report

M.A.A

M2, Department of Computer Science, School of Computing

1. Program Overview

The Asian Science and Technology Pioneering Institute of Research and Education (ASPIRE) League is a collaborative project between five leading Asian universities in the science and technology discipline that comprised of The Hong Kong University of Science and Technology (Hong Kong), Korean Advanced Institute of Science and Technology (South Korea), Nanyang Technological University (Singapore), Tokyo Institute of Technology (Japan), and Tsing Hua University (China). Every year, they hold ASPIRE League Symposium as well as ASPIRE League Student Workshoop hosted by the five universities alternatively with different focus of research. This year, the host of the forum is NTU with theme of Smart City.

There are programs for the professors of ASPIRE League universities as well as another one for the student representatives which is the ASPIRE League Student Workshop. The main purpose of Student Workshop is for students from different background to interact and brainstorm on the cases given in the Student Workshop. Students from IDEA League were also present in ASPIRE League Student Workshop. Students are divided in groups with at most one student from each university. Each group chose one topic related to smart city and has to present one smart city application on the chosen topic. Our group chose a topic of "Home and Environment" to present. There are different kind of activities, such as lectures, site visits, free discussion hour, welcome dinner, ASPIRE Symposium, student's presentation, and finally city tour. Each day typically comprises of two morning lectures, followed by afternoon visit sites, and concluded with free night discussion session for the first three days. The details will be explained in the following.

Tokyo Tech delegates from right to left: Kyoko, Yuxin, Yushi, Ms Sai, Dang, and me.

2. Preparation

There was no significant preparation that should be done except by following the procedures instructed by Tokyo Tech. After the interview, we get notified if we get accepted to the program. The most important preparations were just filing out necessary documents provided by Ms Sai and buying insurance. The insurance did not take very long time to be released, but earlier purchase is better. Since I do not have visa requirement to go to Singapore, there was nothing else to prepare beforehand except for buying tickets.

3. Activity Summary
3.1 Lectures

Lectures are conducted by different NTU professors and researchers from different field who focus on one aspect of smart city.

Lecture 1: Human AI-Interaction in Smart City Applications

This lecture was focused on applications to design solutions for aging populations. In Singapore there are many cases of elderly couple or people living by themselves without any relatives. Some of the solutions include games for dexterity exercise, social notification for nearby activity, accident and anomaly detection, etc.

Lecture 2: Critical Technologies and Underlying Drivers for a Smart Nation

Prof Lam Kwok Yan showed us different components of smart cities as well as the general plan of Singapore government's direction on making Singapore a better city. The lecture presented conceptual idea of smart city such as its domains, necessary researches, and infrastructure needed to reach the Smart Nation Systems of Singapore.

Lecture 3: Realistic Immersion with Virtual Humans

Dr Nisha Jain presented about how virtual reality and virtual city development could make city smarter. She presented application of VR development for design as well as simulation practice for populations whom otherwise could not get access to the real object.

Lecture 4: Exploring Indicators for Smart Cities: Making Smart Smart

The point of this lecture was to present the ongoing attempt on establishing smart city as a research domain. Prof Theng Yin Leng presented on the various definition of smart cities. We got to know the measurement and metrics that currently used in developing smart cities.

Lecture 5: Autonomous Vehicles in a Car-lite Singapore

Mr Niels de Boer presented on current development of autonomous vehicles, particularly in the case of Singapore. Singapore does not aim to develop their own autonomous vehicles. However, researches are especially necessary for future planning and policy studies. It is part of consideration on Singapore plan on developing multi-zoned area where cars, pedestrians, and other street components interact.

Lecture 6: Super Low Energy – Advancing Net Zero in the Tropics

Mr Noel Chin presented on how to design 'smart building'. Modern buildings typically consume so much energy compared to traditional buildings, where he argued that previous design of buildings might have been 'smarter' in that it was adjusted to the environment. However, for functionality

reason most building must be built according to the typical design of modern building and it becomes a special challenge in tropical countries when it is hot all year long.

3.2 Site Visits

We visited different laboratories and companies that take part in Singapore smart city project.

Site 1: Robotics Research Centre, NTU

This research center is focused on different development of robots for various applications. The robots include humanoid robot, shop sorter, furniture builder, etc.

Left: Visit to Robotics Research Center. Top Right: Visit to Google Singapore. Bottom Right: Welcome dinner at NTU Alumni Club.

Site 2: Google Singapore

We visited Google Singapore office. They presented the various opportunities and works being done in Google Singapore as well as office tour. It has nothing to do with smart city directly and felt more like a recruitment talk instead.

Site 3: Smart Nation TRANS Lab, NTU

This is a lab that focuses on translational research. The researches are targeted to be developed until household application. One of the projects we were shown was the development of voice sensor that can distinguish different activities such as crying sound, people singing, water pouring, coughing, etc.

The other project was smoke detector that could differentiate smoke created by cooking and smoke differentiated by fire accident.

Site 4: Smart Mobility Lab, NTU

This lab develops infrastructure and system that could observe traffic and detect vehicles. They developed smart road camera that could directly detect what kind of vehicle is passing and monitoring system for possibly traffic intervention.

Site 5: Centre of Excellence for Testing & Research of Autonomous Vehicles NTU

We visited NTU's laboratory that does research and testing of autonomous vehicle. The lab is located just outside of NTU campus, where they build miniature of Singapore's road with all its feature including crossings, traffic light, and street sign. We got to ride one of the self-driving cars as a demonstration. Current limitation is its relation in mixed environment, when there are manned vehicle and pedestrian.

Site 6: Changi Airport Living Lab

We were presented at how Changi Airport employs technology to be one of the best airports in the world. They experimented a lot in terminal four where the system runs differently compared to the other terminals. We were explained on the self-check in baggage technology and system design that makes Changi Airport terminal 4 works.

3.3 Student Group Work and Presentations

From the first day, we were divided into 5 groups. Our group chose the topic of "Home and Environment". We have our group projects discussion in the room where we receive the lecture. The group project is done any when we are free. Typically, after all the lecture and visit session, we are given time to discuss from 6 PM onwards without time limit. Our project was about development of framework for home and environment safety by implementing IoT technology inspired form the lectures. On the last day, we present our work to all audiences including VP of the five universities as well as other staffs and professors from the universities. After the presentations, one best team and two best presenters were chosen. Ji Yuxin from Titech was one of the best presenters.

3.4 ASPIRE Symposium

In the morning of fourth day, we all went to NTU Alumni Club to attend ASPIRE Symposium. On this day, it was mostly the event for professors where students were just audience towards different presentation by professors from the member universities. Progresses on different aspects of smart cities that become the foci of each professor such as urban informatics by Prof Shimosaka from Titech. Others also presented the challenge and development of smart city in China, Hong Kong, South Korea, and Singapore, mostly from the side of urban planning. The previous research funded by mutual grant of ASPIRE league was also presented there. After lunch, the professors continue their symposium while the students go back to NTU to finish final presentation projects.

4. Logistics

We were hosted by NTU in their Yunnan Garden campus. We went to the campus by ourselves, however there are student helpers that helps us to check in. They provided us single room dormitory with air conditioning and internet access and external bathroom. There are two buildings of the same dormitory where we stayed. Every morning we took five minutes bus ride at 7:30 going from dorm to

the academic building. The academic building, The Hive, is one of the newer building in NTU that has many multimedia facilities. We did not really utilize them fully, but it was good to have room with many whiteboards and free electrical sockets. We use similar bus to visit other places outside such as Google office and Changi airport.

Food was provided four times a day, breakfast, morning break, lunch, and dinner out of the lecture room as a self-service catering. The food quality was very good, and it caters to my dietary restriction (halal). I personally found that there were too many vegetable dishes compared to the meat dish that were not eaten much. And maybe the foods were served too frequently with such large quantity. There was also welcome dinner in the end of the third day in NTU alumni house. The last food served after student presentation was the best where they served local delicacy.

On the last days, we had city tour where we visited famous Singapore landmarks such as Garden by the Bay, Singapore Flyer, and the top of Marina Bay Sand. Throughout the tour, we were guided by official guide. Somehow during the day, we were short on time that we could only visit each of the attraction quite rushed even though there were time gap between the end of student presentation. The day was concluded by having dinner at a Chinese restaurant. After the dinner, students go their way to explore the area since the restaurant is in Singapore night life place. Few students including me decided to go back earlier since I had to catch early flight.

5. Suggestions

The workshop was overall enjoyable and educational. I got to meet and gain insights from students from different countries and making friendship with fellow Tokyo Tech students. At the same time, we can see how different professors from different part of the world try to tackle problems in their area. However, some suggestion could be done to make the event even better. I think the workshop were too packed to get quality discussion. We did not have time to discuss except at night for the first three days, when we were already tired for the whole event. Depending on the theme for the next year workshop, it could be more focused if the case is prepared similar o case competition/case challenge. Maybe there is concern on fewer variety of presentation if the question is narrowed, however I believe it would make the presentation to be of better quality. The timing was in general too packed, while many of us would want to explore the city more. The city tour was also too packed that we could not really enjoy the excursion comfortably. With this in mind, I hope Titech could hold ASPIRE Forum 2018 better than the previous years.

Y.Y.
M2, Department of Transdisciplinary Science and
Engineering, School of Environment and Society

必須報告事項

① 留学先（参加プログラム／受入れ機関）の概略
プログラム詳細が分かる、日程表等があれば貼付けてください。

9 July (Monday)

AM:
- 7:45-8:00am **Transfer from the Hall to the Hive**
- 8:00-9:00am: Breakfast @Level 2, the Hive
- 9:00-12:30pm **Lecture 1 & Lecture 2**

PM:
- 12:30-1:30pm Lunch @ Level 2, the Hive
- 2:00-3:00 pm **Visit Robotics Research Centre**
- 3:30-5:00 pm **Visit Google Singapore**
- 5:30-6:30 pm Dinner

- Evening:
- Group Discussion

10 July (Tuesday)

AM:
- 7:45-8:00am **Transfer from the Hall to the Hive**
- 8:00-9:00am: Breakfast @Level 2, the Hive
- 9:00-12:30pm **Lecture 3 & Lecture 4**

PM:
- 12:30-1:30pm Lunch @ Level 2, the Hive
- 2:30-3:15 pm **Visit Smart Nation TRANS Lab (SNTL)**
- 3:15-4:00 pm **Visit Smart Mobility (SMTB) Lab**
- 5:00-6:00 pm **Visit Centre of Excellence for Testing & Research of Autonomous Vehicles NTU (CETRAN) and experience NAVYA**
- 6:30 pm –7:30 pm Dinner

- Evening:
- Group Discussion

11 July (Wednesday)

AM:
- 7:45 - 8:00am **Transfer from the Hall to the Hive**
- 8:00 - 9:00am: Breakfast @Level 2, the Hive
- 9:00 - 12:30pm **Lecture 5 & Lecture 6**

PM:
- 12:30 -1:30pm Lunch @ Level 2, the Hive
- 2:30 - 4:00 pm **Visit Changi Airport Living Lab (bring your passport)**
- 6:30 - 8:00 pm Welcome dinner hosted by **Prof Alan Chan**, Vice President (Alumni and Advancement), NTU

- Evening:
- Group Discussion

12 July (Thursday)

AM:
- 7:15-7:30am Assembly
- 7:30-8:00am **Bus transfer from the Hall to NTU@One North** (Only one bus transfer, please don't be late)
- 8:00-8:45am Breakfast in NTU@One North
- 9:00-12:20pm **ASPIRE Symposium**

PM:
- 12:20-1:20pm Lunch
- 1:20 -1:50pm Transfer from NTU@One North to the Hive
- 1:50pm onwards Group Discussion
- 6:00pm Dinner

Evening:
- Group Discussion

14 July (Friday)

Wear NTU logo T-shirt

AM:
- 7:15-7:30am Assembly
- 7:30-8:00am **Bus transfer from the Hall to NTU@One North** (Only one bus transfer, please don't be late)
- 8:00-8:45am Breakfast in NTU@One North
- 9:00-12:30pm **Student Presentations to Vice Presidents and Senior Staff**
  - ➤"Best Presenter"
  - ➤"Best Group Presentation"

PM:
- 12:30-2:00pm Closing Lunch
- 2:00-8:00pm **Singapore Half Day City Tour**

14 July (Saturday)

8:00-12:00 Check-out from the Hall

Please hand over the room key and linen items (bedsheet, pillow&cover and blanket) to NTU Coordinators in **Room 18B-7-181.**

NTU Coordinators:

Ms Cheam Yu Juen: +65 92458958

Mr Iswandi: +65 97801380

*In case of early and late check-out, please make special arrangement with them.

*Breakfast packs will be ready in the coordinator's room from 8:00am.

② 留学前の準備

留学情報の入手方法、専門分野・語学の準備方法、留学先の研究室に所属した場合は、留学先大学の指導教員との準備、ビザ取得方法、住居の探し方など。

このプログラムは事務的な手続きがほかのプラグラムに比べると、多いほうではないと思います。私の場合、保険に関して少し時間がかかってしまいましたが、それ以外はスムーズに準備ができたと思います。
指導教員には、志望理由書を見ていただきました。単位は十分に取れているので、授業は取っていませんでした。
ビザ取得の必要はなく、住居などすべてを南洋工科大学にカバーしていただきました。

③ 留学中の活動及び感想 （プログラムの内容、新たな気づき、取り組んだことなどを詳しく書いてください。）

プログラムの内容は①に記載しています。
プログラム自体はとても充実したものでした。Smart city を作り上げるべく、各機関がどのように努力を重ねているかを勉強させていただきました。
ワークショップでは、各グループにお題が渡されそのお題を IOT などを通じてどのようにより効率化できるかプレゼンするというものでした。
私たちのグループは public sector というお題を選び、国がどのように水の政策をとっていくかについて提案してきました。結果として、ベストプレゼンターグループに表彰されることができました。

図 1　google での集合写真

④ 留学を終えて、自分自身の成長を実感したエピソード

　他国の学生等との交流、海外における勉学・研究等の学校生活や日常生活を経験して、自身の成長を実感したことと思います。留学前に立てていた目標に対する達成度や苦労話など、何でも結構ですので、自身の成長を実感した中で一番記憶に残っているエピソードを記入して下さい。

　グループワークで一つのものを期限内に作り上げることは大変でした。
　私たちの班のテーマは public sector のできる AI を用いた改善案をプレゼンすることでした。それを通じて成長した点が大きく分けて二つあったかと思います。一つは言語の壁、もう一つは研究背景の違いです。
　一つ目に関しては、話す程度で英語を使うことはどの学生も問題なかったのですが、いざディスカッションの細かい部分を伝えようとすると、言いたいことが 100%で伝わらず、ディスカッションのポイントが少しずれてしまうのを感じました。「そういう意味じゃなくて…」と、言いたいことを何度も伝え合っていたので時間のロスが生じてしまいました。まだまだ英語の勉強をしなければならないと感じました。
　二つ目に関しては、各々得意な分野が違うということで、焦点を当てたい部分が違ったということです。私たちは、シンガポールの水道を IOT などを用いてどのように効率化を図るかについてディスカッションしましたが、細部の構造を気にする人や、全体に焦点を当ててシステムを気にする人など、背景によりバラバラでした。そこで彼らが共存できるような大枠を作って、パートをあてがいました。そうすることにより、お互いのテリトリーを侵食せず、自分たちのテリトリーに集中できる環境ができたのかなと思います。
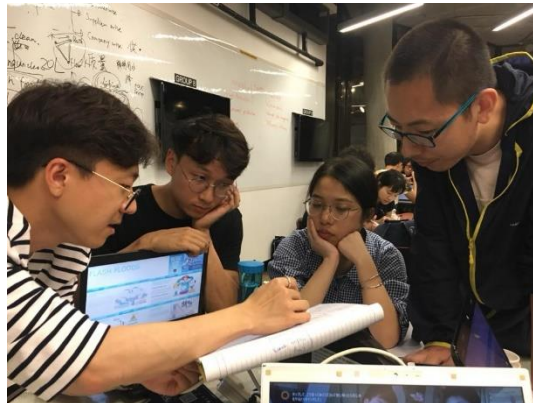　人とコミュニケーションをとる際には、この二点に気を付けていきたいと思います。

図 2　グループディスカッション

⑤ 留学費用

　渡航費、プログラム参加費、生活費、住居費、保険料、奨学金の有無など。

　渡航費　50,000 円
　プログラム参加費　0 円
　生活費　5,000 円
　住居費　0 円
　保険料　6,000 円
　奨学金　60,000 円

⑥ **留学先での住居**

　　住居（寮、ホームステイ等）、申し込み方法、ルームメイト、その他。

　　住居は大学の寮を貸していただきました。
　　部屋は一人一つ振り分けられました。洗濯機、乾燥機はそれぞれ１シンガポールドル
　　で使うことができます。自分で洗剤はもっていかないといけません。
　　シャンプーなども用意されていないので、すべて基本的には自分で準備する形になり
　　ます。

⑦ **留学先での語学状況**

　　例えば、留学期間中は○○語を使用。留学前の TOEFL 等語学試験は、○○だったが、
　　十分であったなど。

　　シンガポールにいる間は基本的に英語です。学科の関係上、すべての授業やグループ
　　ワークが英語で行われているので、授業と同じ感じで受けました。シンガポール人の独
　　特の話し方に少し戸惑いましたが、時間がたつにつれ徐々に慣れていったかなと思いま
　　す。

⑧ **単位認定（互換）(当プログラムは単位互換対象ではないため、記載不要)**

留学中に取得した単位の認定（互換）を東工大で行ったか（行う予定か）。

⑨ **留学経験を今後、どのように活かしたいか**

Smart city を題材にいろいろな授業を受け、施設見学を行いました。人口増加が顕著な現代
において、いかにビッグデータを用いて効率を高めて物事を進めていくことが重要であるかを
学びました。水道のプロフェッショナルになりたいと考えておりますので、将来的にはいかに
効率よく配水をできるかビッグデータや AI を用いて挑戦したいと思います。

図 3　東工大からの参加者

⑩ 留学先で困ったことがあったか　またどのように対処したか

　とてもよく構成されたプログラムでしたので、プログラム自体で困ることはありませんでしたが、ワークショップの際、話がまとまらず半ギレの子が出てきてしまったことがいちばん困ったことでした。その際には論点がずれてしまうので、その現在の論点はどこにあるのかを明確にしつつ、それを解決するためにはどのような議論が必要かを意識して進めました。

基本的にはプレゼンをより良くしようという姿勢の表れなので、その分いいプレゼンが仕上がったのかと思います。

図 4　ベストグループプレゼンター賞受賞

⑪ 留学を希望する後輩へアドバイス

　このプログラムは自分の知見の狭さに気づかせてくれるいい機会であると思います。色々なバックグラウンドを持った人々とのグループワーク、自分と違う分野の先生の授業を通して、自分のやったいることへの可能性の広さ、またほかの人がやっていることへの興味が膨らむ機会であったなと感じました。

図 5　最終日の夜、気の合う仲間と

K.O.
M2 Department of Architecture
School of Environment and Society

① 留学先（参加プログラム/受入れ機関）の概略

修士・博士学生用の ASPIRE のプログラムは、ASPIRE リーグに加盟している５大学（香港科技大学、韓国科学技術院、南洋理工大学(NTU)、清華大学及び東京工業大学の５大学）及びヨーロッパの IDEA リーグに加盟している大学から、学生が集まり、テーマに沿った講義や施設見学及びディスカッションを行い、最終日に成果発表としてのグループプレゼンテーションを行うプログラムです。今年のテーマは、"Smart Cities" でした。受入れ機関となる主催大学は２年ごとに交代しますが、本年度はシンガポールの南洋理工大学で行われました。南洋理工大学は、シンガポールの西端に位置する国際的にも著名な理工系大学です。

図１ ASPIRE リーグの５大学

図２ 今回のテーマのイメージ画像

② 留学前の準備

i. 学習面での準備

テーマについての知識が不足していると感じたため、事前にインターネットで情報収集した他、図書館で「シンガポール：スマートな都市、スマートな国家」（ケント・カルダー著、長谷川和弘訳、中央公論新社）という本を借り、出発前の時間と飛行機の中で読んでいきました。シンガポールの国家の政策に焦点がおかれており、グループディスカッションには参考にすることはできませんでしたが、シンガポールという国について知るには十分知識を得られたので良かったです。

ii. 渡航の手続き

航空券は自分自身で予約します。その他は、大学の指示に従い、国際連携課の職員の方にご案内していただき、留学届けや誓約書などの書類を数点提出し、海外保険の振込みを行いました。また、現地からの案内に基づいて顔写真や航空券の情報を送りました。

③ 留学中の活動及び感想

プログラムは、主に三つの活動で構成されており、講義、施設訪問、グループディスカッションです。週の後半には、それらに加えてシンポジウムとグループプレゼンテーションがあります。

講義では、毎朝二つずつ表１のようなテーマについて、教授や研究者の方にお話していただきました。シンガポール国家や NTU のプロジェクトとして行っている研究も多く、日本と視点やアプローチ方法が異なるものがあり、興味深かったです。

表1　講義の内容

講義番号	タイトル
Lecture 1	Realistic Immersion with Virtual Humans
Lecture 2	Critical Technologies and Underlying Drivers or a Smart Nation
Lecture 3	Human-AI Interaction in Smart City Applications
Lecture 4	Exploring Indicators for Smart Cities: Making Smart Smart
Lecture 5	Autonomous Vehicles in a Car-lite Singapore
Lecture 6	Super Low Energy – Advancing Net Zero in the Tropics

　施設訪問では、NTU キャンパス内の Robotics Research Center, Smart Nation TRANS Lab (SNTL), Smart Mobility Lab (SMTB), CETRAN, 学外では、 Google Singapore, Changi International Airport を見学しました。SMBT の大学のキャンパス内でセンサーやカメラで交通量のデータを計測し評価する取り組みや、チャンギ空港のチェックインカウンターや手荷物カウンターの無人化が特に面白いと思いました。

　グループディスカッションでは、Mobility, Clean Energy, Workspace Productivity 等の与えられたテーマから、グループごとに異なるものを一つずつ選択します。指示は、最終日にテーマに沿ったプレゼンを行うことのみであり、それ以外の提案内容や発表形式は特に指定されていません。私たちのグループは、Clean Energy を選択し、最初にエネルギー、再生可能エネルギーの概要について述べた上で、エネルギーの発電を地域で分配し、停車中の電気自動車に蓄電し、地域で管理する仕組みを提案しました。また、エネルギーの需給量の波や送電の過供給といった欠点と解決法や、持続可能なデータ管理法についても検討しました。

　プレゼンのテーマは各グループに一つであり、グループのメンバーの専門分野はそれぞれ異なり、期間も４日間と短いので、最終発表までにディスカッションの内容をうまくまとめる必要があります。私たちのチームも、発表前日は深夜の１時半まで資料作りに取り組んでいました。
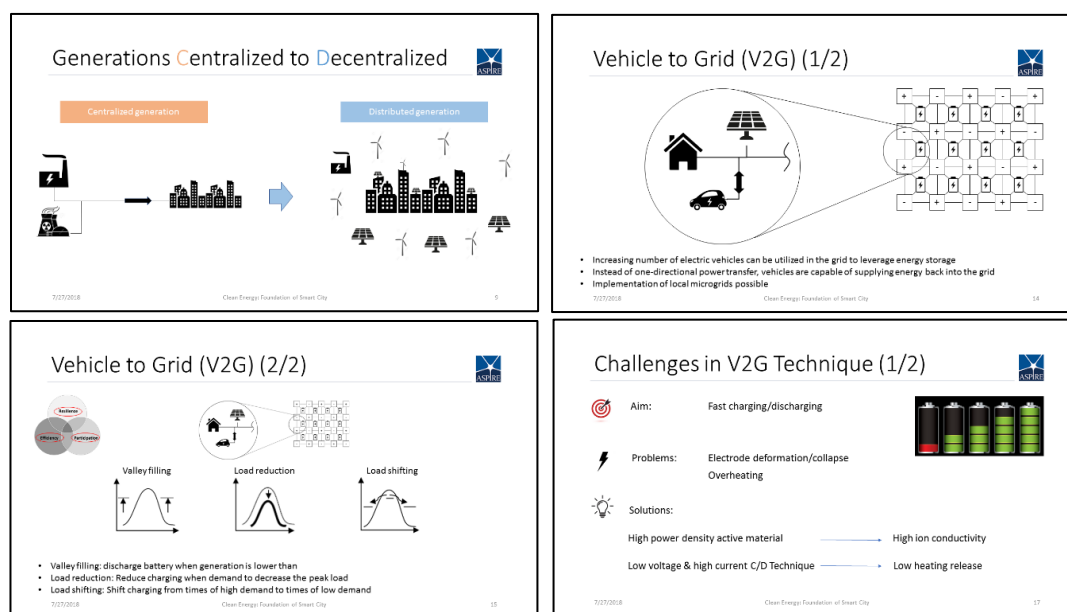

図3　グループプレゼンテーションの発表資料

図4　発表の様子

図5　発表の様子２

④　留学を終えて、自分自身の成長を実感したエピソード

　スマートシティに関する講義や施設訪問、グループディスカッションを通して、エネルギーの仕組みやIoT を駆使した新しい技術、政策、また、それらの技術を先駆的に活用・発展させていこうとするシンガポールという国家に、今まで以上に興味を持ちました。良い勉強の機会になったと同時に、自分のエネルギーに関する知識がまだまだ不足していると感じたので、これからも勉強していきたいと思います。

　また、普段会えない海外の大学からの友達を作り、一歩踏み込んだことを聞いてみたいというのが、今回の渡航の目標の一つでした。初日から積極的に友達に話しかけ、ワークショップの２日目までに参加学生の全員の 27 名と友達になることができました。今までの自分の渡航経験以上に、普段の暮らしや育った環境のこと、自国の様々な地域のこと、国同士の意識や日本に対する素直な印象に関して、学生の意見を聞くことができたのが、今回の私の渡航の大きな収穫です。

図6　グループディスカッションの様子

図7　NTU のスタッフと学生の集合写真

⑤　留学費用

　事前の準備にかかった費用としては、渡航費（７万円程度）と海外保険料（５千円程度）です。奨学金は、東工大から学資金として６万円をいただきました。

　現地では、空港から NTU に着いてしまえば、NTU が寮代、食事代、交通費を全て支払ってくれたので、プログラム中はほぼお金を使いませんでした。最低限必要なのは、空港と NTU の往復の MRT（地下鉄）代またはタクシー代と、現地で買うなら sim カード代くらいだと思います。空港からのアクセスは、事前に NTU から交通の詳細な案内を送ってもらっていたので、全く困りませんでした。

⑥ 留学先での住居

滞在した NTU の寮は、一人部屋で、6畳ほどの部屋にベッドと机、棚とクローゼットが備わっています。私はバスタオルを多めに持っていくのを忘れたので、毎日洗濯していましたが、忘れても生活用品はほぼ大学内のスーパーで買うこともできるようです。寮は、ASPIRE への参加が決まった時点で、NTU が部屋を用意してくれたので、特に手続きは必要なかったです。

⑦ 留学先での語学状況

講義やディスカッションは全て英語で行われました。しかしながら、シンガポールの公用語は、英語、マレー語、中国語、タミル語であり、今回の参加者の学生においても、清華大学や香港科技大学だけではなく、NTU や IDEA リーグの学生の中にも中国系の友達が多くいたことから、プログラム中も中国語が聞こえてくることが多々ありました。参加者の多くが中国語を話せる状況は特殊かもしれませんが、欲を言えば、自分が英語だけではなく中国語も話せたらもっと楽しめたのにと思いました。

参加者の学生たちは、英語の授業や発表に慣れている人も多く、発表態度が堂々としていて、自分ももっとそういう場数を踏んでいくべきだと思いました。講義やディスカッションでの会話はあまり困ることはなかったですが、聞き逃した際も、周りの友達に聞けばすぐにわかりやすく教えてもらえました。講義やラボツアーを担当した教授や研究者の方は、優しく熱心な方ばかりで、質問したら何でも親切に答えてくださりました。

⑧ 留学経験を今後、どのように活かしたいか

今回学んで更に興味を持ったスマートシティやエネルギー問題、IoT、そしてそれらを活用する仕組みや政策について、帰国後も強い関心を持って勉強し続けたいです。また、今回シンガポールで出会うことの出来た大切な友達とも、連絡を取り続け、将来また一緒に仕事をしたり遊んだりしたいと思います。

⑨ 留学先で困ったことがあったか　またどのように対処したか

初日に寮の部屋の冷房のリモコンが壊れていることに気づき、自分の学生ヘルパーの子に連絡したところ、次の日帰ってきたら修理されていました。

プログラム中は元気に活動に集中することができましたが、結構タフなプログラムだと思うので、念のために風邪薬や鎮痛剤、普段飲み慣れている栄養剤等を持っていくと良いと思います。

⑩ 留学を希望する後輩へアドバイス

たとえ短期間だとしても、普段得られない学びを見聞きできる留学は、貴いものだと思います。私はASPIRE に参加して、興味のあるテーマについて勉強し、ディスカッションをして掘り下げられたことに加え、自分に足りない視点を発見し、伸ばしたい能力を見極めることができました。後輩には、自信を持ってお勧めしたいプログラムです。