

The Challenges and Benefits of Change

Emily Porter

When I started thinking about what to write in this column, I was planning to tell you about my experiences living and working in different countries as a woman in electrical engineering. However, it is perhaps not fair to do so because I was at such different stages in my career at each place. Therefore, I will tell you a little about my experience starting a career in academia, the transition to being an independent researcher, and the challenges and highlights along the way.

BACKGROUND

I became interested in research when I was working on my undergraduate thesis. Supervised by Prof. Milica Popović at McGill University in Montréal, Canada, the project was about developing numerical models of the breast, derived from magnetic resonance images. The models were to be used for simulating microwave radar imaging of the breast. I became very intrigued by the field in which I now work: the medical applications of electromagnetics. I was initially attracted to this area because I could see the potential for designing technologies that could have a positive impact on people's lives. I always had an inclination for medicine and for problem solving (fostered by my parents—my dad is an engineer and my mom is a nurse), so medical electromagnetics easily checked both boxes.

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EDITOR'S NOTE

Emily Porter describes her professional life, highlighting the challenges and benefits of working in different countries. She shows us what it means to be a woman in electrical engineering in Europe and the United States and how this has changed during the past 10 years.

Dr. Porter is an assistant professor in the Department of Electrical and Computer Engineering, University of Texas at Austin. She is the recipient of several prestigious awards, including multiple URSI Young Scientist Awards, the IEEE Antennas and Propagation Society Doctoral Research Award, the Irish Research Council "New Foundations" Grant, and the Royal Irish Academy Charlemont Grant.



Francesca Vipiana

Therefore, in 2010, I started my Ph.D. degree in electrical engineering, specializing in computational and applied electromagnetics, at McGill. I

was still being supervised by Prof. Popović, who has been a wonderful mentor to me throughout my studies and during the years since (Figure 1). My research



FIGURE 1. The author (right) with her Ph.D. supervisor, Dr. Milica Popović, at the 2012 IEEE International Microwave Symposium, in Montréal, Canada.

was on time-domain microwave breast imaging. We designed and built the first experimental prototype for time-domain microwave radar imaging of the breast and simultaneously fabricated anatomically and dielectrically representative phantoms for testing the system prototype. After much debugging, the prototype worked, with early images showing

successful identification of tumor phantoms [1] (Figure 2).

After demonstrating the system functionality, we went on to perform the first clinical evaluation of a time-domain radar system for microwave breast health monitoring [2]. It was very exciting to work with patients, and I learned an immense amount, from obtaining ethical

approval to conducting a clinical trial to how to explain engineering concepts in a nontechnical way. I practiced my explanations on my family a lot—my 90-year-old grandmother still asks me about my progress with my microwave breast imaging bras. Overall, I gleaned a lot from my Ph.D. studies, and I am eternally grateful to Prof. Popović for supporting me and encouraging me throughout the whole process.

After graduating, I wanted to move abroad to experience a new perspective on research and live in another part of the world. I decided to go to the National University of Ireland Galway. I started a two-year postdoc there, in 2015. Then I became a Marie Curie fellow and adjunct lecturer, and before I knew it, I had been there more than four years. My experience working in Ireland was awesome. Supervised by Prof. Martin O’Halloran, our lab was located in the hospital, and we had great interactions with companies and learning the bench-to-bedside translation process. I expanded my research interests in medical electromagnetics—first, in the foundational dielectric properties of biological tissues, and second, in new technologies, including electrical impedance tomography for bladder state detection and brain stroke type differentiation (Figure 3) as well as microwave ablation and hyperthermia.

While in Galway, I was also able to get more involved in the European research community exploring microwave medical technologies. I became vice chair (alongside Dr. Lourdes Farugia) of MyWAVE COST Action, an international network of more than 200 researchers from around the world (Figure 4). The collaborative environment was fantastic, and during my four years living in Europe, I traveled to more than 30 countries for research visits, training, meetings, and conferences. I am very thankful to have had these experiences. I think traveling, meeting new people, and learning about what others do is an unmatched experience that fosters new ideas and helps us grow as people and as researchers.

I have felt fortunate to have strong women role models and influences

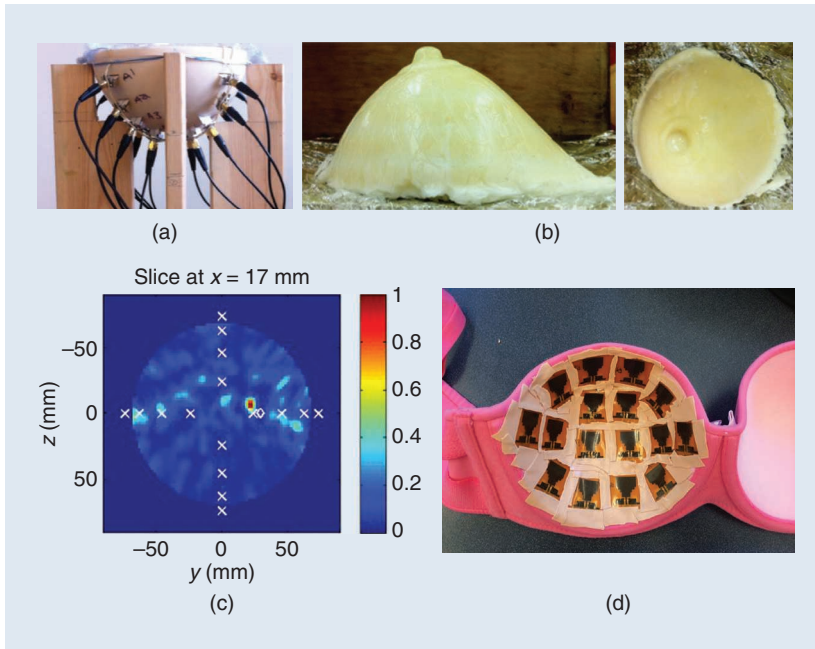


FIGURE 2. The microwave time-domain radar system developed during the author’s Ph.D. studies at McGill University: (a) the time-domain microwave breast imaging prototype, showing the cup-shaped radome and the embedded antenna array; (b) breast phantoms with realistic shape and dielectric properties; (c) a proof-of-concept cross-sectional radar image of a tumor (the red region) detected in a breast phantom; and (d) the envisioned next-generation prototype: a wearable bra with an embedded array of flexible antennas. [Source: images (a)–(c): [1]; used with permission.]

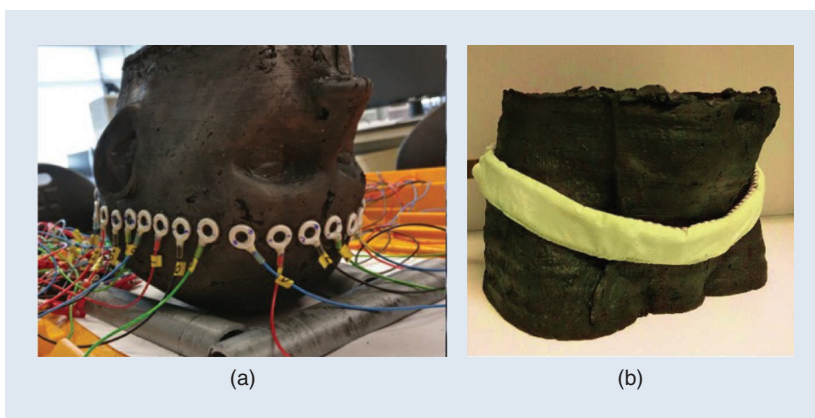


FIGURE 3. Phantoms designed and fabricated for impedance tomography: (a) a modular head phantom, including lesions, with electrodes placed around it (built based on [3]), and (b) a pelvic phantom, including a bladder phantom, with a Swisstom electrode belt. (Source: [4], Institute of Physics and Engineering in Medicine; reproduced by permission of IOP Publishing. All rights reserved.)

during my career. When I started my undergrad in electrical and computer engineering, I was one of only 11 women in the program, out of 150 students. More than a decade later, my postdoc lab had women outnumbering men. Overall, I feel I have been lucky not to have faced any serious issues as a woman in engineering, although I think we have all known our share of “mansplaining” and feeling out of place or left out at men-dominated meetings and conferences. Despite this, it seems to me that the situation is improving drastically, just in comparing my experiences as a woman in electrical engineering to those of the generation that preceded me.

But in many countries, there are still far more men than women at the senior professor level. For example, a report from the American Society for Engineering Education, released in 2019, found that women hold only 12.3% of full professor positions in engineering, [5], and recent figures from the European Commission (2018 data) found that, although the numbers are improving through time, women remain underrepresented in science, technology, engineering, and mathematics fields, particularly in more senior academic positions [6]. I hope that my generation will continue to realize this change and that we will further balance the scales toward equality.

A NEW START, AGAIN

Eventually, I decided it was time to apply for permanent jobs. I wanted to come back to North America to be closer to my family. In early 2019, I took a position as an assistant professor at the University of Texas at Austin. Here, I have many brilliant colleagues who have had enormous impact on their respective fields. Austin is a lovely city—if you ever visit, I highly endorse the barbeque. However, it is hard to face the challenge of building up a new network and a new community. I found working in the United States to be a big adjustment from the culture in Europe. I am still adapting, and, of course, it has been a bad time to do this, with the COVID-19 pandemic that has affected us all. However, the challenges are for a good cause. Working in a new country

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is a wonderful opportunity for personal development, growth in research, and exposure to new people and ideas.

DUAL-CAREER CHALLENGES

I have a two-body problem. I had the challenging situation of graduating just a few months before my husband, which meant I was the first to look for positions. We ended up having to do a year and a half of long distance, first while I lived in Ireland and he lived in Canada, and then when I lived in the United States

and he was finishing work in Ireland. It was a very difficult time, and I wish that it wasn't so challenging for dual-career couples to be able to find jobs in the same city. Thankfully, we were very lucky that he ended up eventually having job opportunities everywhere we lived (albeit with some compromises). However, I felt (and still feel) a lot of pressure since I was the reason we were moving. Thankfully, my husband has been supportive of joining me on my adventures around the world.

Also, despite the challenges that come with being a dual-career couple, there is one big positive: since we work in similar research areas, we often get to go to the same meetings and conferences. As a result, we have been able to travel the world together, from Queenstown, New Zealand; to Sibiu,



FIGURE 4. The kickoff meeting of COST Action MyWAVE.



FIGURE 5. The author and her husband, following a week of discussions with colleagues at the 2019 European Conference on Antennas and Propagation, in Krakow, Poland.

Romania; to Hiroshima, Japan. (As you can tell, traveling is a big passion of mine.)

CONCLUSIONS AND LESSONS LEARNED

I can say without a doubt that I would not be working in academia today without the wonderful support and community I have been a part of through the years. I truly believe that success in academia is more readily achieved when we are supported by a team—in our personal lives, in our research labs, and in our community.

The first year as an assistant professor is one of enormous growth and learning. Now, in year two, I still find myself doing new things almost daily. I have learned an immense amount through this process. My biggest lesson has been learning to speak up and advocate for myself. As a shy person, this is a hard task. However, it is an important one. This is my best advice for those of you who

are beginning your journey to becoming an independent researcher. If you need something, ask for it. If you don't know what to do, ask for help. People may not answer, and they may say no, but don't take it personally; just ask someone else. Many people (most people) will be happy to share their experience and give guidance on challenges you may be facing. You just have to make the first move and ask.

AUTHOR INFORMATION

Emily Porter (emily.porter@austin.utexas.edu) is an assistant professor in the Department of Electrical and Computer Engineering, University of Texas at Austin, Austin, Texas, 78712, USA. Her research interests include electromagnetic medical technologies and the dielectric properties of biological tissues.

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EDITOR'S NOTE

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