21st Century COE of Flow Dynamics
F2005 International Internship Program
Achievement Report

Date: August 26, 2005

Name: Lae-Hyong Kang

Academic year: 1st year, Ph.D candidate

Department: Aerospace Engineering

Institutions: KAIST (Korea Advanced Institute of Science and Technology)

Research topic in International Internship Program:

Smart Material Based Fluid Sensor for MAV Application

Accepting supervisor in Tohoku University: Professor Jinhao Qiu

Period of Internship: 19 / 06 / 2005 ~ 20 / 08 / 2005
Day Month Year Day Month Year

Date	Itinerary during your stay in Japan (places of visit, etc.)
June 19	**Arrival at Sendai**
June 20	**Attending Intelligent Systems Laboratory**
June 30	**Welcoming party with members of Intelligent Systems Laboratory**
July 19-20	**Jinja(神社) festival**
July 30	**Korean food party with Korean friends of Institute of Fluid Science**
August 05	**Visiting various laboratories in Tokyo Institute of Technology**
	Welcoming party with TIT and KAIST members
August 06	**Attending 2nd Tokyo Tech-KAIST Joint Workshop**
August 07	**Visiting Tokyo Metropolitan Government Buildings, Harajuku, and Rainbow Bridge, etc.**
August 08	**The last day of Tanabata(七夕) festival(8/6-8/8), Purchasing Yukata**
August 10	**Going around Sendai (especially, Seeing whole of Sendai in SS30)**
August 11	**Farewell party with members of Intelligent Systems Laboratory**
August 12	**Visiting Aoba castle and Zuihoden**
August 13	**Travel through Matsushima**
August 20	**Return to Republic of Korea**

Outline the scientific activities you conducted while in Tohoku University (e.g. experiments, discussions, research trips)
My major is aerospace engineering and I am very interested in smart materials and structures. So, I wanted to know how to fabricate smart materials and to do it by myself when I stayed in Tohoku University. In Prof. Qiu's Laboratory, there were many experimental devices for making PZT material (one of the best smart materials) and previous researchers had already made different kinds of PZT ceramics and PZT fibers. So, at first, I started to make PNN-PZT powder and then I made PNN-PZT fiber successfully. But, some devices had problem because nobody used those machines and the devices were moved from another room after graduation of previous researchers. In spite of these problem, thanks to Mr. Gael, I could get many fibers and check them to confirm a possibility of use. During a test, I found something important to have an experiment. (I'm telling what you already know.) It is preparations for a test (including make a schedule) before we have an experiment. Also, cooperation with previous researchers. Actually, Mr. Park and Mr. Nagai gave me a lot of advices and guidelines. I appreciate their help and cooperation. After making PZT fibers, I wanted to test them as a fluid sensor. So, I checked the output signal from fibers using DSP board. But, I couldn't perform the wind tunnel test in Tohoku University. Now, I'm in Korea and I can use wind tunnel in KAIST. So, I will give you further information about my research when I have a good result. I had a research trip. I visited Tokyo in order to attend TIT(Tokyo Institute of Technology)-KAIST Joint Workshop. While in Tokyo, I had a lab-tour at TIT and travel around downtown of Tokyo. Also, I presented my research work to TIT members and had a great party with them after workshop.
Give your impressions of the present state of science in Tohoku University in your field

In my opinion, the technique of smart materials in Japan is the most famous and best over the world. Researchers also made an effort to get better smart materials and continuously they spend more time to study. And, to tell the truth, I wondered the PZT fiber before I saw them. How did it work? I thought it was amazing! I think the first researcher who developed this kind of fibers was very clever. Although it has some defects, I think they can be overcome because there are many people to investigate them, to optimize them and to develop much better way to make them. And I was very impressed that there were many kinds of experimental devices in Tohoku University. Some devices are very expensive ones. In addition, there was a technician in Prof. Qiu's Lab. so students could make various kinds of experimental setup without any difficulties. I think that's very convenient system. In sum, the experimental environment in Tohoku University is very good for students and researchers. Also, for me.
Give your future plan of submitting a paper
If I get some good results, I will submit a paper about an application of PZT fibers in the future. But I didn't plan to submit the paper this time.
Give 21st Century COE of Flow Dynamics your comments or suggestions particularly with regard to the internship program
First I appreciate your help. Thanks to your support, I had a good chance to stay in foreign country and could stay in Japan very comfortably. Ms. Konohara always informed me of my schedule and solved many things when I had some problem or questions. Thank you again!
General impression you had of Sendai and Japan during your stay
Most of people live in the city nowadays so we don't get to see much nature. But I was very impressed Sendai has many beautiful place to take a rest. And I'd like to talk about traffic. I think most Japanese keep the traffic signal very well and drive a car very slowly and safely. Although I saw some people didn't keep the traffic signal at night, most of drivers seemed to think 'after pedestrian'. So I was very comfortable on the road. Also, everywhere including the road, inside of building, etc. was very clean. When I visited Tokyo, I didn't know how to get to the place where I want to go. So, I asked to many people of the direction using my poor Japanese. Everyone was very kind and someone, especially, guided me pleasantly. Without their help, I might not reach my destination. Japan is very close to Korea so I want to be back in Japan. I think Japan is a really good

and advanced country.