4th Asian Students Collaboration Encouragement Program in Technology

ASCENT 2013
Final Report

東京工業大学
Tokyo Institute of Technology

Chulalongkorn University
จุฬาลงกรณ์มหาวิทยาลัย
Pillar of the Kingdom

Institut Teknologi Bandung

Organazed by
Student Association for Global exchange

ACKNOWLEDGEMENT

All the ASCENT 2013 (Asian Students Collaboration Encouragement Program in Technology 2013) members would like to thank the Good Student Support Practice of Tokyo Tech for giving us precious opportunities to experience special activities and global discussion including Japanese, Thai and Indonesian students.

We also would like to give special thanks to Tokyo Tech Fund and Office for supporting ASCENT2013.

Sincerest appreciations are given to all of the following cooperating organizations and companies, namely in order of visits, lectures and cooperation;

Mechanical Innovation Center, Hitachi Research Laboratory, Hitachi, Ltd.
National Institute of Advanced Industrial Science and Technology

Kawashima Laboratory	(Mechanical and Control Engineering)
Omata Laboratory	(Mechanical and Control Engineering)
Kitagawa and Tsukagoshi Laboratory	(Mechanical and Control Engineering)
Hirose and Fukushima Laboratory	(Mechanical and Aerospace Engineering)
Kurabayashi Laboratory	(Mechanical and Control Engineering)
Yamakita Laboratory	(Mechanical and Control Engineering)
Iwatsuki and Okada Laboratory	(Mechanical and Intelligent Systems Engineering)
Fujita Laboratory	(Mechanical and Control Engineering)

SAGE Representative
Yuhki Taoka

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Abstract of ASCENT2013

1. What is ASCENT?

ASCENT stands for Asian Students Collaboration Encouragement Program in Technology, and is one of the international exchange programs in Asia. This program aims to establish further international networks among students in Asian countries by studying and discussing problems and leading edge technologies as considering Asian industry together. ASCENT is held in Japan about 10 days every March and contains company visiting, laboratory visiting in Tokyo Tech, special lecture, group discussion, presentation and more on the settled theme.

2. Motivation

ASCENT was first held in March 2010 by Student Association for Global Exchange (SAGE) in Tokyo Tech to strengthen the connections more and to lead Asian development of economy and technology in the future. This program intended to be a complementation of JAYSES (Japan-Asia Young Scientist and Engineer Study Visit) program, which send Tokyo Tech Students to Asian countries organized by International Office of Tokyo Tech from 2007.

3. Outline

Theme	Robot Technology Linking Human and Machine
Date	March 15th (Fri) 2013 – March 24th (Sun) 2013
Place	Ookayama campus, Tokyo Institute of Technology, Japan
Universities	Tokyo Institute of Technology (Tokyo Tech / Japan)
	Chulalongkorn University (CU / Thailand)
	Bandung Institute of Technology (ITB / Indonesia)

4. Schedule

Date	Schedule
15(Fri)	Arrival
16(Sat)	Opening Ceremony, Pre-presentation, Welcome Party
17(Sun)	Special lectures, Discussion
18(Mon)	Hitachi, Ltd. visiting
19(Tue)	AIST visiting
20(Wed)	Discussion, Presentation of Mini project
21(Thu)	Campus tour, Exchange party
22(Fri)	Discussion, Final presentation, Closing ceremony, Farewell party
23(Sat)	Kamakura sightseeing
24(Sun)	Departure

5. Visiting place and Lecturer

- Lecturer Associate Professor Mr. Kenji Kawashima
  Professor Mr. Toru Omata
  Associate Professor Mr. Tom Hope
- Companies Hitachi, Ltd.
  National Institute of Advanced Industrial Science and Technology
- Laboratories Kitagawa and Tsukagoshi Lab (Mechanical and Control Engineering)
  Hirose and Fukushima Lab (Mechanical and Aerospace Engineering)
  Kurabayashi Lab (Mechanical and Control Engineering)
  Yamakita Lab (Mechanical and Control Engineering)
  Iwatsuki and Okada Lab (Mechanical and Intelligent Systems Engineering)
  Fujita Lab (Mechanical and Control Engineering)

6. Organizer

Student Association for Global Exchange

website: http://www.siengp.titech.ac.jp/~sage/

Facebook Page: https://www.facebook.com/sage.titech

Twitter: @SAGE_TokyoTech

Staffs

Chairman	Yuhki Taoka	Mechanical Engineering and Science, B3
	Momoko Yamamoto	Inorganic Materials, B3
	Mari Yoshihara	Metallurgical Engineering, B3
	Tomoki Ishimaru	Earth and Planetary Sciences, B3
	Soichiro Endo	Civil and Environmental Engineering, M1
	Ryutaro Minematsu	Bioengineering, M1
	Haruna Sugiura	English Literature, Tokyo Woman's Christian University, B2
Consultant	Yahiro Hirakawa	Associate-Professor of International Students Center
Advisor	Tsugihiro Shimura	Group Leader, Graduate Admission Group, Admission Division, Student Service Department
Advisor	Akinori Nishihara	Professor of dept. of Human System Science, Graduate School of Decision Sciences

7. Participants

University	Name	Nickname	SEX	Department	Grade	Group
Tokyo Tech	Hiroyuki Miyamoto	Hiroyuki	M	Mechano-Micro Engineering	D3	A
	Haruka Saso	Haru-chan	F	Social Engineering	B2	C
CU	Piyapat Saranrittichai	Charn	M	Computer Engineering	B4	B
	Hathaipat Srivarasat	Fang Fang	F	Information and Communication Engineering	B4	C
ITB	Gladys Brigita	Gladys	F	Environmental Engineering	B4	C
	Nanda Pratiwi Kusumastuti	Nanda	F	Environmental Engineering	B4	B
	Maharani Meganti	Mega	F	Electrical Engineering	B4	B
	Venny Sartika	Venny	F	Ocean Engineering	B3	A
	Made Ian Maheswara Suprivatna	Made	M	Chemical Engineering	B4	A

Outcome of Mini project

Lectures and companies visiting

Mini Project
Special Lectures

Hiroyuki Miyamoto (TokyoTech-Japan)
Made Ian Maheswara S. (ITB-Indonesia)
Piyapat Saranrittichai (CU-Thailand)

The special lectures were given by two lecturers from Tokyo Institute of Technology, Associate Professor Kawashima and Professor Omata. Both lecturers belong to the same department, that is Department of Mechanical and Control Engineering. Ass.Prof. Kawashima and his group is currently working on the development of innovative mechanical system based on robotics, measurement, and control techniques, with focus on electric and pneumatic drive. Professor Omata, on the other hand, focus on studying grasping mechanism and manipulation. This topic is developing even more nowadays, plus the collaboration with Tokyo Medical and Dentist University to apply this topic to the medical world, specifically surgery operation. This technology is hoped to be useful for the society.
Traditional surgery, while favored by many due to its ease of work, has some disadvantages that make traditional surgery less favored by the patients. In traditional surgery, the part of the body that needs surgery is cut and then opened wide. This may provide some advantages e.g. easiness of surgery because the area of working is relatively flexible. However, big incision of the body part like that will of course adds extra pain for the patient after the effect of anaesthesia runs off, finally leading to longer recovery for the patients. To eliminate this disadvantage, laparoscopic surgery made its way to the medical world. With the help of renowned technology, there is no need to make big incision: only few small holes are needed, for the newer surgery equipment and small camera, so that the surgeons can do the surgery only by looking at the TV that is connected to the camera.

However, once again, some downsides are making this laparoscopic technology less advantageous. Even though, with smaller incision, pain and recovery period are reduced, it still faces some limitations. The movement of the surgery equipment is limited, it takes longer operation time since it needs some adaptation and takes longer to get used to, and the surgeons cannot really feel the organs inside the incision because the surgeons only rely on the TV. This condition, therefore, attract Kawashima and Omata Lab. Studies to develop novel surgical instruments, with the application of robot and mechanical technology.

Kawashima laboratory has technique about pneumatic drive system and its control system. Pneumatic drive enables the device to sense the force applied on the instrument by air pressure. Sensing the force is valuable for safety surgery. Omata laboratory has technique about designing mechanism. In abdominal cavity, electricity is supposed to be avoided

because it might induce heart attack easily. Therefore the devised mechanism works well in the situation.

Professor Kawashima has developed IBIS, which is master-slave surgical robot system. The slave manipulator is driven by air pressure and has 7 degrees of freedom in total. The tip of the manipulator is gripper which is driven by air also and is able to generate high power. In addition, generally pneumatic drive system has non – linearity due to the compressibility of air. They compensate the non-linearity by means of incorporating the drive force control loop achieved by pressure sensor into the manipulators control system, and so can generate power with high speed and precisely.

Professor Omata has developed Assemblable Surgical Instrument for Purse-string Suture for laparoscopic surgery. A purse-string instrument is one of required instruments for gastrectomy. Conventional purse-string instrument is T shaped at its tip, so it cannot be inserted into ports installed on the abdominal cavity. The developed instrument consists of two parts and can be assembled and disassembled in the abdominal cavity. Surgeon could use purse-string instrumentus without making the incision larger.

According to preceding chapters, Laparoscopic surgery has many advantages. However, there are many limitations in practical.

1. Is it possible to use in another place?

Generally, Laparoscopic surgery is mostly operated in the patients' abdomen. Therefore, the possibility of using Laparoscopic in other organ is going to be discussed.

a) ***Brain:*** To perform brain operation, the doctor has to remove the large area of patient's skull. Therefore, Surgery in brain is much invasive into our body. The technology of Laparoscopic surgery can decrease this invasion in significant degree. However, the limitation of the surgery in brain is lack of space. So, further researches in Laparoscopic should focus on this space limitation.

b) ***Heart:*** For heart operation, the operation time has to be low. Hence, Laparoscopic surgery, which takes more time to operate than traditional surgery, might not suit for operating at heart.

2. Higher Precision, Lower Invasion

The degree of invasion of Laparoscopic surgery is indicated by the diameter of hole for its tools. Normally, the tools' diameter is about 5 – 12 mm. In this case, if we change cutting tool

into laser scissor, the minimal size of the hole is greatly decreased. At the same time, the precision is higher because of high precision of laser scissor.

3. Other Practical Limitations

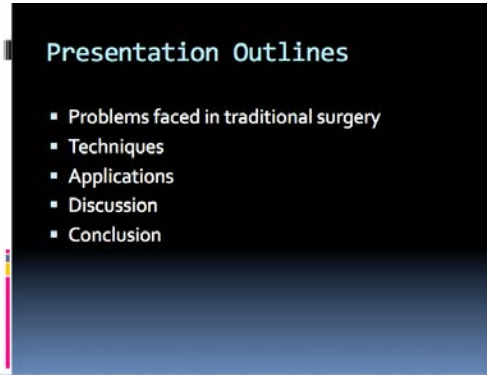
   a) ***Space Limitation:*** To perform abdomen surgery without opening large wounds, the doctor has less room's space to operate. This leads to more difficulty to operate.

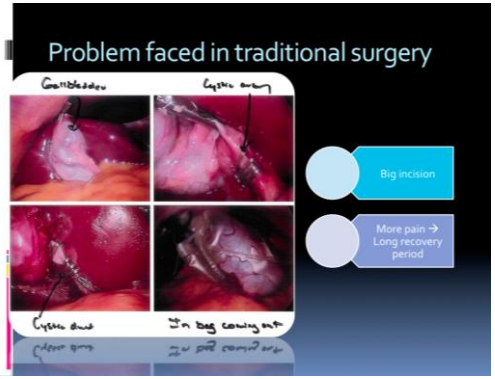
   b) ***Time Limitation:*** Time limitation is also the crucial problem. Some cases of operations have to perform as fast as possible such as emergency cases. Therefore, Laparoscopic Surgery has not been applied to that kind of cases yet.

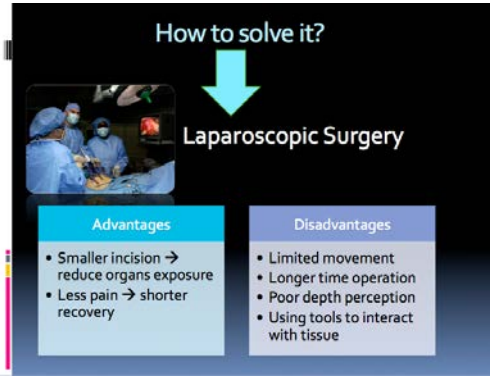
   c) ***Regulation:*** Some countries have their laws to prevent importing some devices. Therefore, using Laparoscopic Surgery in those countries might be tough.

In conclusion, robotics technology can be applied in Laparoscopic surgery to make less invasion effectively. Because of its advantages, many researchers are interested in its development using many techniques such as pneumatic actuator. In the future, the laparoscopic surgery might be improved and overcome some of its limitations such as space and time.

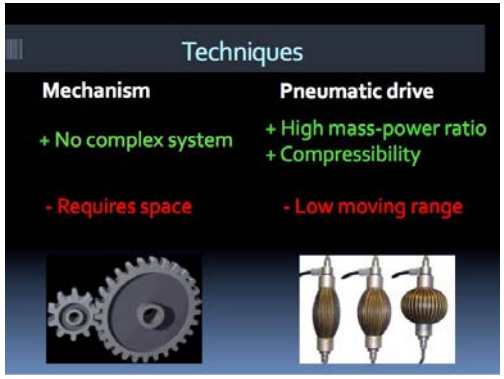
ROBOTICS FOR MEDICAL WORLD

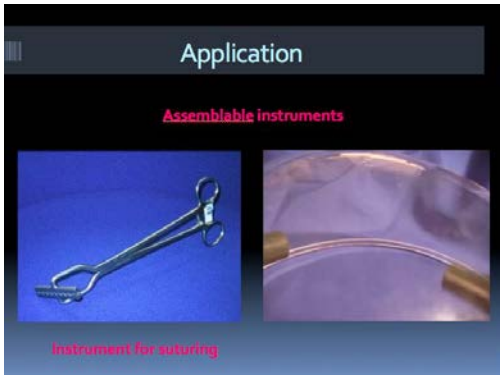

Presentation Outlines
Problems faced in traditional surgery
Techniques
Applications
Discussion
Conclusion

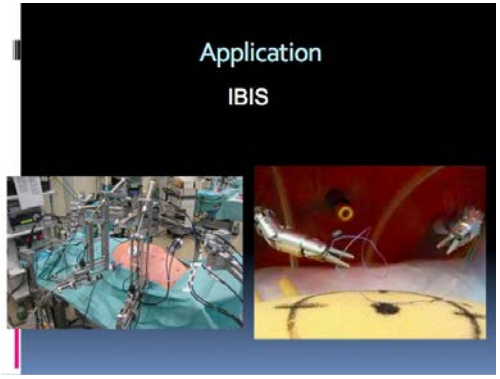

Problem faced in traditional surgery
Big incision
More pain → Long recovery period


How to solve it?
Laparoscopic Surgery
Advantages
• Smaller incision → reduce organs exposure
• Less pain → shorter recovery
Disadvantages
• Limited movement
• Longer time operation
• Poor depth perception
• Using tools to interact with tissue

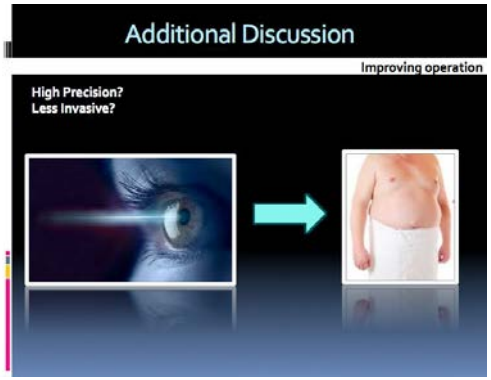
How to reduce the disadvantages?
Surgical Robot


Techniques
Mechanism
+ No complex system
- Requires space
Pneumatic drive
+ High mass-power ratio
+ Compressibility
- Low moving range

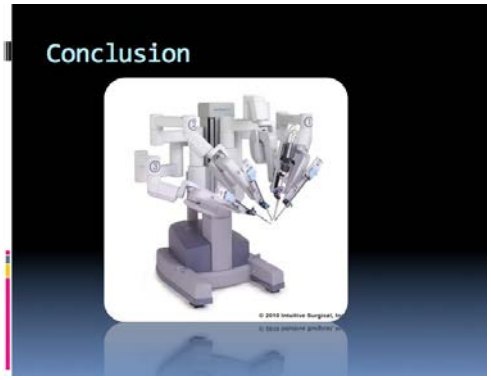

Application
Assemblable instruments
Instrument for suturing


Application
IBIS

Additional Discussion
Practical Problem
Limit of Space
Emergency Case
Regulation


Additional Discussion
Improving operation
High Precision?
Less Invasive?

Additional Discussion
Location of the operation


Conclusion

HITACHI

Venny Sartika (ITB)
Nanda Kusuma (ITB)
Hathaipat Srivarasat (CU)

1. Brief Explanation about Hitachi Research Center

The first company that we visited was Hitachi Research Laboratory (HRL), Hitachi, Ltd. The laboratory was set up in 1934, to perform the research duties of the original Hitachi factory. The company focused on control system in many ways, for example transportation, in environmental friendly way. In this, environmental mean is safety, optimize, and comfortable. HRL are pursuing Research and Development on crash analysis technology for vehicle safety. The methods for optimizing maintained plan based on condition monitoring technology for safe, energy efficient and comfortable railway systems, environmental friendly inverters, engine, and cruise control system for save and comfortable automotive systems.

HRL has wide research areas to make some innovation for the society, including clean energy, green mobility, life infrastructure, key device, and material & platform. There are 4 main Research Center in HRL, namely:

a. Material Research Center
b. Information and Control System Research Center
c. Mechanical Engineering Research Center
d. Energy and Environmental Research Center.

2. Lesson Learnt in HRL

HRL also have developed new construction machinery system based on optimum design technology and created EMIEW 2, a safety robot that could safety coexists with humans. Other than EMIEW 2, there's also Lapi, a logistic robot, and Ropits, a vehicle type robot. Those robots were established to support people in various situations in life. There's also robots demonstration which they explain how the robots (only EMIEW 2 and Ropits) work and its function.

It does really amaze us how the robots look and function. The robots itself was very advance in technology. And it makes us realize how Japan takes the future aging problem very seriously. And they take care of it in a very different way of how we, developing country's people, would solve it. If it happened in our country, mostly we would likely solve

the problem in increasing the birth rate of our people. But again, human is a difficult and dynamic variable, it will be easier to predict other and a lifeless one. Again, problems are not the barrier for the country to grow. They are the motivation to make the country surpass it.

3. Problem and Solution

As we know that price is one of the main factors that impact on revenue of the company. The customer needs to buy the low price with high quality. One of the problems is that Hitachi Company cannot charge the same prices as competitors. So, it is going to be the problem for customer who doesn't care about value the brand. If this problem still exists, the number of potential customer will decrease.

Hitachi Company needs to produce more variety of products and prices that can support the width length of customer. Moreover, Hitachi should update the current trends of technology that can support the modern lifestyle with but reasonable price. Marketing department should play an important role. All modern organizations engage in marketing so as to be able to please and win the loyal support of their customers.

HITACHI, Ltd.

Venny Sartika
Nanda Patiwi Kusumastuti
Hathaipat Srivarasat

About the Company

Vision

"Inspire the next"

Mission

"To contribute to global growth of social innovation business emanating from many fields"

Outline

1. About the company
2. Company Product
3. Conclusion

Hitachi Research Laboratory

Set up in 1934 to perform the research duties, Hitachi Research Laboratory (HRL) was established with the aim of "Contributing to the well-being of humanity as well as that of Hitachi Corporation"

Company Product

1. Logistics Automation Partner with Intelligent (LAPI)

2. Robot for Personal Intelligent Transport System (ROPITS)

3. Excellent Mobility and Interactive Existence as Workmate (EMIEW2)

Company Product

- LAPI :
  - Useful & practical
- ROPITS :
  - Limitaion
  - Small function
- EMIEW 2 :
  - Unclear function
  - Inefficient & ineffective
  - Only for entertainment

SWOT Analysis : Overview...

S : Strengths
W: Weaknesses
} INTERNAL

O: Opportunities
T: Threats
} EXTERNAL

Why SWOT Analysis is important?

- Guideline your business
- Maximize the profit

SWOT Analysis...

Location: Hitachi at Ibaraki, Japan

STRENGTHS	WEAKNESS
• Pricing Power •Focus on Research and Development •Size advantages	• weak brand
OPPORTUNITIES	**THREATS**
• Innovation • Online market	• Poor economy •Change in Taste

Conclusion

- Hitachi is a multinational company that contribute in global society.
- Hitachi should keep improving their product varieties based on the market needs
- 3 robot products from Hitachi is:
  - LAPI
  - ROPITS
  - EMIEW2

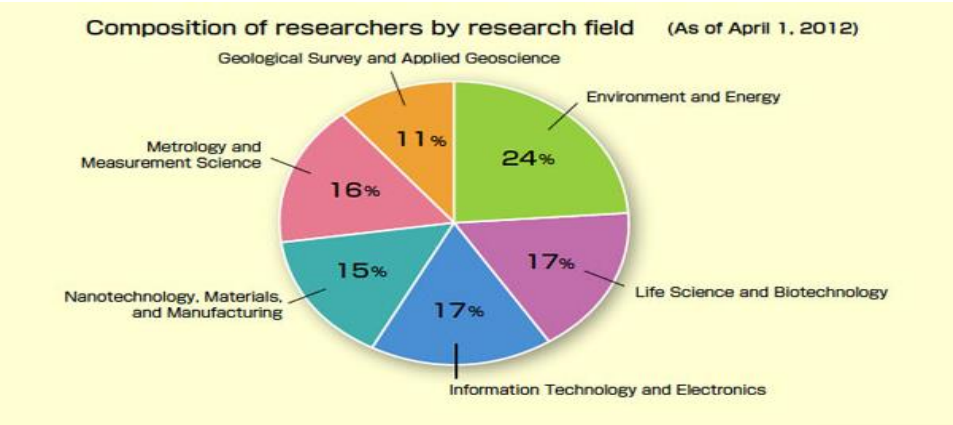
National Institute of Advanced Industrial Science and Technology
AIST

ADVANCED INDUSTRIAL SCIENCE AND TECHNOLOGY (AIST)

Gladys Brigita M. (ITB)
Maharani Meganti (ITB)
Haruka Saso (Tokyo Tech)

- Company Introduction

The National Institute of Advanced Industrial Science and Technology which is known for short as AIST, is a public research institution funded by the Japanese government. AIST was established as an organization in 2001, however its contribution has been given to the society since 1882. The Headquarters of AIST are located in Tokyo and Tsukuba, while we got the chance to visit Headquarters in Tsukuba. Based on AIST Facts and Figures, it is believed that AIST has been conducted many researches in various types of area. The figure below shown you the composition of researchers conducted by AIST



Taken from : from http://www.aist.go.jp

Figure 1.1 Composition of researchers by research field (per April 1, 2012)

Although there are various types of research being conducted, here in this report we will focus to the Information Technology and Electronic section, which we have visited. There are two big sub-department that we visited in AIST. Each sub – department has many types of robotic invention which is being developed. These two sub – departments are :

1. Field Robotics Research

The Field Robotics Research Group aims at meeting the demand for mobile assistance system in outdoor human activities such as transportation, heavy physical work, and etc. Here are some of the robots which being invented by AIST to contribute to the society.

1.1. Robotic Wheel Chair

1.2. Micro Mobility

1.3. Modular Transformer (M-Tran)

2. Service Robotics Robot

The aims of Service Robotics Robot is to develop and provide an assistive service robots which can work together with human especially in a condition of that Japan is facing an aging society. These service robots are hoped to operate efficiently in the future. Here are some of the robots which are being developed by AIST cooperate with another company to enlarge the robotics development.

2.1. ACTROID

2.2. FETCHING OBJECTS ROBOT

2.3. HRP – 4

2.4. Array Marker Robot

- Discussion

For our mini project, our group has decided to focus on one particular robot that we thought is the most promising robot for the future, the M-TRAN. M-TRAN stands for Modular Transformer. It is a self-reconfigurable modular robot. This robot is designed by Mr. Haruhisa Kurokawa. There are three generations of M-TRAN. While M-TRAN I & M-TRAN II uses magnet as the link, M-TRAN III uses plastic hooks and do mechanical movement to combine with each other. This robot kind has several main features, one of them is shape-shifting. If one robot is combined with the others, they could form certain shapes, such as a 4-legged robot, snake, giraffe, etc. The other feature of M-TRAN is locomotion. It means other than just changing shape, it could also do a movement and go from one place to another. After shape-shifting and move around, this robot could also adapt into certain environment, for example, when M-TRAN moves it is most likely that it will face an obstacle. This ability of adaptation enable the robot to avoid the obstacles in front of it. To be able to perform the abilities mentioned above, this robot already reached an advanced level of technology. Each modul of M-TRAN has a computer inside. Based on the main function of computer itself, the computer is used to calculate the action of the robot's movement. This robot also uses infrared transmitter and receiver to send and receive data to one another. M-TRAN also uses internet to communicate, therefore to send signals to other M-TRAN robot it doesn't need a

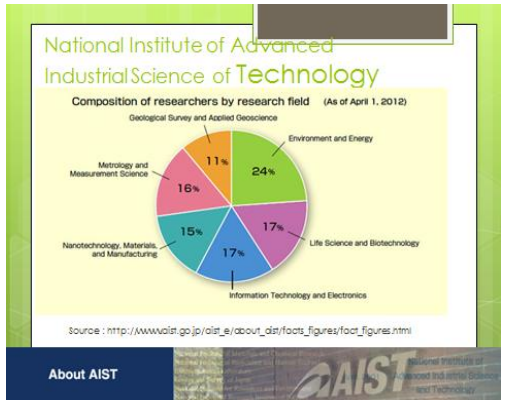
wire connection.

- Conclusion

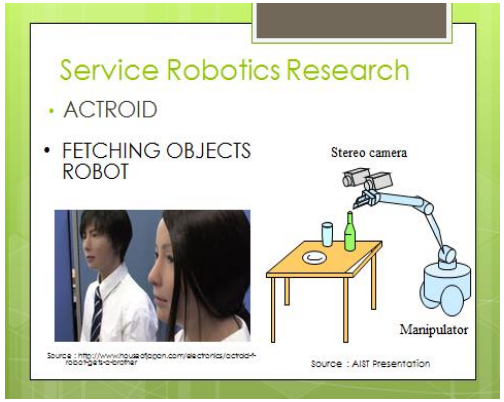
From all the product being introduced, Modular Transformer is a potential invention to be developed. However, it still takes much time to move while transforming. In the future there might be more improvement for M-TRAN so that it can be used in our daily life. Such as construction, for entertainment, or household application

National Institute of Advanced Industrial Science and Technology
AIST
Japan, 19th March 2013
Gladys Brigita – Haruka Saso – Maharani Meganti

OUTLINE
Introduction
AIST Activity
Places we visited
Observation
M-TRAN
Summary


National Institute of Advanced Industrial Science of Technology
Composition of researchers by research field (As of April 1, 2012)
Geological Survey and Applied Geoscience
Environment and Energy
Metrology and Measurement Science
Nanotechnology, Materials, and Manufacturing
Life Science and Biotechnology
Information Technology and Electronics
11%
24%
16%
15%
17%
17%
Source : http://www.aist.go.jp/aist_e/about_aist/facts_figures/fact_figures.html
About AIST

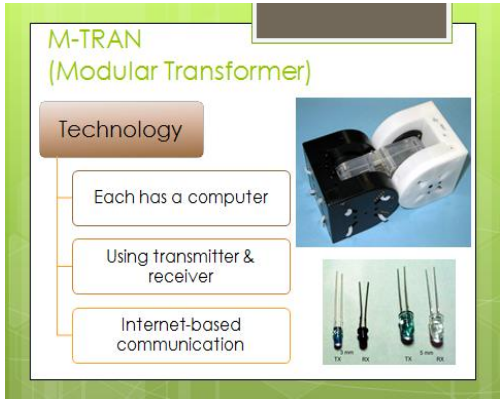
Field Robotics Research
Robotic Wheel Chair
Micro Mobility
Modular Transformer (M-Tran)

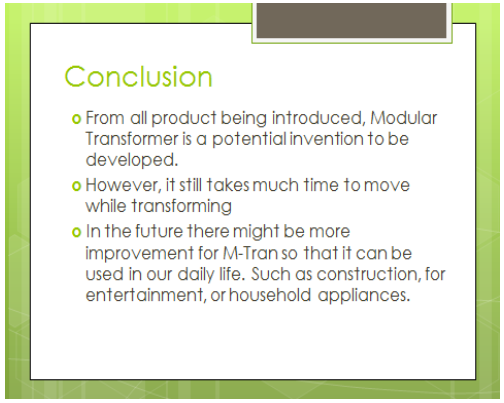

Service Robotics Research
ACTROID
FETCHING OBJECTS ROBOT
Stereo camera
Manipulator
Source : AIST Presentation

HRP – 4
Array Marker Robot
source : http://www.telegraph.co.uk/science/space/8330246/Japanese-robot-could-be-sent-to-Space-Station.html
Source : http://kinovarobotics.com/array-markers-for-assistive-robot-users/

M-TRAN (Modular Transformer)
M-TRAN I & II
M-TRAN III

M-TRAN (Modular Transformer)
Ability
Shape-shifting
Locomotion
Adaptation


M-TRAN (Modular Transformer)
Technology
Each has a computer
Using transmitter & receiver
Internet-based communication


Conclusion
From all product being introduced, Modular Transformer is a potential invention to be developed.
However, it still takes much time to move while transforming
In the future there might be more improvement for M-Tran so that it can be used in our daily life. Such as construction, for entertainment, or household appliances.

Report of program activities

Edited by SAGE staff

➢ Laboratories, Special lecture

【Iwatsuki/Okada Lab】

Associate Prof. Dr. Okada talked about robot motion related with human dynamics. The group studies that, for example, by modeling human motion obtained from motion capture system with an attractor and analyzing, the virtual reference posture, which is pseudo-reference to realize the reference motion from dynamical point of view and enables motion transfer, are rendered.

【Fujita Lab】

Assistant Prof. Dr. Hatanaka talked about mainly cooperative control. The group studies to work out fundamental principles of cooperative control to render highly-networked control systems totally optimal and/or robust state via distributed decision-makings. The targeted applications include energy management systems, visual sensor networks and robotic networks. He explain about, for example, experimental results on Robotic Networks, where multiple networked robots try to attain one or multiple objectives via communication between neighbors.

【Kurabayashi Lab】

Dr. Minegishi, who is a post-doctor in the laboratory, showed something related with their research. For example, there are some moths and they didn′t move. But, after some pheromone dropped near the moths, they suddenly started moving and went back and forth. According to his explanation, the pheromone can induce their moving. And in their research, they try to apply this to mechanical and control engineering, for example, some devise, play a role of something like pheromone, lead airship to the particular place.

【Special lecture by Prof. Mr. Hope】

Associate Prof. Mr. Hope lectured how to give a presentation well. He talked many topics, for example "Why we present?", "Tips and Tricks" and so on. In the lecture, he said that the important things are that less information is more effective and that a good presentation needs the structure, which includes introduction, some kind of analysis, and conclusion. After the lecture, students practiced presentation about some topics with team members. It seems that they can reconfirm how to give a presentation and learn how they can do better.

➢ Exchange Party

The attendees had an exchange party with some Tokyo Tech students, who did not join ASCENT. 10 Tokyo Tech students came to the party and enjoyed it. SAGE stuff prepared some food and drink, and we chatted with each other through having them. We talked about some experience in ASCENT, cultural difference among Japan, Thailand, and Indonesia and anything we want to ask each other. At last, we took a picture all attendees of the party joined. We had a good time with students from some Asian countries.

➢ Kamakura sightseeing

On March 23rd, we went to Kamakura, which is one of the popular and traditional places in Japan. That day was the most suitable day for visit there, because cherry trees were in full bloom then.

After arrived at Kamakura station, we rode Enoden (Enoshima Dentetsu, an electric railroad company) to Hase station at first. Enoden is Japanese one of the famous and unique trams, so it might be good experience for participants. Then, we went Koutokuin, which has a huge statue of Buddha. The road to go there, we saw some souvenir shops along the street, and some of participants bought a purple sweet potato ice cream. They said that taste was really nice. At the Koutokuin, every participant included Japanese staffs enjoyed taking pictures of Buddha with many interseting poses. Moreover, we entered inside of it. It was really interesting to see it from otherside especially, top part. We could learn history of Koutokuin Buddha statue, which was destryoed few times because of Tsunami before from a slate.

Next, we had lunch at Japanese style "set-meal" restaurant "Syamoji". That was so popular and crowded but we could get in there easily because of reservation. Some people ate Sashimi(raw fish) set, Karage set(flied chicken),also Yakizakana set(grilled fish). We waited

little bit long, but there was a surprising thing like eating rare fish Manbou(head fish). Everyone talked a lot about own cultures and Japanese cultures and seemed enjoy eating. Besides, Indonesian students could pray after eating.

After that, we visited Hase temple. We could see Japanese style of beautiful garden and many flowers especially full bloom of cherries. In addition, we also saw golen Buddha statue and other lovely statues like Nagomi Jizou. We saw an oragal shop after that.

Then, we went Tsurugaoka Hachiman shrine by Enoden again. First, we walked Dankazura street which has beautiful cherry trees. We saw around there and took a whole members picture. Finally, we walked Komachi Street to Kamakura station, which have many souvenir shops.

This day tour to Kamakura was not only fun but also brilliant opportunity to touch Japanese culture and life style. I hope this experience became one of the good memories for them.

Outcome of Main project

Student forum discussion

Hybrid Assistive Limb for the Elderly

Group A
Hiroyuki Miyamoto (Tokyo Tech)
Made Ian Maheswara S. (ITB)
Venny Sartika (ITB)

Robot technology is a very important aspect in supporting the society. Meanwhile, this technology is still has many problems to solved. One of those problems is their concept and design. Most of low cost home robots perform few useful functions other than entertainment. In the other hand, sophisticated robot with very useful function, such as laparoscopic robot, is awfully expensive.

Japan is facing unprecedented super aging society. Based on the data from Cabinet office, the number of elder people in Japan is predicted to grow up to 40% of the population in 2060. In the future, these elder people will have very limited physical ability because as we growing up, our physical capabilities are decreasing. Thus, the number of handicapped people will continue to rise in the future. Meanwhile, the number of people in the productive age is decreasing. This phenomenon will create workers deficiency in the future.

Indonesia is an agricultural country, which most of its farmers are the elder people. There are 11.3 million elder people (6.4%) in 1990, 15.3 million in 2000 (7.4%), 24 million in 2010 (9.77%), and it is predicted to increase up to 28.8 million in 2020 (11.34%). Based on the data, we can conclude that the elder people population is increasing around 1.6% every 10 years. So in the future, Indonesia is going to have the same problem as Japan.

We can conclude that in the future, the society will need a device that can improve human physical capability. That is the main reason why our group chose "*Hybrid Assistive Limb for the Elder People*" as the topic of our main project.

We received lectures presented by the two robotics professors, who are Prof. Kawashima and Prof. Omata. Before we worked through our main project, we had focused the following points that we learnt from the lectures.

1. To emphasize "application oriented"
2. Advantage of pneumatic drive

Firstly, the two professors mentioned importance of application oriented development to get practical utility. Their laboratories focus on specific problem such as low dexterity of instruments for laparoscopic surgery.

Secondly, Professor Kawashima explained about the benefits of pneumatic drive, especially Pneumatic Artificial Rubber Muscle, referred to as PARM. Its advantages are summarized as follows;

- Higher mass – power ratio
- To generate large force without a reduction mechanism
- Compressibility
- No heat and magnetic generation

In light of the above points, we started to discuss and share social problems about Indonesia and Japan. We focused on aging society in Japan and situation of agricultural people in Indonesia. Then we suggest HAL could be a good solution to overcome the both of problems of the two countries. Also, PARM is suitable for actuators which always contact to human body with the objective to secure safety.

Among the many possibilities to solve those problems for both countries, Hybrid Assistive Limb (HAL) is one technology that may have a long future and probably stands out. Invented by Tsukuba University and Cyberdyne Studio, this interdisciplinary robot suit has the ability supplement, expand or improve physical capability of the user, especially people with physical disabilities. When a person attempts to move their body, nerve signals are sent from the brain to the muscles through the motor neurons, moving the musculoskeletal system. When this happens, small biosignals can be detected on the surface of the skin. The HAL suit registers these signals through a sensor attached to the skin of the wearer. Based on the signals obtained, the power unit moves the joint to support and amplify the wearer's motion. The HAL suit possesses both a user-activated "voluntary control system" and a "robotic autonomous control system" for automatic motion support.

The technology, even though mainly intended for handicapped or elderly people, can also be used by heavy workers e.g. construction site workers and logistic workers. In Japan, HAL has already been distributed to several hospitals not only for rehabilitation applications, but also for more severe cases where the nurses need better physical abilities and endurance to lift up disabled patients to bed. Thanks to the mechanical and robotic technologies applied to this HAL, it can support the users to carry about five times as much weight as he or she could lift and carry unaided.

Since this technology is still very young, disadvantages are, undoubtedly, inevitable. For elderly people, this robot suit is considered to be too heavy, weighing around 23 kg if both the upper and lower body are used. Therefore, elderly people will need assistance if they want to wear HAL. Other disadvantages are also inevitable, such as the short battery life (only less than 3 hours), flexibility issue and it is really dependent on the user. For example, people having much more fat than average people will have some difficulties if they are to

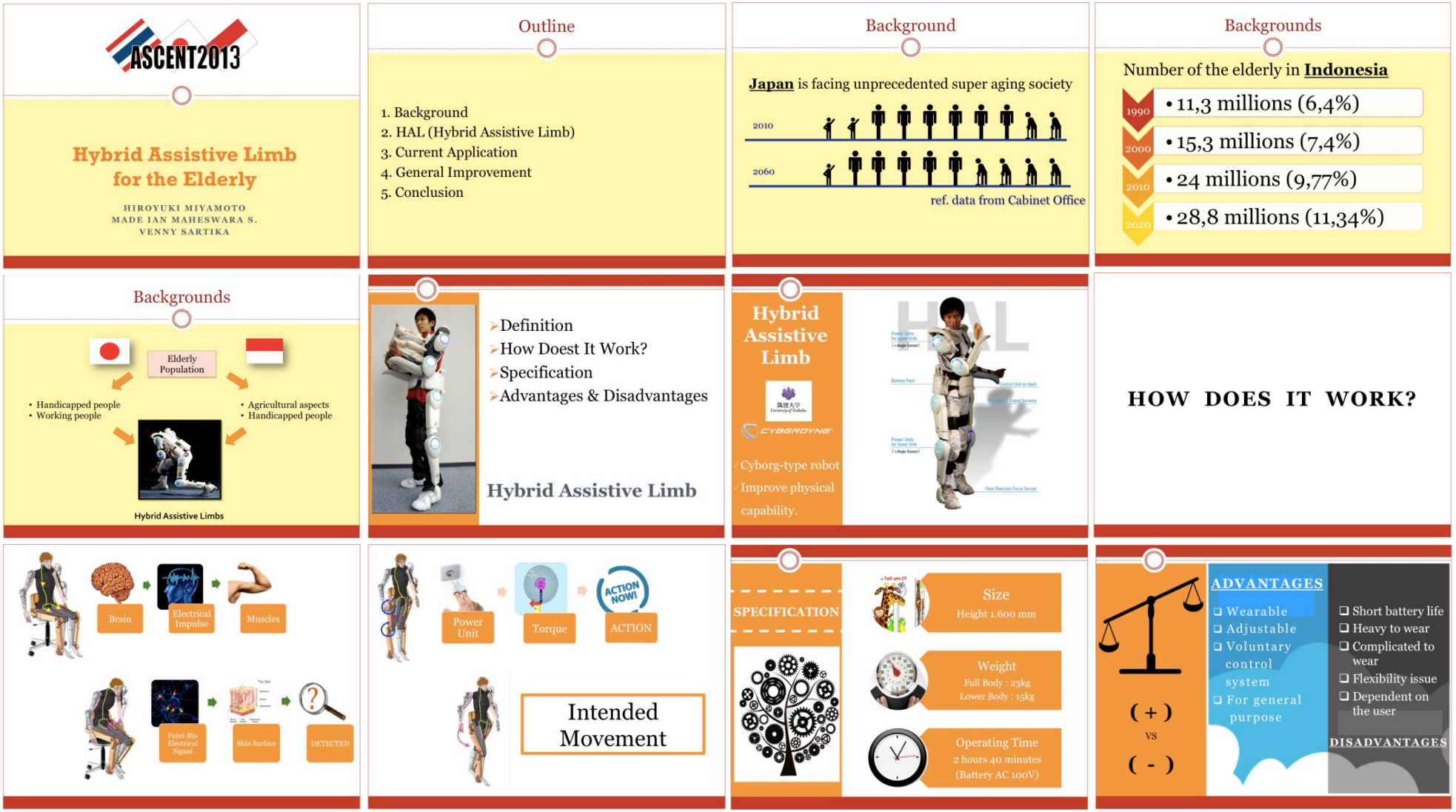
use HAL, because there might be chance that it is harder for the sensor to read the neuro-signal on their skin.

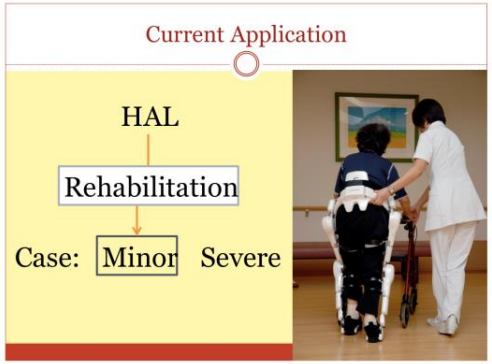
All the disadvantages mentioned above call for immediate improvements, if Cyberdyne wants to continue developing this robot-suit. From our discussion, we concluded that there are four areas that need improving, namely:

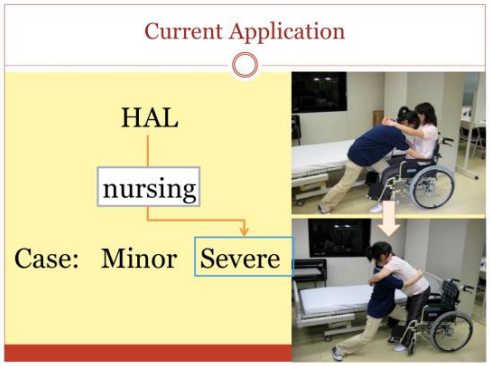
1. ***Short battery issue***: can be taken care of by plugging in for electricity or applying solar cell for outdoor application.
2. ***Heavy weight issue***: use rubber pneumatic drive instead of heavy motors. Moreover, the application of pneumatic drive can also increase the mass-power ratio
3. ***Flexibility issue***: softer material such as rubber can be used for the external parts
4. ***User-adaptability issue***: two solutions are proposed: to improve the sensor and to use alternative sensor (e.g. brain activities sensor)

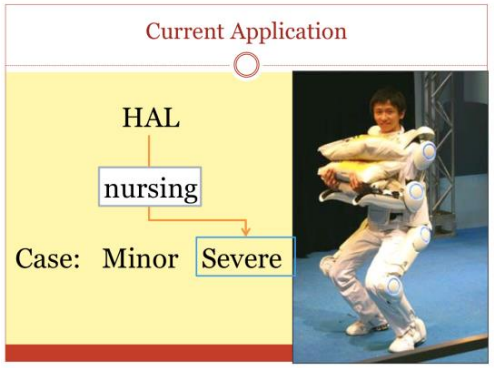
For the application in Indonesia, there is a possibility that this robot suit can be used for Indonesia's outdoor agricultural application, to enhance the physical abilities of the farmers who are mostly old people. Some problems like electricity source, rain, and extreme heat might be faced, but it is possible to reduce the effects. Solar cell can be used for electricity source, waterproof material can be used to protect the user from the rain, whereas porous materials can be used to promote better air circulation for the users. The idea of applying this robot-suit might be outrageous for some, but far in the future, this kind of technology might be useful.

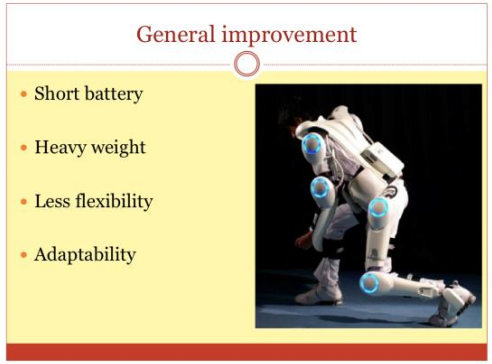
In conclusion, this physically improving robot-suit, even though still has many limitations, is a promising robot technology. Limitations will always be there, but it can always be improved for better applications, moreover for society.


ASCENT2013
Hybrid Assistive Limb for the Elderly
HIROYUKI MIYAMOTO
MADE IAN MAHESWARA S.
VENNY SARTIKA
Outline
1. Background
2. HAL (Hybrid Assistive Limb)
3. Current Application
4. General Improvement
5. Conclusion
Background
Japan is facing unprecedented super aging society
2010
2060
ref. data from Cabinet Office
Backgrounds
Number of the elderly in Indonesia
1990 • 11,3 millions (6,4%)
2000 • 15,3 millions (7,4%)
2010 • 24 millions (9,77%)
2020 • 28,8 millions (11,34%)
Backgrounds
Elderly Population
• Handicapped people
• Working people
• Agricultural aspects
• Handicapped people
Hybrid Assistive Limbs
➢Definition
➢How Doest It Work?
➢Specification
➢Advantages & Disadvantages
Hybrid Assistive Limb
Hybrid Assistive Limb
CYBERDYNE
Cyborg-type robot
Improve physical capability.
HOW DOES IT WORK?
Brain
Electrical Impulse
Muscles
Faint-Bio Electrical Signal
Skin Surface
DETECTED
Power Unit
Torque
ACTION NOW!
ACTION
Intended Movement
SPECIFICATION
Size
Height 1.600 mm
Weight
Full Body : 23kg
Lower Body : 15kg
Operating Time
2 hours 40 minutes
(Battery AC 100V)
(+)
vs
(-)
ADVANTAGES
Wearable
Adjustable
Voluntary control system
For general purpose
Short battery life
Heavy to wear
Complicated to wear
Flexibility issue
Dependent on the user
DISADVANTAGES

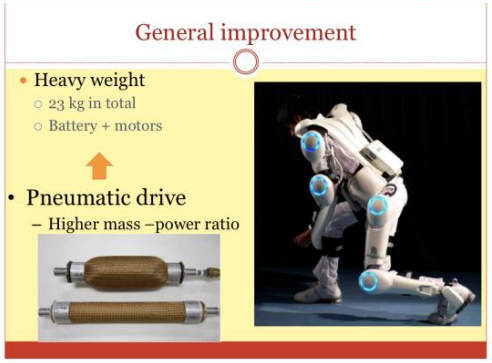

Current Application
HAL
Rehabilitation
Case: Minor Severe


Current Application
HAL
nursing
Case: Minor Severe

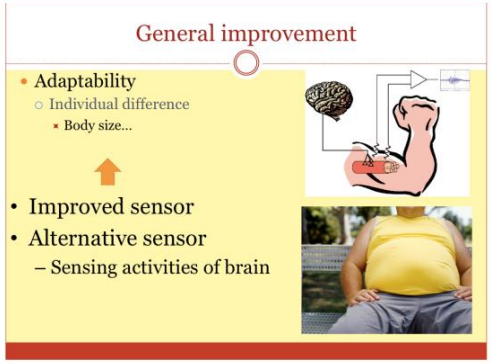

Current Application
HAL
nursing
Case: Minor Severe

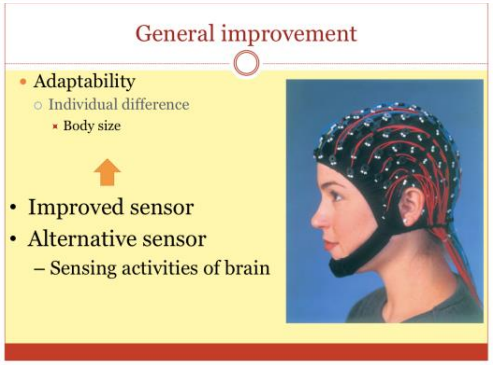

General improvement
Short battery
Heavy weight
Less flexibility
Adaptability

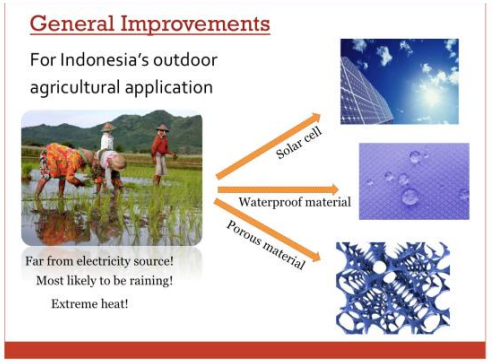
General improvement
Short Battery Life!
Plug in for electricity
Solar cell for outdoor application

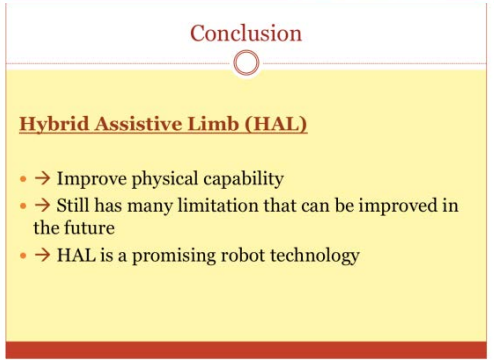

General improvement
Heavy weight
23 kg in total
Battery + motors
Pneumatic drive
– Higher mass –power ratio

General improvement
Less flexibility
Feel awkward(?)
Soft material
– Rubber
Pneumatic actuator
– Compressibility


General improvement
Adaptability
Individual difference
Body size...
Improved sensor
Alternative sensor
– Sensing activities of brain


General improvement
Adaptability
Individual difference
Body size
Improved sensor
Alternative sensor
– Sensing activities of brain


General Improvements
For Indonesia's outdoor agricultural application
Solar cell
Waterproof material
Porous material
Far from electricity source!
Most likely to be raining!
Extreme heat!


Conclusion
Hybrid Assistive Limb (HAL)
→ Improve physical capability
→ Still has many limitation that can be improved in the future
→ HAL is a promising robot technology

THANK YOU

Second Life Robot

Group B
Maharani Meganti (ITB)
Nanda Pratiwi (ITB)
Piyapat Saranrittichai (CU)

Background

There are many type of robot application in real life. Those robots are created because there are aspect that human just cannot do or they not do it well enough. Other aspects are, sometimes because it is really dangerous and human just cannot handle it (like entering the nuclear plant when there is accident), and also because it is more ineffective and expensive when we use human as the resource. That is where robot is needed.

The problem is not about the robot, the problem lies in human itself. Does we as human can be familiar with robot, can we take care of the robot, and can we accept those robots as our friend or coworker. The answer is still somewhere in the middle of thinking over and over about it and testing it. In Japan maybe the robot can be accepted easier, but if we look to other country, it will be easier and inexpensive to not using one. There are many aspects that must be inspected before we can come to one conclusion.

According to United Nations Statistic Division, Glossary of Environmental Statistics, "Wastes are materials that are not prime products (that is products produced for the market) for which the initial user has no further use in terms of his/her own purposes of production, transformation or consumption, and of which he/she wants to dispose. Wastes may be generated during the extraction of raw materials, the processing of raw materials into intermediate and final products, the consumption of final products, and other human activities. Residuals recycled or reused at the place of generation are excluded."

(Thousand tons)

Item	FY1990	FY1995	FY2000	FY2005	FY2009
Industrial waste					
Total volume of waste generation	394,736	393,812	406,037	421,677	389,746
Recycling	150,568	146,620	184,237	218,888	206,712
Treatment for waste reduction	154,443	177,941	176,933	178,560	169,443
Final disposal	89,725	69,257	44,868	24,229	13,591

Fig. 1 Industrial Waste Generation and Disposal (Ministry of the Environment)

If we look at Fig. 1, we can see that every year the industrial wastes are increasing. It is understandable because every year human need is increasing and the advancement of technology also takes part in it. And recycle is not a new thing in Japan. As you can see also in the picture, half of the wastes are being recycled. And our idea of this project is to induce the usage of recycle or reuse product into a useful robotic system. In other words, recycled

materials will have the second chance to be beneficial for all of us as a robot parts. Therefore, our theme will be "Second Life Robot" which questions about "How to use recycled materials in Robot Technology?"

2. Learning from ASCENT

To answer our problem, we'd searched for much information from the internet. In addition, many kinds of activities in ASCENT gave us significant idea as well. The knowledge we've obtained from ASCENT is as follow

Pneumatic Actuator

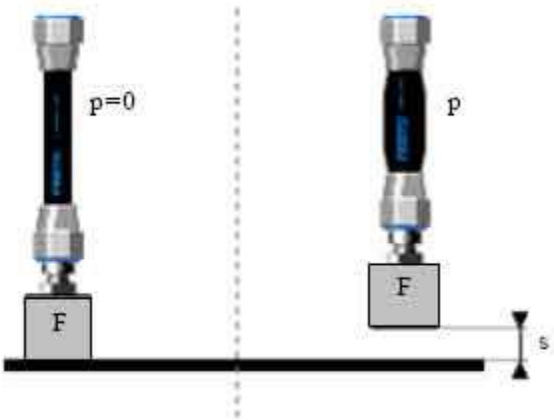


Fig. 2 Pneumatic Artificial Rubber Muscle (PARM)

Every moving device has to be integrated one or more actuators which can generate motion from given energy. The example of actuator, which most of us know, is motor. Motor can create the motion through its magnetic field and feeding current. This is able to generate force to rotate its axle. However, the disadvantages of motor are low value of power-weight ratio and its amount of heat generation while operating. Anyway, participating in ASCENT introduced us new kind of actuators which overcome that limitation which is called "Pneumatic Actuator".

Theoretically, pneumatic actuator is an actuator which controls its movement by controlling the air pressure inside. The example of pneumatic actuator is Pneumatic Artificial Rubber Muscle (PARM) shown in Fig. 2. PARM is a cylinder shape actuator containing air inside its tube. When there is no addition pressure, the tube remains in its steady state. However, if we increase the pressure of air inside the tube, PARM's tube will be contracted. These changes in the tube's length can generate movement.

3. Solution for the problem

To apply recycled material in the robot, we design our new pneumatic actuator which is simple enough to use recycled material as some parts of it. The mechanism of our device is described in chapter 3.1. In addition, the appropriate material for our device is discussed in chapter 3.2.

3.1 System Model

Our pneumatic actuator mechanism is shown in Fig. 3. There are nine parts. The movement can be generated by pumping the air into its cylinder. The air pressure will push the lid forward. However, if the air leak out, the lid will be back to its old position by the force of the spring.

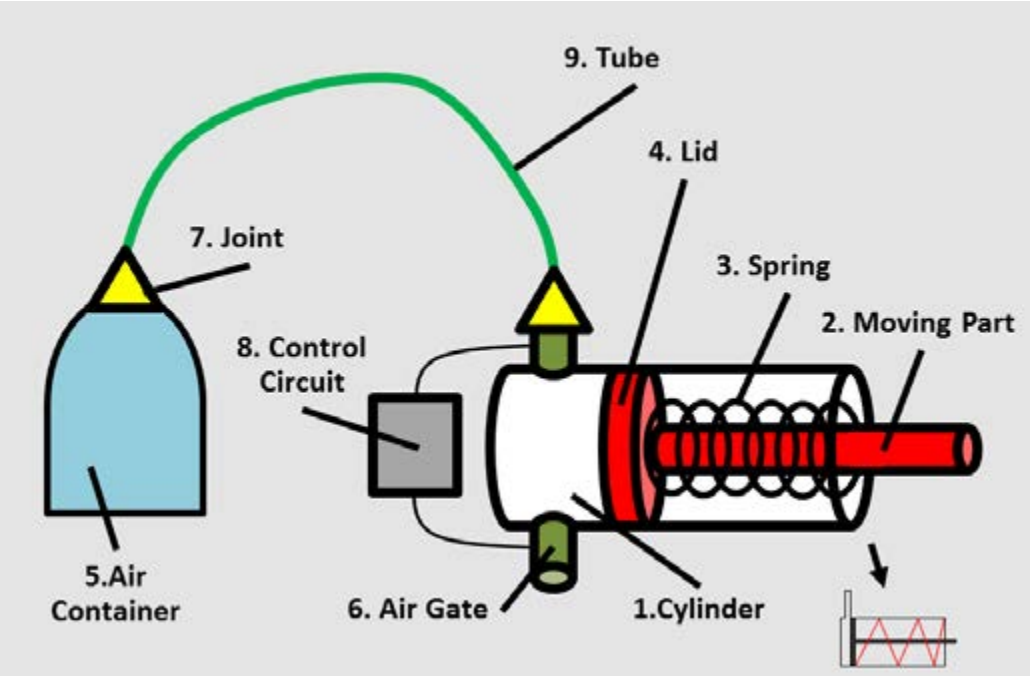


Fig. 3 Mechanism of our pneumatic actuator

3.2 Green Materials

Green materials mean waste materials that can be reused or recycled. These green materials are those that have less of an impact on the environment or human health, in other words: environmental-friendly.

As it has already been explained before, pneumatic actuator is formed by several components. Some of these components can be replaced by green materials. In our group discussion, the most feasible parts to be replaced are cylinder, lid, and air container.
An example of green material which can be used as the air container is plastic water bottle. As for the materials which can replace the cylinder part is cans. Cans are very easy to find,

especially since there are a many vending machines in Japan. But, because cans are usually made from a thin plate of aluminum, it will usually crushed. This will not meet our requirement for cylinder's material replacement because cylinder contains the main parts of a pneumatic actuator; therefore common cans cannot be used for replacement. Because of this reason, our solution is to form a new can from recycled cans, this will make the new cylinder has thick surface and better quality. The third part from pneumatic actuator that can be replaced by a green material is the lid. The lid is used to prevent air leak from the pressurized air to the moving parts inside the cylinder, therefore the green material used to replace this part has to be leak-free, and rubber is the perfect material to use because the easiness to use and find.

4. Problems in Practical Used

The advantage of using green materials to form robot parts is the environment-friendliness. However, there are several problems that can be occurred because of the usage of these materials.

First problem is air leakage. As it has been mentioned before, the possibility of air leakage can be found easily on the lid. The other place that can easily be the source of air leakage is on the joint of every part. Whenever the air is pumped, there will always be a possibility of air leak because the pneumatic actuator consists of joined components which they may have different material characteristic. So when they are joined together and air is pumped, some materials may be loose and some materials may become tighter. Therefore if these differences are found on the joint, it can trigger the air leak.

The other problem of this system is the high deteriorating rate. It means the lifespan of the actuator itself. Because it uses waste materials in the first place, which already on the process of deteriorating, it causes the device or the pneumatic actuator to have a high deteriorating rate too.

Other problem that can occur to this system is when it tried to be produced massively. For a company to be able to massively produce some product, it means it has to have a large number of raw materials. In this case, a great number of wastes will be needed.

5. Appropriate Application of Green Pneumatic Actuator

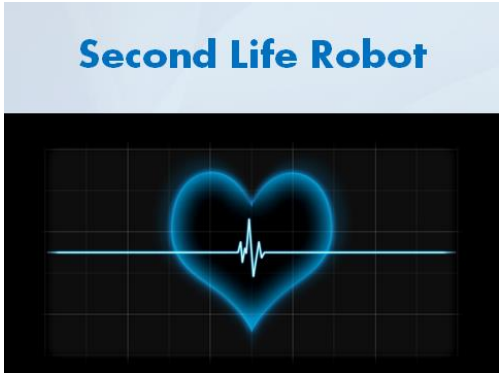
There are two examples of the appropriate application of the pneumatic actuator, which are robotic arm and pneumatic canon. Robotic arm is used for holding something and use pneumatic system as the driver. Also, pneumatic system is used as the power source.

6. Future Work

The possible future works of this device (green pneumatic actuator) is to do material improvement. For example, plastic water bottle is easily crushed. Therefore we should look for another green material to be used for the air container. The other possible research is the force adjustment system. This means to be able to use it for various applications, the actuator's force, which comes from the air pressure, needs to be adjusted. So a bigger and more robust system will be needed.

7. Conclusion

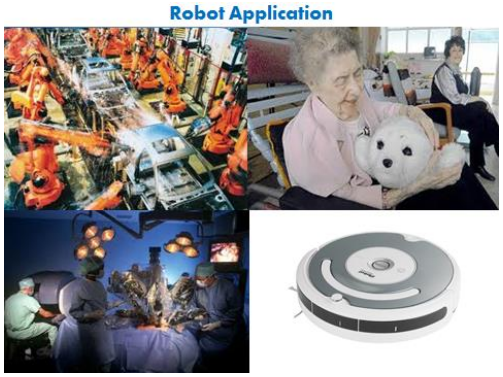
The main idea of our project is to turn waste material into a useable system. In this case a pneumatic actuator for robotics. However this green system has some constraints: the problem with air leakage, high deteriorating rate, and hard to produce massively. To be able to make this system better, there are possible future works and research to be done, such as material improvement and making a force adjustment system. The main idea of our project is to turn waste material into a useable system. In this case a pneumatic actuator for robotics. However this green system has some constraints: the problem with air leakage, high deteriorating rate, and hard to produce massively. To be able to make this system better, there are possible future works and research to be done, such as material improvement and making a force adjustment system.


Second Life Robot

Outline
Background
- Waste
- Robot Application
- Environmental-Friendly Robot
Robot System
- Robot System
- Pneumatic Actuator
Second Life Technology
- Mechanical Model
- Green Materials
Discussion : Applications & Problems
Conclusion

Background

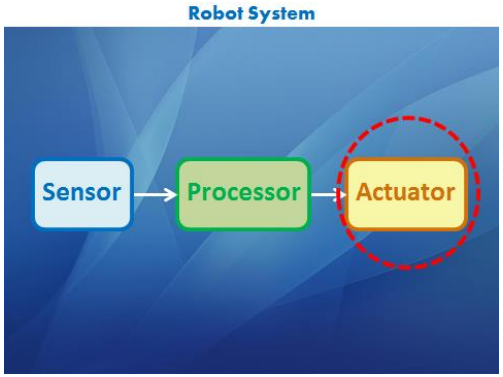
Waste

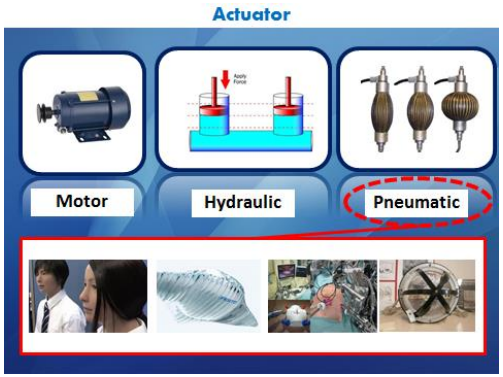

Robot Application

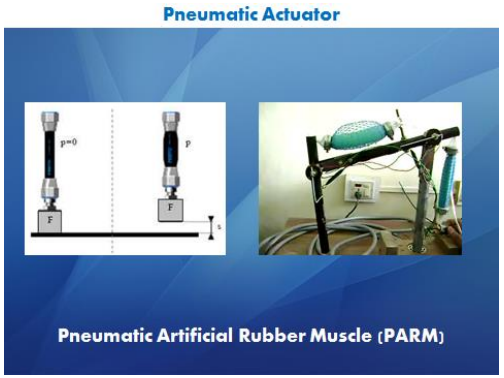
Environmental-Friendly Robot
HITACHI "Green Mobility"
Wayside Controller
Maintenance factory
Preventive diagnosis

Environmental-Friendly Robot
Our work...

Robot System

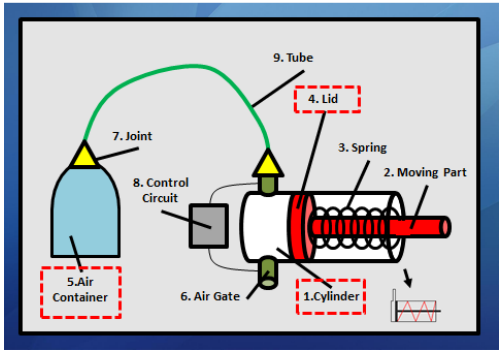

Robot System
Sensor
Processor
Actuator


Actuator
Motor
Hydraulic
Pneumatic


Pneumatic Actuator
Pneumatic Artificial Rubber Muscle (PARM)

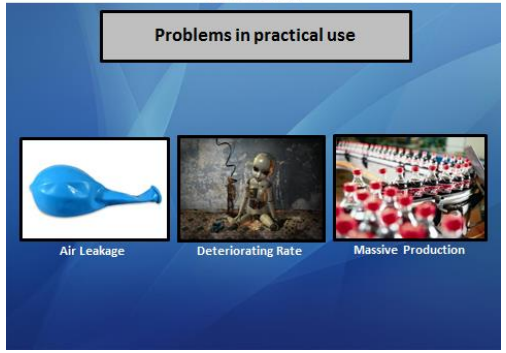
Second Life Technology

Mechanical Model

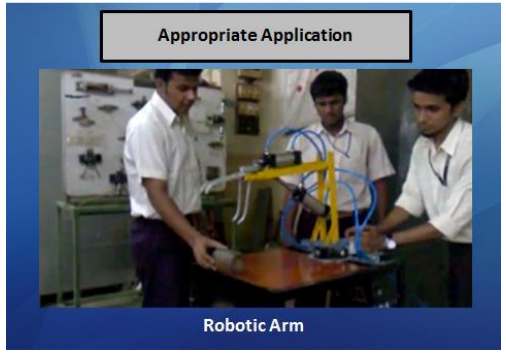


Green Materials

Discussion

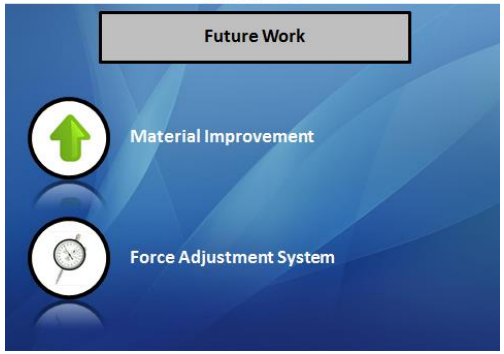


Discussion

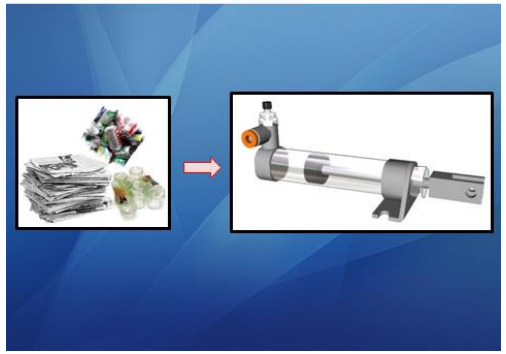


Discussion

Discussion



Conclusion



Q&A

Our simple model

1. Air Container (Bottle)
2. Tube
3. Cylinder (Resistance to high pressure) - Can
4. Lid (Prevent air to leak into other side)
5. Spring
6. Piston
7. Rubber (Prevent air to leak out the joint)
8. Air Gate (Prevent air to leak out)
9. Control circuit

DISASTERS AND ROBOT TECHNOLOGY

Group C
Harukua Saso (Tokyo Tech)
Gladys Brigita (ITB)
Hathaipat Srivarasat (CU)

A disaster is a tragic condition (whether it is man-made or naturally happened) that cause significant physical destruction, loss of lifes, and total change to the environment. For examples earthquake, floods, avalanche, thunder storms, volcano eruption, and etc. When the disasters go even worse, it can hamper the economy, health, cultural, and social development in one country. The United Nations Office for Disaster Risk Reduction (UNISDR) stated that the damage worth about 1.3 trillion and almost 2.7 billion people are effected, moreover there are 1.1 million people were killed because of the disasters happened in the last 12 years. Although it is believed that natural disaster is something that can be predicted but can't be avoided and contribute more to these numbers rather than man-made disaster, that doesn't come to a conclusion that we just have to let go with disasters. We might not be able to avoid any kind of disasters, but people nowadays do have the chance to prevent the damage and the number of the victims.

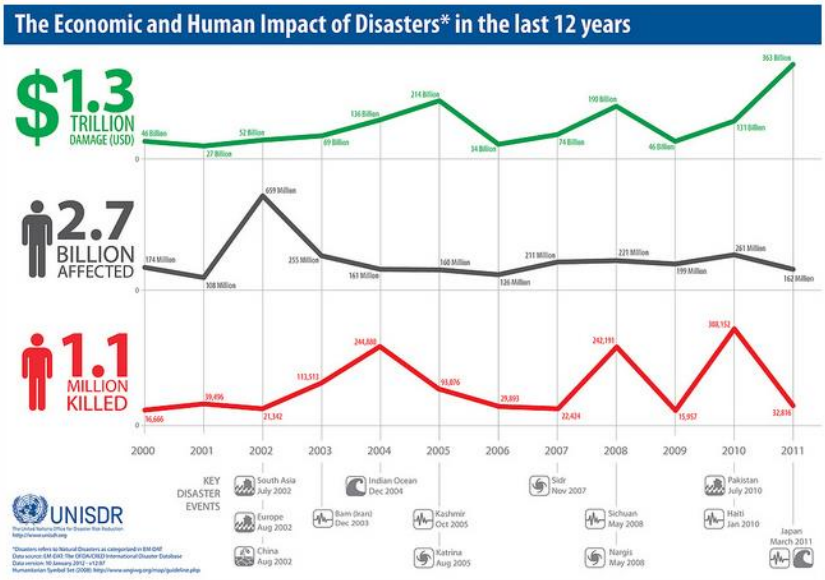


Figure 1. The Economic and Human Impact of Disasters
(source : http://www.unisdr.org/we/inform/disaster-statistics)

1)The reason why we choose this theme

Robot technology is being used to answer these need, nowadays numerous top universities are conducting research in creating robot to prevent the disaster. There are three main reasons why using robot is a better option, first robot technology is compact but have strong power, second several area are too dangerous for human to be sent to, and third is the personal costs, it might be very expensive at first, but once we build the technology it can be used longer. For example a robot being used in detecting the volcano activity, exploring the area of nuclear site, or snake robot that seeking a victim under the wreckage. We believe that robot technology is very useful, robot technology can be sent to the area that might be dangerous for human, while it can be operated and controlled by the operator from a distance. Another robotic system can be programmed to give such warning when sudden change of weather occurs. As we can see, these robot technologies have worked well in preventing and helping the world after the disaster happen, to some extend we think there is still area that can be developed from these robot technologies.

2) The solution of our theme

When natural disasters occur such as Tsunami and earthquake, rescue robots will provide two functions. First, the robots that have special detecting devices will immediately inform and warn the people around that area before the natural disaster happened. Secondly, these robots will try to find injured people and provide the position of people to the human rescue team.

3) Future work

Robots will play important role in rescuing and saving people from natural disaster. The rescue robots provide many advantages including reducing manpower, no fatigue, and have ability to access unreachable areas, etc. However, these robots still have some limitations due to its nature. During operation, the rescue robot constantly getting stuck or broken. For recommendation, the design engineers and scientists should develop the shape and material in order to increase efficiency. The programmers should also improve software in the robots to increase their reliability. In the future, rescue robots in development are being made to be able to search, reconnaissance and mapping, removing or shoring up rubble, delivery of supplies, medical treatment, and evacuation of casualties. Once these robots function properly, the world will be change to the next generation, the era of rescue robot

Robot Technology in disasters

Created by
Haruka Saso
Gladys Brigita
Hathaipat Srivarasat

Outlines

- INTRODUCTION
  - Types of natural disaster
  - Problem and statistics
  - Necessity of using the robot
- EXAMPLE OF ROBOTS
  - General background
  - Additional and Improvement
- CONCLUSION

Types of natural disaster

Necessity of using robots

- Too dangerous for human
- Compact but have strong power
- Personal costs

Problems and statistics

- Happens suddenly
- Large scale
- Takes long time for recovery

photos of 3.11 Tohoku Earthquake

NUCLEAR EXPLOSION

Nuclear Explosion

Meister by Misubishi

Robo-dog by Toshiba

ASTACO-SoRa by Hitachi

Analysis…

The limitation*

- Weight: 2.5 tons
- Speed: 2.6 km / hour
- Can't climb stairs or high obstacle

Additional comment

Jumping rescue robot which can jump over obstacle.

(*) http://www.gizmag.com/hitachi-robot-nuclear-plant/25377/

EARTHQUAKE

Earthquake

Purpose: "Search for survivors in earthquake"

Quince

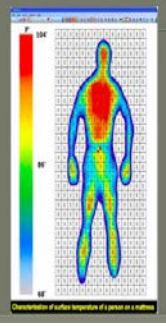
Snake robot

Which one is better?

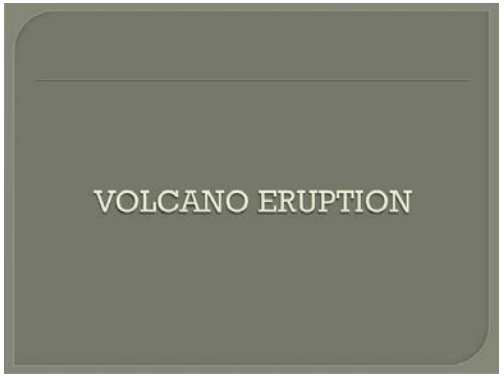
Compare and contrast

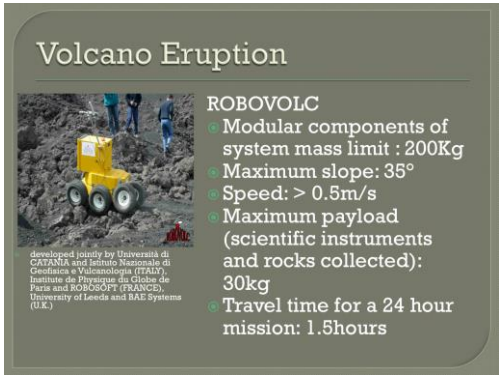
Topics	Quince	Snake robot
Weight	27 kg	Low weight
Limited space	✗	✓
Camera	✓	✓
Infrared	✓	✗
Detecting sensor	CO_2	✗

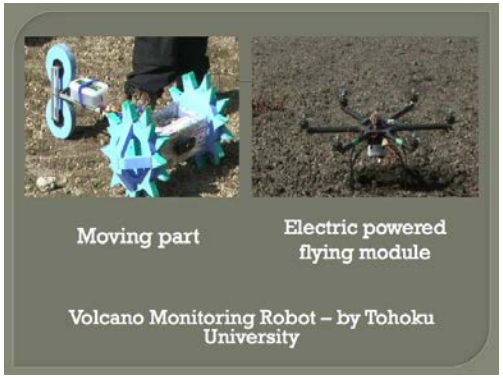
Is that enough for snake robot?

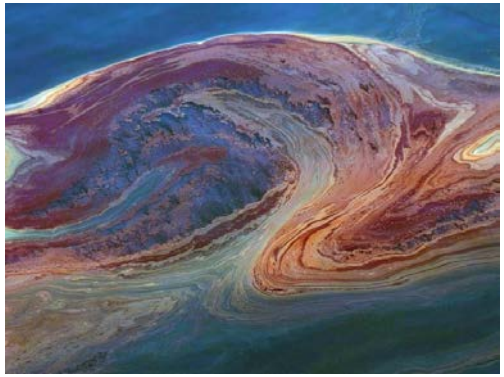


- Heat sensor
- Add more camera (2 sides)
- Tracking the location


VOLCANO ERUPTION


Volcano Eruption
developed jointly by Università di CATANIA and Istituto Nazionale di Geofisica e Vulcanologia (ITALY), Institute de Physique du Globe de Paris and ROBOSOFT (FRANCE), University of Leeds and BAE Systems (U.K.)
ROBOVOLC
Modular components of system mass limit : 200Kg
Maximum slope: 35°
Speed: > 0.5m/s
Maximum payload (scientific instruments and rocks collected): 30kg
Travel time for a 24 hour mission: 1.5hours


Moving part
Electric powered flying module
Volcano Monitoring Robot – by Tohoku University



OIL SPILL

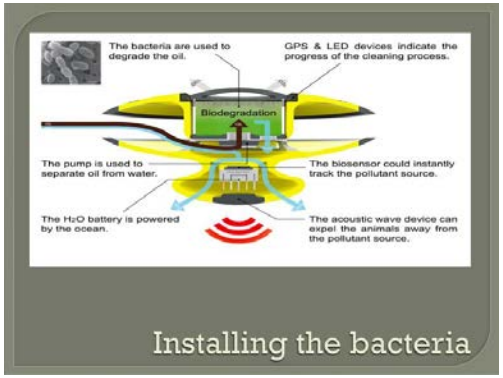
KEEP CALM AND SAY NO TO STATUS QUO
Using chemical Cleaning process

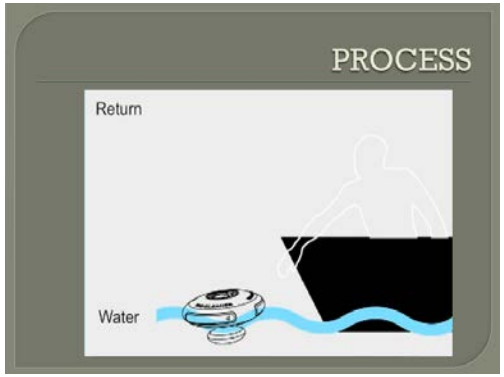
KEEP CALM AND SAY NO TO STATUS QUO
Waste very much manpower and time

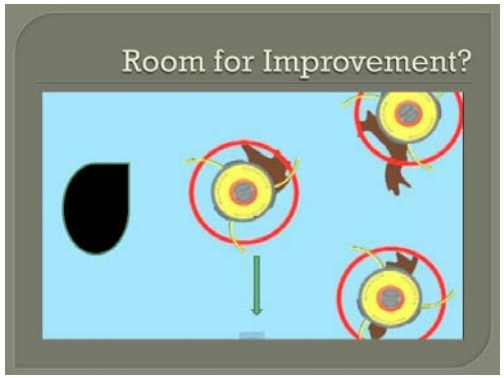
KEEP
CALM
AND SAY NO TO
STATUS
QUO
Animal approaching pollutant source

Oil Spill
Seaswarm Robot by Massachusetts Institute of Technology

BIO Cleaner – Hsu Sean Design


The bacteria are used to degrade the oil.
GPS & LED devices indicate the progress of the cleaning process.
Biodegradation
The pump is used to separate oil from water.
The biosensor could instantly track the pollutant source.
The H2O battery is powered by the ocean.
The acoustic wave device can expel the animals away from the pollutant source.
Installing the bacteria


PROCESS
Return
Water


Room for Improvement?

Conclusion
collect data more precisely and reliable.
Better rather than sending human.
Prevent the disasters
Harmony of working together

THANK YOU

Participants' Essay

-Tokyo Tech students

-CU students

-ITB students

➢ Tokyo Tech Students

Hiroyuki Miyamoto

What I learned from the program

Through the discussion, I developed an understanding of social problems of Indonesian and Thai country, then I realize countries are facing their own problem respectively. Also participants comes from several major, I think it was a good opportunity to listen to opinions from different perspectives.

In addition, the lecture about presentation skills and the couple of performing presentations are great opportunity to improve my skills of presenting something such as emphasizing visual.

Changes of my idea through the program

I will try to get interested several things to have wide view and to come up with the idea of application of technologies.

Future plan

I plan to work on research related to robotics. I think the experience through the program will be applied somewhere in my life.

Culture exchange

I was impressed with the performance both of Indonesian and Thai students. About Indonesia, the color and the pattern of their cloth looked beautiful. I think it is interesting the difference between dances performed male and female. Thai students′ music was also great and I was wondering it fell like nostalgic somehow.

Haruka Saso

First I would like to talk about the changes of my idea through this program. During this program I could take some lectures and visit companies and I saw the latest robotic technology. These are amazing and I realized that in the near future, these robots are going to be very important position in our everyday lives. I always think that human being will be able to do everything we want, like we can make cars and computers and so on. I believe that we are stronger than nature and any animals in the whole world. But still there are many things we have not achieved yet. Robot technology is one of them. If we make better robots and we can apply in the disaster situation or in any other places that might be dangerous for people. Robots can help people and recover cities and towns beside human. Once we make then, the only thing we need to do is charge them and sometimes control them. I think every technology we use nowadays is very complex and difficult to make. Before joining this program, I thought computer or TV technology is much more difficult to make robots. But now I realized how complex and difficult to make robots is.

Second I would like to talk about culture exchange. I could have an opportunity to see Thailand and Indonesian singing and dancing. This was my first time to see such a great performances. I realized that even we are in the same Asian countries, but the culture and traditional is very different from country to country. The Indonesian

dancing was gorgeous and amazing. Thailand singing was beautiful and relaxing. At the same time, I do hope international participants enjoyed the Japanese culture, for example origami and Kamakura and so on. I do not have confidence that I could explain well about Japanese traditional and culture, because their questions were not what I expected. Their way of thinking was not the same of Japanese way of thinking and I was very curious about it. And one more thing is that I was surprised that international students are always enthusiasm about everything they found and noticed. They always ask questions and always curious many things. We Japanese said to be shy people. I do not think being shy is different from asking many questions. So from now on, I would like to try not to hesitate to ask any questions that I cannot get. Then I hope I will be able to learn more and more and it will be good for my future and getting a job. They gave me a great impression. And they were friendly and easy to talk with and they were always smiling. I like them and I would like to be more friendly and talkative.

Finally the best memory for this program is that I could make many new friends outside of Japan. I would love to keep in touch with them and I would like to see them all again in the future. And I also interested in Asian countries and want to visit there some day. At last I would appreciate all of my friends support and kindness. And I hope we Asian countries corporate with each other and contribute to the whole world. I wish I could do something as one of the researchers in the future and use what I had learned through this program.

・English

Second, we can make friends easily in this date. But it is not easy to continue the friendship. Therefore I will keep touch with them on the Facebook or e-mail. I would like to meet them again and I will meet them when I will go their countries or they come again japan. I would like to continue our friendship as long as possible. I am a second of master course student. I have limited time for my student life. I would like to enjoy and study hard in my student life.　Finally, I really appreciate all SAGE members, Shimura-sensei and all. I could get a good experience and I really enjoy this program. All members were so kindness and they helped me anytime. I hope that other students will join this program and they will also get a good experience from this program.

➢ CU Students

Hathaipat Srivarasat

What you learn from the program

I have learnt many robot technologies that are being currently in used or currently developing. I have a chance to go to a well known company like Hitachi. It was a very good experience to see such an innovative thing. Moreover, the program gave me a chance to communicate and exchange the idea with my friends from other counties.

Comparison between your countries about the things you studied in the program

This program not only gives me the robot technology knowledge but also give me a chance to learn cultural and lifestyle in other countries. Indonesia people like spicy and they have religion. They pray two times one day, never eat pork, and never drink alcohols. It is big difference from Thailand. Japanese are very punctual and uses their time very wisely. They don't spend as much time traveling and getting traffic jam, when the transport system is very effective and personal vehicles are not required.

Change of your idea through the program

"The impossible is now possible" that is what I think now. After I've saw a lot of real production process and exchange the idea with my foreigner friends I think everything is possible for us. The new urban system idea is interested me a lot because the urbanization in Thailand is increasing so if we have a good system to systemize it the urbanization will not create the problem such as CO2 emission or traffic congestion problem in the near future.

What I want to do in the future

I want to work in consulting company which is relative to my major which is information and communication engineering. The scope of the work is taking care about the IT component and managing information to reduce the wrong information. The factor of problem nowadays is the wrong and misunderstanding information and communication. I also want to make the best information system like SAP.

Cultural Exchange

Japan is a very interesting. I am surprised by the people's punctuality, their vision about helping others and their kindness. It has the best food in the world. During the program, we found other aspects of Japanese culture, their perfect integration of the eastern and western world. However, I wonder how people were very uniform. Nobody actually stands out or be different from others, resulting in a stressful society. Everything goes according to rules and time. Because Japanese people have no excuse when they are late, the train is always on time by seconds. And people would not hesitate to go on jam-packed trains. On the sightseeing day, the trip was so much fun.

Piyapat Saranrittichai

What you learned from the program

The thing I've learned is, of course, robotic technology. Participating in ASCENT gave several opportunities for me to explore how Japanese developed their great autonomous systems. For example, I've seen from ACTRIOD and HRP-4C robots from AIST. It shows that user interface is as important as other technical issues. In addition, in my point of view, Japanese laboratories are advanced in the development of robots in practical use. Hirose Fukushima Laboratory from Tokyo Institute of Technology demonstrated several robots which can be applied in real environment such as rough surface, underwater, or even outer space using many kind of mechanical technics.

Comparison between your countries about the things that you studied in the program

My country, Thailand, has one major difference from Japan. Firstly, most organizations in Thailand don't focus on the development of advance technology as much as those in Japan. Normally, the researches in Thailand focus on the optimization of processes. For example, they attempted to solve the problems such as "How to minimize the time and money for deploying our products?", "How to grow our plants effectively?" In the other hand, Japanese do more than that. In my opinion, Japanese researchers do not only optimize the systems, but also attempt to convert old manual systems into new autonomous systems in several ways.

Changes of your idea through the program

1) User interface is also important as well as other technical issues to develop robots.

2) To improve a system, the better way might be that not only improve the old one, but create the new one.

What do you want to be or do in (for) the future

I want to become a researcher in robotics. To pursue my dream, I have to do more researches projects in my interested area. In addition, I'll continue my degree to Ph.D. and come back to my hometown being a great researcher in the future.

Culture exchange

Fortunately, there was culture exchange party in ASCENT. This gave me an opportunity to open my eyes to both Indonesian and Japanese cultures. Indonesian dance is quite exciting one. The fascinated thing for me is eye movement. In Thailand, the dancers in any type of dance are watched directly to the audience or to any objects related to their stories while dancing. However, In Indonesia, the dancers' eyes moved quickly. At first, I think they were moved randomly but later I noticed that there is a pattern that made me very impress. Other than Indonesian culture, Japanese culture was also fun. Origami is one of the activities which I like most in my childhood. Providing origami competition is a good idea to make everyone becoming a part of the culture. My memory in ASCENT is the one I'll never forget.

➢ ITB Students

Gladys Brigita

After joining ASCENT 2013, I realize that robots can be developed with various types of functions. All this time, I have never thought that robots can be so useful in our daily life, because there is no massive use for robot technology in my daily life, seeing the fact that Indonesia have numerous of human resources which still best chosen rather than replacing it with the robot technology. There might be a lot of contests in robot technology, both national scale and international scale, but no further action is taken. Not to mention there is less information about robot for people in common ground. It indicates that the awareness of people in developing robot technology is not high and popular among students. If we can compare, there is no special body or agency which main focus is researching in robot technology like AIST in Japan. I hope in the future, the government of Indonesia can allocate more focus for the development of robot technology. So that people's awareness towards robot technology can be increased and create more room for students and university to develop more invention about robots.

All this time, I thought that something that categorized as robot must be in the humanoid shape. During the program, we are taught that robot technology can come in a very various types and function, and robot technology knows no limit and boundaries to make it more efficient to be developed. I find it interesting that robot technology is open to cooperate with any other field of study, seeing the fact that people in Indonesia might have this fear towards robot development. How they believe robot to some extends can take away their job opportunity. Based on the lectures given by the professors, know I understand robot should not be seen as competitors but as a co-worker in creating a better environment of work. All I can say is, I believe there is more for robot technology. And I'm sure that any other country especially Indonesia will finally see this area of research, as an important key in facing global needs in the future.

As an environmental engineering student, I hope in the future I can contribute more to the environment and society. In Indonesia there is a massive government movement in recreating a good municipal waste management system, I hope I can apply my knowledge from this program to create a technology that can help the separation of waste based on its type.

Besides learning about robot development, I also learn about the Japanese culture and how to live a daily life in Japan. This opportunity is very interesting, because the atmosphere of living in Tokyo is really different than living in Indonesia. The culture of Japan fascinates me, especially for the politeness and obedience which is rarely find here in Indonesia. Not to mention I also get more knowledge about Japan in details, such as food, languages, today's life style, places to go, and etc. Thank you for the transfer of knowledge that been given to me.

Made Ian Maheswara Suprivatna

<u>What I learned from the program</u>

During the program, I got to see and learn about various kinds of robots which are intended for various functions, ranging from medical to logistics. I visited HITACHI, which is now developing ROPITS, a vehicle type robot capable of assisting elderly people to anywhere around the city autonomously, and LAPI (Logistics Automation Partner with

Intelligence), a small logistic robot used to help carrying things in office uses. In AIST, more robots are now being researched, ranging from welfare robots, entertainment robots, humanoid and android robots, to therapeutic robots. Another interesting robot in my opinion is robot suit HAL (Hybrid Assistive Limbs) invented by Cyberdyne Studio, which are mainly used for the elderly people to enhance their physical capabilities and rehabilitation programs. Too bad we didn't get the chance to visit Cyberdyne Studio ourselves due to limited time.

Changes of your idea through the program

Before the program, I thought that the Japanese are developing robot technology only to fulfill and answer their curiosity about the robot technology. Then after the program, I realized that the robots are also developed according to the problems occuring in Japan, like the aging society, even though some robots developed don't have clear functions whatsoever. Indonesia, at the moment, might not need robot technology because Indonesia has other urgent matters that need fixing, such as its transportation system and agriculture. However, it has to be noted that every technology that is developed must reach the lowest level of society and impactful for the society itself, as quoted by Prof. Kawashima: "*We developed robot technology not to become rich. We are trying to contribute to the society. That is every university's duty.*"

Comparison between your countries about the things that you studied in the program

By joining this program I learned that – without a doubt – Japan is really excelling in robot technology, where the Japanese government gives full support for this. In addition, the urgencies for robot to develop even more has been rising. One of the main driving force for this condition is the decrease of the number of Japanese residents and the increase of elder people, meaning that robot technologies might come in handy to assist and support the elder people's daily lives. I also realized that the condition is very different compared to Indonesia and Thailand, where, because of the high number of unemployment, robot technologies have not been much applied in our daily lives. The development on a small/laboratory scale goes on, but further development does not occur. In the future, I am hoping there will come a time where robot technology can be applied in useful ways. For me personally, one the most useful and practical applications of robot technologies is PARM (Pneumatic Artificial Rubber Muscle) that can be used for laparoscopic surgery, where this technology came across really useful for the medical world to reduce the recovery period after the surgeries.

What do you want to be or do in (for) the future

In the near future, I'm planning to pursue a degree related to sustainable agriculture and food processing, hopefully in Japan. After that I'm planning to work on a related field/department in Indonesia so that I can bring something useful back to Indonesia.

Maharani Meganti

What you learned from the program

I'm currently majoring in electrical engineering backgroung, therefore I have a few basics about electrical movement system as well as robotics. In this program I learned a lot of new things about robotics and the development in Japan. In fact, robot technology is not used for industry only, but also for medical purposes, disaster risk reduction, and even for home appliances. By coming to HITACHI and AIST, I realised that the world of robotics in Japan have been very developed, compared to in Indonesia.

Comparison between your countries about the things that you studied in the program

In Indonesia, the development of robot technology is very rare. This occured because research and development of robot technology itself would cost a high budget and time consuming, and almost no company or institution in Indonesia would risk for that. The research for robot technology is developing in academic institution, such as universities. National robot competition is annually held in Indonesia, which called Kontes Robot Indonesia (KRI). In this competition, the students from various places of Indonesia come and compete with each other from different universities. In this case, the development of robot technology is just for prestige. From what I have learned in the program, in Japan, robot are very developed and widely used for various applications. Also, the research and development of this technology is probably supported financially too, so the companies and institutions in Japan are not afraid to continue developing robot technology.

Changes of your idea through the program

After I join this program, I thought, "his is exactly what I want Indonesia to be," it is to be able to accommodate the youth of Indonesia for doing research and development, especially the ones who have background and interest in robotics, to make our country better and better.

What do you want to be or do in (for) the future

I want to learn more and more about technology and its development, probably in other countries in the world. That way I could have a wide knowledge and develop new ideas to make Indonesia a better country.

Culture exchange etc.

In this program I learned various things about other countries' culture, especially Thai and Japanese. What I really felt about Japanese people is that they (I think all of them) are nice people and willing to help others. We, Indonesian, oftenly wander around Tokyo in our free time and it's not rare for us to get lost. Not many Japanese could speak good English, but, if we ask them for help (to show directions and such) they will try to help us no matter what, whether it's just pointing to the map or showing the directions with their hand. The most memorable moment for me is when I was looking for a place to pray in a very crowded place that almost don't have any room. I asked the employee whether if we could get a quite room for praying or not. He looked confused and then leave us for about 10-15 minutes. Suddenly he returned and bring us to a place which quite enough for us to pray. I thought then he was going to leave us to do our prayer, but instead, he stood by our side and wait for us until we

finished praying. This is the moment which has amazed me the most. For the record, the employee didn't speak English at all, yet he still help us to the fullest.

Nanda Pratiwi Kusumastuti

If you're look at my majors, maybe you'll wonder what an environmental engineering student did in robotic seminar. And yes, peoples asked me why I apply to this. Mostly the reaction was expressed in a quite negative way, like 'What?? What are you doing there', Oh people, and their ability to look things in a usual way. And I was like, 'Hey, I'm smart girl you know'. And yes that's the truth. At first, my motivation to join this seminar was not entirely to learn about robotic. The very first reason was because of my friends and the other's because I like Japan. Very not academically. But I'm really like to learn about something new, something that I don't know before. I'm very open to study anything, moreover outside the class. And I just love experience. And as I learned one and two in the seminar, the subject about robot did make me attracted to it. What we learned there was not just robot in an ordinary way, but to understand the cause of needing robot and why it's great. Most of the lecturers that came and gave the lecture are scientist. And I love how they emphasized that creativity is very important in this robotic business. The integration of science and art, will make the robot can be both marketable and approachable for people. There's also company and laboratory visit that gave us a chance to see robots closely. Hitachi showed us that flaw is the motivation and AIST let us knew that yes creativity is everything. I've met many smart people there that spoke perfect English, very impressive. There's also lecture about how to give a great presentation which come very handy for me. And I just love my main project team, they're so critical person in many ways. The project did make us became thinker. It digs our ways of thinking. Before I joined this seminar, I knew that Japan's robots are one of the high tech and advance in the world. But I never knew the real motivation for Japanese to invent the robot. Not until in the seminar, I knew that one of the reasons is Japan predicted that in the future the old people will exceed the young one. It is a terrifying problem. It's understandable that Japan takes this problem very seriously. But Japan takes this matter very different from my way of thinking, a developing country's mind. First, in the term of cultural and custom, Japan is so much different from Indonesia. I can't imagine Indonesia with a low birth rate. In my country, making commitment such as marriage is a customary thing. And having children will be the next step. Everyone loves to have family. But if for some reason, the same problem as Japan happens to Indonesia, I think Indonesian will take this matter in a diverge perspective. We mostly will put the answer to increase the birth rate again. Compare to living in Japan, living in Indonesia is far more inexpensive. So it will be easier to build a big family here. Joining this seminar is one of the great things that happened in my life so far. Can you imagine how much fun to travel with your fellow university student that you didn't knew before but become a great friends after that. And can you wonder the experience that we get there. It's priceless. All the knowledge that we learned and all the things, the bad and the good, that did happened will make us a better person. In the future, I hope to be the person that helps Indonesia to come forward on and on in many sectors and I want to spread the good about Indonesia in the world. We have so much goodness in us and yes we will be the next advance nation. I also believe Indonesia and Japan will grow more and more firm in the future. It just a start between us both.

Venny Sartika

What you learned from the program

I learned about how robot technology supports various aspect of human life. Robot technology has ambiguous meanings, and then as a result, robot technology has a very wide scope. Robot technology is more like supporter of the other field, for example the laparoscopic robot and the silk moth robot. That is the reason why the robot/mechanical engineers need to build good cooperation with people from the other fields. I also learned about how to make a good presentation and how to be a good presenter. As Professor Hope said, less is more. We need to put less word in our slideshow and explain more about the material.

Comparison between your countries about the things that you studied in the program

In our country, there is not much research about robot technology because of the budget limitation and also the difficulty finding spare parts needed. In Indonesia, robot technology is being developed only for competition and factory. But in Japan, robot technologies are really developed and even still continue to develop.

Changes of your idea through the program

This program really changes my perspective about robot technology, and about research opportunity in other country.

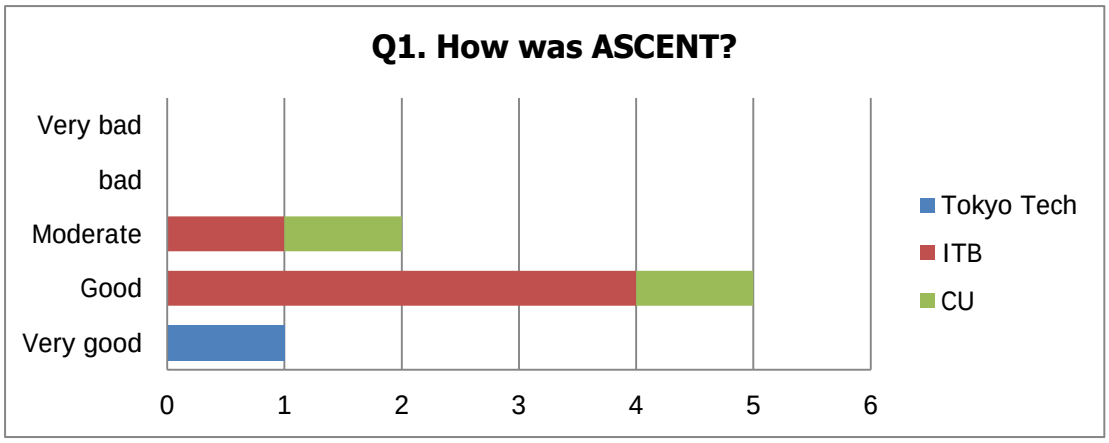
What do you want to be or do in (for) the future

I want to keep developing the technology for the benefit of the society, as Professor Kenji Kawashima said in his lecture.

Culture exchange etc.

I learned a lot about Japanese and Thai culture, and it is very interesting. I also got lessons about Japanese people habits and work ethics. It may be better if ASCENT program involves more than 3 countries.

Summary of Questionnaires



Q2:Reason

・ASCENT is a very interesting program because it has a quite good concept by combining intercultural learning and technology development discussion.

・The very first reason is that I never went to Japan before. Experiencing Japan, with all the style and funkiness, was really an interesting event in my life. And also my knowledge about robot itself is increased, more and more. All the experience, knowledge, and friends that I get in Japan are invaluable.

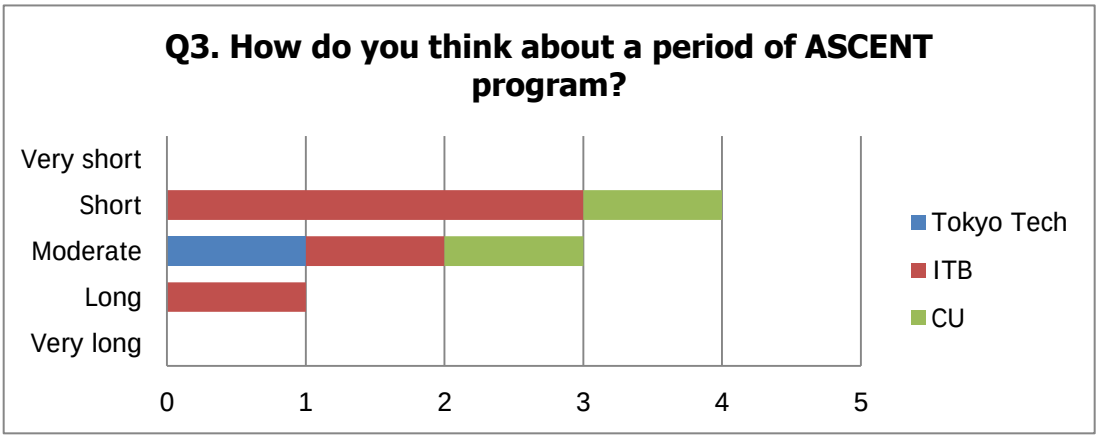
・Because I could learn many things about Japanese technologies in robotics, and it's really exciting because it corresponds to both my major and my future master course. Besides, I could get a lot of friends too by joining this program.

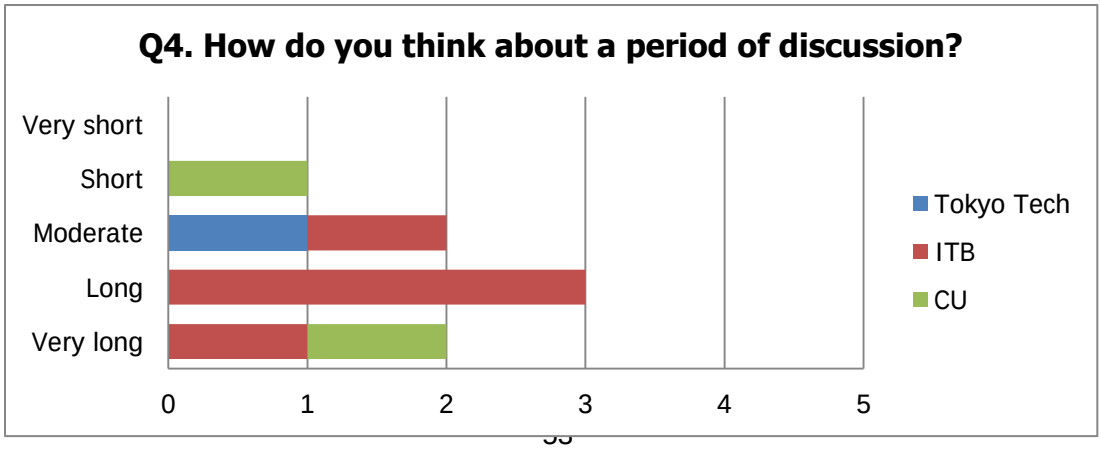
・I've seen many Japanese Technology. And I've learn many Japanese Culture.

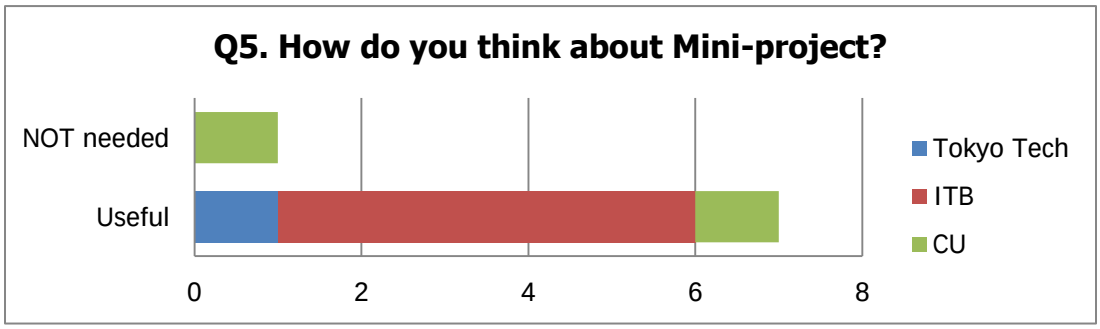
・I think ASCENT 2013 program is quite interesting, it enlarges my knowledge about robot technology since in my home country the growth of robot technology doesn't grow as fast as in Japan. The committee are so nice and kind, it's really a good experience for me.

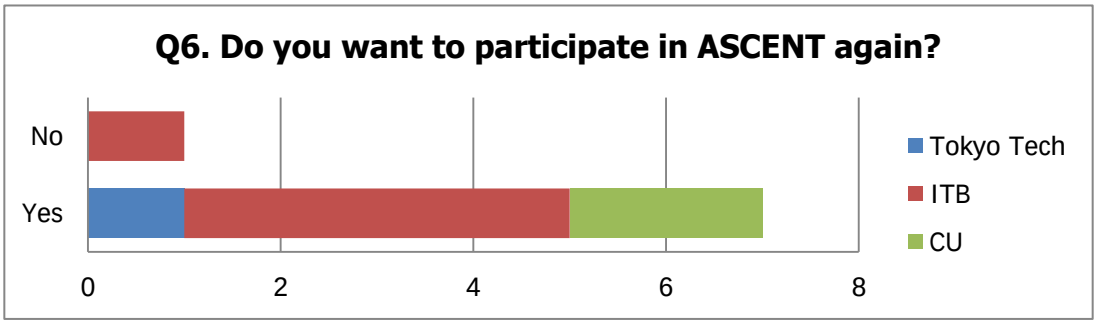
・The programs of ASCENT itself is adequate in my opinion. I got the chance to learn first things about robot even though it's not my major. The chance to mingle and socialize with ASCENT participants, SAGE staffs, and ex-JAYSES participants is also worth treasuring. And I really appreciate SAGE staffs for giving us such a great hospitality. The only thing ASCENT 2013 lacks is the number of participants. Hopefully in the future the number of participants will increase, as more number of participants means more diverse and exciting discussions and broader networkings.

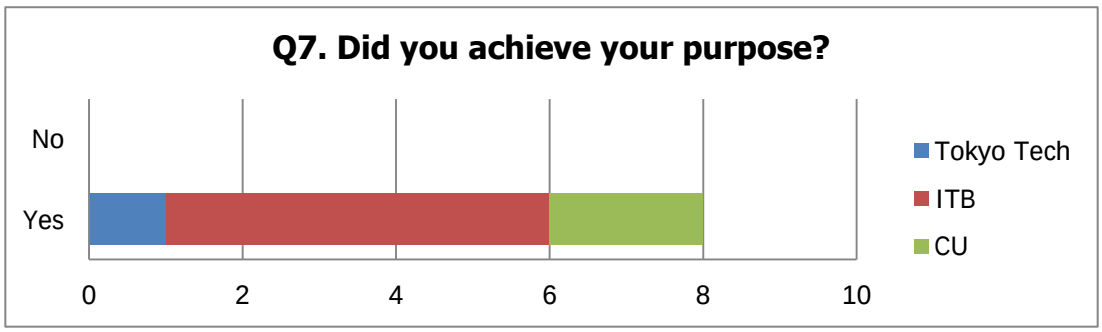
・It was a great opportunity to see the future problem of each country, to present things achieved through discussions in English.

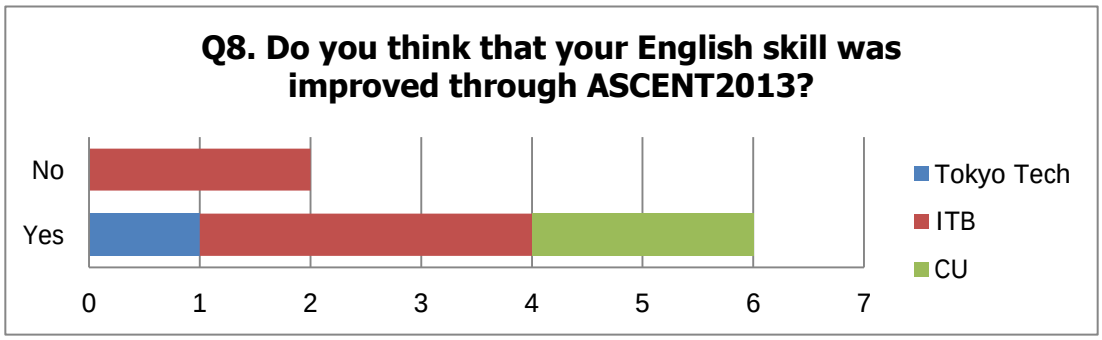


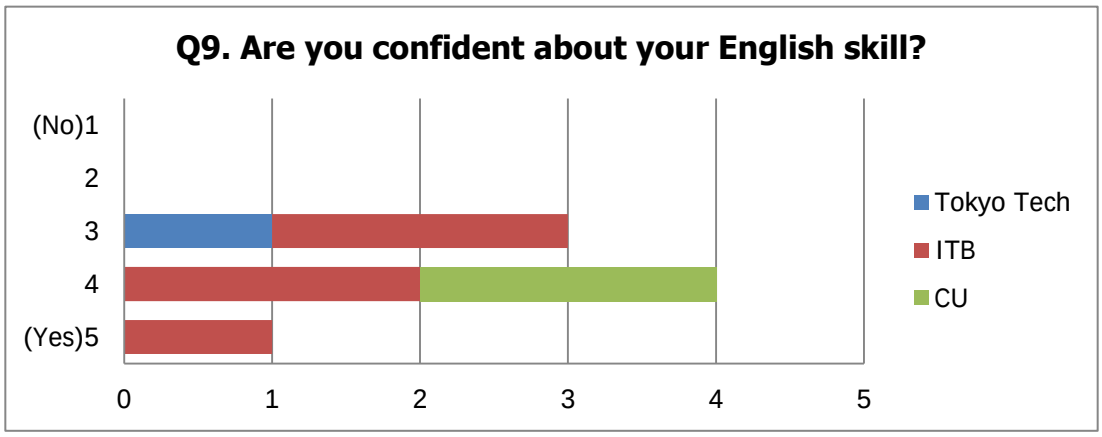


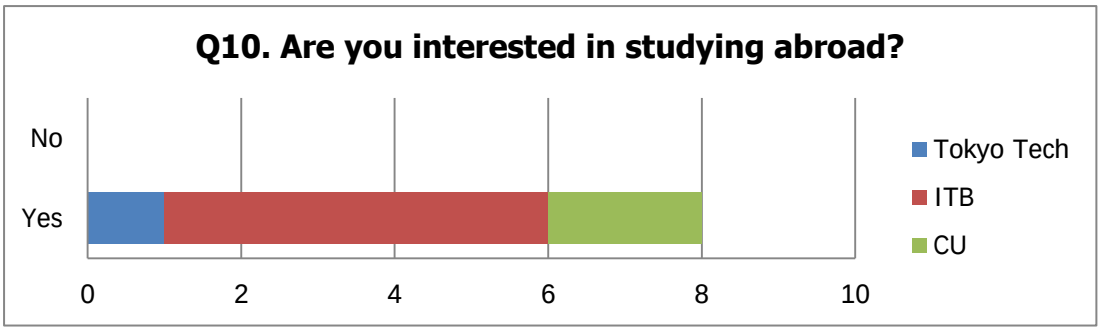

Q5. How do you think about Mini-project?
NOT needed
Useful
0
2
4
6
8
Tokyo Tech
ITB
CU


Q6. Do you want to participate in ASCENT again?
No
Yes
0
2
4
6
8
Tokyo Tech
ITB
CU


Q7. Did you achieve your purpose?
No
Yes
0
2
4
6
8
10
Tokyo Tech
ITB
CU


Q8. Do you think that your English skill was improved through ASCENT2013?
No
Yes
0
1
2
3
4
5
6
7
Tokyo Tech
ITB
CU

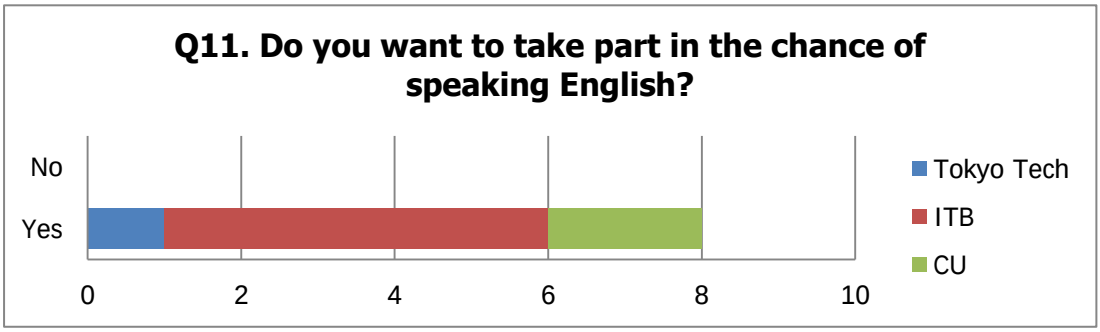

Q9. Are you confident about your English skill?
(No)1
2
3
4
(Yes)5
0
1
2
3
4
5
Tokyo Tech
ITB
CU

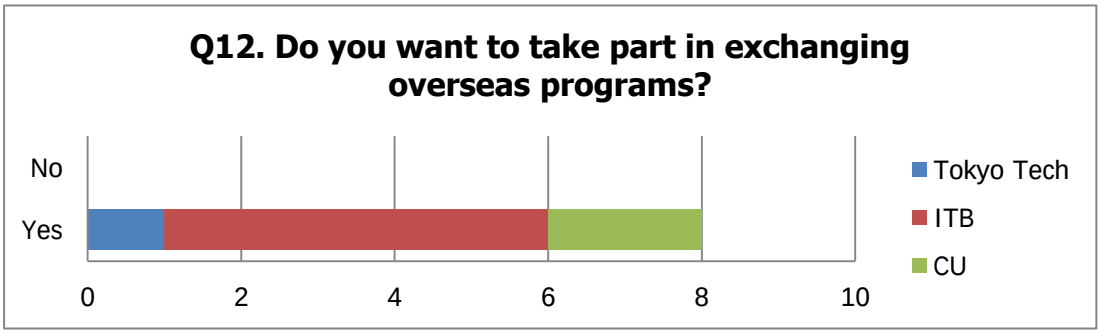


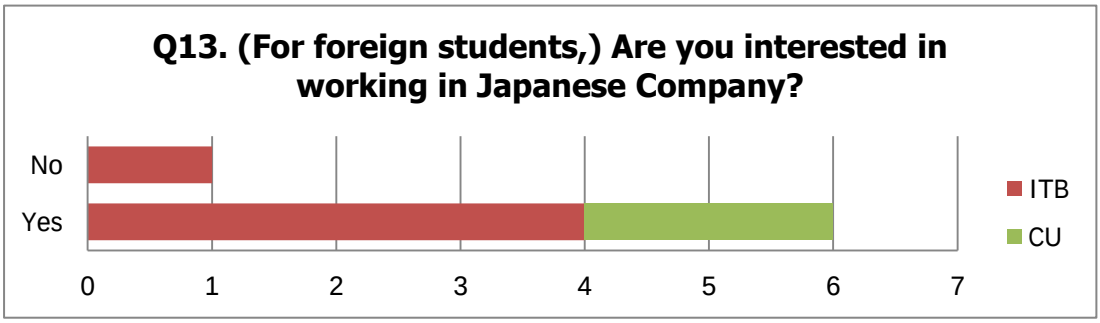
Where?

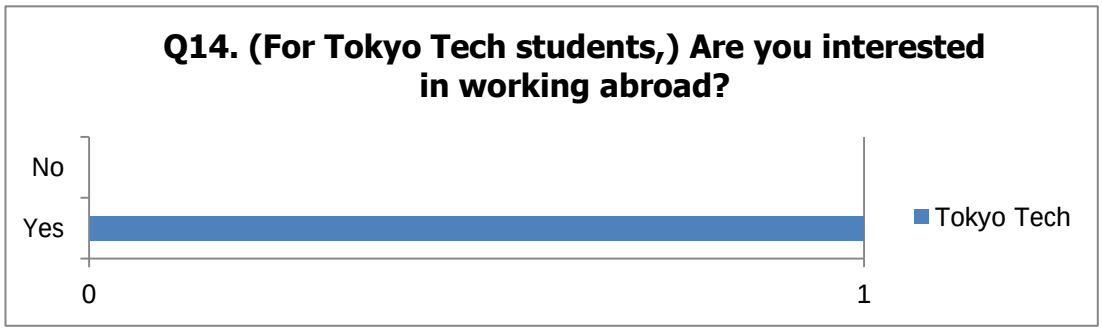
Japan, Korea, Australia, France, Norway, Netherland, UK

Not sure, not decided









Q16. If you have some comments, please write down here.

・I appreciate all the staffs who directed this great program. Thank you!

・I personally believe that ASCENT 2013 is a good program, but I think the length of the program can be shorten so schedule per day can be more compact. maybe in the future ASCENT program, the committee can add more cultural traditions, such as spend one or two days for learning Japanese culture, or maybe going out to Japan national museum of history.

・Thank you so much SAGE Committees, for the wonderful experiences ! :D

Anyway I have some comments that could be used for the next ASCENT program,

- About when we first come to Japan, it would be really nice if the committees would come pick us up at the airport. Because if I was a stranger in another country, especially if it's my first time in the country and I don't have any friend, it would be nice to have a little guiding from the program's committees. Fortunately, I have a friend who came to pick me up at the airport, so it's not really a problem for me ;)
- I really appreciate how the food is divided into halal and not, thank you !
- Also, it's really nice how you guys come to pick us up at the hotel everyday :)

Overall, it was a great experience, coming to Japan and joining the program. Arigatou !!

・Tuition fee is too expensive. In my humble opinion, it will be better if the SAGE staff can choose cheaper hotel/hostel with nearer location. It will be better if the number of participants can be increased, because 9 people are too little.

・Tuition fee is too expensive.

Only 9 people is too small.
Poor response from staff before the programming start.

・First of all, sorry if this comment is a bit long. I actually have some critics for you guys. First is I'm a bit confused as why there was no SAGE committee that welcoming us back in Narita Airport or in the hotel. I would love a heartwarming welcome from you guys.

Second, what I saw was that between you guys there were not enough coordination. Like when one of us asked something, most of the times the committee did not know the answers. Or sometimes like some people did not knew about all the rundown agenda.

Third, I'm a bit confused again why the committee sends us the guide book in the day of our flight. Because we already in Japan we did not knew where to print it nor we had the chance. But gladly, in the first day, the committee printed the guide book to all of us. But for me, the guide book would be very helpful if it was given to us long before our flight day. And last, it was really sad there were no people that send us back to Narita.

But I know that above all of that all of you are a generous, funny, sincere, and kind person. You guide us all in Japan safe and sound. And I also have some suggestion about ASCENT. First, I do not know if there are some ethic codes for giving the accommodation, but I think the hotel is too fancy for me. Because we just use the hotel for sleep and it's far from TIT. Hostel will be just fine for me. And if the place is near TIT the transportation cost will be reduced. You guys said that it hard for students to join ASCENT because it's expensive fee. You can reduce more from the accommodation and transportation costs.

Second, it would be very nice and fun if ASCENT is hold in January, June, July or August. Because those months are Indonesian university student's holiday. And I actually a bit sad because there were not many people in TIT. As a foreign student, I want to experience Japan's university feel, with many other Japanese students.

That's it from me. Thank you very much for the hard work and kindness that you gave us. Take care.

・Invite more countries. More countries will engage more open discussions and bigger network, aside from more participants.

Invite more universities from each country.

Make sure the information and publications about ASCENT is well publicized in the future.

For next year's ASCENT, I think it'd be better to pick a theme that could engage a more general discussion and issues that is really happening, especially in developing countries, like climate change issue, energy sustainability issue, and so on. Because I think themes like that are really thought-provoking and the discussions will result more impactful and beneficial outputs.

Aside from more impactful and beneficial outputs from the program, more general themes will attract more students to join this program.

If the program's theme is specific, then it'll be better to also invite related extracurricular organization in the invited universities. For example, if the theme is about robotics, it'd be better to invite Robotics Extracurricular Unit in ITB also.

For the final presentation, hopefully more people could be invited, to trigger more interesting discussions and practice our presentation techniques.

[Minor improvement] Make the certificate more official, by putting SAGE's advisor's signature, for example. This way, the certificate will have better values.

Memories

Industrial robot

ASCENT2013

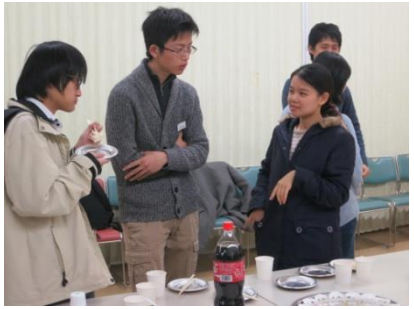
Perfecting Presenting

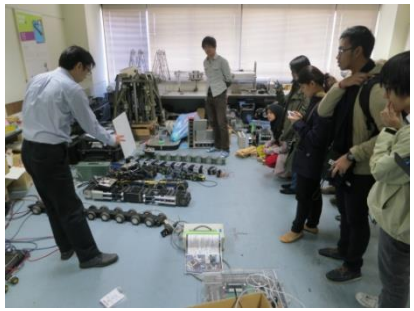
Manually working robots

Exploration

Application
IBIS

SWOT Analysis
Location: Hitachi at Ibaraki, Japan





Current Application
HAL
nursing
Case: Minor Severe

Necessity of using robots

Closing
Ceremony