PROGRAM GUIDE

TOHOKU UNIVERSITY
ENGINEERING
SUMMER PROGRAM
2015-ROBOTICS

July 27 – August 7

School of Engineering
TOHOKU University
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Tohoku University and TESP 2015 - Robotics:

Tohoku University was founded in 1907 as the third Imperial University of Japan. Located in Sendai City, the heart of the east-north area of Japan, Tohoku University continues to offer students a world-class education, and an opportunity to succeed in conducting pioneer research. Students at Tohoku University can experience the history, Japanese culture, the natural beauty, as well as a world-class education. For the 6th time, Graduate School of Engineering, Tohoku University will be offering a two week graduate level summer program focusing on “Robotics,” a program designed to inspire graduate level (MSc and PhD) students or young professionals in the field of Engineering. We are excited that this summer, TESP-Robotics is held in partnership with HeKKsaGOn (The German-Japanese Universities Alliance). The program provides a series of English lectures and hands-on activities on the advanced topics of robotics. In addition, the program includes various activities that expose the participants to Japanese culture to enrich their academic experience. The program overall aims to provide students rich academic and cultural experience for their academic and global insight.
## Daily Schedule

### Tohoku University Engineering Summer Program in 2015 for graduate students

#### Daily Schedule

**Week 1**

<table>
<thead>
<tr>
<th>July 26 (Sun)</th>
<th>July 27 (Mon)</th>
<th>July 28 (Tue)</th>
<th>July 29 (Wed)</th>
<th>July 30 (Thu)</th>
<th>July 31 (Fri)</th>
<th>August 1 (Sat)</th>
</tr>
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<tbody>
<tr>
<td><strong>8:50</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Field Trip (Shiroishi City)</td>
</tr>
<tr>
<td><strong>10:20</strong></td>
<td>Arrival</td>
<td></td>
<td>Me 10:30</td>
<td></td>
<td></td>
<td>Itinerary (tentative)</td>
</tr>
<tr>
<td><strong>10:30</strong></td>
<td>Hotel Check-In</td>
<td>Me 10:30</td>
<td></td>
<td></td>
<td></td>
<td>9:00 - Leaving hotel</td>
</tr>
<tr>
<td></td>
<td>14:00-</td>
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<td></td>
<td></td>
<td>11:30 - Moving (bus)</td>
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<tr>
<td><strong>12:00</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>12:00 - Lunch</td>
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<tr>
<td><strong>12:00</strong></td>
<td></td>
<td>Lunch</td>
<td>Lunch</td>
<td>Lunch</td>
<td>Lunch</td>
<td>13:00 - Moving (bus)</td>
</tr>
<tr>
<td><strong>13:00</strong></td>
<td>Me 13:00</td>
<td>Laboratory</td>
<td>Open Campus</td>
<td>Open Campus</td>
<td>Open Campus</td>
<td>13:30 - Shiroishi Castle</td>
</tr>
<tr>
<td><strong>14:30</strong></td>
<td></td>
<td>Hands-On Activity</td>
<td>Lab Visit</td>
<td>Lab Visit</td>
<td>Lab Visit</td>
<td>(theater, samurai residence)</td>
</tr>
<tr>
<td><strong>14:40</strong></td>
<td>Laboratory Hands-On Activity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>15:30 - Moving (bus)</td>
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<tr>
<td><strong>16:10</strong></td>
<td>10:20</td>
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<td></td>
<td></td>
<td></td>
<td>17:00 - Sendai (hotel)</td>
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<td></td>
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<td>10:20</td>
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<td></td>
<td></td>
<td>17:00 - Sendai (hotel)</td>
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<td></td>
<td>12:00</td>
<td>Lunch</td>
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<td>Lunch</td>
<td>Lunch</td>
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<tr>
<td></td>
<td>13:00</td>
<td>Laboratory</td>
<td>Open Campus</td>
<td>Open Campus</td>
<td>Open Campus</td>
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<tr>
<td></td>
<td>14:30</td>
<td>Hands-On Activity</td>
<td>Lab Visit</td>
<td>Lab Visit</td>
<td>Lab Visit</td>
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<tr>
<td></td>
<td>14:40</td>
<td>Laboratory Hands-On Activity</td>
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<td></td>
<td>16:10</td>
<td>10:20</td>
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<td></td>
<td>12:00</td>
<td>Lunch</td>
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<tr>
<td></td>
<td>13:00</td>
<td>Laboratory</td>
<td>Open Campus</td>
<td>Open Campus</td>
<td>Open Campus</td>
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<tr>
<td></td>
<td>14:30</td>
<td>Hands-On Activity</td>
<td>Lab Visit</td>
<td>Lab Visit</td>
<td>Lab Visit</td>
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<tr>
<td></td>
<td>14:40</td>
<td>Laboratory Hands-On Activity</td>
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<td></td>
<td>16:10</td>
<td>10:20</td>
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</tr>
<tr>
<td>Time</td>
<td>August 2 (Sun)</td>
<td>August 3 (Mon)</td>
<td>August 4 (Tue)</td>
<td>August 5 (Wed)</td>
<td>August 6 (Thu)</td>
<td>August 7 (Fri)</td>
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<tr>
<td>8:50</td>
<td>【M.E.#1】 Field Robotics I (Nagatani)</td>
<td>【M.E.#1】 Tactile Sensing (Tanaka)</td>
<td>【M.E.#1】 Molecular Robotics I (Murata)</td>
<td>【M.E.#1】 Computer Vision I (Okatani)</td>
<td>Hands-On Activity (Preparation for Final Presentation)</td>
<td>Hotel Check-Out (-11:00)</td>
</tr>
<tr>
<td>10:20</td>
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<tr>
<td>10:30</td>
<td>【M.E.#1】 Field Robotics II (Nagatani)</td>
<td>【M.E.#1】 Medical Applications of Microsystem Technologies (Haga)</td>
<td>【M.E.#1】 Molecular Robotics II (Murata)</td>
<td>【M.E.#1】 Computer Vision II (Okatani)</td>
<td></td>
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</tr>
<tr>
<td>12:00</td>
<td>Lunch</td>
<td>Lunch</td>
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<td>12:00</td>
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</tr>
<tr>
<td>13:00</td>
<td>Laboratory Hands-On Activity</td>
<td>Laboratory Hands-On Activity</td>
<td>Laboratory Hands-On Activity</td>
<td>Laboratory Hands-On Activity</td>
<td>13:00-16:30 【CH2F】 Final Presentation</td>
<td></td>
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<tr>
<td>14:30</td>
<td>15:00-16:30 【RIEC#M431-Katahira Campus】 Bio-inspired robotics, Synthetic robobiology (Ishiguro)</td>
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<tr>
<td>14:40</td>
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◇ CH:Center Hall  ◇ #611:Research Building-M.A.E., #611 ◇ M.E. #1:Mechanical Engineering Lecture Room No.1  ◇ RIEC#M431:RIEC Main Building Lecture Room M431

Ceremony, Student Activity  Lecture  Laboratory
# Lecture Titles

**Tohoku University/HeKKSaGOn Engineering Summer Program 2015 - Robotics**

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<th>Time</th>
<th>Title</th>
<th>Place</th>
<th>Professors</th>
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<tr>
<td>1 July 27, Mon 10:30-12:00</td>
<td>(Lecture) Micro-satellites and Micro-rovers</td>
<td>Center Hall 2F Conf. Room</td>
<td>Prof. Kazuya Yoshida</td>
</tr>
<tr>
<td>2 July 28, Tue 8:50-10:20</td>
<td>(Lecture) Robotics for Disaster Response</td>
<td>Room #611</td>
<td>Assoc. Prof. Kazunori Ohno</td>
</tr>
<tr>
<td>3 July 28, Tue 8:50-10:20</td>
<td>(Lecture) Haptic Interfaces</td>
<td>Room #611</td>
<td>Assoc. Prof. Masashi Konyo</td>
</tr>
<tr>
<td>4 July 29, Wed 8:50-10:20</td>
<td>(Lecture) Robotics as Systems Integration I</td>
<td>Room #611</td>
<td>Prof. Kazuhiro Kosuge</td>
</tr>
<tr>
<td>5 July 29, Wed 10:30-12:00</td>
<td>(Lecture) Robotics as Systems Integration II</td>
<td>Room #611</td>
<td>Prof. Kazuhiro Kosuge</td>
</tr>
<tr>
<td>6 July 30, Thu 8:50-10:20</td>
<td>(Lecture) Visual Servo and Its Application in Robotics I</td>
<td>Room #611</td>
<td>Prof. Koichi Hashimoto</td>
</tr>
<tr>
<td>7 July 30, Thu 10:30-12:00</td>
<td>(Lecture) Visual Servo and Its Application in Robotics II</td>
<td>Room #611</td>
<td>Prof. Koichi Hashimoto</td>
</tr>
<tr>
<td>8 July 31, Fri 8:50-10:20</td>
<td>(Lecture) Space Robotics I</td>
<td>Room #611</td>
<td>Prof. Kazuya Yoshida</td>
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<tr>
<td>9 July 31, Fri 10:30-12:00</td>
<td>(Lecture) Space Robotics II</td>
<td>Room #611</td>
<td>Prof. Kazuya Yoshida</td>
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<tr>
<td>10 August 3, Mon 8:50-10:20</td>
<td>(Lecture) Field Robotics I</td>
<td>Room #1</td>
<td>Assoc. Prof. Keiji Nagatani</td>
</tr>
<tr>
<td>11 August 3, Mon 10:30-12:00</td>
<td>(Lecture) Field Robotics II</td>
<td>Room #1</td>
<td>Assoc. Prof. Keiji Nagatani</td>
</tr>
<tr>
<td>12 August 4, Tue 8:50-10:20</td>
<td>(Lecture) Tactile Sensing</td>
<td>Room #1</td>
<td>Prof. Mami Tanaka</td>
</tr>
<tr>
<td>13 August 4, Tue 10:30-12:00</td>
<td>(Lecture) Medical Applications of Microsystem Technologies</td>
<td>Room #1</td>
<td>Prof. Yoichi Haga</td>
</tr>
<tr>
<td>14 August 5, Wed 8:50-10:20</td>
<td>(Lecture) Molecular Robotics I</td>
<td>Room #1</td>
<td>Prof. Satoshi. Murata</td>
</tr>
<tr>
<td>15 August 5, Wed 10:30-12:00</td>
<td>(Lecture) Molecular Robotics II</td>
<td>Room #1</td>
<td>Prof. Satoshi. Murata</td>
</tr>
<tr>
<td>16 August 5, Wed 15:00-16:30</td>
<td>(Lecture) Bio-inspired Robotics, Synthetic Robobiology</td>
<td>Katahira</td>
<td>Prof. Akio Ishiguro</td>
</tr>
<tr>
<td>17 August 6, Thu 8:50-10:20</td>
<td>(Lecture) Computer Vision I</td>
<td>Room #1</td>
<td>Prof. Takayuki Okatani</td>
</tr>
<tr>
<td>18 August 6, Thu 10:30-12:00</td>
<td>(Lecture) Computer Vision II</td>
<td>Room #1</td>
<td>Prof. Takayuki Okatani</td>
</tr>
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Yoichi Haga, Professor, Graduate School of Biomedical Engineering

“Medical Applications of Microsystem Technologies”

Abstract
Using microfabrication technologies called micromachining and nanotechnology, small medical devices with several functions for use in the human body have been developed. Several new technologies, for example, semiconductor microfabrication, ultra-precision machining, laser machining are used for fabrication. Minimally invasive examinations and therapies with endoscopes and catheters are already widely performed, and new more precise examinations and diagnoses which have been impossible to date can now be realized by installing microsensors in these medical devices. Furthermore, precise surgical treatment can be realized by installing microactuators (shape memory alloy, piezoelectric elements, etc.) in minimally invasive therapeutic devices. We are presently improving these devices with an eye to actual applications.

Research Interests
(1) Active Catheter and Endoscope Using Shape Memory Alloy Actuators
(2) Ultra Miniature Fiber-Optic Pressure Sensor
(3) Intravascular Forward-looking Ultrasonic Probe
(4) Wearable-type Healthcare Devices

Honors and Awards
2012 IEEJ Technical Development Award, The Institute of Electrical Engineers of Japan
2007 Best Paper Award, Japanese Society for Medical and Biological Engineering
2004 Best Presentation Award, Welfare Engineering Symposium, The Japan Society of Mechanical Engineers
2004 Best Paper Award, Japan Society of Computer Aided Surgery
2002 JSAO-Grant, Japanese Society for Artificial Organs
Abstract
Visual servo is a feedback control framework useful for robot motion generation. It can also be used for robust image processing. Using with high-speed cameras image processing algorithms with feedback structure presents outstanding robustness. A parallel processing algorithm suitable for GPU architecture will be introduced. In this lecture, many visual servo applications of robot manipulation systems and micro-nano bio-systems are presented.

Research Interests
Theoretical issues in visual servo, High-speed vision systems and high-speed image processing algorithms, GPU programming, Visual servo microscope, Optogenetic motion control of micro bio-systems, Fluorescent 3D measurement of neural activity from freely moving animals.

Honors and Awards
2011 Best Contribution Award, System and Integration Chapter, Society of Instrument and Control Engineers
2010 Best Paper Award, Journal of Institute of Systems, Control and Information Engineering
2009 Best Paper, IEEE Int. Conf. Mechatronics and Automation
2006 Best Biomimetics Paper, IEEE Int. Conf. Robotics and Biomimetics
2005 Best Mechatronics Paper, IEEE Int. Conf. Mechatronics and Information Technology
1994 Young Investigator Excellence Award, Robotics Society of Japan
“Bio-inspired Robotics and Robot-inspired Biology”

Abstract
Animals are able to exhibit surprisingly adaptive and resilient behavior in real time under real world constraints. Such movements are achieved via spatiotemporal coordination of a large number of bodily degrees of freedom in response to the environment. Clarifying the control principle underlying this remarkable ability of animals allow us to understand biological systems more deeply as well as to construct truly adaptive robot that could not be realized solely by the conventional robotics technology. In the lecture of “Bio-inspired Robotics and Robot-inspired Biology,” our current activities are introduced. We also show demonstration of some of our robots developed in our lab.

Research Interests
(1) Bio-inspired robotics
(2) Synthetic robo-biology (robot-inspired biology)

Honors and Awards
2014  CLAWAR Association Best Technical Paper Award
2012 IEEE/RSJ International Conference on Intelligent Robots and Systems JCTF Novel Technology Paper Award for Amusement Culture Finalist
2012 The International Conference on Biomimetic & Biohybrid Systems Best Paper Award
2011 IEEE/RSJ International Conference on Intelligent Robots and Systems NTF Award Finalist for Entertainment Robots and Systems
2009 IEEE/RSJ International Conference on Intelligent Robots and Systems Best Paper Award Nomination Finalist
2008 Ig Nobel Prize (Cognitive Science Prize)
2004 IEEE/RSJ International Conference on Intelligent Robots and Systems Best Paper Award
2003 IEEE/RSJ International Conference on Intelligent Robots and Systems Best Paper Award Nomination Finalist
“Haptic Interfaces”

Abstract
Haptics is all things related to our sense of touch. Creating haptic feedback for human interfaces contributes to enhancing our communication and physical capabilities. In this lecture, the recent topics and the state-of-art on haptic interfaces are introduced, especially from the aspect of cutaneous sensations. Advanced vibration feedback technologies, which produce force-like sensations, such as friction, inertia, and viscosity sensations for mobile information devices and motion support system are also introduced.

Research Interests
Haptics, Tactile Display, Tactile Sensor, New Actuators, Virtual Reality

Honors and Awards
Best Paper Award, Journal of Robotics and Mechatronics, 2010
Best Paper Award, Transaction of Virtual Reality Society of Japan, 2002 and 2007
Best Poster Award of IEEE World Haptics Conference 2007 and 2013
Best Hands on Demo Award at the EuroHaptics 2008
Best Demo Award of IEEE Haptics Symposium 2014
Abstract
First, two issues for robot systems integration are discussed. One is related to how to integrated devices and unit technologies into robot systems and the other is related to how the robotic systems are integrated into society. Both issues are very important for bringing the robotics into the real world. Then, the systems integration issues are discussed using examples of robots and RT systems having physical interactions with humans which include robot helpers, passive robotic systems, and walking helpers. The dance partner robot, PBDR, is also discussed as a research platform for the future robot and RT systems for quality of life.

Research Interests
Robotics
New Robots Design
Intelligent Systems Design
Control Engineering

Honors and Awards
President, IEEE Robotics and Automation Society (2010-2011)
IEEE Fellow
RSJ Fellow
JSME Fellow
SICE Fellow
JSME Awards for the best papers, Japan Society of Mechanical Engineers in 2002 and 2005
RSJ Award for the best papers from the Robotics Society of Japan in 2005
Original Paper Award, FANUC FA and Robot Foundation in 2004 and 2006
Best Paper Award of IROS’97
Satoshi Murata, Professor, Graduate School of Engineering

“Molecular Robotics I, II”

Abstract
The concept of nanometer scale mechanical systems first appeared in the famous lecture “There is plenty of room at the bottom” by Feynman (1959). Inspired by this idea, Drexler claimed that it is possible to build innovative artificial molecular machines such as gears and bearings by using a universal assembler that assembles atoms. Although his idea was met with much skepticism, it led to the establishment of a research field called molecular nanotechnology. In this lecture, DNA nanotechnology which is one of those emerging molecular nanotechnologies will be depicted. By the DNA nanotechnology, it becomes possible to make various mechanical and/or information processing devices out of DNA molecules. Accordingly, current efforts focus on creation of nanoscale molecular robots. Some topics on the frontline research will be reported.

Research Interests
(1) DNA Nanoengineering and its application to create Molecular Robots
(2) Distributed Autonomous Systems
(3) Sciences on Form

Honors and Awards
1992 IEEE Industrial Electronics Society, Outstanding Transaction Paper Award
1996 Outstanding Paper Award J.SICE 1996
2004 ROBOMEC Award, JSME
2007 Good Design Award, METI, Development of M-TRAN III (as a chief designer)
“Field Robotics I, II”

Abstract
Field robots are expected to work in irregular outdoor terrains and hostile environments, instead of human. Therefore, the field robotics research includes the following topics: high-performance mobility, environment mapping and localization, path planning and navigation, and supervisory teleoperation. In the lecture of “Field Robotics”, some technical issues relating to the field robotics will be introduced, and mobility mechanism topics will be discussed in detail.

Research Interests
(1) Teleoperation
(2) Mapping and path planning for mobile robots on rough terrain
(3) Autonomous navigation

Honors and Awards


“Robotics for Disaster Response”

Abstract
Robotics for disaster response is an important research subject in field robotics. Because, in Japan, we had big disasters: East Japan Great Earthquake, tsunami after the earthquake, volcanoes, and landslides. Peoples need robot technologies to tackle these disasters. Disaster response robots are expected to work in the disaster situations instead of humans or with humans. This lecture describes studies of disaster response robots and its social applications by taking rescue robots and infrastructure inspection robots as examples. Technical issues relating to the disaster response robots are also introduced.

Research Interests
(1) Field robotics
(2) Disaster response robotics
(3) Robot’s intelligence and recognition

Honors and Awards


Takayuki Okatani, Professor, Graduate School of Information Sciences

“Computer Vision I, II”

Abstract
It is said that more than eighty percent of sensory information humans receive is through vision. Computer vision is a research area that studies how to make a computer perform the high-level visual information processing that humans do. Its application covers a wide range including robot vision, video/film production, medical applications, computational photography etc. This lecture describes two key problems in computer vision, 3D reconstruction from multi-view images and visual object recognition, from their theoretical bases to practical applications.

Research Interests
(1) Statistical methods and optimization in computer vision
(2) Multi-view geometry and its applications, e.g., large-scale city modeling
(3) Image-based recognition of objects, materials, and others that humans can visually recognize.
Mami Tanaka, Professor, Graduate School of Biomedical Engineering

“Tactile Sensing”

Abstract
Tactile sense and the sense of touch are active senses that humans actively move their hands and fingers to receive stimuli from mutual deformations of hands/fingers and objects, and so on. Clarification of mechanisms of tactile sense demands a clear understanding of relations between finger motions and the obtained various information by the motions. In this lecture, some investigation relating with the touch and tactile feeling will be introduced, and the developed sensor system and application will be present in detail.

Research Interests
(1) Clarification of mechanisms of human tactile sense
(2) Development of Active Robot Finger System for Measurement of Tactile Sense
(3) Palpation Sensing System

Honors and Awards
2006 Best Student Paper, BioRob 2006 The first IEEE/RAS-EMBS International Conference on Biomedical Robotics and Biomechanorotics “Development of a Wearable Braille Sensor with a Robust Recognition System”
2006 Best Poster Award, The 3rd Asia International Conference on Tribology “Study on the relationship between hair surface property and tactile perception”
“Space Robotics: I, II”  “Micro-satellites and Micro-rovers”

Abstract
Space robots have two distinct application fields: One is orbits around the earth. Manipulator arms mounted on Space Shuttle or International Space Station are in this category and dynamics and control in free-floating environment are of interest. The other is the surface of the moon or planets. Locomotion and remote/autonomous navigation are of interest. After a general introduction of current achievements in space robotics, specific focuses are placed on Hayabusa, a Japanese asteroid probe and the sensing and navigation of a wheeled mobile robot (rover) for lunar/planetary exploration. In the lecture of “Micro-satellites and Micro-rovers,” our current activities on micro-satellites and micro-rovers are introduced. As for the micro-satellites, a university-made “RISING-2” satellite was launched on May 24, 2014 and it is now making top-of-the-world level achievements. As for the micro-rovers, lunar rovers for the GLXP challenge are elaborated.

[reference article]

Research Interests
(1) Dynamics and control of space robotic systems ranging from orbital free-flying robots to planetary exploration rovers
(2) Development of university-based micro-satellites
(3) Terrestrial applications of space technology, such as robotics remote exploration for search and rescue missions.

Honors and Awards
2014  Commendation for Science and Technology by the Minister of Education, Culture, Sports, Science and Technology, Japan
2008  Best Paper Award from IEEE at 2008 International Conference on Mechatronics and Automation
2001  Best Conference Paper Award from IEEE at 2001 International Conference on Robotics and Automation
JSME Fellow, JSASS Fellow (Japan Society for Aeronautical and Space Sciences)
Evaluation

Four (4) ECTS credits should be awarded to the student by his/her home university upon the completion of the required coursework and a successful assessment of a developed “Robotics” project through an oral presentation and performance demonstration.
Japanese Culture

Tea Ceremony and Kimono Dressing

Week 1, Fri July 31st, 13:00-16:00
Aoba Memorial Hall 7th floor

**Tea Ceremony**

Students will have an opportunity to experience a Japanese tea ceremony in an authentic tearoom. The procedures for tea making will be demonstrated by professionals as well as a chance to prepare it by yourself.

**Kimono Dressing**

Students will also have an opportunity to wear a “Kimono” or “Yukata” with the help of professionals.

The Yukata is a Japanese summer Kimono worn by both men and women. The name Yukata came from the word "yu" (bath) and "katabira" (under clothing). Thousands of years ago, Court Nobles wore linen "yukatabira" which were draped loosely after taking a bath.

The ceremony venue will be situated overlooking the city of Sendai, with a beautiful view of the Pacific Ocean, and the mountains.
Field Trip

Shiroishi City, Miyagi:
Miyagi Zao Kokeshi-Kan (Kokeshi Doll Painting), Shiroishi Castle, Buke-Yashiki (Samurai Residence)

Week 1, Sat. August 1st, 9:00-17:00
Start & End: Hotel Premium Green Hills

Miyagi Zao Kokeshi-Kan
(Kokeshi Doll Painting)

Kokeshi are dolls originally from northern Japan. They are handmade from wood, have a simple trunk and an enlarged head with a few thin, painted lines to define the face. The body has a floral design painted in red, black, and sometimes yellow, and covered with a layer of wax. One characteristic of kokeshi dolls is their lack of arms or legs. The bottom is marked with the signature of the artist. They are exchanged amongst friends with written messages stored within them as tokens of friendship. Kokeshi were first produced by kijishi, artisans proficient with a potter's wheel, at the Shinchi Shuraku, near the Tōgatta Onsen in Zao from where kokeshi making techniques spread to other spa areas in the Tōhoku Region. It is said that these dolls were originally made during the middle of the Edo period (1600–1868) to be sold to people who were visiting the hot springs in the north-east of the country.

"Traditional" kokeshi dolls' shapes and patterns are particular to a certain area and are classified under eleven types, shown below. The most dominant type is the Naruko variety originally made in Miyagi Prefecture, which can also be found in Akita, Iwate, and Yamagata.
Prefectures. The main street of the Naruko Onsen Village is known as Kokeshi Street and has shops which are operated directly by the kokeshi carvers. The woods used for kokeshi vary, with cherry used for its darkness and dogwood for its softer qualities. Itaya-kaede, a Japanese maple, is also used in the creation of both traditional and creative dolls. The wood is left outdoors to season for one to five years before it can be used.

**Shiroishi Castle & Buke-Yashiki (Samurai Residence)**

It was originally founded in the Kamakura era (1185 – 1333) by the Karita clan. In 1591, during the late Azuchi-Momoyama era, the castle was held as an outpost by the Gamō clan, ruled by the senior retainer Gamō Satonari. Beginning in 1600 (Edo era), the castle and its environs were located in the Sendai Domain. From 1600 onward, Shiroishi Castle was ruled by the Katakura clan, who were retainers of the Date clan of Sendai. It was also one of the exceptions to the Tokugawa shogunate's rule of one castle per domain. The castle was the meeting place for the delegates of the northern domains in early 1868, during the Boshin War. It then became the
headquarters of the Ōuetsu Reppan Dōmei. The castle was then occupied by the Imperial Japanese Army. It was briefly placed in the care of the Nanbu clan of Morioka, but was demolished in 1875. The Katakura family and its retainers then went north and settled in Hokkaidō. The castle was demolished in 1875, however the castle you see today was restored in 1995.

**Shiroishi Umen (Lunch)**

*Umen* is a type of wheat noodles similar to *somen* and *udon*. Usually *somen* noodles are coated with oil to prevent from caking while *Umen* is shorter in length and made without oil. The origin of *Umen* is said to be attributed to a man named Ohataya Suzuki Asauemo, who lived in Shiroishi at the beginning of Edo. He learned how to make noodles without using oil from a monk for his father who had a sickly stomach. *Umen* noodles which were made without oil were more highly regarded than *somen* noodles. It was even used as a gift from Sendai Domain Date clan to aristocrats and *Daimyo*, who were feudal rulers subordinate to *Shogun* (the General, de facto ruler of the country appointed by the Emperor).
Star Festival “Tanabata” Aug. 6th -8th
The Star Festival is a summer feature of Sendai, taking place from August 6th through 8th. The streets of the city are decorated with ornaments of Japanese paper attached on green bamboo logs swinging in the wind (“Streamers”). More than 1,500 of these bamboo ornaments filled with variety, such as having banderoles and gimmicks, cover the main streets of Sendai.

Fireworks on Aug. 5th
The parades and fireworks scheduled on Wednesday, August 5th, the eve of the festival, are not to be missed events.
Farewell Party

Farewell Party in Katahira Campus, at “Restaurant Hagi”

“レストラン萩 -hagi-”

Final Day, Fri. August 7th, 19:00 -

TEL: +81-22-224-8336

Located on the 2nd floor
**Accommodation**

“Hotel Premium Green Hills”

2-8-11 Chuo, Aoba-ku, Sendai, Miyagi, 980-0021 Japan
Phone: +81-22-722-1501; Fax: +81-22-722-1561
http://www.bh-green.co.jp/hotel/hills/outline.html

**Check-in / Check-out, Meals, etc.**
Twin rooms are reserved for the participants during
the period of TESP.
Check-in : After 2pm
Check-out : Before 11am
Breakfast and dinner are NOT included.
Optional breakfast: 800 yen per meal
   *apply at the front desk
Free Wi-Fi in all rooms
Laundry facility with washer and dryer (free)
 (Laundry detergent packets are sold at the front desk.)

**Access from/to Sendai Station:**

**10 minutes on foot**
The hotel is located North-West of JR Sendai Station. When you arrive
at JR Sendai Station by Shinkansen (super-express) from Tokyo or the train from Sendai
airport, exit from the West entrance at 2nd floor
(http://www.jreast.co.jp/e/stations/e913.html) and walk across the pedestrian bridge.
Access to the Campus

15-20 minutes by bus  50 minutes on foot

Buses depart the starting bus terminal at the “JR Sendai Station (bus stop No. 9)” and go through Aoba-dōri Avenue for the School of Engineering. It is about a 20-minute trip to the “Kogakubu-chuo” bus stop in front of the School of Engineering. Upon arriving at the School of Engineering bus stop, an announcement “The next bus stop is TOHOKU UNIVERSITY, SCHOOL OF ENGINEERING” is made in English.

Buses with the numbers #710, #713, #715 or #719 will arrive at the School of Engineering. The fares from the “JR Sendai Station” to the “Kogakubu-chuo (School of Engineering)” bus stop is 230 yen, paid when exiting the bus.

### Timetable for Buses

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1) The opening ceremony on July 27th will start at 9:30am.
2) From July 28th to August 7th, lectures start at 8:50am.

THE BUSES ARE CROWDED AT THIS TIME OF MORNING. THEREFORE, WE RECOMMEND THAT YOU TAKE THE #719 BUS, WHICH GOES THROUGH THE SCHOOL OF SCIENCE.
How to get on and off the Sendai City Bus

The entrance to the bus is in the middle, and the exit is at the front.

CASH

When you get on the bus
Take a numbered ticket.
*You will need this when you get off, so please don’t lose it.

When you get off the bus
1. Check the fare price on the fare display board at the front of the bus. Your fare price corresponds to the number on the ticket you took when entering the bus.
2. Put the money in the fare box with the numbered ticket.
*No change will be given, so if you need change, please use the money changer in the bus before paying for your fare.

BUS CARD

When you get on the bus
Insert your bus card into the card reader by the door.
*You do not need to take a numbered ticket.

When you get off the bus
Insert your bus card into the card reader on the fare box beside the driver. The fare for one passenger is automatically subtracted.

*After the name of your stop is announced, push one of the buttons near the window or on the ceiling to let the driver know you want to get off.
*Please note credit-card payment is not accepted.

How to purchase a prepaid bus card
You can purchase a prepaid bus card through the automated machine next to the bus driver.

(1) Card selection button
Push the desired card button on the fare box beside the driver. If no button is pressed, change instead will be provided for the bill inserted.

(2) Paper currency insertion
Insert bills into the slot. Only 1,000-yen bill can be used. Insert one bill at a time.

(3) Card outlet
*Type of bus cards
With premiums but not subject to connection discounts
- 1,000 yen (equivalent to 1,100 yen)
- 3,000 yen (equivalent to 3,360 yen)
- 5,000 yen (equivalent to 5,850 yen)
On Wednesday, August 5th, you have a lecture on Katahira Campus at 15:00. You can either take the Campus Bus or the city bus.

Campus Bus is the free shuttle bus service for Tohoku University students and staffs. Students can use buses when going to school/going home and going to other campuses for lectures, student activities etc. Below is the schedule for the campus bus.

The bus only has 28 seats. Plan accordingly.

If you decide to take the city bus, take the usual S710, 713 or 715 (bus stop across from the side of the street Center Hall is located) or S719 towards Sendai Station (bus stop same side as Center Hall, going through Faculty of Science) and get off at “Aoba-dori Ichibancho” stop. Please check the bus schedule found at the bus stops beforehand. After you get off, walk straight towards east and you will arrive on Katahira Campus (Takes about ~20minutes). Walking from Aobayama Campus to Katahira will take 45 minutes.

Refer to the map of Aobayama Campus for the bus stops. Make sure to locate them beforehand so you won’t be late.
Bus stop for Sendai station (Bus No. S710, S713, S715) & from Sendai station (Bus No. 719)

Bus stop from Sendai station (Bus No. 710, 713, 715)

Research Building
Lectures on the 6th fl.

Lecture Room
Building
Lectures in Room 1

Center Hall
Student Cafeteria
(Ceremonies)

Aoba Memorial Hall
(Japanese Culture Program)
Restaurant Hagi
Farewell Party 2nd Floor

RIEC Main Building
Lecture on the 4th Floor

Katahira Campus
Bus Stop (Approx.)
Earthquake

What should you do?

First step:
Ensure your own safety
Put on a helmet or cover your head with a cushion and take cover in a safe place such as under a sturdy desk. It is dangerous to dash out of the house.

Second step:
Evacuate to the nearest designated refuge area
Designated refuge areas are facilities with open space for the initial refuge in the event of a disaster. On the Aobayama campus, there are refuge areas at each department. In Sendai, public elementary schools, junior high schools, and high schools are designated as refuge areas. Confirm your nearest refuge area and escape route.

Other
At school: Follow the instructions of faculty members or staff
At the hotel: Follow the instructions of the hotel staff
Health Care

Medical Facilities
Health Administration Center at Kawauchi Campus provides outpatient medical examination and treatment.

Health Administration Center, Tohoku University
Kawauchi 41, Aobak-ku, Sendai, 980-8576, Japan
Phone: +81-22-795-7836 Fax: +81-795-3804
http://www.health.he.tohoku.ac.jp/?num=70228130607

Medical treatment is also available from any hospital outside the campus. We introduce some clinics and hospitals on your request.
Please bring along your Passport, Cash and a copy of Insurance to the medical facilities.

Travel Insurance
Please carry your insurance policy throughout the program.
A copy of your travel insurance will be collected after this orientation session.
Facilities

University Cafeteria & Shops on Aobayama Campus

Cafeteria & Restaurant

- Aoba Syokudo
- Book+cafe "Boook"
- Restaurant “Shikisai”
- Komorebi Cafe
- KEYAKI DINING-Student Restaurant
- Espace commun

Library

You can enter the library and borrow two books with the library card provided at the opening ceremony. The card is available only at the Engineering library on Aobayama campus during this program. If you would like to use, please say to the staff members.

Computer & Internet Access

Division of International Education & Exchange (IEED)
8:30-17:30 Mon.-Fri.
Locates at Center Hall building in Aobayama campus (2F)
(http://www.ied.eng.tohoku.ac.jp/lang:en/)
Mission Statement
Tohoku University has been committed to the "Research First" principle and "Open-Door" policy since its foundation, and is internationally recognized for its outstanding standards in education and research. The university contributes to world peace and equity by devoting itself to research useful in solving societal problems, and educating human resources in leadership.

**Established:** 1907

**President:** Susumu Satomi

**Faculty:** 4,300 university staff, 1,500 university hospital staff

**Students**
About 11,000 undergraduate students  
About 7000 graduate, professional school and other/non-degree students  
(Includes 1,500 international students)

**University Professors**
Over 800 professors including 30 'Distinguished Professors'

**Faculties, Schools and Institutes**
10 faculties, 16 graduate schools, 5 research institutes, 10 inter-department institutes for education and research, 10 university collaborating institutions, and 4 other institutes

**Library Collection**
Books: About 3.8 million volumes  
Periodicals: About 76,000 volumes

**University Hospital**
University Hospital: General hospital (1,308 beds)

**Nobel Laureates**
4 current professors (1 University Professor, 3 visiting Professors)

**Campuses**
Katahira, Kawauchi, Aobayama, Seiryo, Amamiya  
(Future Global Leadership at Tohoku University: http://www.fgl.tohoku.ac.jp/about/smry.shtml)
Useful Information

Link List

Hospital and Clinics in Sendai
http://www.sira.or.jp/japanese/info/img/H&C200905.pdf

Ministry of Foreign Affairs
http://www.mofa.go.jp/index.html

Sendai International Relations Association
http://www.sira.or.jp/english/index.html

Sendai City
http://www.city.sendai.jp/index-e.html

Miyagi Prefecture

Sendai Traveling Information
http://www.sentabi.jp/1000/10000000.html

Miyagi Touring Navigation

Tohoku University
http://www.tohoku.ac.jp/english/

School of Engineering, Tohoku University
http://www.eng.tohoku.ac.jp/english/

Division of International Education and Exchange, School of Engineering Tohoku University
http://www.ied.eng.tohoku.ac.jp
IMPORTANT

Contacts & Information

Narita Airport
Phone: 0476-34-8000 (General Information Desk)

Sendai Airport
Phone: 022-382-0080 (General Information Desk)
URL: http://www.sdj-airport.com/english/index.html

JR Sendai Station
Phone: 022-223-3313

Tourist Information Center in JR Sendai Station
Phone: 022-222-4069 (Open 8:30-20:00)

Bus & Tube in Sendai (Transportation Bureau City of Sendai)
Phone: 022-222-2256
(Open: Mon-Fri 8:30-18:30, Sat/Sun/national holidays 8:30-17:00)

Hotel Premium Green Hills
Phone: 022-722-1501
2-8-11 Chuo, Aoba-ku, Sendai, Miyagi
http://www.bh-green.co.jp/hotel/hills/

In case of Emergency:
Police: 110
Ambulance and Fire Engine: 119

Division of International Education & Exchange (IEED)
School of Engineering, Tohoku University
Phone: 022-795-7996
6-6-04 Aramaki Aza Aoba, Aoba-ku, Sendai, Miyagi, 980-8579, Japan
E-mail: office@ied.eng.tohoku.ac.jp
URL: http://www.ied.eng.tohoku.ac.jp/
School of Engineering, TOHOKU University
6-6-04 Aramaki Aza Aoba, Aoba-ku, Sendai, Miyagi, 980-8579
http://www.eng.tohoku.ac.jp/english/