



Women in Microwaves

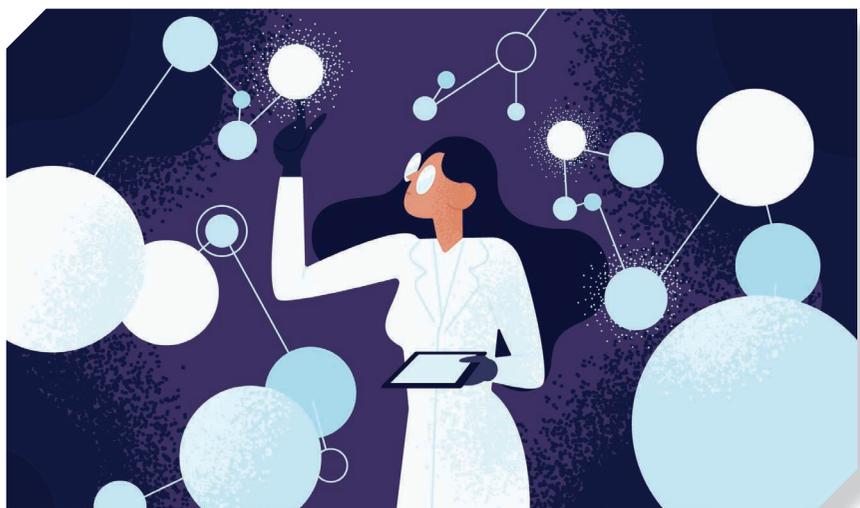
A Journey of Continuous Learning

■ Aqeela Saghir

It is a great privilege to write on behalf of the many women who have high aspirations but never know whether their dreams will one day become reality. I was among them once. I did not know that one day I would get the opportunity to implement in practice the things I had learned during my education as an engineer.

Despite living in a society that was a constant hurdle for a woman, my family was my biggest support, and I was the first woman in my family to become an engineer. It was my father's dream, and it became my dream to pursue it further. Therefore, during engineering courses, I put effort into every project, especially those related to hardware, as I loved implementing things and observing the magic of science. This was also due to the huge support from my teachers who helped and motivated me a lot during my engineering education.

There were around 14 other female students in my engineering cohort of



about 100, and I remember each of us struggling in our own way to do our best and stand out. However, only a few succeeded in specializing in their fields. It was always a huge misconception in our culture that women generally cannot pursue their careers, and therefore most are reluctant to go abroad for further training.

However, when I went abroad, I found that I had been too protected in my country, which meant that I had never actually grown up. When I first moved abroad, I faced being homeless for months, being ill and not able

to share that with my family, getting lost, and dragging my luggage with a broken wheel; many of these hardships made me find the strength that I had in me—which most of us do not find until we actually face deep challenges. Therefore, I want to convey to all women the message to search for the strength inside them.

The journey to learn and explore could start any day, and, when it started for me, it was impossible to stop. My first interaction with practical RF and microwaves was when I did my final-year project for my bachelor's degree.

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Figure 1. The author's first antenna fabrication at home.

As I always preferred to see how things were done from scratch, I implemented my designed antenna using a toner transfer method at home (Figure 1). Although the fabrication was not successful, it did give me insight into how wet etching is done. After my degree, I published my first-ever work related to this antenna. I completed my bachelor's degree in electrical telecommunications engineering from the COMSATS Institute of Information Technology in Islamabad, Pakistan, in 2011.

As the job market for electrical engineering was very tight when we graduated, my friends and I applied for the master's degree program in RF and microwaves at the Research Institute for Microwave and Millimeter-Wave Studies (RIMMS) in Islamabad, an



Figure 2. The author presents her experience at the Erasmus Mundus Workshop, 2015.

institute under the National University of Science and Technology (NUST). This one-of-a-kind institute was solely dedicated to RF and microwave design. It gave me a huge opportunity to learn in my field. My master's thesis was on the electromagnetic compatibility of dc-dc buck converters. I was really inclined toward studying electromagnetic compatibility, as I was attracted to circuits and their implementations.

While I completed my master's degree, I also worked as a research assistant at the same institute. The project concerned the design of training boards for students in the field of digital logic design. The complete layout and implementation of this project was designed by members of my group and me. Additionally, I was in charge of the Microwave Devices and Integrated Circuits Lab and taught a lab for the CAD course. Despite the low salary, I worked very hard at each of my responsibilities, and, as my thesis supervisor and boss were the same person, I was successful in gaining his recommendation throughout my future work.

In 2014, I received an Erasmus scholarship (Figure 2) for Ph.D. degree training at Technische Universität Dortmund, Germany. There, I continued pursuing the area of electromagnetic compatibility. I worked with the emissions group to study radiation emissions from a printed circuit board for vehicle components with the help of a near-field scanner (Figure 3). Unfortunately, things did not work out, and I had to quit my Ph.D. program after two years. It was really devastating.

Maybe the thought of learning more kept me going. I was lucky to transfer to Cyprus, where I restarted my Ph.D. degree. With a huge effort and courage, I began working on a completely different project. The objective of this Ph.D. research was to design reconfigurable planar filters. As the remaining scholarship was just for one year and the program ended, I returned to Pakistan in 2017. However, I did not stop working on my Ph.D. degree and continued doing so part time.

When I returned to Pakistan I was very lucky to get a job in a well-regarded

government organization. There, I came into direct contact with passive components and their implementations. I was successful in building accurate software models that matched the hardware implementations. I already had enough knowledge about filters from my Ph.D. work, and I increased my knowledge about passive components through this job. The project ended in 2019, and, right after completing it, I got another job as a research associate. The job contract was short term, so during this time I applied for a job in Italy and, after successfully clearing all my interviews, traveled to Italy to take up my new post.

Currently, I am a researcher at the Leading Innovation and Knowledge for Society (LINKS) Foundation in Turin, Italy, and I am also working part time on a Ph.D. degree in electrical engineering from Frederick University in Nicosia, Cyprus. The decision to apply to the LINKS Foundation was the best decision I could have made (Figure 4). Not only is the staff highly motivating and helpful, but I am also learning a lot every day.



Figure 3. Near-field scanning of the automotive electrical control unit designed and soldered by the author.



Figure 4. Celebrating Women in Science Day at the LINKS Foundation, Turin, Italy.

My journey was very hard, and one of the biggest issues was financial. My father's income was low, but, despite this fact, he made sure that he allotted

funds for both his daughters and son. My mother also sacrificed a lot and made sure to have enough savings for our education. I can never repay

what they have given me. Being the eldest, I also felt the responsibility to ensure that I was a role model to my siblings, and I am proud to say that all of them are doing great. In fact, my younger sister is the second engineer in the family—in the field of material engineering.

It was hard to share so many of my personal feelings and experiences in this article, but I hope that it helps many women out there to strive for better and to believe that nothing is impossible in life. The strength is inside you, and you just need to find it. Never believe at any stage in life that you have learned enough, because then you will stop moving forward. Finally, be a support to everyone around you; it is a great feeling to work together and help each other.



Microwave Surfing *(continued from page 11)*

have acted on these views by filing petitions challenging the Order in various federal appellate courts. Although the Order went into effect on 14 January 2019, these challenges remain ongoing and have been consolidated in the Ninth Circuit Court of Appeals.

The judges of the Ninth Circuit Court, issuing their decision in favor of the “FCC Fast Plan” rules, wrote [2], “Statements in the [FCC proceeding’s] record from wireless service providers, and an empirical study, are cited to support the conclusion that limiting fees will lead to additional, faster deployment of 5G technology throughout the country.” The judges also upheld the FCC’s changes to “shot clocks” that give local authorities a fixed amount of time to act on carriers’ applications to deploy small cells. However, the judges’ panel overturned the commission’s pre-emption of certain aesthetic requirements that cities and towns impose on cellular installations.

The American legal system has its origins in the traditions of English

common law. Therefore, it was interesting to note that, at about the same time a U.S. court voted against local autonomy, a court in Britain ruled in favor of the landowners on whose property cell phone towers are erected. According to [6],

Operators such as Vodafone pay landowners billions of pounds in rents every year at thousands of sites—but hoped to reduce these under the Electronic Communications Code, which was introduced in 2017. It was designed to speed up the rollout of 5G by cutting costs for operators hoping to install the infrastructure quickly and cheaply . . . Judge Martin Rodger QC ruled that Vodafone should pay rent to the landowner, Hanover Capital, based on the value to the operator as opposed to the value of the land itself, which would be much cheaper.

It remains to be seen whether the American companies will really get their

5G infrastructure developed faster than their British counterparts.

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