



How satellite technology has opened new opportunities:

From El Salvador to the world

Interview conducted on 25 August 2021

Institution:



Interviewee: Fatima Duran, Master's Student at Kyushu Institute of Technology from the Republic of El Salvador

Background:

The [United Nations Office for Outer Space Affairs \(UNOOSA\)](#), in partnership with the Government of Japan and the [Kyushu Institute of Technology \(Kyutech\)](#) offers the [UN/Japan Long-term Fellowship Programme Post-graduate student on Nano-Satellite Technologies \(PNST\)](#).

The programme provides 3 masters and doctoral students from developing countries the opportunity to enroll in the Kyutech [Space Engineering International Course \(SEIC\)](#) to study nano-satellite systems. The chosen candidates receive a grant from the Ministry of Education, Culture, Sports, Science and Technology of Japan for the duration of their fellowship, covering housing, food, local transportation, and other expenses. In addition, each candidate is provided an economy class air ticket between an international airport in the country of his/her nationality and Narita or Fukuoka International Airport. Fees for matriculation, tuition and entrance examination are covered by Kyutech.



Fatima on her graduation day as an aerospace engineer from Pusan National University, South Korea ©Fatima Duran

Fatima is a first-year master student in the programme since fall of 2020. Prior to receiving the PNST fellowship, she obtained her bachelor's degree in aerospace engineering at Pusan University of South Korea and an associate degree in aeronautical maintenance technician in Universidad Don Bosco, El Salvador. She is also the National Point of Contact of the Space Generation Advisory Council (SGAC) of El Salvador and an active member of the El Salvador Aerospace Institute.

In this interview, we spoke with her about her experience at Kyutech.



Interview:

How did you learn about the PNST fellowship and where were you at the time in your studies and career?



Flight Dynamics practice on a CTWS flight design training airplane ©Fatima Duran



With Dr. Gwang Rae Cho, President of KARI for participating in the 2017 International Space Training ©KARI



Group of attendees of the 2017 International Space Training at Daejeon ©KARI

I have always been interested in aerospace engineering. However, since there was no university that taught aerospace engineering in El Salvador at that time, I studied aeronautics first in my country, at Universidad Don Bosco. With that experience, I moved to South Korea to obtain my bachelor's degree in Pusan National University. In South Korea, not only did I have the opportunity to study aerospace engineering at university, but I had the privilege to take part in the 2017 International Space Training that was conducted by the Korean Aerospace Research Institute (KARI). KARI invites delegates from developing countries to this programme and I was very fortunate to be given this opportunity. It was a wonderful 2-week course to gain theoretical training about remote sensing and GEO satellite technology, have the chance to participate in technical visits to actual testing facilities in KARI's headquarters and Naro Space Center, and visit Korean space-related start-ups and companies. I learned intensively on how space technology can be used to help developing countries from various perspectives.

While I was in South Korea, I heard about PNST from the El Salvador Aerospace Institute -a non-governmental organization in El Salvador which develops space related educational projects to stimulate the space community in El Salvador. When I heard about PNST, I was very excited but very nervous, since you can tell from the information provided how competitive the programme must be... but I put together my application and here I am!

How did PNST change your education/career path? What opportunities did it unlock for you?

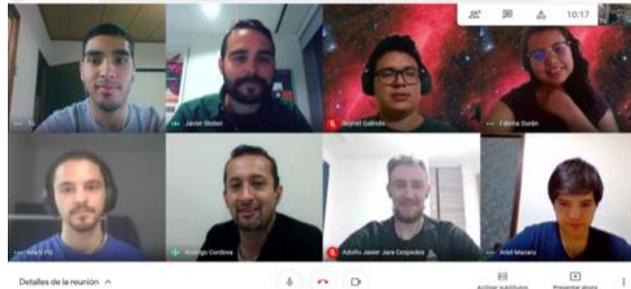
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Aerospace engineering requires knowledge that it is not covered in aeronautic engineering, such as space systems, space environment and other topics, which are covered in the detailed curriculum that Kyutech offers. The best part of the PNST programme is that we participate in satellite projects that allow us to gain practical experience through hands-on activities and by applying the knowledge we learned in class. I am currently assigned to 2 satellite projects.

For one, I will be working on the ground station operations, sending uplink command signals to the satellite, gathering and analyzing the data that it provides. For the other, we are still in the phase of defining the mission. I am lucky to be able to work on 2 projects at different life cycle stages, since it brings me more perspectives from distinctive scopes.

How has COVID-19 impacted your experience?

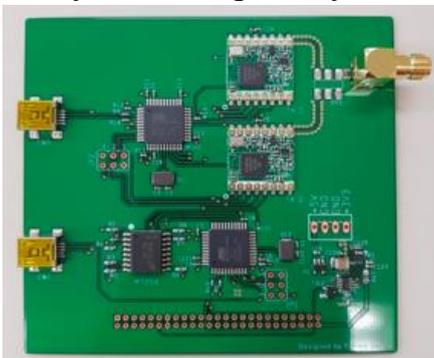
In the beginning of the academic year, I was not able to travel to Japan due to COVID-19 restrictions, which forced me to take online classes from El Salvador. Having classes and meetings with a different time zone was difficult and it cost me the chance to be assigned to a satellite project earlier in the life cycle. However, I was finally able to move to Japan in January 2021 and am catching up with my studies and the members of the lab.



Meeting with Kyutech students, staff and Dr. Javier Stober from MIT Media Lab
©Esteban Fretes

Even with COVID-19, there were activities that enabled us to network virtually with professionals in the space domain, such as online guest seminars. We had weekly and monthly seminars with guest speakers from industry, governmental/non-governmental institutes, and academia from all over the world. We were able to learn about various topics such as space law from UNOOSA. This has also expanded my knowledge and interest in space.

What are you focusing on in your current studies at Kyutech?



(Top) 400/433MHz LoRa receiver. Simplified version of the LoRa receiver on board the KITSUNE satellite ©Fatima Duran
(Bottom) Checking communication between the LoRa receiver and Ground Sensor Terminal (GST) ©Pooja Lepcha

My research topic is the utilization of Long Range (LoRa), a new technique for satellite and ground communication. LoRa has various advantages such as enabling long range communication with low energy consumption and low costs compared to other similar technologies, which makes it very attractive for its applications to the Internet of Things (IoT).

LoRa can be used in a variety of IoT sensors, such as the ones used for agriculture, to develop aggregation systems for watering the field, measuring temperature and so on. LoRa devices can be installed in remote areas where it is hard to have costly and large ground stations, for surveillance and land monitoring. It is beneficial that it requires less maintenance, so operators do not have to constantly be present, like for ground stations. For one of my satellite projects, we are developing a LoRa receiver to install as part of the payload.



What do you think is a distinctive feature of the Kyutech fellowship?

There are many things that I have already mentioned, but I also want to emphasize 2 amazing points of PNST. The first is the experience of completing a whole life cycle of a satellite (definition, design, development, testing, utilization, and operation). Although in the satellite project team, you oversee a specific subsystem, in the meetings with the colleagues, you get insights of what other members of the team are doing and get to learn about the different subsystems at the same time. This helps to understand the various aspects of realizing a satellite.

The second point is the international network and support that you gain by becoming part of the Kyutech family. You spend a lot of time with your colleagues and they become friends for life. In the satellite project, you are usually paired up with a mentor who helps you get through each step of the process. Moreover, there is a strong support system with open-minded professors, staff members and fellow students that are always willing to help you. In addition, the Space Engineering International Course (SEIC) is truly international and interdisciplinary, with students from diverse backgrounds and numerous countries from around the globe. By working with them, you will get to learn about different cultures and get a lot of information about the many space-related activities in each region. With the strong friendships you build with the fellow students and staff, it expands the chances of cooperation in the future after you have graduated from Kyutech, and this is what we see from alumnae. There is also a strong push for gender diversity at Kyutech.

There are many successful female students, tutors, and staff that you can look up to and ask for support from. I truly feel that Kyutech brings the world into your hands.

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With fellow classmates after the end of the Ham Radio Test, which is needed to operate the Ground Station at Kvutech ©Fahd Mouri



With mentor and fellow PNST student from Bhutan ©Pooja Lepcha

What are your next steps in your education/career?

My goal is to help El Salvador develop space capacities.

My goal is to help El Salvador develop space capacities. The country may not have the necessary institutes and policies in place, but the demand is growing. I hope to realize my goal not only in the field of space technology but also to support policy making. There are many Salvadorians that are taking part in space related activities and, I would like to work with them to share the knowledge, expand the network and organize more dedicated space projects within the country.



Would you recommend PNST to other people? If so, what would be your advice to them?



Soldering some components of the LoRa receiver ©Pooja Lepcha

I would definitely recommend PNST. Kyutech is a leading institute in the field of nano-satellite technology. They have an organized programme where you can gain experience through hands-on opportunities and learn about the complete life cycle of the development of a satellite. Kyutech proudly holds the position as top in the number of academic small satellites by academic and non-profit institutions, according to the [“Smallsats by the Numbers 2020” provided by Bryce Space and Technology.](#)

Furthermore, the prospects you gain from living in a different country, learning the culture/language and making friends from all over the world is a precious part of the experience that needs to be emphasized. Life in the lab with my international colleagues continuously brings me new findings, on how they work, approach problems and come to conclusions. Of course, with a new language and culture, life is not always easy, but Kyutech has an amazing support system from day 1, with a tutor that helps to set up necessities such as accommodation, bank accounts and so on.

My advice for the application would be to have a clear idea of what you want to do at Kyutech, especially what the experience that Kyutech has to offer for you, but also what you can offer to Kyutech. It is also significant to have a vision of what you want to do after you finish your studies there. Kyutech wants to support and enable more non-space faring countries to develop in space, and the reason you want to study space engineering should go into that direction. Another tip to anyone who is interested in PNST is to not be afraid of new challenges and just go for it! Stepping out of your comfort zone is always frightening, and things might be challenging, requiring a lot of work. However, remind yourself that you are always learning something new and that this experience is helping you get closer to your goals. Make sure to have a determinate goal, in your mind and in your heart as well, as this will motivate you when you get lost and remind you of why you are there.



Breathtaking scenery in Japan. Biking has become an important part of my life in Japan. ©Fatima Duran



Fellow space engineering students from Sri Lanka and Myanmar. ©Fatima Duran