
2005 Co-op Japan Experiential Report

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Brief History of the Company

Advanced Telecommunications Research Institute International (ATR) was founded in 1986. It was established to conduct research and development in the field of communications. The company is located in Kansai Science City close to Nara city and currently consists of eight laboratories, some of which have only been set up in the past 3 years. The eight laboratories are: Spoken Language Communications (SLC), Adaptive Communications Research (ACR), Wave Engineering Laboratories (WEL), Human Information Science (HIS), Network Informatics (NIS), Computational Neuroscience (CNS), Media Information Science (MIS), and Intelligent Robotics and Communications (IRC).

The research that takes place at ATR varies from neuroscience applications to language translation innovations to integrating communication robots into daily life. The company consists of around 390 researchers and employees from around the world and conducts research using state-of-the-art machines. Funding is achieved through industry and academia in addition to the Japanese government.

Led by President Nobuyoshi Fugono, ATR hires world-class researchers from across Japan and across the world and is often included in joint research with other institutions, companies and universities. Many papers are published from these laboratories making ATR well-known in many research fields. Visiting researcher talks are frequent and are often in English to accommodate ATR's high percentage of foreign employees.

ATR has been recognized as a center of excellence and has had such decorated visitors as the Emperor and Empress of Japan as well as the Prince and Princess of Japan among others.

ATR continues to push the envelope using science and technology in innovative ways to help society live in greater comfort into the 21st century.

What My Department Specializes In

The department that I was assigned to was the Intelligent Robotics Communications Laboratories (IRC) directed by Dr. Norihiro Hagita. Within IRC, there are several subdivisions: the Robovie Project, the Networked Interaction Therapy Project, and the Network Robot Project. IRC does research into the three areas of developing a robotic community: visible robots, virtual robots, and unconscious robots. Their vision is to integrate robots into the daily lives of humans. Teams of robots who can communicate with each other as well as pass information back to a main server has already been tested with the recent Science Museum experiment in Osaka. The Robovie division, led by Dr. Hiroshi Ishiguro, concentrates mainly on the visible robots and how they interact with real people.

The department covers a good portion of the 3rd floor and is one of the larger departments of ATR. The workspace environment is very hands-on as the robots people work with are tested in the lab. The lab benches are littered with RobovieM robots walking back and forth and the one can often here Robovies talking while being tested. Recently, the group brought several robots to Expo, held in Aichi, Japan. Audiences were wowed as they saw a human-sized RobovieII and a small, 30cm Robovie work together to build blocks. The show was a great success and generated a lot of attention, especially from children lucky enough to get a seat for the show. A version of manzai (a Japanese comedy show popular in Kansai) performed by robots was also a big hit at Expo.

Most of the work done in IRC is programming based as the actual building of the robots is done by another company. The group consists of friendly people who regularly have parties to thank interns and workers who are leaving and often hold barbeques to celebrate the completion of expositions and important conferences.

My Responsibilities

My responsibilities were varied and involved the use of many skills. All the tasks were centered on the development of Robovie4, one of the newer robots that ATR owns. The tasks were mostly related to the many sensors the Robovie uses to sense his environment.

My first task was to test a new laser distance ranger to see how accurate it performed under various lighting conditions and sizes. Several targets of different colors were made and a series of experiments were run. The result was a much better understanding of how the laser ranger 'sees' the office environment.

What makes the new Robovie different from the previous versions is that it is completely covered with a silicon skin. There are 56 pressure sensors laid out across the skin which allows a whole new level of sensory to the environment. In addition each skin sensor can sense the type of touching applied. It can differentiate between a regular touch, a hit, and whether a human hand is at rest over the sensor. I was asked to find the threshold values for each individual sensor. After calibration, I was asked to make several reaction gestures to react to certain sensors touched a certain way. For example, if a person hits Robovie on the head, he will say that it hurts and hold up his arms in defense. However, if he is rubbed on the head, the sensors know that the person thinks that Robovie is cute and a different gesture is loaded.

Because the third floor of ATR functions as Robovie4's home, it must know the environment very well. I was therefore asked to digitize the IRC half of the third floor of ATR. The mapping software was specially written for Robovie4 and using that, a map was constructed including all walls, desks, doors and appliances. Robovie4 can use a technique of map matching so that he always knows where on the third floor he is. Also, a window can be easily called which shows Robovie's position in real time. Location and waypoints were also included into the map so that Robovie can know, for example, where a certain person's desk is located and which path to take to arrive at that point.

What I Have Learned

Through the assignment of various tasks that required computer usage, I learned a lot about large scale programming and building a humanoid robot from the ground up. The first day on the job, I was asked to setup my laptop with a dual-boot Linux and Japanese Windows. Luckily, I was allowed to install an English Linux. Having only used an older version of UNIX, I learned to become proficient in Suse Linux. It turned out to be a much better environment for programming in and I will definitely use it over Windows for personal use in the future.

The languages used to control Robovie4 that I had to work with were C++ and Lua. My supervisor and co-workers were extremely skilled in both languages and could help me with any problem I had. Also thought editing the existing RobovieII code, I was taught standardized formatting and how to edit files quickly using the emacs editor. I realized how powerful emacs really was because although I had used it before in school, the course did not go into any depth teaching how to use it effectively.

Another very useful and very Japanese skill that I grew accustomed to was working without a lab bench and a large table. I am definitely more space efficient than before and came to appreciate how much can be accomplished given minimal working area. The workspace was usually just the floor space beside the robot. The Japanese people are traditional known to kneel a lot and that culture crosses into the workplace often. The research laboratory I worked at before had lab tables that allowed one to work comfortably while standing and had high chairs to accommodate the tables. It was the opposite here as table space was not abundant. Often I found myself sitting cross-legged on the ground working on my laptop, which often only lasts me 5 minutes before my legs get numb. Much to my surprise, many computer setups in and around the lab were on the ground, monitor, mouse, and keyboard. Many of the researchers preferred it that way and it was something I found very hard to emulate.

How It Applies To My Academic/Career Goals

Having chosen Engineering Physics as a major, I wanted to gain a variety of skills especially ones that relate to my interests. One of the topics that ranked high on my list of potential careers paths was robotics. Ever since I saw Honda's ASIMO robot walk a few years ago, humanoid robotics was something I that highly interested me.

I have always wanted to work on projects that benefit society. It was the case with my previous co-op term in developing a lighting system to save electricity and this time, for my second co-op term, I was given the opportunity to help develop a robot that relates directly to people.

Because Robovie4 is still in its early development stages, its purpose to society is still undefined at the moment. Still, it gave me a chance to see exactly how much work and co-ordination it takes to develop such a complicated robot.

I helped out with a few mechanical tasks and it was really interesting to see the real innards of a moving humanoid robot. I tried to compare it to how I built my rescue robot in PHYS 253 and found many differences as well as some similarities. Thinking back, I would have definitely made some changes to my robot especially with the wiring, particularly how well the wiring was organized on Robovie4. It was also great working with the main mechanic of Robovie4, Dr. Iwasaki, as he seemed to come up with endless innovative ways to modify the robot using only a limited number of tools and working on floor-space not much larger than a square meter.

This placement has opened up my view of robotics and introduced me to many sensors that I did not know existed. Having to integrate all the sensors and movements of Robovie has made me realized that to work in the field of robotics, one must be a jack of all trades. It really tests out every skill from programming to mechanics to electrical knowledge. It really made me glad that I chose the major that I did. This work placement has further confirmed my preference for the engineering side of Engineering Physics.

Relationship with Supervisor/Coworkers

I was given my own desk and workspace with which to work. I was situated around a group of graduate students from Osaka University who have graduated with a similar degree as the one I hope to obtain. We grew to become friends and they were always willing to lend me a hand whether it was locating where certain equipment were stored or translating a webpage of a restaurant I wanted to eat at. Through daily contact, they helped me a lot with the improvement of my Japanese and I tried to help them as much as possible with their English.

At ATR, there are a lot of sports teams such as soccer, badminton, volleyball, etc. I chose to join the soccer team and got to know a lot of people who work in other labs through playing pickup games. It was a much easier way to meet the locals than trying to start random conversations on the company bus. The spirit was always on enjoying soccer and the skill level was accommodating to everyone.

With ATR being such an international company, fellow internship students come from such countries as France, Germany, and the USA. Most of the students were housed in company housing so it was quite convenient to meet up and hang out together. Being in Japan can sometimes be quite daunting by yourself not knowing the language and being so far from home. The other interns provide a comfortable base to fall back on and often will be in contact even after leaving Japan.

Dr. Mitsunaga and two other senior researchers, Dr. Yoshikawa and Dr. Iwasaki were my direct supervisors. They were all extremely bright, hard-working and friendly people. They always had a smile on their face and took their time to help me with my tasks. I felt very fortunate to have them as supervisors as I learned a lot just by observing how they work. They were all skilled in English which made misunderstandings, which are common in international placements, minimal.

Living Arrangements

Living space was one of the biggest surprises to me. After hearing countless stories about the general cramped apartment spaces that CJP students were given, I was shocked to hear that I would be living in a multi-room 60 square meter apartment unit with only one other roommate.

The unit included a full kitchen and was fully furnished with desks, air conditioners, and a television among other things. I was also really happy to hear that I would be sleeping in a futon on top of a tatami mat room, one thing that I would never have a chance to do anywhere else in the world.

The location of the apartment is very convenient as it provided easy access to all three of the major cities in the area, Nara, Osaka and Kyoto, while being situated in a small and quiet town. Big malls and the bustling city of Osaka was only a half hour train ride away. In contrast, Nara and Kyoto were even closer and offered many temples and cultural sightseeing options.

Transportation to and from work was also very trouble free. A company bus arrived outside the apartment complex and drove straight to work in only 12 minutes, much shorter than many of the other students who had to commute almost an hour to work every morning.

ATR does a great job in making sure that its students settle in quickly and are well taken care of. A dedicated SHIEN department is provided and will answer any questions that arise regarding just about anything. They take new employees back to the apartment on the first day of work and show them useful skills such as shopping at the supermarket and figuring out how to operate the washing machine.

There exists a small shopping complex next to the station only five minutes on foot from the apartment. It was extremely convenient because most living necessities could be purchased without even having to take a train. There is the ever important 100yen shop, grocery supermarket, photo center and bookstore. Also within walking distance is a Lawson's convini, a ramen shop and in my opinion, the best takoyaki I have eaten in Japan.

Cultural Experience

Besides the great companies that Japan offers, traveling to see the country is absolutely amazing and the most memorable part. Being a country that is a vertical strip, Japan offers many types of climates. One can choose from the Hawaii-like beaches of Okinawa and ski the slopes in Nagano.

During the summer, it felt very tropical with moisture in the air and about 35C weather. This was matsuri season and there were many fireworks and festivities. During the fall, I was lucky enough to have participated in a mikoshi parade for the local town. It was the first time the town invited foreigners to help carry the two hundred year old mikoshi structure. We were given headbands, traditional jackets and several towels to pad our shoulders with. Each carrier loads about 100lbs and the carriers switch often. My shoulders were dark red the next day but it was a great honour to be invited to participate in something as cultural as a parade. Everyone in the town was in high spirits even though it was a cloudy day and really showed us what it meant to be a community.

One definitive feature of the Japanese people was that everyone was eager to help. I was not at all nervous about asking for directions and always felt like the person was trying very hard to give an honest response. It was really amazing to see how the people almost took it upon themselves as their responsibility to help you get to where you want to go.

Of the two scenic seasons I was told that Japan is famous for, maple leaves and cherry blossoms, I was only able to see one of them. I was skeptical at first as to why the Japanese people made such a fuss about some leaves changing colour. I thought it was just like autumn back home in Vancouver which is pretty, but not something the country looks forward to every year. I decided to join into the festivities and it was absolutely beautiful. At first I was not sure whether it was just that Japan's trees were brighter in colour or I just never chose to notice the trees back home.

Advice to Future Students

Generally everyone comes to Japan for the same reason, to experience independence and to have as much fun as possible in a foreign culture while gaining valuable work experience. As much as you learn about the Japanese culture, you in turn are trading your culture with your supervisor, co-workers and everyone you meet and in the end, everyone benefits. Keep in mind that you are extremely lucky to have this chance. The majority of people travel the whole of Japan in one or two week spurts which is quite tiresome and a lot to take in a short while.

Traveling on weekends while working weekdays, not to mention the extra financial support, truly enhances your ability to absorb in everything Japan has to offer.

Being students, one really has to do a lot of research to find cheap ways to travel and generally, manage a tight budget. Japan is not the cheapest place to live but there are certain things one can do to lessen the damage done to your bank account. Watch out for the train fares as they can add up really quickly without you knowing and that is where a large chunk of your change will end up. Cooking for yourself is one surefire way to save money. Not to say that Japan has bad food, it has some of the best food in the world, but eating in the company cafeteria day in and day out will get tiring and expensive very fast. Who knows, you may grow to love cooking as much as I did.

Another point to be aware of is that Japan is very seasonal. If there is something, especially clothing, that is to your liking, buy it because the turnover time is very quick. One regret that I have and kick myself for was holding back on those coveted Japanese t-shirts. I thought I could wait until a few months before my departure and then purchase the best ones. Much to my chagrin, October came and stores no longer sold t-shirts anymore and I was left in the dust. However, because the turnover time is quick, one can often find cheap electronics that are no longer the newest thing in Japan even though they just came out in Canada.

Overall Impression

The Co-op Japan experience is definitely one of the best decisions I have made in my life. The initial cost and the whole thought of being away from family and friends for 7 months was originally a little overwhelming. But from day one, I have experienced nothing but kindness and acceptance.

However, Co-op Japan is definitely not for everyone. It is for sure the best way, in my opinion to experience Japan but one has to accept Japan for what it is. It may have some quirks and is quite an expensive place to live in but in the right mindset, it will reward you left and right. It took a little getting used to but trying to think like a Japanese person was definitely one of the most interesting aspects of it. In addition to learning about another culture, you get to know a lot about yourself.

I would like to continue studying the language and one day return to Japan for an extended period of time. I would also like to come back to do some more traveling as the entire upper half of Japan has yet to be explored. Another lasting impression that I will take back with me is trying to be a tourist in one's own country. I talked with many people about the sites that I had visited while interning in Japan and the most common answer was that they had never been there before. The ones who had visited Canada raved about its beauty while I often thought it was somewhat boring country. I definitely grew to appreciate my home country while being away from it.

All in all, I couldn't have had a more enjoyable seven months meeting new people, many of who I will try hard to keep in contact with, and experiencing living in a foreign country. Working with humanoid robots was definitely something that I thought was not possible in the middle of an undergraduate degree and am exceptionally grateful to have had the opportunity to experience. Thank you to everyone who helped make my trip so memorable.