

Greetings! My name is Nikita Buchinskiy and I'm a recipient of the MEXT scholarship for research students which allows me to pursue a PhD degree in the field of electrical engineering at Tohoku University. It has been almost ten months since I arrived in Japan and in the next paragraphs I will try to describe in more or less chronological order what I have been up to so far. I will go over the application process for the MEXT scholarship, describe how I had to follow the intensive Japanese language program first online in Belgium and then continue when I arrived in Japan. Next, I will explain how the entrance exam is structured and how it feels to be a research student at a Japanese university. I will end with a few short anecdotes that are not directly related to my academic life. I hope you will find my journey interesting.

## Application process

*June 2021 - March 2022*

In 2021, I graduated from Ghent University with the degree of Master of Science in Electromechanical Engineering. I specialized in the field of electrical power engineering which opened my eyes to the many technological challenges our society still needs to face in order to facilitate the further growth of renewable energy. These thoughts together with the experience I gained during my master's thesis fueled my ambition to pursue a PhD degree. At the same time, I always had a strong interest in the country of Japan both from a cultural and academic point of view. So it should come as no surprise that I was very excited when I learned about the existence of the MEXT scholarship and the opportunity it provides to foreign students to study in Japan.

In the first half of 2021, I prepared all the necessary documents and applied for the MEXT scholarship at the Embassy of Japan in Belgium. After the language examination and interview, I was notified that I had passed the first screening and thus was allowed to contact professors at Japanese universities. The lab of Professor Saitoh at Tohoku University quickly piqued my interest due to their extensive research in the domain of electrical power systems. I introduced myself to Professor Saitoh and expressed my desire to conduct research under his supervision in the framework of pursuing a doctoral degree. After some more emails back and forth, followed by an online meeting discussing the research plan and schedule, I was thrilled that Professor Saitoh was willing to have me on board in his lab. However, at this point in time - around September of 2021 - my acceptance as a PhD student was still only provisional in the sense that MEXT itself had to conduct a second screening based on the Letter of Acceptance that Professor Saitoh had kindly prepared for me. The months that followed were a true test of patience as all I could do was wait for the final decision of MEXT on whether or not I was awarded the scholarship. During this time, I was given the opportunity to continue working as a voluntary researcher at my alma mater - Ghent University - for which I am deeply grateful.

To my surprise, the first update I received regarding the scholarship was at the start of 2022 from the student exchange division of Tohoku University asking me to apply for a dormitory. This was indeed a good sign as not much later on February 15, 2022, I obtained the official confirmation that I was accepted as a 2022 MEXT scholarship student at Tohoku University. The anxiety of the waiting process could finally make room for excitement about studying in Japan and I could not wait to embark on this new journey.

From that point on, I started to make preparations for my arrival in Japan. This includes the necessary correspondence with the Embassy of Japan in Belgium to arrange my departure to Japan as well as the student exchange division of Tohoku University to help me settle down as a fresh student during my first months. Thanks to the great effort and guidance of everyone involved, this process went by rather smoothly except for one important hurdle: the Covid-19 pandemic.

You see, contrary to Europe, the academic year in Japan usually starts in April and hence, MEXT scholarship students in the past would also arrive in Japan at the beginning of April (at the latest). In my case however, traveling to Japan seemed to be impossible around this time due to the stringent regulations imposed by the Japanese government to limit the spread of the virus. As a result my departure date was indefinitely delayed. The length of this delay was very difficult to predict as it was dependent on various factors which could change on almost a daily basis. I had to show a bit more patience but I knew that in the end, it would be more than worth the wait.

## The Japanese Language Course: in Belgium

*April 2022 - May 2022*

It soon became April which marked the official start of my 4 year-long journey as a MEXT scholarship student. Prior to applying for the scholarship I had never taken any Japanese classes so except for a few hiragana and katakana characters I learned on my own, my level of Japanese language proficiency was basically non-existent. Luckily, the first 6 months of the MEXT program are dedicated to the “intensive Japanese language program” which I followed at Tohoku University. This course takes place before the regular course in the respective major and in my case, I was even enrolled in a different graduate school during this period. The goal of the course given at my level was to teach the students daily-life Japanese and the requirements for successfully completing the course were attending daily classes, completing homeworks and passing multiple exams.

At the time that the classes had kicked off I was still in Belgium. Since attendance is mandatory my only option was to follow the classes online which, due to the time difference with Japan, implied that I had to stay awake for up to 9 hours in the middle of the night. These were maybe not ideal circumstances but with enough determination (and coffee) I was able to make the best of it. Besides, all my classmates - MEXT scholars from different countries - were in the same boat as me so we tried to support and encourage each other to the best of our ability. Meanwhile the border restrictions were starting to ease up and I was given a provisional departure date to look forward to: May 26, 2022.

The days leading up to my departure were rather packed: I said goodbye to friends and family, took care of the necessary paperwork, packed my bags, reconsidered what I wanted to take with me since I was over the weight limit, all while trying to find the time and energy to attend my Japanese classes, do my homeworks and study for the mid-term exams. In all honesty, there were times when I felt slightly anxious about the leap into the unknown that I was about to undertake. But at the same time, the support of everyone around me helped

me to set my mind at ease and convinced me to fully embrace this opportunity. And I am so glad I did: a long-time dream was about to become reality.

As a result of the Covid-19 regulations, I had to prepare a few more documents than usual, including a Covid PCR test within 72 hours before my flight. Even though I made sure to be sufficiently thorough during this process, I was still slightly worried that I may have overlooked some minor details. In the end, my worries ended up being for nothing as my entry at the border was smoothly given the green light (literally in this case via the MySOS app). Once I saw the big welcome board at the exit of Narita Airport, it started to really dawn on me: I had finally arrived in “the Land of the Rising Sun” and could start experiencing my journey as a MEXT scholarship student to the fullest extent.

## The Japanese Language Course: in Japan

*June 2022 - August 2022*

When I arrived at Narita Airport I was greeted by a staff member of the traveling agency that was responsible for arranging my flight and he brought me to a hotel not far from the airport. Since I had received all necessary vaccinations in the past, I was exempted from quarantine upon arrival. However, I was requested by Tohoku University to stay one night at this hotel for logistical reasons. This gave me the opportunity to recharge my batteries after a flight of approximately 14 hours and prepare the journey to my final destination: Sendai.

The next day I took the Skyliner to Ueno station and after a 2-hour long ride on the Shinkansen, I made it to Sendai station. From there, it was only a matter of time before I arrived at Tohoku University International House Sanjo 2, the dormitory where I would live for almost one year. At the airport I had already received my residence card and upon arrival in Sendai, Tohoku University staff members aided me in registering for the national health insurance and opening my Japanese bank account. With these procedures taken care of I was ready and eager to start exploring what Sendai had to offer.

Speaking of Sendai, it is the capital of Miyagi Prefecture as well as the largest urban center in the Tohoku region. Due to the abundance of greenery it is often given the nickname “City of Trees”. Sendai was founded more than 400 years ago by Date Masamune, famous for his missing right eye, black-gold attire and iconic crescent-moon-bearing helmet. An imposing statue of lord Masamune was erected in the remains of Aoba Castle. Sadly, it was damaged by the March 2022 earthquake and has been under maintenance ever since. I’m looking forward to April when the statue is scheduled to open back up to the public and I can see it for the first time. Sendai is also the home of “zunda”, a green paste made of sweetened edamame beans which is used in all types of sweets. Although I am not a big fan of edamame on its own, I have quickly grown fond of zunda and can highly recommend the excellent zunda mochi and refreshing zunda shake.

Meanwhile I still had to attend and keep up with all of my Japanese classes. Under the influence of the Covid-19 regulations it was decided to continue the classes in an online manner, even though the students taking this course had all already arrived in Japan. The online infrastructure was set up well enough that it did not hinder the learning experience in my opinion. Besides, I was already used to this system and had adapted my studying

methods accordingly. The language program consisted of five classes each aimed at developing a different language component: basic comprehension class (including grammar study), kanji class, reading class, speaking class and finally one-on-one sessions for additional support. The textbook that was used throughout the course was “Irodori”, definitely a recommendation for people interested in learning basic Japanese as all content can be accessed for free on the internet. In August 2022, I passed the final exams and a few weeks later, a completion ceremony was held where I received my certificate for successfully finishing the Japanese language course.

After my experience with the language course I can confirm that learning Japanese is certainly a challenge. But, as someone who is fond of foreign languages, it was equally as fascinating to discover how strongly the Japanese language differs from the languages commonly spoken in Europe in terms of inherent structure and grammar. Additionally, I felt a real sense of pride and accomplishment when I started to have my first simple conversations with locals. Don't be fooled however, mastering a language requires a lot of time and effort. In that sense, the intensive Japanese language program has provided me with an excellent foundation to continue my study of the Japanese language on my own. Lastly, it is also important to realize that the key to success is consistency, so even long after completing the language course I'm still trying to take full advantage of all opportunities to practice my Japanese skills. As I have witnessed with some of my former classmates, language proficiency can start to fade rapidly without sufficient repetition, especially in the case of Japanese.

## The Entrance Exam

*September 2022*

As I explained before, my main focus during the first six months of the MEXT program was the Japanese language course but when my schedule allowed for it I tried to spend time in the laboratory of Professor Saitoh from time to time (located in Tohoku University's Aobayama Campus). Professor Saitoh and all lab members were very welcoming, even enthusiastic about my arrival and I was already assigned my own office space and desk when I visited for the first time. I deeply appreciated their eagerness to integrate me into the team so I also made an effort to join the lab's seminars as often as possible and get acquainted with all members and their respective research topics.

A requirement for admission to a regular course - including the doctoral (PhD) program - is passing the entrance exam, which is comprised of a written examination and an interview as well as the need to prove English Language proficiency by submitting a TOEFL / TOEIC score. The subjects of the written test vary depending on the department and in my case - for the department of electrical engineering - I chose “mathematics” and “electrical circuits” as the two main subjects. I prepared for the written exam mainly by solving the exams from previous years, which took approximately two full weeks. For the interview I had to first explain the topic of my master's thesis and future research plans during a 20-minute long presentation and afterwards answer the questions from the jury members. The whole process was not easy so I was relieved when I received the confirmation that I had successfully passed the entrance exam.

A week after the entrance exam I was invited to attend my first national conference of the Institute of Electrical Engineers of Japan (IEEJ). Together with my lab colleagues we traveled south to Fukui prefecture where the 3-day long conference was organized by Fukui University. Everyone in my lab had prepared presentations about their work but since I was yet to start my own research, my main objective was to attend various presentation sessions and gain experience. The vast majority of presentations were obviously given in Japanese which made it difficult - some even impossible - to fully understand their content due to my lack of knowledge of the Japanese language on an academic level. However, it was still a valuable experience in the sense that it painted a good picture of what is expected from a high quality presentation. Additionally, it gave me a clear overview of the research topics and trends that are currently popular in the field of electrical engineering in Japan. These points have helped me to guide and support my own research and will continue to play an important role in the near future. I am also proud to say that at the end of the event four members from our lab received an award for their excellent work.

During our free time we took advantage of the opportunity to explore many sightseeing spots in Fukui prefecture, including Tojinbo (a picturesque cliff along the Sea of Japan), Eiheiiji Temple (a famous center of Japanese Zen Buddhism), as well as many onsen spots (hot springs) in the neighborhood. On our way back we also passed the impressive city of Kanazawa, famous castle town and capital of Ishikawa prefecture. Disregarding the one time I was scolded by my friend from Toyama prefecture for not liking squid, I think that the time spent together was a great bonding experience between me and my lab colleagues in a more casual environment. As such, I was very much looking forward to my time at "Saitoh Laboratory".

## Research Student

*October 2022 - March 2023*

October is the start of the second term in Japanese universities and this is also the time that I began working on my own research topic under the supervision of Professor Saitoh. Even though I had already passed the entrance exam for the doctoral course, I first enrolled as a research student until March 2023. This is the status given to students who engage in research activities but are not tied to a particular degree. Together with Professor Saitoh we decided that this approach would give me six months of additional time before enrolling as a PhD student in order to get familiar with the Japanese academic system as well as my own research topic. In hindsight, I am glad that we opted for this path as I quickly encountered many differences that I was previously not aware of.

First of all, a higher priority is given to conducting research in the master course in Japan compared to Belgium which means that there is less time for classes. In fact, Japanese students already lay the groundwork for their research during the 4th year of the bachelor course. Here they have the opportunity to explore their first ideas with the goal of eventually formulating a solid research proposal. I am under the impression that the aim of the master course in Belgium is to become a specialist in a particular field by going through advanced classes and demonstrating this expertise during the master's thesis. The primary goal of the master course in Japan on the other hand is to develop strong scientific skills on an academic level. The doctoral course is in both countries heavily aimed at engaging in

research activities while also playing a supporting role during classes and is thus, except for the duration (typically 3 years in Japan vs. 4 years in Belgium), rather similar.

The difference in approach can also be observed in the way that laboratories operate. In Japanese universities, bachelor, master and doctoral students spend the majority of their time in their respective lab and the first line of contact is usually the students among themselves when someone seeks advice or feedback. All students are thus closely linked to their respective lab and in that sense, each lab has its own culture and customs.

In our lab there are two types of weekly seminars: study seminars and research seminars. During each study seminar, a topic related to the study of electrical power systems is discussed in detail and thus, these sessions are mainly aimed at the bachelor students. The master and doctoral students are also present to support the discussions and give guidance where necessary. Larger progress updates of the ongoing research are typically presented during the research seminars where the professor and other lab members have the opportunity to review each other's work, ask questions and make comments.

The points that I have listed are based on firsthand experience from my own lab. Yet, it is important to note that they may not be applicable to other graduate schools or departments.

## Doctoral Student

*April 2023 - March 2026*

At the time of writing, I am also in the midst of submitting the necessary documents to enroll as a PhD student starting from April 2023. For the next three years I will spend my days (and probably a few sleepless nights as well) trying to tackle the problem of instabilities in the electrical power system. In my humble opinion this is an interesting topic so let me try to give you some context.

Traditionally, electrical power is generated in centralized power plants and is then transported via high-voltage transmission lines over long distances to the eventual end-users such as households or industrial consumers. In this system, it is important to maintain at all times a balance between the produced power and the consumed power since a disturbance of this power equilibrium would cause an undesired deviation of the net frequency (50 Hz in Belgium and 50 Hz or 60 Hz in Japan depending on the location). These instabilities will in turn lead to malfunction of equipment and the dangers that are associated with that. The large generators found in traditional power plants play a crucial role in maintaining this power balance since they are inherently able to "smooth out" small disturbances as a result of their so-called "rotating inertia".

The architecture of the above system has been changing in recent years though due to the rapid growth of alternative methods for generating power closer to the consumer, think of solar panels, wind farms, fuel cells, and even batteries or electric vehicles for that matter. It is clear that traditional power plants relying on fossil fuels are being replaced by renewable alternatives. This trend is of crucial importance in order to make the energy sector more sustainable yet at the same time, it introduces new technological challenges: since these

new generators lack the feature of “rotating inertia” they make the electrical power system weaker, i.e. more susceptible to instabilities during power imbalances.

However, these new types of generators are usually connected to the grid via a sophisticated and controllable switch known as an “inverter”. By applying a certain advanced algorithm to this switch it is possible to precisely control how much power is supplied to the grid. In this way, the function of “rotating inertia” can be mimicked even by this new wave of power generating units (albeit each independently). In my research we will go a step further and consider a network of multiple units - think of a street where multiple houses have solar panels installed - that are able to communicate and share data with each other. This would allow for the power imbalances to be reduced more effectively and on a larger scale, which in turn would allow the share of renewable energy to further increase. In the past few weeks, I have been finalizing the models that will be used in our simulations and soon we will put our hypotheses to the test. I hope that the results of these tests can be found at a later stage in a published article.

Needless to say, I am looking forward to finally starting my doctoral degree. There are still many exciting facets of a PhD that I am eager to experience: supporting classes in the undergraduate courses as a teaching assistant, working as a research assistant under Professor Saitoh, attending and presenting at various conferences, dealing with all the intricacies of publishing my findings in a distinguished journal, advancing my own work and seeing what ideas we can think of, etc. It will undoubtedly require a lot of hard work but I will do my best to bring the PhD to a successful conclusion.

## Life in Japan

So far I have been focused almost solely on describing my academic adventures but my time as a MEXT scholarship student has been filled with other activities as well. I have been able to continue practicing karate under the legendary Mori Sensei in his dojo in Sendai as well as participate in the daily training of the karate club of Tohoku Fukushi University. Thanks to Mori Sensei and his hospitality I was able to attend traditional Japanese tea ceremonies and visit many fascinating locations in Miyagi prefecture. I have visited Tokyo a few times to explore the city and meet up with friends. In November 2022, I was infected with Covid-19 and had to self-isolate in my room. After a few days I had fully recovered and was allowed to continue my daily routine. Currently I am preparing to move out of the university's dorm into my own apartment. Obviously I have been greatly enjoying Japanese cuisine as well, with some of my personal highlights being Japanese curry, kushikatsu, unagi and all types of mochi yet I have to confess that I still prefer Belgian beer over Japanese beer. I could easily go on but I think it is clear that I have been fully enjoying my time here in Japan.

This brings me to the end of my report. Looking back at the start, it surprises me how quickly I was able to get accustomed to my new surroundings, both at Tohoku University and in my general life as well. This is mainly due to the kindness and helpfulness of the people around me, so I'm truly in their debt. Living on the opposite side of the world and having to adapt to a completely new culture has made me reflect on and discover who I am as a person, or rather who I want to be as a person (for others). This experience has been so valuable and transformative that I want to express once more how deeply honored and grateful I am to have received such a prestigious recognition in the form of the MEXT scholarship.

-----  
Google drive photos:

[https://drive.google.com/drive/folders/18OG5Zqo0NYMtV5-Ygu4M-O\\_T8rPmudTQ?usp=sharing](https://drive.google.com/drive/folders/18OG5Zqo0NYMtV5-Ygu4M-O_T8rPmudTQ?usp=sharing)

Photo 1: Arriving at Narita Airport in Japan

Photo 2: At the completion ceremony of the intensive Japanese language program

Photo 3: Sharing a drink with Umezawa-kun and Kato-san from Saitoh Laboratory

Photo 4: (Some) Members of Saitoh Laboratory