Society News

Beyond the Borders: Mentoring Enhances Professional Skills

Testimonials from the field

Nyi Nyi Tun, Sahar El Hayek, José Quintero, Nuwan Sriyantha Bandara, Indya Ceroni, Diego Valdes Cavazos, and João Vitor Mendes Pinto dos Santos

The IEEE EMBS Student Mentoring Program (SMP) is an international community of engineering in medicine where many experts of BME come together. The program is a reliable program for IEEE EMBS members to promote professional skills [1]. It is one of the most successful programs under the initiative of the IEEE EMBS Student Activities Committee, providing students with the opportunity to meet global experts under the well-steering of Dr. Nyi Nyi Tun (Figure 1), IEEE EMBS SMP Chair 2023. The core value of the six-month-long program lies in matching mentees with the right-matched mentors, helping them enhance their professional skills with the support of program ambassadors [2]. As a program chair, Dr. Nyi's desire is to support global youths and society with qualified education from the perspective of biomedical engineering and professional development-focused areas.

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Figure 1. Dr. Nyi Nyi Tun, IEEE EMBS SMP 2023 Chair. (Photo courtesy of IEEE EMBS SAC.)

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Figure 2. Sahar El Hayek, mentee. (Photo courtesy of IEEE EMBS SAC.)

Figure 3. José Quintero, mentee and ambassador. (Photo courtesy of IEEE EMBS SAC.)

Sahar El Hayek, mentee

As a fourth-year Lebanese BME student (Figure 2), my journey with IEEE-EMBS has been transformational. Like many of my peers, I entered university with questions about my future, my career, and my passions. IEEE-EMBS provided me with a platform to explore these questions and offered opportunities that shaped my personality and professional path.

One of the pivotal experiences of this program was the connection I made with an extraordinary mentor, Dr. Sulekha Chattopadhyay. Despite the geographical distance (Dr. Chattopadhyay being in the USA and myself in Lebanon), we successfully maintained weekly meetings tailored to my specific needs. Dr. Chattopadhyay has been instrumental in guiding me through the nuances of being a woman in STEM, dealing with stress in the workplace, maximizing my performance, as well as securing a prime internship. She helped me develop leadership and communication skills, always encouraging me to overcome challenges with resilience and confidence.

A highlight of our collaboration was organizing an international virtual panel with notable speakers: Dr. Sulekha Chattopadhyay, an IEEE-EMBS member, Fulbright Specialist, and a renowned expert in air pollution and climate change strategies; Dr. Celia Shahnaz, WIE Chair (professor at the Bangladesh University of Engineering and Technology; and my professor Dr. Sandy Rihana, a biomedical and computer engineer (Head of Technology Transfer Office at the Holy Spirit University of Kaslik, Lebanon). The panel discussed the intersection of climate change, health care, and technology, emphasizing the unique challenges faced by women and children. This event provided me a platform to moderate discussions critical to global issues and gave me hands-on experience in event management, international communication, and marketing.

Reflecting on my journey, the IEEE EMBS SMP has not just been about learning technical skills. It has been about networking, stepping out of my comfort zone, and discovering the limitless possibilities that the world offers. This program has been a cornerstone in my personal and professional development, and I am immensely grateful for the guidance and support of Dr. Chattopadhyay.

To all young engineers and students out there, I urge you to take that step outside your bubble. Explore, engage, and embrace the opportunities that come your way. The IEEE EMBS SMP is a testament to the growth and opportunities that await when you dare to venture beyond the familiar.

José Quintero, mentee and ambassador

The EMBS Mentoring Program is a program that opened its application period from 1 March 2023 to 15 April 2023, and the program period was extended for six months, from July to December 2023.

Figure 4. Nuwan Sriyantha Bandara, mentee. (Photo courtesy of IEEE EMBS SAC.)

Figure 5. Indya Ceroni, mentee. (Photo courtesy of IEEE EMBS SAC.)

The experience of the EMBS Mentoring program exceeded my expectations. It is a program where if you participate as a student, you interact with a professor. In my case, the meetings were every two weeks. This professor helped me to discover scholarships to study abroad, being that this was my main objective when entering the program, but we also developed a small research work. As an ambassador for the program (Figure 3), I had tasks related to organizing activities. I was assigned to a group of mentor/mentee pairs where I had to follow up on their mentorships and concerns and make templates for the bimonthly meetings that took place between mentees and mentors. I really enjoyed going to the bimonthly meetings because the program extends your interaction beyond being a student and teacher: You also interact with the other mentees and mentors, seeing how their work and mentorships are developing. I observed that other pairs of mentors and mentees have done great and interesting work. I made some relationships, so this program also serves as networking. According to the surveys conducted, 96% of the participants answered that this program has helped in their professional development and leadership skills, and 94% showed a satisfaction between 4 and 5 points in a survey rating from 1 to 5. This shows that it is a program with a high level of organization and is very complete. I would extend the invitation to every student and teacher to join the program in the coming years. Thanks to the SAC and Dr. Nyi Nyi Tun for guiding the EMBS 2023 mentoring program with excellence and success.

Nuwan Sriyantha Bandara, mentee

As an inspiring young professional who aspires to develop a well-formed research career in the field of BME, I personally found the IEEE EMBS SMP as a game-changer since it was timely and objectively structured specifically for all those who are at the end of their undergraduate studies and searching for sophisticated opportunities to further expand their research horizons, like myself (Figure 4). Therefore, through professional outreach and coordination, this program established an invaluable platform for me to collaborate with an amazing mentor toward an impactful project which both of us were interested in. This collaborative process did not only guide me to acquire new technical skills, it also supported me to continuously enhance my research communication skills while adding a well-versed article to my publication portfolio. I am grateful to my mentor and IEEE EMBS SAC for their unwavering dedication for the BME field, and I truly hope that this program will continue to enlighten the research thirst of many aspiring young researchers like myself.

Indya Ceroni, mentee

The mentorship program has been a great opportunity for me (Figure 5) to challenge myself beyond my comfort zone and connect with an international community of scientists. From a personal point of view, the greatest outcome of this program has been the professional relationship that I built with my mentor, Prof. Fujiwara, which I am confident that will last for long after the end of this program.

Having the opportunity to discuss about the rationale and work plan of my Ph.D. program with Prof. Fujiwara has been highly fruitful and has helped me to point out the major challenges of my project and to figure out how to deal with them. We have had many enlightening exchanges regarding the possible scientific impact of the project and about the technical details of the analyses involved.

The main theme of my Ph.D. is the electromyographic characterization of human movement for rehabilitation. Prof. Fujiwara has been exceptionally available in sharing with me his expertise in biomedical signal processing, giving me valuable insights about algorithms that had improved my data processing pipeline as well as hardware support that could be beneficial to optimize the computational speed for my application. I also greatly appreciated Prof. Fujiwara's genuine interest in the practical applications of my research in the rehabilitative field.

Prof. Fujiwara also proposed me to participate in a fellowship program offered by the Japan Society for the Promotion of Science (JSPS) that provides opportunities for overseas researchers to spend a period in Japan to conduct collaborative projects, and I was honored to accept his proposal and applied for the January 2024 call. We collaborated on defining a research project that we will pursue together in Japan if my application is successful. We decided to focus on a dataset acquired from patients with amyotrophic lateral sclerosis (ALS), and we agreed that an interesting and impactful application to assist the treatment of ALS patients could be the design of a machine learning model able to classify different clinical subtypes of ALS based on needle electromyographic recordings.

It has been a great challenge for me to effectively describe the research plan that we envisioned and its foreseen impacts in my JSPS application, but I have no doubts that this experience is going to be extremely helpful for my career in research.

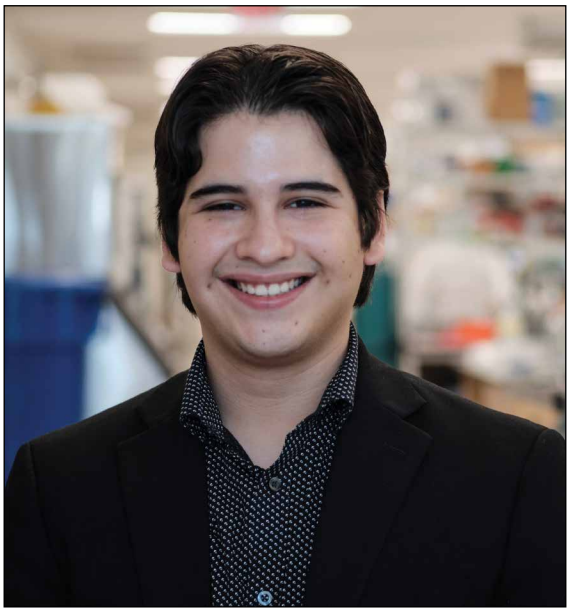

Figure 6. Diego Valdes Cavazos, mentee. (Photo courtesy of IEEE EMBS SAC.)

Diego Valdes Cavazos, mentee

Participating in the 2023 IEEE EMBS-SMP was a transformative experience that broadened my understanding of the applications and career paths within the realm of engineering in medicine (Figure 6). This opportunity not only exposed me to the vast possibilities in the field, but also provided me with a unique international perspective thanks to my mentor, Ziyuan Zhao.

Ziyuan, from Singapore, brought a wealth of knowledge and experience that was truly enlightening. His guidance was pivotal as I navigated through the complexities of planning my academic and professional future. Through our meetings, Ziyuan introduced me to a diverse range of careers in BME, from research and development in new medical devices to innovative health care technologies. His insights were key in helping refine my interests and set a focused direction for my future graduate studies.

Moreover, Ziyuan's mentorship extended beyond career advice. He played a crucial role in preparing me for several academic achievements, including multiple conference poster presentations. His guidance in this area was instrumental, as he shared strategies for effective abstract making, how to convey research findings, and how to engage with conference attendees. Perhaps most importantly, he

taught me how to maximize my time at conferences, encouraging me to network with other professionals and researchers.

One of the most significant insights I gained from this mentorship was an appreciation for the academic differences between countries. The contrast between Ziyuan's perspectives, rooted in his Singaporean background, and the advice I typically received from my Mexican-American context, was intriguing. It highlighted the differences in approaches to education, research, and professional development in our respective countries. This cross-cultural exchange improved my understanding of the global BME field, teaching me that there are multiple paths of success and unique strengths and methodologies in the field.

The IEEE EMBS-SMP, through the guidance of mentors like Ziyuan, offers an invaluable glimpse of the international community of engineering in medicine. It equipped me with not only the technical knowledge and skills necessary for my future career but also a global perspective that I believe will be crucial in my contributions to the field.

João Vitor Mendes Pinto dos Santos, mentee

I wanted to shift my research focus to the use of AI in processing cardiac signals at the end of 2022. However, I had yet to gain experience in this field. At the beginning of 2023, I received an email about the mentorship program for students from EMBS, which would be an excellent opportunity to take my first steps and develop more quickly with the help of a professional experienced in this field (Figure 7). Although I had low expectations of passing the selection process, I received a message in my email on 2 July 2023, informing me that I had been selected. Masoud Fetanat was assigned as my mentor. He holds a Doctorate in Philosophy in Engineering from the University of New South Wales. He has published numerous articles on artificial intelligence use in bioengineering and works for a major company. Thanks to the program' mediation, I had the opportunity to connect with and learn a lot from him. He filtered and sent me good introductory articles and relevant courses on my research interest, greatly facilitating my first steps. He was always willing to clear my doubts, and even though I was not fully proficient in English, he was very patient with me, which provided a suitable environment

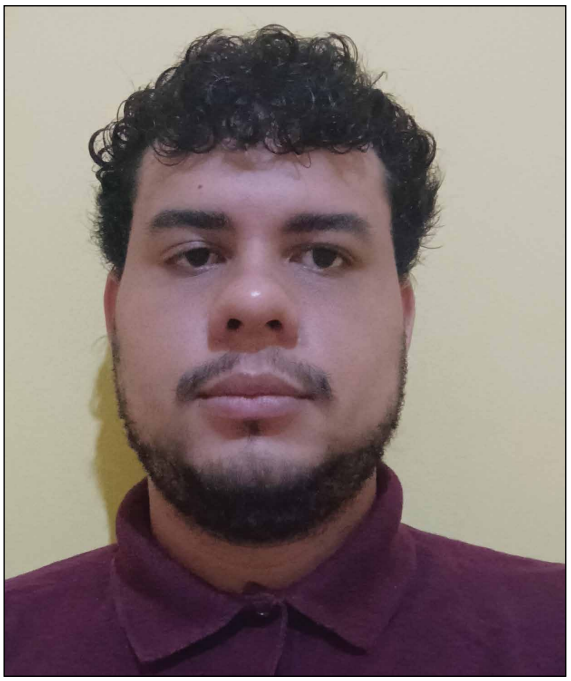

Figure 7. João Vitor Mendes Pinto dos Santos, mentee. (Photo courtesy of IEEE EMBS SAC.)

for practicing my English. In September 2023, the National Council for Scientific and Technological Development (CNPq) of Brazil, one of the country's largest agencies supporting scientific research, opened the selection process for scientific initiation scholarships. Developing a work plan with a theoretical foundation was necessary to participate in the selection process. Reading the articles that Masoud sent me and the questions he answered during our meetings gave me a much more solid foundation and confidence to write about machine learning and its variations, the current state of the art, and the method to implement the project. On 6 October 2023, the CNPq announced the selection process results, and I was selected. This selection process is crucial because I was previously linked to a research funding agency with local recognition, and being associated with CNPq adds a more prestigious name to my curriculum vitae. This will aid my academic progression and improve my chances of being selected for a master's program in the near future.

According to the testimonials, the outcomes of the program were very significant insightful. On the other hand, there were some foreseeable challenges for program participants. The different time

zones, their regions, and countries' educational backgrounds can be a challenge for the participants. However, beyond those borders, the paired mentees and mentors proved that they could perform their best with significant progress throughout the program duration. Each participant could grasp the different transformative achievements, such as the increased potential to be attended at the prestigious conferences and paper-poster presentations, student exchange fellowship opportunities, scientific research supports, cross-cultural experiences, and personal and professional development after successfully joining the program. Thus, if you would like to expand your networking and professional skills beyond the borders, the IEEE EMBS SMP is the right phase to keep on the dreams. Moving forward at SAC@EMBS.ORG! ■

References

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■ ***Nyi Nyi Tun*** *received the Ph.D. degree in information science from Kyushu University, Fukuoka, Japan, in March 2022. He is currently a postdoctoral researcher with the University of Peloponnese, Greece. He is also researching biomedical and neural circuits in fusion with mechatronics engineering. With a passion for volunteering, he is dedicated to contributing to society and collaborating with students and professionals globally.*

■ ***Sahar El Hayek*** *is a senior biomedical engineering student with experience in AI applications for health care, including diagnostic tools and AI-powered chatbots. She has had internships at BioMaps, Paris, France; COMO Facilities Management, Doha, Qatar; and Saint George Hospital, Beirut, Lebanon, which have sharpened her research and project management skills. She has led initiatives at IEEE-EMBS as Student Chapter Chair for 2023 and Caritas Lebanon Youth as head of the communication unit.*

■ ***José Quintero*** *is a student of electromechanical engineering with the Technological University of Panama. He is developing a thesis on cold plasma in medical applications. He has been part of the IEEE/EMBS since 2023. He organized the opening of the EMBS Student Chapter at the Technological University of Panama and is the president of the chapter.*

■ ***Nuwan Sriyantha Bandara*** *is a biomedical engineer with demonstrated accomplishments in novel health-tech developments. He is currently working as a research engineer at the School of Computing Information Systems, Singapore Management University. He obtained his Bachelor of Science of Biomedical Engineering (Honors) degree from the University of Moratuwa, Sri Lanka. He is interested in the areas of artificial intelligence for health care, medical instrumentation, bio-signal processing, geometric learning, and computational biology.*

■ ***Indya Ceron*** *is a biomedical engineer pursuing the Ph.D. degree in the field of rehabilitation technologies. She is focusing on the electromyographic characterization of human movement to inform the development of novel control strategies for robotic assistive devices. She has also worked in the development of rehabilitative solution based on functional electrical stimulation during her master's degree, which she obtained from Politecnico di Milano in 2021.*

■ ***Diego Valdes Cavazos*** *is a third-year biomedical engineer studying at the University of Texas at San Antonio. He is in the NIH-funded MARC Research Program and works in Dr. Brey's Tissue Engineering and Regenerative Medicine Lab. He researched at the Broad Institute of Harvard and MIT during the summer of 2023 through their Summer Research Program and is going to be participating in the MIT Summer Research Program in 2024.*

■ ***João Vitor Mendes Pinto dos Santos*** *is an undergraduate computer engineering student at the Integrated Center for Manufacturing and Technology (SENAI CIMATEC). He is a scientific initiation scholarship holder at the National Council for Scientific and Technological Development (CNPq). His areas of interest are machine learning, distributed systems, signal processing, and biotechnology.*