

Status Report on United Nations/Japan Long-term
Fellowship Programme on Nano-Satellite Technologies
Hosted by
Kyushu Institute of Technology, Japan
~Doctorate in Nano-Satellite Technologies (DNST)~

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Thank you Mr. Chairman.

My name is Mengu Cho. I am a professor and the director of Center for Nanosatellite Testing at Kyushu Institute of Technology.

Today I would like to report the status on UN/Japan long-term fellowship program on Nano-Satellite Technologies, which we call DNST.

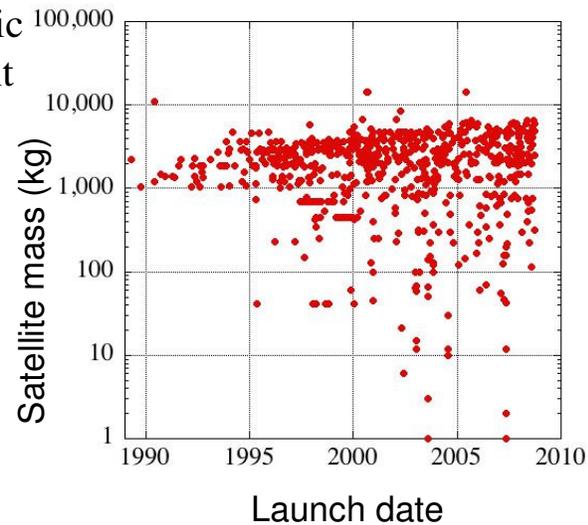
This program was launched in 2010 and we now have the first class of students. Today I would like to introduce this important program again and report what progress we made during the last one year.

Background



Background

- Interest in capabilities for basic space technology development
- Satellites affordable even to universities and smaller institutions
- Small space enterprises from University-based satellite projects



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First, let me talk about the background why KIT decided to host the fellowship program. This chart shows the increasing trend of nanosatellite launches as the year progresses. Due to this trend, there is a growing interest among developing countries in acquiring capabilities for basic space technology. This is partly because the satellites are now very cheap and affordable even to universities and small institutions. For an example, currently in Japan more than 20 universities are developing their own nanosatellites. Upon the success of the satellite program, there are now even small space enterprises that have spun off from the university satellite project.

Background

- Presentation of UN Basic Space Technology Initiative (BSTI) at 27th International Symposium on Space Technology and Sciences, Tsukuba, Japan in 2009
- **Mission**
 - To enhance access to space application tools for sustainable development through building capacity in basic space technology
- **Objectives**
 - Respond to the growing **interest in many countries to establish indigenous capacities in basic space technology**
 - Promote **international cooperation and information exchange** in capacity building in basic space technology
 - Others

KIT answered the call for collaborations made by UN



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Three years ago, there was a presentation about Basic Space Technology Initiative at 27th International Symposium on Space Technology and Sciences that was held in Tsukuba, Japan.

There was call for collaboration made by UN in order to meet the growing demand from many countries to obtain the basic space technology. KIT saw our own merit to answering the call made by UN.

Needs of Long-term Fellowship for capacity building

- Reading books or attending lectures can not make a satellite
- Experience the complete cycle of designing, building and testing
 - Even better with launching and operating
 - Learn through the failures during the tests and the efforts necessary to correct the defects
- **Long-term** fellowship to support students studying abroad and gaining experience through *on-the-job training (OJT)*
- Learn to *think and be innovative*
 - Participate in a satellite project *as a team member not as a guest*
 - Experience necessary to *build a facility from scratch* in home country
 - **University-like environment** is more suitable than well-prepared comfortable institutions, such as space agencies or industries



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Let me explain why we need long-term fellowship programme for BSTI program. First of all, we can not make satellites simply by reading books or listening to a lecture. We need experience based on on-the-job training. (OJT) We actually need to use our own hand to learn the satellites. To gain the experience through the OJT, short term such as 1 year or less is not enough . Therefore, a longer period such as 3 years is desired. Considering the nature of BSTI program, the experience should not only fabricate the satellites, but it has to include every aspect of satellite development from its designing through to testing. It is even better if one has had the opportunity to launch and operate the satellites. Even if the students fail, they can learn from that experience.

To promote the space technology build up in developing countries, the students have to be innovative. They may have to build an infrastructure from scratch when they return to their home country. Therefore, they have to think themselves by joining the satellite development as a team member not as a guest.

Also, the university atmosphere is ideal to think and learn rather than in a fancy space agency where the equipment is well-prepared and maintained. In the university they have to fix the equipment themselves and to fix it they have to know the detail of the equipment.

Introduction of KIT



Kyushu Institute of Technology (KIT)

1909	Founded as Meiji College of Technology (4-year, private)
1921	Became a national institution
1949	Renamed as Kyushu Institute of Technology
1986	Addition of Faculty of Computer Science and Systems Engineering
2000	Addition of Graduate School of Life Science and Systems Engineering
2004	Became a National University Corporation
2009	Celebration of 100th anniversary



4,400 Undergraduate students
1,700 Graduate students
370 Academic staff



Before I go into the detail of the fellowship program, I would like to make a brief introduction of Kyushu Institute of Technology. Kit was founded in 1909 and celebrated its 100th anniversary three years ago. We are a national university dedicated to science and technology. The number of students are 6,000 including undergraduate and graduate students. The number of academic staff is approximately 400.

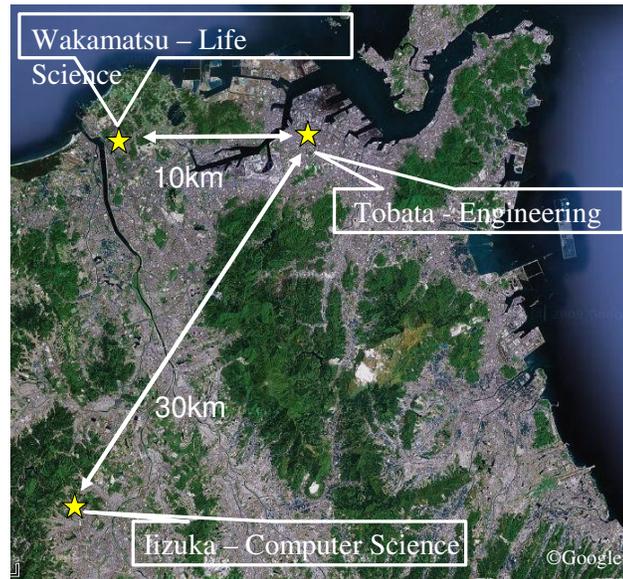
Kyushu Institute of Technology

- Located in the Kitakyushu region
 - Population of more than 1million
 - Cost of living is much lower than Tokyo



KIT is located in Kitakyushu region. Kitakyushu region is known as the birthplace of Japanese modern industries, such as steel mills and now famous for the green environment technologies. The area is about 1,000 km west of Tokyo. Although it is city area populated by more than 1 million people, the cost of living is much lower than in Tokyo.

Kyushu Institute of Technology



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KIT is made of three campuses, Engineering, Computer Science and Life Science. Most of the space-related education and research is carried out in the Tobata campus that deals with traditional disciplines of Engineering.

International Students at KIT

Country (Region)	Number of Int'l students	Country (Region)	Number of Int'l students
China	108	Australia	1
Korea	22	Taiwan Province of China	1
Malaysia	9	Myanmar	1
Indonesia	7	Syria	1
Vietnam	9	Algeria	1
Bangladesh	5	Iran	1
Thailand	4	Fiji	1
France	4	Sri Lanka	1
Laos	4	Liberia	1
India	1	Peru	1
Nepal	1		
Brazil	1	Total	185

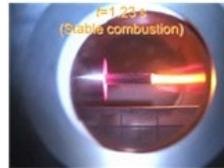
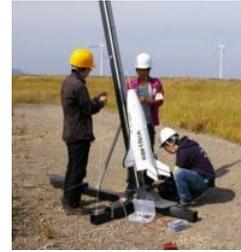


Total of 185 international students as of May 2011

KIT attracts many international students. This is the list of countries of the students. Currently we have about 200 students registered as full-time students. This list does not include short-time exchange students between the sister schools among the world. We have partnership agreements with more than 60 universities among 23 countries.

Space Engineering Research and Educations at KIT

- Space Engineering Education at Tobata Campus since 1993
 - Undergraduate (30 students/class) and graduate levels
- Laboratory of Spacecraft Environmental Interaction Engineering
 - Established in 2004
- Center for Nanosatellite Testing
 - Established in 2010
- Member of International Astronautical Federation (IAF) since 2011



At KIT, we have a tradition of space engineering research and education. First, we have established space engineering educational course at the school of engineering located at Tobata Campus in 1993. Currently a class of 30 students graduate each year.

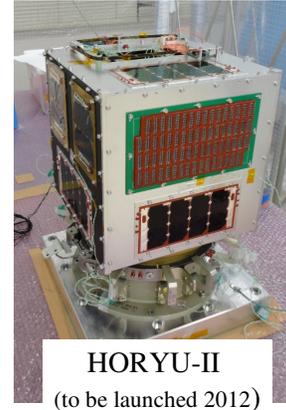
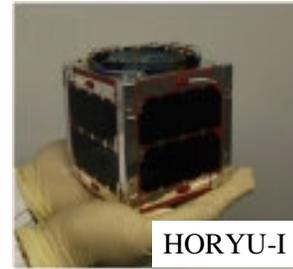
In year 2004, KIT launched a new research laboratory, called Laboratory of Spacecraft Environment Interaction Engineering. The laboratory was dedicated to various aspects of spacecraft environmental interactions, such as spacecraft charging, hypervelocity impact, and material degradation.

In 2010, a new center was added to the laboratory of spacecraft environment interaction Engineering as a research division. It is the center for nanosatellite testing.

In 2011, KIT has become a member of International Astronautical Federation.

KIT satellite project

- KIT nanosatellite project
 - 25 graduate and undergraduate students working together
 - Responsible for all the processes
 - Conceptual study, design, fabrication, testing and operation
- Official educational program for graduate student
 - Learn systems engineering and project management
 - Writing a Ph.D thesis
 - Extract a state-of-the-art research element from the project work



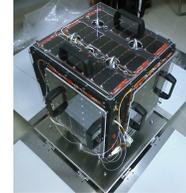
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KIT has its own student satellite program. The satellite program is regarded as an important educational program of systems engineering. Currently about 25 students work on the satellite project. They are responsible for all the processes of the satellite development, which range from conceptual study, design, fabrication, testing and operation. The photographs shown here are flight models of a 10cm and 30cm cubesats. This 30cm cubesat will be launched this year by a H2A rocket.

The satellite project is being carried out as a part of official educational program for graduate students. The students earn the credit by working on the satellite project as they learn important lessons of systems engineering from the project. Also, some students write Ph.D. thesis by extracting a state-of-art research element from the project work.

Center for Nanosatellite Testing

- Established in 2010
- Provides all the environmental test services except radiation for :
 - Nanosatellite up to 50cmx50cmx50cm and 50kg
 - More than 2 million US\$ worth equipments
- Reduce the development cost of nano-satellites while ensuring the reliability of the system



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As I mentioned before, KIT established center for nanosatellite testing in 2010. It is supposed to provide the testing services except radiation to all the satellites up to 50cmx50cmx50cm and 50kg. KIT invested more than 2 million US\$ for hardware and we are currently conducting the environment tests of various nanosatellites. The mission of the center is to reduce the development cost of nanosatellites while ensuring the reliability of the system by making it possible to completely outsource the environment tests.

Introduction of Doctorate in Nano-Satellite Technologies (DNST) program



Now I would like to introduce the detail of the doctorate in nanosatellite technologies program, which we call DNST in short.

Motivation

- **KIT's motivation for UN/Japan Long Term Fellowship**
 - Contributing to humanity through space engineering education to international students and promotion of peaceful use of outer space
 - Recruiting excellent students from all over the world
 - Providing a multicultural learning environment to Japanese students
 - Strengthening Space Engineering research



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Now, let me explain our motivation to host this fellowship program.

First of all, it is our fundamental responsibility to contribute to humanity through education and promotion of peaceful use of space.

Also, there are our own reasons, such as recruiting excellent students, motivating Japanese students and making our space engineering research stronger.

UN/Japan long-term fellowship

- United Nations/Japan Long-term Fellowship Programme on nano-satellite technologies
 - Doctorate in Nano-satellite Technologies (DNST)
- KIT provides financial support to students entering Doctorate programme (3 years) from developing countries or countries in economic transition
 - Extensive research opportunities in core technologies for nanosatellite system development
 - **Epecially infrastructure, such as testing**
 - Participate in the KIT satellite project
 - Find a research topic for Ph.D. thesis
 - Doctorate degree (Doctor of Engineering) after completion of 3 year course work/research and successful defense of the Ph.D. thesis
 - Program language is English



The first students enrolled in KIT in October, 2011

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The fellowship is named as Doctorate in nanosatellite technologies, DNST. You can find a brochure on the table near the entrance of this room.

In this fellowship program, KIT provides financial support for three years to those who are coming from developing countries or countries in economic transition.

KIT will offer extensive research opportunities in core technologies for nanosatellite system development especially infrastructure building such as testing.

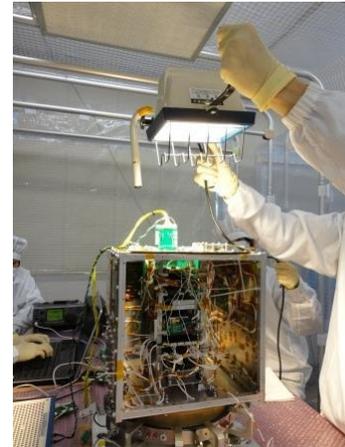
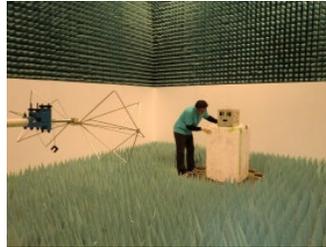
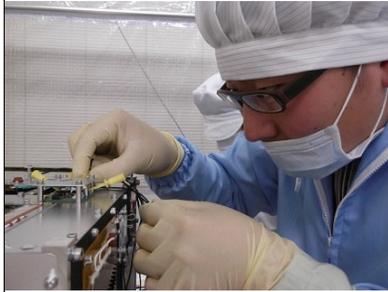
The fellowship recipient also participate in the KIT student satellite project to have experience of working under multicultural environment. The recipient is also supposed to find a research topic for their PH.D. thesis that will be supervised by one of professors at KIT.

After completion of three years study and passing the thesis defense, the recipient will obtain a Doctorate degree.

The first class started in October, 2011.

On-the-Job Training

KIT can offer on-the-job training opportunities to those who want to start their own space program in their home country



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Center for nanosatellite testing can offer OJT opportunities especially for nanosatellite testing. The training will be precious experience to those who want to start a new space program in their home country.

UN/Japan long-term fellowship

- Support by KIT
 - 2 students each year, 3 years for each student
 - Enrolment as a full-time Ph.D. candidate student after passing an examination by KIT faculties.
 - Exemption from the tuition and entrance fees
 - Room in on-campus dormitory (5,900 yen/month = 55 euro/month)
 - Living expense of 80,000 yen per month
 - Support by UN
 - Presentation of the DNST programme to the UN Member States
 - Promotion of the DNST programme on the UNOOSA web site
 - Pre-selection of the candidate student (KIT will make the final selection.)
-  – Payment of the travel expenses to KIT

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Under this fellowship program, two students enroll at KIT each year. As the program last for 3 years for each student, the maximum of 6 students will be financially supported by KIT. They are exempted from the tuition fees and the entrance fee. They will be given a room at the dormitory. They will receive a support of 80,000 yen (720 euro) as a living expense per month. The cost of living in Kitakyushu is much lower than living in Tokyo and the monthly rent for the dormitory is extremely low. A single student can live a decent life with this support of the living expense. Actually many Japanese students are living with this amount of money per month.

In total, KIT's support could be as much as 10 million yen, (100 thousand euro) each year.

UN supports the fellowship program by advertisement of the fellowship through its international network. UN also makes a pre-selection of the candidate students, although the final selection is made by KIT. Finally the UN will pay the travel expense of each student for their round-trip to/from Japan.

Housing of international students

	Rent (per month)	Tobata	Iizuka	Total
For singles	JPY 5,900 (€59)	38	12	50
For couples	JPY 9,500 (€95)	6	3	9
For Families	JPY 14,200 (€142)	6	3	9

Iizuka



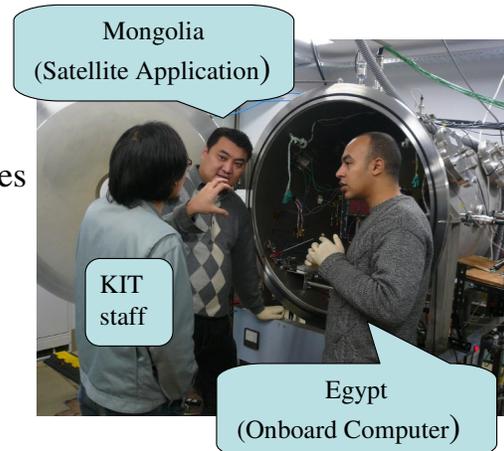
Tobata



KIT has an apartment for international students. The rent is less than 60 euro per month which is quite affordable. The apartment is located inside the campus and is only less than 10 minutes walk to the office and laboratory.

Status

- September, 2010
 - Exchange of diplomatic documents between Japan and UN
- December, 2010
 - Official announcement of application process for class of 2011
- April 30, 2011
 - Closure of application for 2011
 - 36 applications from 18 countries!**
- May~June, 2011
 - Telephone interview with 7 candidates
 - Final selection of 2 candidates
- September 2011
 - Official admission by KIT
- October 2011
 - Enrollment of class of 2011 students



Application process for class of 2012 has started

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This list demonstrates how we went through the selection of the students who started in last October.

The fellowship application process officially started in December 2010.

Even though we had only less than 5 months to receive the application, we had 36 applications from 18 countries. This is quite good for the first year. We hope that we will have more applications for the second year. By the end of June, we selected two successful candidates after interviewing 7 candidates.

The two were officially admitted to the graduate school of KIT and began their study from October 2011. This photograph shows the two students with a KIT staff while working on preparation of vacuum testing. You can see a bit of the satellite model behind this person. One student is from Mongolia. His research topic at KIT is satellite application. Another student is from Egypt. His research topic at KIT is satellite onboard computers. They were already working on space fields in their home countries and will do so after completing the degree program at KIT.

How to apply?

Application package:

UN

<http://www.unoosa.org/oosa/en/SAP/bsti/fellowship.html>

Or Google “UN Japan space fellowship”

For KIT

<http://cent.ele.kyutech.ac.jp/unitednations.html>

The application deadline is April 30, 2012

For further detail, please contact

cho@ele.kyutech.ac.jp (KIT)

werner.balogh@unoosa.org (UN)



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Application processes for class of 2012 have already started. The application packages are on the website. Again, you can find a brochure near the entrance of this room.

Conclusions

- United Nations/Japan Long-term Fellowship Programme on nano-satellite technologies
 - Provide the hands-on experience necessary to build capabilities in basic space technology, especially infrastructure building through testing of nano-satellites
 - Further worldwide nano-satellite development efforts
- The first class started in October 2011
 - Strong worldwide interests proven (36 applications from 18 countries)
 - The application for the second class is due April, 30, 2012

Goal

Promote the peaceful and innovative use of outer space with the participation of a larger number of countries for the benefit of humanity

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Finally as a conclusion, this fellowship program will provide the hands-on experience necessary to build the space technology capacity in developing countries. The program will also expand worldwide nanosatellite development efforts.

Applications of the first year were quite successful with 36 applications from 18 countries.

Japanese government and KIT hope that this fellowship program will help in promoting the peaceful and innovative use of outer space with the participation of a larger number of countries for the benefit of humanity

This is the end of my presentation.

We hope that there will be many applications for the second year and the fellowship program will grow further in future.

Thank you very much.

