



Internship Experiential Report

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Company Overview

Located in the capital of Wakayama Prefecture, Wakayama City, Taiyo Industrial Co., LTD. (hereafter referred to as Taiyo) was established in 1960. Taiyo specializes in Flexible Printed Circuit Board (FPC) production and defect detection technologies.



History

Taiyo started off as a company that manufactured, engraved and electroplated textile printing rollers destined for export to the United States. From 1981 onwards, Taiyo started advancing in PCB manufacturing, building facilities to produce Flexible PCBs, and creating quality testing machines for PCBs. Seeing success in the PCB inspection machinery, a department dedicated to PCB inspection research and development (Test Systems Department) was created. Over the years, the Test Systems Department has developed multiple circuit board testing systems, both physical and visual.

Products and Services

As the PCB development department experiences very low turnover times, they specialize in quickly developing prototypes for research and development departments of other companies. The flexible circuit boards developed by Taiyo are mainly used in mobile devices, such as phones or digital cameras. The Test Systems Department is actively engaged in researching new PCB inspection technologies to speed up inspection times while simultaneously reducing cost. Physical defect inspection systems like the DG/DS were created to test functionality of tested circuits, while visual defect inspection systems like the TY-VISION were created for faster inspections of any visible defects. This second type of system is the section in which my internship took place. Thanks to the accumulated efforts of fellow intern Marc and I, we have successfully created AIs capable of significantly speeding up the defect detection process. These AIs are now being tested in real-world situations and environments.

Internship Overview

Department Roles and Responsibilities

During my 12-month internship, I was placed in the Test Systems department. This section of Taiyo is responsible for developing and selling the DG/DS systems as well as the TY-VISION series systems. Dividing the department in half, there is a separation between the physical test section (DG/DS) and the visual test section (TY-VISION). While the visual test products are still seeing upgrades and improvements, the physical test section limits itself to production and maintenance of products.

My Role in the Department

Unlike many previous interns at Taiyo, I was not given multiple projects to work on during my internship, but rather one long-term project to work on for the entirety of my stay in Japan. I worked with the visual test section team throughout this project. Prior to my arrival, Marc had started working on the groundworks for an artificial intelligence system that would optimize defect detection time by detecting real defects and ignoring false positives that the TY-VISION system would create. For the first 4 months, I worked with Marc to find the most efficient ways to create AIs and seamlessly implement them in the already existing TY-VISION environment.

After having successfully implemented the AIs in the TY-VISION system, I moved on to compatibility checking. Taiyo has multiple versions of its products currently in use by clients. This includes older versions that use programming languages that are no longer compatible with their newest products. To allow all of Taiyo's clients to benefit from this new AI technology, I was tasked with converting all the code Marc and I developed in the TY-VISION software to the oldest version still in circulation today.

To collect data from off-site locations to train AIs with, I was tasked with creating a program that collects and sorts the necessary files as quickly as possible. For the remainder of my internship, I worked on making the Deep Learning program (DeepTaiyo) more user-friendly and streamlining the whole process, while documenting the code previously written to allow other employees and future interns an easier time understanding its functionality.

Work Environment

For the first couple of months, I worked at a desk on the second floor of the Test Systems Department's office. Later, I needed to test out the code I wrote and so I moved to the first floor of the factory, where the test systems are built and tested. The office setting was very convenient when discovering the project that I was working on, as it is an open office and anyone I needed to ask a question to was always sitting nearby.



Work station for the majority of the internship

One aspect of working at Taiyo that surprised me was the amount of meetings. My past experiences made me expect maybe 1 meeting per week, however at Taiyo there was a minimum of 3 meetings per day (I would participate in the last two). The first meeting was between the managers of the Test Systems Department at the office level, ending with them saying the company philosophy chant. The second was with the members of the subsections of the Test Systems Department where the manager of said subsection would announce any new information such as who is on vacation, on a business trip or on sick leave. This meeting also ended with everyone saying the company philosophy chant, while being led by someone different each day. During the third meeting all the developers, both for the physical and visual test sections, and I would descend to the factory level. There, we would explain what we had accomplished on the previous day or week and what we planned to do on the present day.

Occasionally, there would be a fourth meeting where Maeda-Jichou, Satomura-Kachou, Uemura-Kachou, Tanizawa-San, Marc (for the first four months) and I would discuss the direction of the Deep Learning project and what changes needed to be made. While Marc was still at Taiyo, he would translate parts of the meetings that weren't clear to me. After Marc returned to Canada, I had a bit of trouble understanding what was being asked of me during these meetings, but my supervisors were very patient with me and this motivated me to learn Japanese even more.

Knowledge and Skills Acquired

My internship at Taiyo was my first ever internship and at first I was nervous, wondering if my lack of real-world experience would prevent me from performing well. However, everyone was very patient with me and they mostly let me decide for myself when I would finish the tasks I was working on. This allowed me to research topics on which I had little or no knowledge and experience. My tasks mainly involved programming in C++, Halcon, Javascript and HTML, while using JSON and CSS to make the code easier to write. While I had university level experience with C++, I had never used any of the other languages and tools that were involved in the Deep Learning project. The user interface elements of this project were a great learning experience for me, allowing me to find out for myself better ways to interact with users of my programs. I can say with confidence that my skills in these programming languages have greatly increased, as I can now give much better estimates of the required time to accomplish a task and I am able to map out the necessary steps to take much quicker than I used to.

Working with the TY-VISION software was a challenge at first, as there were tens of thousands of lines of code that I was unfamiliar with. With the help of Marc and Tanizawa-San, I was able to develop debugging skills that allowed me to locate a piece of code that I wanted to edit. School projects were often small and didn't necessitate much teamwork. In contrast, the projects at Taiyo were much bigger, both in size and in teams. This allowed me to improve my teamwork skills and gain experience with the software versioning and revision control system "TortoiseSVN", merging my work with the previous versions.

Working with artificial intelligence was not something I was expecting when I applied for this internship, but I am very grateful that I had a chance to experiment with Deep Learning. I had very basic knowledge of AIs at first and creating error segmenting AIs for images allowed me to gain a deeper understanding of Deep Learning and artificial intelligence as a whole. I discovered how interesting AI can truly be and I am now considering pursuing a career in this domain in the future.

While my Japanese language skills are not where I would ideally want them to be, I cannot deny that I am much better than I was when I first arrived in Japan. My initial lack of knowledge of this language really motivated me to learn fast, as nearly everyone in Wakayama spoke to me in Japanese. There are still the occasional misunderstandings here and there, but communication is much smoother after a year fully immersed in Japanese.

Of course, all these skills I've acquired have motivated me to try even harder when I return to Canada to continue my electrical engineering degree, having had a taste of the engineering experiences that await me. The values of hard work and efficiency held by Taiyo will no doubt stay with me when I move from the academic world to the professional one.

Life In Japan

Living Arrangements

The dorm house I lived in during my internship was located behind one of the company buildings and it took about 5 minutes to get to work. The dorm room provided was much more spacious than I expected, with all the necessities available in the house. There was even a massage chair in the main shared area that we could use whenever we wanted. This main shared area acted as a kitchen, dining room and living room for my fellow housemates and myself.

For the first months, Marc and Hai (another foreign employee working at Taiyo) lived in the dormitory with me and we would eat lunches and dinners together. Lunches were available at the company cafeteria, where 3 different choices offered themselves to us every day. However, my favorite meals by far were the dinners cooked by Ueda-San, one of the sweetest people I have ever met in my life. These dinners were served at the girls' unoccupied dormitory close to the company's main entrance after work. Every day, she would cook us something different and it was always delicious. It was always fun chatting with her during these times.



Bento dinner that Ueda-San made me when I got sick

Occasionally, company guests from other parts of Japan or Asia would stay in the dormitory and this was always a good chance to talk to people from different backgrounds and cultures to my own.

Life in Wakayama

Residents of Wakayama often asked me why I chose to come to Wakayama, saying that it was much less interesting than more popular prefectures like Tokyo or Osaka. However, the more I explored this prefecture, the more their words seemed to be disproved. I came to Japan to experience the living culture and Wakayama's much more relaxed pace and lack of masses of tourists allowed me to take my time in exploring everything that caught my eye. The beaches of Wakayama were leagues ahead of what I had experienced in Montreal and I tried to visit them as often as possible during the summer. Overlooking the city, Wakayama castle was the most pleasant castle that I've visited, almost having the whole castle to myself. To the east lies the famous Mount Kōya, where I attended the Aoba Matsuri (Festival of Kobodaishi's birthday). The prefecture's western island of Tomogashima proved to be one of the most interesting places I visited, filled with old military ruins and beautiful sights.



Tomogashima Island

On Sundays, I would usually go to the Big Ai (ビッグ愛), where they hold Japanese language and culture classes. This allowed me to improve my Japanese skills and understand the special holidays, events and cultural norms that we don't have back in Canada. These classes were so worthwhile that I kept taking them for the duration of my stay in Japan.

Taiyo provided me with a bicycle from the beginning of my internship and this gave me the chance to really explore the city the way I wanted to. During the warmer months, I biked to the far ends of the city, reaching Marina City, where they hold many festivals and events, such as whole tuna cutting shows and the *Yosakoi*.

Another plus is that Wakayama is a fairly central prefecture and although most of my free time was spent in Wakayama, travelling to other places in Japan was very easy and convenient.

Travel

Taking advantage of the convenient travel options, I used night buses, trains, *shinkansen* and low-cost flights to get to all the destinations I wanted to visit. To avoid weighing down this report with too much information, here are some photo highlights of my travels outside of Wakayama:

- Okinawa



- Kyushu



Festival preparations in Fukuoka | Kumamoto Ramen

- Hiroshima



Hiroshima Atomic Dome | View from Miyajima island

- Kobe



Port near the center of Kobe | Kobe beef

- Osaka



- Kyoto



- Fukui



Tojinbo | Ominato Shrine

- Kanazawa



Kanazawa Station | Kanazawa Castle

- Shirakawa-go



Cultural Experiences

Being a part of Taiyo, I had the chance to experience Japanese business culture in ways I did not expect. Every Wednesday, all employees, including interns, cleaned their respective working areas, while garbage was collected, separated and weighed to keep track of company waste. This was not something I was used to in Canada, but I grew to enjoy these moments and now I find them to be quite relaxing. A few weeks after my arrival, they held a welcome party for all the new employees and myself at a restaurant. There, we ate and drank while socializing and meeting the people I would work with for the next year. I also participated in parties held for New Year's and for a coworker's retirement. After New Year's, Taiyo handed out *zenzai* to all employees to celebrate the company's new year. All the new employees and I took part in a bowling tournament with other companies from Wakayama, and I ended up winning an electric kettle.

One of my favorite memories of Japan was participating in the *Yosakoi* and the *Bundara* which are part of the summer festival *Odorunya*. I am forever grateful to Taiyo for allowing me to participate in these events. The main events take place at Marina City and around Wakayama Castle, bringing together people from all over Wakayama and the surrounding prefectures. During this event, teams of volunteers dance a special choreographed dance with their custom costumes. Taiyo employees start practicing for this event from June to August and then perform in front of thousands of spectators. At the end of the *Bundara*, all the participants gathered in a big hotel hall and we all ate together in celebration.

Festivals in general are a big part of Japanese culture. During my stay in Japan, it seemed like every corner of Japan had their own unique festivals and traditions as well as the nation-wide festivals. Discovering these festivals with the food and special shows that accompanied them was one of the most interesting aspects of living in Japan, with the most

unexpected festival being at a temple about a minute's walk away from the dormitory. During this festival, volunteers participated in a karaoke show in front of the locals and at the end, everyone attending took part in a raffle to win loaves of bread baked by a local baker. I'm glad I had the chance to taste that special bread after one of my friends won a loaf.

The classes I attended at the Big Ai weren't only theoretical, as I got to try out most of the cultural elements that we learned about. I even participated in a cooking class where I was taught how to cook *oyakodon*, a classic Japanese rice bowl dish. Most of the friends I made in Japan were somehow connected to the Big Ai, whether they were teachers, students or students' friends. This led to me being invited to many other activities, like going to the birthplace of soy sauce (Yuasa), making my own plum wine, making a *temari* ball, making traditional Japanese ribbons known as *Kumihimo*, hiking trips, karaoke, calligraphy and many more activities I never dreamed of doing. I was invited to a "gyoza party" by one of my friends at the Wakayama Foreign Language College where I then met many other foreigners who had come to Japan to study the language. Together, we made industrial quantities of *sui gyoza* and then ate them all while chatting.

Conclusion

Recommendations for Future Students

Whether Japan interests you because of the food, the music, the games, the shows, the technology or anything else, I would say the most important thing is to keep an open mind and try as many new experiences as you can. Of course, learning some Japanese before coming to Japan is very important as most people outside of the main cities can't speak English or aren't comfortable enough to try. Speaking Japanese opens many doors to adventures that would otherwise be impossible. To fully experience life in Japan, I believe you should make friends with the locals and share memories with them.

To the future interns at Taiyo, I recommend participating in as many of the company's events as possible, as these are all enriching and very fun. These activities offer opportunities to socialize and make friends! I have found my work here to be very fulfilling because I put in a lot of effort to produce the best results that I could. To the future interns heading to Wakayama in general, I recommend going to the Japanese language and culture classes I went to at the Big Ai, where you can always meet new people.

Reflections

Ever since I visited Japan in 2016, I had decided that one of my goals during my university studies would be to land an internship in this country. After my year here, I can say without a doubt that the three years of hard work leading up to this were well worth it. Academically, I gained a lot of technical knowledge but more importantly, I gained a clearer understanding of my final goals when coming back to Canada. As cliché as it may sound, my experience in Japan and thus my exposure to a culture I was unfamiliar with has made me grow and realize things about myself that I never knew.

My stay in Japan has been, through and through, the single most rewarding and worthwhile experience in my life. I would like to express my sincere gratitude to everyone at the Canada-Japan Co-Op Program and Taiyo Industrial Co., LTD. for providing me with this once in a lifetime opportunity and making this experience so memorable and enjoyable.