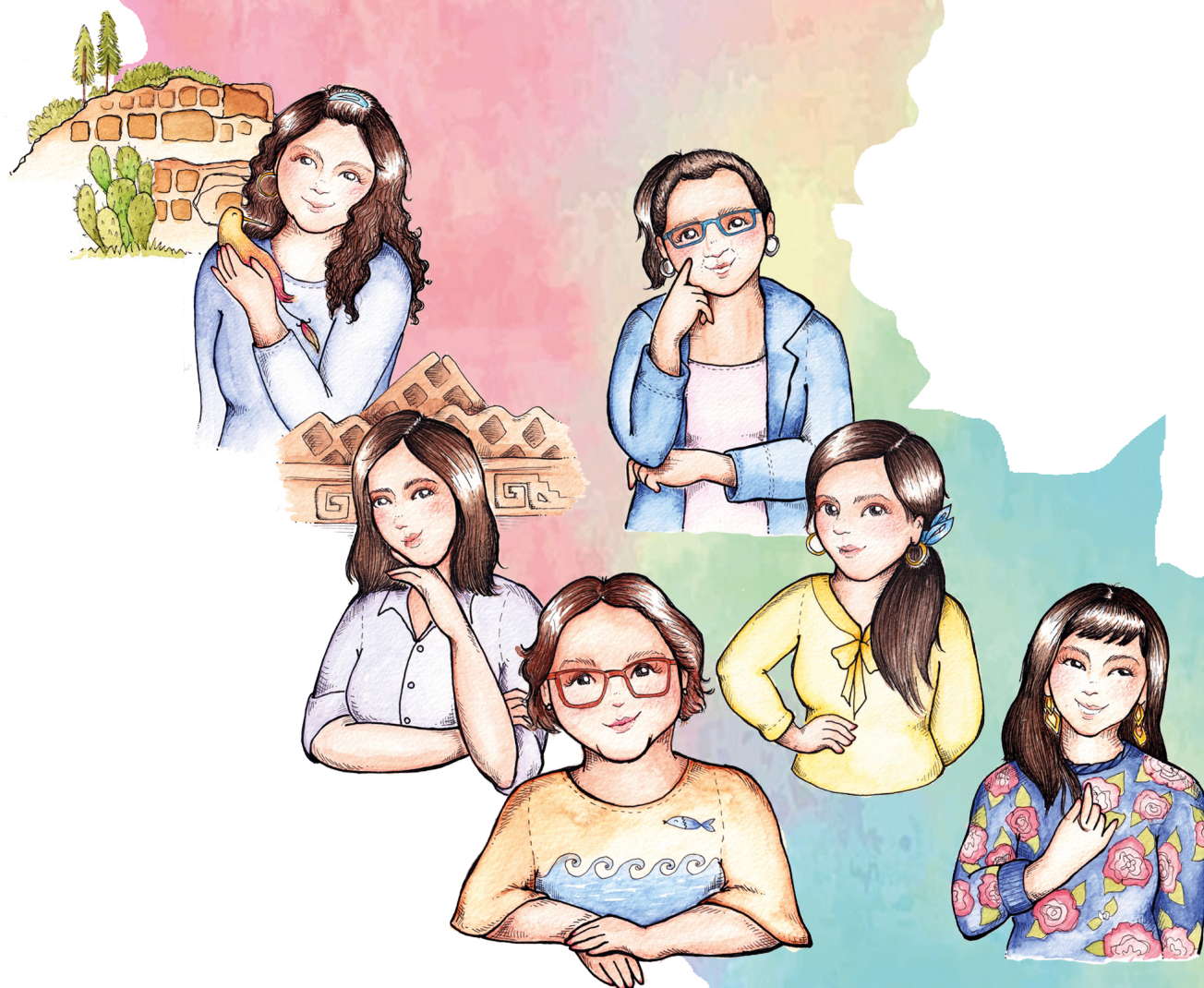


Peruvian Women Inventors:

Inspirational stories for new generations




Alicia
Ugaz

PERUVIAN WOMEN INVENTORS: INSPIRATIONAL STORIES FOR NEW GENERATIONS

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DIRECTORATE OF INVENTIONS AND NEW TECHNOLOGIES

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This publication has been translated from Spanish with the support
from the United States Patent and Trademark Office (USPTO)

December 2021



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INTRODUCTION

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Building a close relationship between science and gender equality is essential for the sustained development of a country. Although this may seem obvious, women still face barriers to access or work in the field of science and engineering because, according to statistics, less than 30% of scientific researchers in the world are women.

Peru is no stranger to this reality. However, in recent years, the number of Peruvian women involved in inventive activities has increased. For instance, the number of national patent applications, with at least one woman named as an inventor, increased from 7% in 2000 to 10% in 2010, and to 36% in 2020.

Based on this, Indecopi's Directorate of Inventions and New Technologies has set the objective of making women from Peruvian regions visible. These women have overcome difficulties and stereotypes that persist in our society and have achieved their dreams using their talent and creativity to make an invention.

To this end, this publication presents six cases of local women inventors, whose life stories, achievements, and careers aim to inspire more Peruvian women and girls to participate in science, technology, engineering, and mathematics and, thus, achieve full and equitable access and participation in these fields. In addition, these women have used patents as an instrument to obtain social recognition, professional growth, financial independence, and equal rights. The expected outcome is the increase of women inventors nationwide in future generations; women who propose or give solutions to social challenges, in an effort to narrow the existing gender gaps, eliminate stereotypes through education, and raise social awareness.

Sofía Miñano Suárez
Author



Judith Olivera Granada (Cusco)

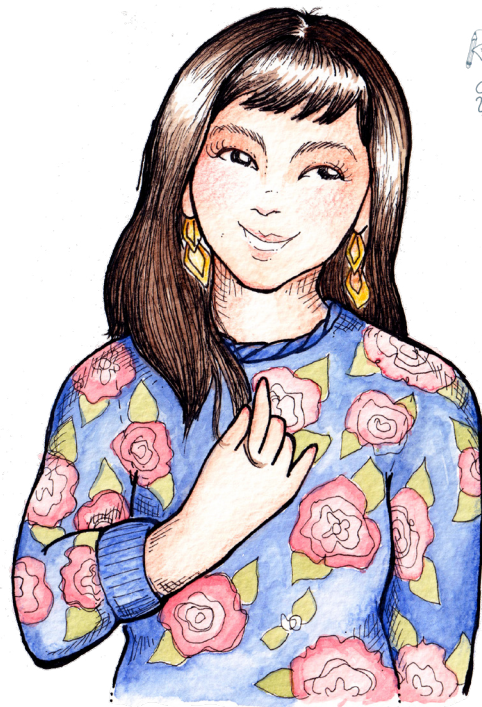
Judith was born in Cusco. Since she was a child, Judith was excited to know the lives of great people who changed the world with their inventions, such as Thomas Alva Edison, Bill Gates, and Steve Jobs. Thanks to these stories, Judith considers herself a dreamer and a bold woman.

Since she was a child, she loved visiting museums to admire the ingenuity of our ancestors.

Judith wanted to understand how ancient cultures used creativity and ingenuity to solve problems in different technological fields.

Her parents instilled in her decisive values in her professional future. Judith always gives her best in all her endeavors and that discipline is rewarding. For this reason, her motto is “always do you best in everything you do.”

Judith remembers the day she decided to turn her dreams into reality. In high school, teacher Raul Rivas addressed his women students at the end of class to assure them that they could make history too if they strive toward their goals.

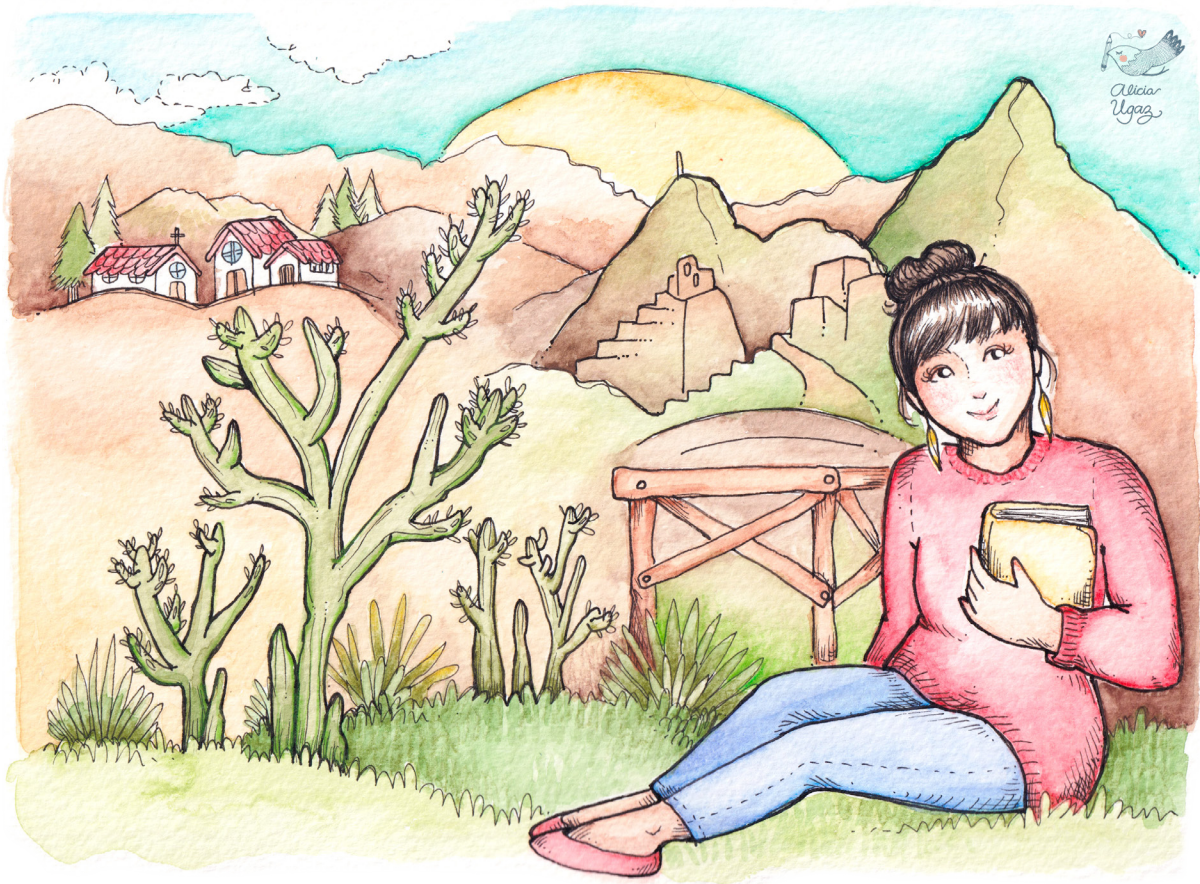


In 2013, Judith pursued civil engineering and considered becoming a researcher to develop strategies that could benefit the country. Her wish was to show her projects to the world, and she succeeded. Judith has traveled to various engineering workshops, despite the economic constraints she had to finance her participation.

Almost at the end of her undergraduate studies, she decided to do her thesis based on her ancestors' historical legacy. Judith proposed a technology that solves an important problem for our society. She developed a stabilizer that waterproofed and improved soils using pataquisca (*Austrocylindropuntia subulata exaltata*), a plant from the Peruvian Andes.

Judith put into practice what she developed in her thesis. Since there are still certain restrictions to use the facilities and equipment at universities, a private company authorized her to use the laboratories and she thus culminated the experiments. At the end of 2017, as a result of the information she obtained in one of Indecopi's regional offices located in Cusco, and the support provided by one of the programs offered by Indecopi's Directorate of Inventions and New Technologies (DIN) to draft the technical document, Judith filed with Indecopi her patent application titled **“Procedure for obtaining an additive to stabilize cohesive soils based on pataquisca (*austrocylindropuntia subulata*) mucilage”**.

Judith won a research project grant that same year, awarded by the Andean University of Cusco, for the project “Analysis of a modified ancestral stabilizer based on pataquisca mucilage for stabilizing cohesive soils in terrestrial routes with soils from the District of San Jerónimo in Cusco.”



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Likewise, Judith won the first place in the soil stabilization competition of the XXV National Congress of Civil Engineering Students, with the project “Stabilization of cohesive soils with pataquisca mucilage”. With this project, she developed a soil improvement technique, using local materials that were cost-efficient, resistant, and suitable for paving, managing to decrease the water sensitivity of these materials to control volume changes and increase resistance to deformation.

In 2018, Judith decided it was time to learn about additives in other parts of the world. For that reason she entered a competition organized by the prestigious American Concrete Institute (ACI), an American non-profit organization which invited professionals and students of different universities in the world to develop concrete spheres, where Judith reached the 16th place of fifty-four projects in the design category.

Afterwards, thanks to her perseverance, Judith continued her career as a researcher and inventor despite the difficulties she overcame. In addition to her research activities, Judith has several hobbies in the artistic field. In 2018, she won the beauty contest “Miss Peru Tourism” in Cusco, her hometown.

«Even though everything is against you, keep trying until you accomplish your goal»

«Do not quit if you suffer setbacks; on the contrary, always focus on your initial goal»

-JUDITH OLIVERA-



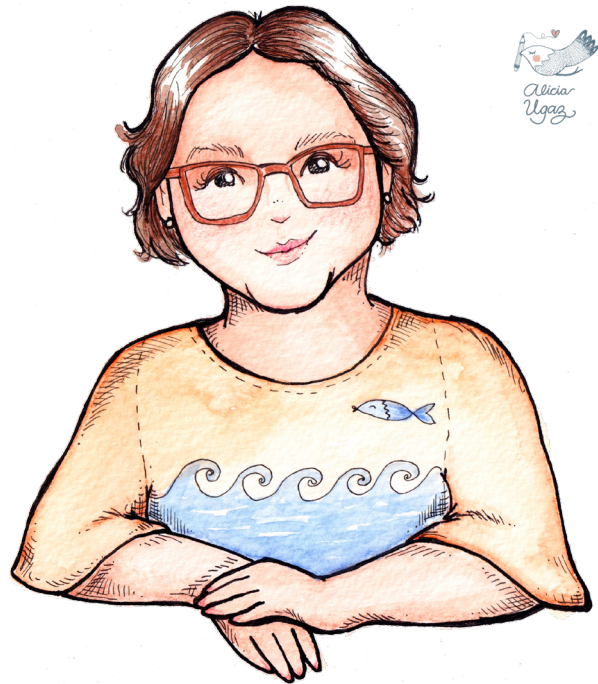


Lila Renee Suárez Muguerza (Lambayeque)

Lila was born in Lambayeque. She has nine siblings and, since she was a child, her father taught her to admire and love nature, especially plants. In high school, her favorite subject was science; she earned excellent grades and stood out from her peers.

After finishing school, in 1972 Lila pursued biological sciences at Pedro Ruiz Gallo National University. She leaned toward a career in fishery and specialized in native fish. After completing her undergraduate degree, she was hired as an intern in the former Regional Fishery Directorate of Lambayeque, as a result of her professional skills.

In 1996, Lila had thirteen years of experience in the public sector. On fieldwork days, she visited the ports of Lambayeque. There she noticed a great environmental problem caused by traditional salted fish processing. This activity generated three to five tons of fish waste—such as viscera, blood, fish bones, among others—that were thrown into the sea, contaminating it. Lila identified this problem and decided to find a solution.



She came up with a way to make the most of the proteins, nutrients and minerals of fish waste and turn them into a useful product to avoid contaminating the Peruvian sea. Lila worked on the project titled “Improving environmental management in traditional fish processing” and invented a fertilizer based on fish waste. After several attempts, she obtained a fully organic fertilizer called “*Ictiocompost Lambayeque*”, which was more efficient than island guano.

Lila looked for various ways to finance her project. She applied to several funds awarded by various public and private institutions, such as the National Council of Science, Technology and Technological Innovation (CONCYTEC), the Regional Government of Lambayeque, the former National Food Support Program (PRONAA), the Ministry of Production, the Association of Santa Rosa Fishing Bay Traditional Processors, and the Association of Santa Rosa Fishing Bay Senior Fishermen.

In 2009, Lila filed with Indecopi, through the Regional Directorate of Production (DIREPRO Lambayeque), the patent application titled “***Process to obtain a fertilizer based on fish processing residues***”. It is important to mention that this was the first patent granted in a regional government in Peru.

A fish waste treatment plant was built in Santa Rosa and San José, in Lambayeque, to subsequently sell the fertilizer. The revenue obtained from the plant was used to pay the workers. This plant protected the environment, generated employment for fishermen who no longer worked in the high seas, and produced a high-quality fertilizer. In 2007, as a result of this initiative, the Regional Government received the Good Government Practices Award, organized by Ciudadanos al Día (CAD).

Lila says that, although she obtained funding from various institutions, she repeatedly invested her own money to cover some of the fishermen's daily expenses. However, the results of the first harvest of "basketball-sized" sweet potatoes, in brackish lands full of salty grass or weeds, excited her and gave her the strength to continue working on this project.



In 2009, the plant and the technological package were transferred on a concessionary basis to the Association of Santa Rosa's Traditional Processors, because it was prohibited for a State entity to compete with a private company. Unfortunately, despite all the effort, the plant closed due to the strong odors it generated. By the end of 2015, the patent expired due to the lack of annuity payment, which is a fee that maintains the validity of granted patents.

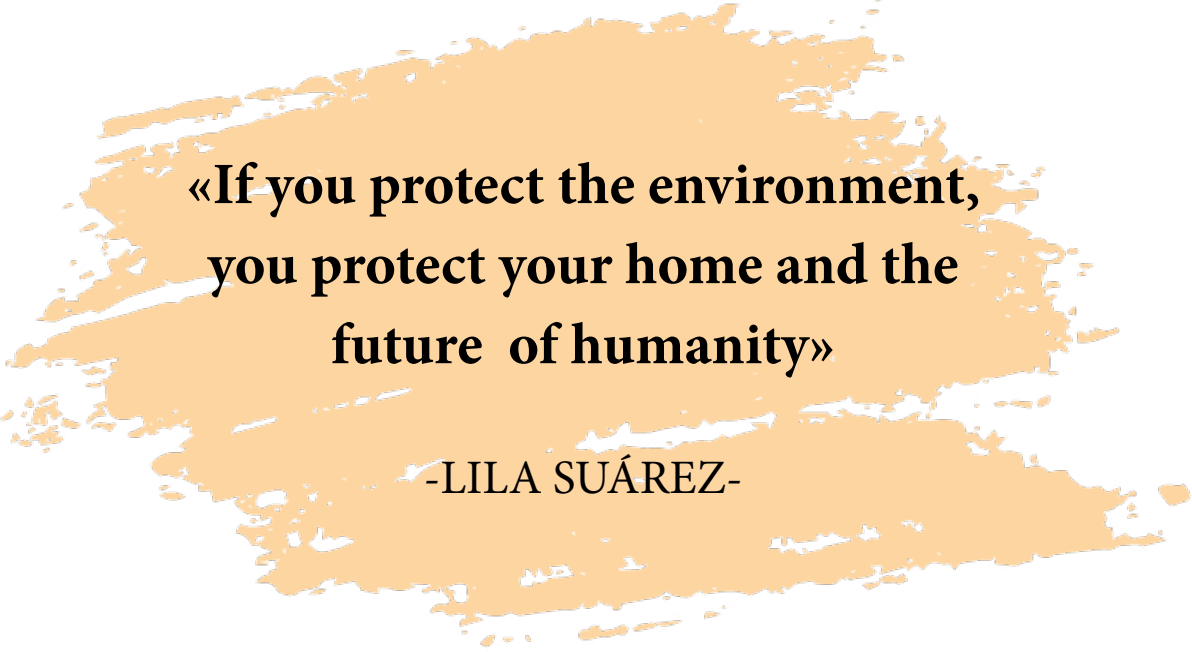
It is worth noting the importance of this patent in the coastal areas of Lambayeque. This project was the most satisfying one throughout Lila's professional career because, in addition to obtaining the patent, her invention had a positive social impact, at least for a short period of time.

This did not prevent her from continuing looking for new solutions to fish waste odor. In recent years, Lila and a colleague have been conducting research that, in the future, could result in a patent application. Lila wants to demonstrate that when you aspire to great things, have the necessary knowledge, and firmly believe in your project, you can achieve your goals and contribute to the world we live in. For that reason, her future plans include projects related to sea decontamination and fish waste treatment to avoid polluting ecosystems.

It is important to emphasize that Lila often worked on the high seas to supervise fish shipments sailing to the Soviet Union, China, Poland, among other countries, and never felt gender-based discrimination in a predominantly male sector.

Es importante recalcar que Lila estuvo muchas veces en alta mar, supervisando los embarques de pescado que navegaban hacia la Unión Soviética, China, Polonia, entre otros, y nunca sintió discriminación de género en un sector predominantemente masculino.

Her final advice to girls is to take up the challenge and pursue science, because the field needs them. Lila thinks that women have the virtue of being more thorough, which is a transcendental quality in experiments and research. In this way, there are greater probabilities of settling on science projects and having more significant impacts on our society.

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**«If you protect the environment,
you protect your home and the
future of humanity»**

-LILA SUÁREZ-

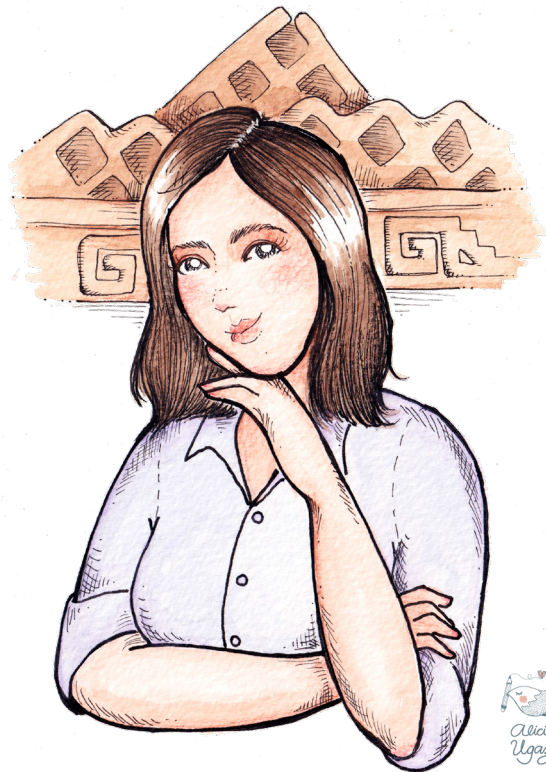
Wendy Lizbeth Polo Bermúdez (La Libertad)

Wendy was born in Trujillo. She is the fourth of five siblings and her parents always encouraged them to strive.

Since she was a child, she was a very dedicated and responsible student. A person close to the family, who worked as a nurse, was her role model and she motivated her to follow in her footsteps. After finishing high school, she decided to pursue a career in nursing at the National University of Trujillo. Her parents supported her because they were sure that, if she chose what she liked, she would be happy and strive to be the best.

At university, she fulfilled her call to serve others. She did her thesis on “Anger Management” and worked with young schoolchildren to test the effectiveness of a methodology used to reduce the negative effects of violence and aggression in environments for young children.

As a result of her constant desire to excel and help others, Wendy moved to Lima to specialize in neonatal and pediatric intensive



care at Cayetano Heredia University. She got her first jobs as a nurse in a polyclinic and then in large clinics and hospitals specialized in the care of children in critical condition, such as the National Institute of Child Health of Breña and San Borja.

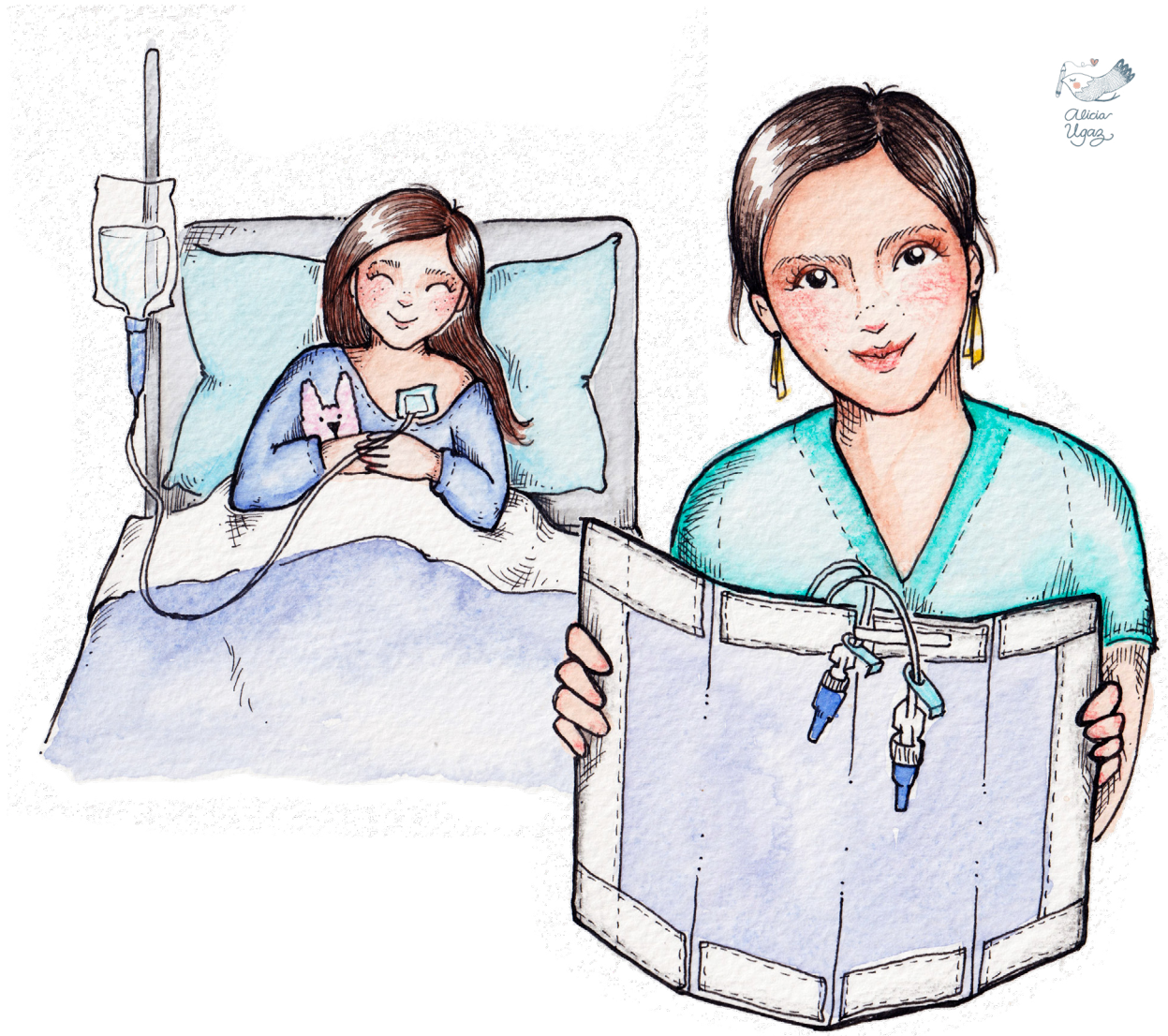
As part of a project of her specialization studies, she was asked to research lumen contamination of central venous catheters. These devices are placed in a large vein in the chest or forearm to put medicines, blood products, nutrients, or fluids right into the blood and remain in place throughout the treatment.

During a weekend in her native Trujillo and, after research and inspiration, she found a solution to avoid lumen contamination of central venous catheters. Back in Lima, she tested the effectiveness of the prototype of her invention and made an excellent impression on her colleagues. After making improvements and obtaining the final version of the invention, she decided to file a patent application at one of her teacher's suggestion. In 2018, Wendy filed her utility model patent application with Indecopi's Directorate of Inventions and New Technologies for the invention titled "**Central Venous Catheter Lumen Protector**", a product that consists of a surgical fabric protector that has Velcro-type fasteners inside to protect lumens.

In her spare time, Wendy enjoys reading, researching, and solving everyday problems. Her main motivation is to follow her path as an inventor to improve patient care. She considers that when you set out to do something, it's easier to be creative and imagine solutions.

Wendy thinks we still live in a society with many inequalities. Therefore, the main barrier that women must overcome is their own fears and prejudices; they should support each other and believe in their abilities. Her advice to girls and young women is

to study hard because knowledge is the foundation of women's empowerment. She also advises choosing a career that makes them happy, because when you do what you like, you will strive to do your best.



Wendy says that her interaction with Indecopi was satisfactory and praised the personalized advisory service because it guided and help her to expedite the application process. Even though she has her patent application on track, she is concerned about the lack of information on commercial issues to launch her product into the market.

Wendy believes that her utility model patent, in addition to the recognition she received as an inventor, will help society, especially hospitalized patients. She currently works in the Cardiovascular Intensive Care Unit with children in critical condition. Her medium-term goal is to continue specializing in the career she chose.

**«We must always believe in
ourselves and say: I can, and I
have to do it»**

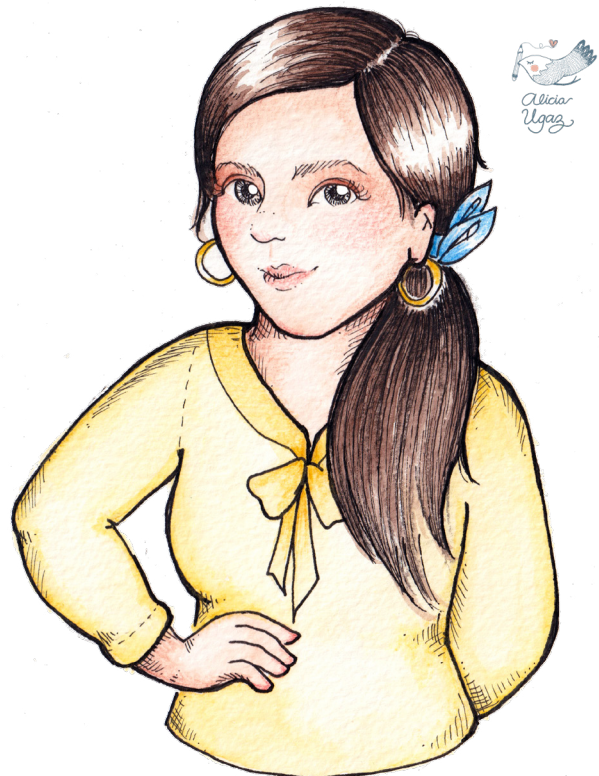
-WENDY POLO-

Pamela Jackelin Casímiro Rivadeneira (Huancayo)

Pamela was born in Huancayo but lived most of her life in Jauja. She has six siblings and, since she was a child, her curiosity and imagination made her stand out. At the age of six, she made wings for her crawling doll and used recycled materials to build toys.

As a teenager, she liked to watch documentaries on the first and second world wars. She was struck by how the affected people ate their food in adverse situations, and she wished she had lived at that time to solve the problem of food rations during the war.

At the age of twelve, she researched devices for unconventional food heating and discovered that, although there were some systems—such as “Esbit” tablets made from alcohol—, these did not achieve uniform heating. Thus, she came up with the idea to invent a device that would allow to have any drink or food ready for consumption just by pushing a button.



She worked with her brother in a family telecommunications company. She quickly became the star saleswoman in the region and learned alone everything about how cell phones work.

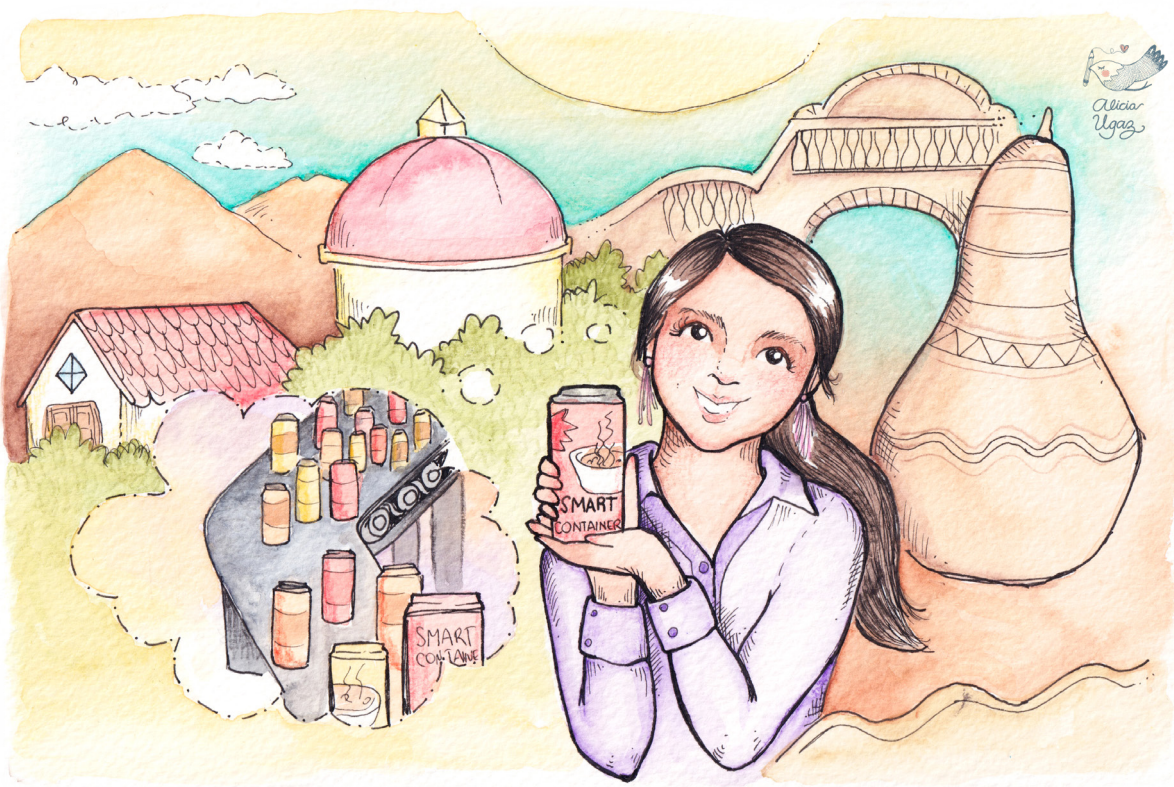
Pamela was accepted to the Administration and Systems undergraduate degree program at Universidad Peruana Los Andes (UPLA), while working to pay for her tuition. She discovered her penchant for creating innovative products and launching them into the market. One of these was a toy bear that translated a baby's cry. She built a prototype that distinguished the different types of cries and then identified the baby's concrete need. In 2010, she entered a competition sponsored by WAYRA, from Telefónica Foundation. Although she didn't win, Pamela had already developed a business plan to launch her innovative product into the market.

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Back then, Pamela had to decide whether to focus on launching the translator toy bear into the market or finish her undergraduate degree. Since the possibilities of launching her project were very limited at that time, and due to the lack of economic resources, Pamela decided to finish her degree.

After graduating, she worked as an administrator. Her creativity prompted her to resume her idea of creating a device to heat food, and she invented a **“self-heating container”**, the most challenging project in her career as an inventor.

Pamela visited the Indecopi patent office to learn about the process to protect her invention. Thanks to the support of the Patent Program's advisors, at the end of 2017, Pamela filed her patent application with the Directorate of Inventions and New Technologies. Then she decided to deepen her knowledge to successfully follow up on her application and attended several talks organized by the Directorate of Inventions and New Technologies.



Pamela has some anecdotes when she attended product trade shows. Some comments showed the prejudices of our society, because several people told her: *“What a good invention! How interesting! but where is the inventor?”* On another occasion she was mistaken for the hostess of the stand. However, none of this discouraged her. Pamela was focused on launching her invention into the market, improve people’s lives, and start her own company.

Pamela says that her invention *“Smart container”* is the most satisfying one throughout her professional career. In 2019 she had the opportunity to travel to the South Korean International Women’s Invention Exhibition (KIWIE), where she won important awards for her invention. This fills her with happiness, motivates her to continue pursuing her dreams, and to inspire other young women to venture into the world of science and inventiveness.

One of her medium-term goals is to launch her invention into the market at an affordable price and help society. Her final advice for girls and young women is not to stop dreaming and fighting for your dreams, because sometimes you don't know your potential until you take risks and do it. There is nothing impossible. There have been and there are many women in the world who have achieved great things for the benefit of humanity.

**«I always thought
I had to pursue my dream»**

**«Women are also made
to achieve great things»**

-PAMELA CASIMIRO-

Lisette Yllanes Nauca (Huánuco)

Lisette was born in Arequipa. Her mother, a pediatrician, was her role model. Lisette had a childhood marked by difficult events that left indelible scars. This did not prevent her from moving forward thanks to her dream of becoming a scientist because, from a very young age, she was fascinated by science courses.

She became a mother at a young age. This filled her with hope and forced her to try even harder to achieve her goals. After studying Law for a short period of time, she realized that she preferred science. She transferred to the School of Pharmacy and Biochemistry at Antonio Guillermo Urrelo University in the city of Cajamarca.

Lisette believes that, even though she was born and spent her childhood in Arequipa, Huánuco has a special place in her heart. Upon moving to this city, she began working and studying a master's degree in Public Health. She also worked as a teacher in several technological institutes.



Her family supported her endeavors, such as the project “Diaper with anatomical separator”. In September 2019, she received recognition from the Regional Health Directorate of Huánuco for this invention and obtained a utility model patent. She also worked on the project “Fertilizer based on recycled diapers and banana peel” and participated in the contest organized by “Premios Latinoamérica Verde” in 2018. Lissette’s project was ranked in the top 500 social and environmental projects in the region and ranked eleventh in the Water Category.

In 2019, Lissette and Diana Karina Palma Lozano invented the **“Procedure for elaborating gummies based on guinea pig blood and Peruvian groundcherry”**, financed by the University of Huánuco. The goal of this invention is to eradicate anemia in our country. The gummies increase hemoglobin in children’s bloodstream. That same year, the University of Huánuco and the Peruvian Nurses Association recognized the project’s positive impact on health. They participated in Indecopi’s 2019 Invention Contest with this invention. They received recognition in the “Academic and Research Center” category. They also filed an invention patent application with Indecopi’s Directorate of Inventions and New Technologies to protect the procedure for elaborating the gummies.

Lissette filed an application for a utility model for the invention “Scream motion sensor device”.

¹**Premios Latinoamérica Verde** is one of the most relevant sustainability events in the world. This annual event rewards and gives visibility to the 500 best social and environmental projects in Latin America. It promotes green economy by showcasing regional initiatives in 10 categories aligned with the Sustainable Development Goals (SDGs).

She came up with this idea to find a solution for girls and young women in danger. The device allows hearing their screams to defend themselves or be rescued. This invention was the people's favorite in 2019 National Invention Contest. Indecopi and WIPO awarded her a medal and a memorial plaque.

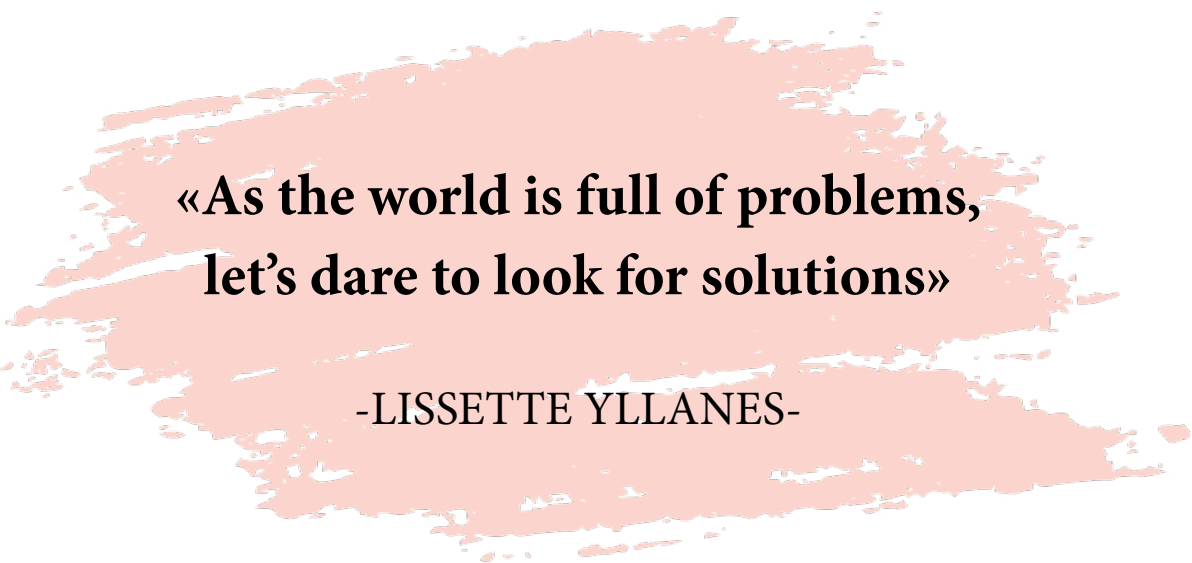


Lisette has received several awards for her contributions to society and for her professional excellence. For example, in August 2019, she received recognition from the Regional Government of Huánuco for her outstanding contribution in science and in the region with several of her projects. In November 2019, the Ministry of Women and Vulnerable Populations, during the “XVI Order of Merit for Women”, praised her outstanding work in the field of science and her constant contribution to the country. Antonio Guillermo Urrelo Private University decorated her exceptional professional performance, and Hermilio Valdizán National University of Huánuco awarded her a “Medal of Honor” for her career as

a researcher. The Association of Pharmaceutical Chemists recognized her professional career in the event “Pharmaceutical academic excellence”. Lissette believes that these awards are an important motivation to continue working as an inventor.

It is important to note that, despite the adversities she overcame both in her childhood and adolescence, Lissette learned that she did not need a hero to rescue her; on the contrary, she would be the heroine of her life. She achieved this by learning self-appreciation, not giving up and fighting for her dreams, even though some people tried to undermine her self-esteem. Lissette says that it is essential to first appreciate oneself and then contribute to the community, the region, and the country.

At present, she considers that there is still much to do in our country. Lissette is willing to do her bit and encourage new generations to fight against gender stereotypes, so that their dreams come true.



**«As the world is full of problems,
let's dare to look for solutions»**

-LISSETTE YLLANES-

Irma Geralda Horna Hernández (Cajamarca)

Irma was born in Cajamarca. Her grandmother took care of her religious upbringing and her grandfather encouraged her taste for nature. Her father gave her natural science books when she saw her chasing toads in the rain for hours. Thus, she learned, at a young age, about the elephants in Africa and the flying lemurs in Madagascar from her room in Cajamarca.

At that time, Peru was going through very difficult times.

However, with her parents' support, she finished high school successfully. She got in the School of Agricultural and Forestry Sciences of the National University of Cajamarca and graduated as a Forestry Engineer. She remembered her father's teachings and how he encouraged her taste in reading. Irma visited the natural wonders of Peru that, until then, she only had explored through books. In fact, her favorite subjects at university were those related to dendrology, chemical botany, and entomology because these topics deepened her knowledge on her region's resources.

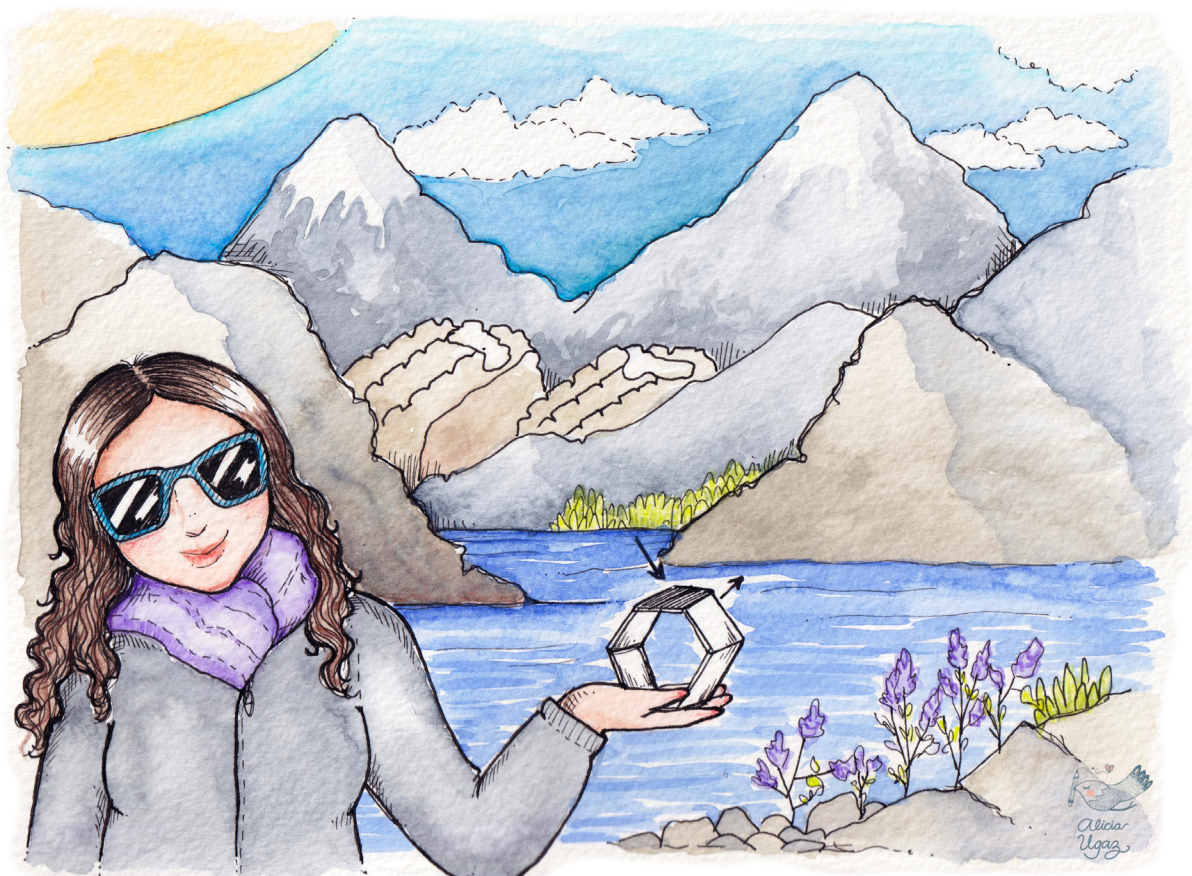


Irma says that her first job was in an open pit gold mine, where her reforestation project won a competition. She learned about mining processes and revegetation practices in this job. She worked on participatory water monitoring in basins affected by mining, rode a horse to get to irrigation canals and learned Quechua to communicate and understand better the community's concerns and needs.

Thanks to this experience, she decided to pursue a master's degree in Development and Environment and, later, a doctorate in Environmental Management and Natural Resources. During this time, she became a mother of three girls and successfully achieved work-life balance. Irma traveled to Huascarán Mountain to take photographs of the glacier retreat; sailed along Marañón River in search of the Colaspátula hummingbird and orchids; and walked the slopes of Sangal Canyon to look for the Hummingbird Comet Ventriguís. She did all these activities with her daughters, her faithful adventure companions.

Her passion for discovering the diverse ecosystems of Peru led her to become a wildlife specialist and photographed hummingbird nests in forest fires. Irma also created the digital magazine "Ecosistema Earth" to publish reports on wildlife from different countries.

Irma then became involved in the design of structures to restore ecosystems and proposed three projects: a device to restore pollinating hummingbirds and neotropical wildlife; a sheep's wool geomat with a nourishing gel based on taya seeds; and finally, a reflective geostructure that forms glacial ice to reverse the melting of snow-capped peaks as a result of global warming.



Irma filed with the Directorate of Inventions and New Technologies the utility model patent application titled **“Reflective geostructure for regenerating glacial ice”**. This invention has the ability to prevent sunlight from entering the area where ice masses are generated, while the air mass—which goes through the geostructure—is adhered. Since it is exposed to low temperatures, it will generate ice naturally that will then expand homogeneously. In fact, ice formation occurs in specially designed polyhedrons located in the geostructure, which is made up of two high-density white polyethylene prismatic structures; one of them is hollow and the other is laminated on one of its sides. It is necessary to put the geostructures in the area where snow-capped mountains need to be regenerated. Irma wants to carry out tests in Huascarán National Park and seeks support from a public or private institution to solve a critical environmental problem in our country.

Irma is currently an inventor and entrepreneur in the field of Peruvian coffee and cocoa. Irma says that life is like a seed that, in the midst of fires and pollution, manages to germinate and grow to become a giant and dense tree. Irma won the first place in the event “*2017 Peruvian Woman Engineer*”, organized by the Peruvian Engineers Association, and she is currently participating in 3M’s initiative “*25 Women Scientists in Latin America*”. She also won the Peruvian Inventor Award, a new category awarded in the 2020 National Invention Contest organized by Indecopi.

Irma confesses that she had some inconveniences during her graduate studies, due to certain prejudices that still persist in our society. For example, some people thought that because she was young, she did not have enough skills, or she would not achieve her goals because she was a mother. Sometimes Irma could not be part of a group assignments due to these prejudices. She was still young when she obtained her master’s and doctoral degrees, and she couldn’t enter the labor market due to stereotypes related to women and motherhood. However, Irma did not give up; on the contrary, she worked independently and promoted innovative ideas to solve different technological problems.

Irma mentions that, although efforts are currently being made to achieve gender equality in science, there are still many difficulties to overcome.

Her final advice is that girls and young women maintain the strength and wisdom to carry out any project they decide to undertake. She also encourages more girls and young women to pursue science because, with dedication and effort, it is possible

to balance their family and professional lives and feel fully satisfied after contributing to the development of the country.

**«Wise women who pursue science
are the light for the world and
human salvation»**

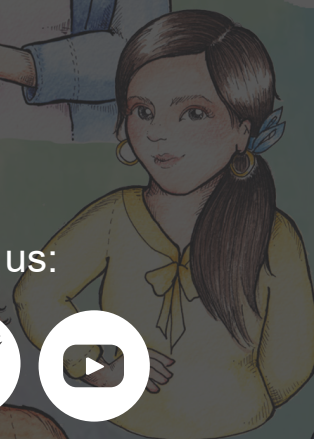
-IRMA HORNA-



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