

From Challenges to Success

A road map for early career researchers.

Gangil Byun 

Young professionals, including graduate students and early career researchers, find themselves contemplating their future career paths, which may involve working in industrial research labs or government-funded institutes or pursuing an academic career. However, it is not uncommon for some individuals to hold the misconception that certain paths are obstructed by insurmountable barriers or a metaphorical “glass ceiling.”

INTRODUCTION

Reflecting on my experience counseling more than 100 students during my five-year tenure as a faculty member, I have observed that many young professionals tend to limit themselves and express frustration with societal injustices despite possessing exceptional qualities and positive attitudes. While a prestigious academic background can certainly provide advantages in overcoming these barriers, it should not be considered as the sole determining factor. To foster the growth of future leaders, it is crucial to provide them with an accurate understanding of the challenges they

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EDITOR'S NOTE

In this issue, Dr. Gangil Byun contributed an interesting article on his personal journey, “From Challenges to Success: A Road Map for Early Career Researchers.” Dr. Byun is one of the 2023 IEEE AP-S Young Professional Ambassadors. This article is based on Dr. Byun’s experiences toward the fulfillment of his aspiration to become a professor at a reputable university with his unwavering determination and perseverance despite the initial setbacks. This article provides inspiration and valuable guidelines that empower young researchers to accomplish their ambitions. A must-read for all young professionals!



CJ Reddy

We have many exciting articles planned for this column in future issues. Anyone who would like to contribute to the “Young Professionals” column or has any suggestions on the topics of interest, please contact me at cjreddy@ieee.org. Follow us on LinkedIn at <https://www.linkedin.com/company/ieee-aps-yp> for the latest updates and events that are of interest to AP-S Young Professionals.

may face, encourage the setting of optimal goals with a positive mindset, and provide guidance for their career advancement.

In this column, based on my personal journey toward the fulfillment of my aspiration to become a professor, we explore the essential components that foster prosperous advancement within graduate school programs and early career stages. The ultimate objective is to provide a valuable guideline that empowers young researchers to discern and accomplish their ambitions.

NAVIGATING UNDERGRADUATE AND GRADUATE STUDIES

EMBRACING YOUR REALITY AND SETTING OPTIMAL GOALS

In 2003, I entered Hongik University, a midtier private university, located in Seoul, South Korea. During my high school years, my family faced financial challenges, resulting in us living apart. Despite initially achieving a top-ranking position among my high school peers, my grades declined during adolescence due to frustrations. This trend continued into my first and second years

of university, resulting in consecutive warnings. In an attempt to rejuvenate my life and surroundings, I voluntarily enlisted in the army in September 2004 as it is mandatory for all South Korean men. However, during the initial week of training, a health-monitoring process raised suspicions of a tumor, leading to my discharge. Subsequent medical examinations revealed that it was a misdiagnosis, but reenlistment required a one-year waiting period. Consequently, I decided to return to university instead.

Upon returning to university, I confronted the harsh reality that graduating from a midtier university with academic warnings did not guarantee a promising future. The prevailing belief that job opportunities were constrained by one's university name disheartened me, but I refused to accept such limitations. Recognizing the significance of overcoming societal misconceptions and self-imposed barriers, I set new goals for myself—to pursue a Ph.D. and become a professor. However, a pressing dilemma remained concerning how to resolve my military duty in light of this new objective. I had two options: either postpone my studies for a year, serve in the army for two years, and then continue my education or opt for a military exemption program, complete my Ph.D., and serve as a professional research agent for three years instead of regular military duty. The first option promised a shorter service period and the chance to study abroad, but

it would disrupt my academic journey and entail isolation in the military. The second option, though demanding an additional year of service, allowed me to pursue my academic aspirations without interruption. Driven by my determination, I chose the latter and focused on my studies, improving my grade point average to be within the top 10%.

As our careers progress, we will often find ourselves at crossroads of choices. Many individuals make the mistake of denying reality and setting short-term goals as a fallback option. Based on my experience, the most crucial aspect is not denying the given reality or harboring dissatisfaction. When I declared my ambition to become a professor, a prevailing cynical opinion dominated among those around me, claiming it would be impossible. However, I focused on having a broader perspective and considering the given circumstances to choose the best option. This does not mean always embracing risks. Instead, I emphasize the importance of having a long-term vision and facing reality squarely as there are moments that call for courage in choosing options that may involve risks.

CONSISTENCY: THE KEY TO PROGRESS

I got married at the age of 25, which is younger than the average marriage age in Korea. It wasn't a planned decision from the beginning. During my second year of my master's

degree, my fiancé received an unexpected diagnosis of borderline ovarian cancer. The doctor advised that if we were considering marriage, we should have children as soon as possible and proceed with a hysterectomy due to the rapid progression of female cancers. This marked the beginning of our married life. Eleven months after our wedding, our first daughter was born, followed by our second daughter 18 months later (Figure 1). As a result, my Ph.D. journey was extremely challenging, both mentally and physically. I had to leave for Hanyang University by 5 a.m. before the children woke up, and after finishing my mandatory service as a professional research agent, i.e., military exemption, at 6 p.m. every day, I had to travel 30 min to Hongik University, where my coadvisor was located.

During my academic period, I participated in various projects related to developing antennas for defense systems (Figure 2). I mainly worked on the development of controlled reception pattern array antennas for antijamming purposes in the Global Positioning System (GPS) [1], [2], [3], [4], [5], [6]. I also developed direction-finding systems for unmanned aerial vehicles and radars for cruise missiles. Since I received most of my financial support from Hongik University, I would handle project and meeting tasks until around 10 p.m. before leaving the office. When I returned home, my duty was to take over the babysitting job from my wife. After bathing and putting my daughters to bed, I had to quickly get some sleep myself since I had to leave for work at 5 a.m. the next day.

Despite the physical, mental, and financial challenges I faced during my studies, I remained steadfast in maintaining a consistent schedule. I would start my workday at 5 a.m. and finish at 10 p.m. I made the most of my commute by reading research papers, compensating for the limited study time. As a result of these unwavering efforts, I managed to publish a total of 18 academic journal articles and 13 international conference papers by the time of my graduation. These accomplishments were exceptional among Ph.D. graduates

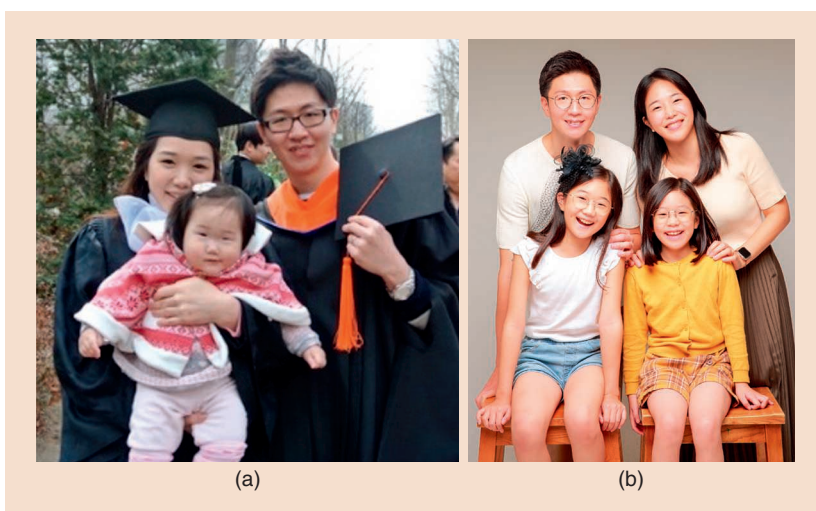


FIGURE 1. (a) My graduation of master's degree from Hongik University in 2012 and (b) my family photo in 2021.

and unmatched during that period. Recognizing my achievements, I was honored with the Outstanding Graduate Award and the Young Scientist Award at the URSI Asia-Pacific Radio Science Conference (AP-RASC) 2016. These research and award records provided me with the momentum to pursue my dream of becoming a professor.

BUILDING A RISING CAREER

PERSISTENCE: NEVER GIVE UP

After obtaining my Ph.D. degree, I returned to Hongik University and secured a position as a nontenure-track research professor. Despite various job opportunities offering higher salaries, I decided to focus on my dream of becoming a professor and chose to remain in an academic position. Before starting my new career as a Ph.D., I set new goals. I explored new research areas, stepping out of my comfort zone in antenna design and delving into RF systems, circuits, and signal processing algorithms. I combined this interdisciplinary knowledge with antenna design to actively pursue research in improving system-level performance for various adaptive beamforming applications, such as direction finding, antijamming, and radar.

Starting from my second year in this role, as substantial research outcomes began to emerge, I actively pursued tenure-track faculty positions. However, during my first 10 applications, I couldn't even pass the initial document evaluation.

As mentioned earlier, the prestige of my alma mater wasn't very appealing in the Korean job market, leading to skeptical views from those around me. While my friends were rapidly climbing the corporate ladder with increasing salaries, I felt a sense of relative deprivation. Though I received advice to give up, I refused to do so. Instead, I exerted more effort to improve the quantity and quality of my research achievements. I knew that giving up at this stage would render all my efforts up until then futile. With determination, I steadily moved forward.

Ultimately, I applied to exactly 30 universities over a period of two-and-a-half years. Most universities rejected my application at the initial document screening, and only three of them granted me an interview. During this process, experiencing anxiety and uncertainty about my chosen path, I was even diagnosed with panic disorder. However, on my 30th attempt, I received the final acceptance from my current university on 23 November 2017. It was a journey of approximately 13 years. I cannot forget how much I cried while talking to my wife on the way back home that day. Though I feel embarrassed to admit it, even now as I write this, my eyes are welling up, and the emotions of that day remain unforgettable.

My intention is not to speak about the injustices prevalent in Korean society. Even if there are injustices, I want to emphasize that if you persistently work with unwavering determination

and avoid harboring dissatisfaction, there will inevitably be a moment when your efforts shine. If I could do it, so can you.

TOWARD INTERNATIONAL RECOGNITION: A NEW VOYAGE

On 1 February 2018, I was appointed as an assistant professor at the Ulsan National Institute of Science and Technology (UNIST) [7]. Everything, including being addressed as a professor by colleagues and students and having a personal office prepared for me, felt so unfamiliar. Over the past five years at UNIST, my focus has been on establishing a strong research foundation. Our group's primary research areas are array antennas and metasurfaces for 5G/6G, satellite, radar, and defense systems (Figure 3). In April 2022, I was fortunate to become the director of a radio research center, a flagship project of the Korean Electromagnetic Society, focused on developing core RF/power components for low-earth-orbit satellites. Our recent interests include millimeter-wave antennas-in-package and reconfigurable intelligent surfaces for future wireless communications.

Based on the foundation my group has built, I also actively pursued opportunities to expand my presence internationally. Fortunately, I was selected as an IEEE AP-S Young Professional (YP) ambassador in 2023, allowing me to contribute to the international community through various volunteering activities (Figure 4). As an IEEE AP-S YP

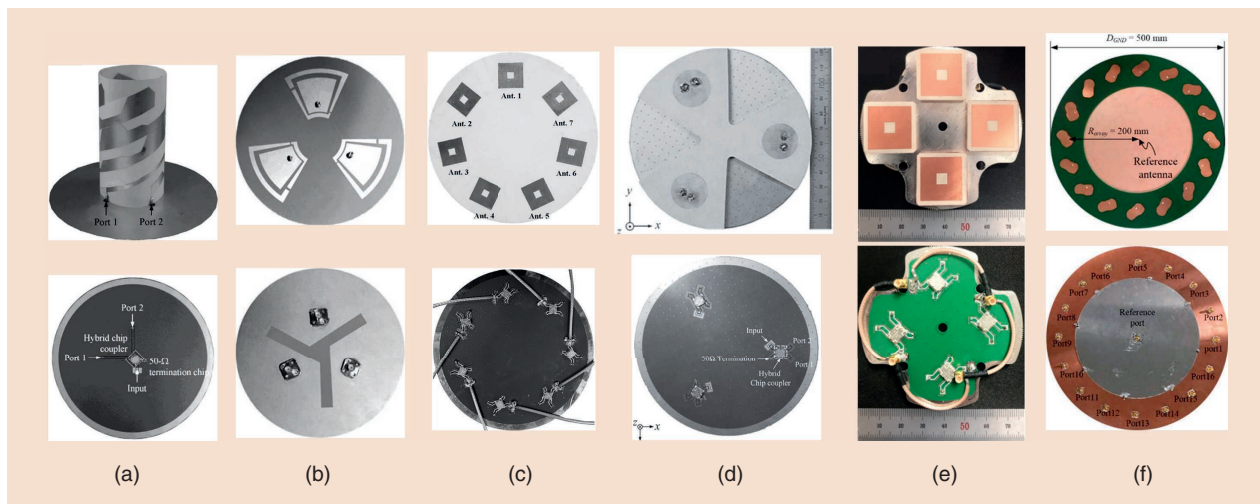


FIGURE 2. (a)–(f) Some selective antennas developed by me during my master's and Ph.D. degrees.

ambassador, I have taken part in the organizing committee for several YP events at AP-S/URSI 2023, such as the IEEE AP-S YPs panel discussion with IEEE and AP-S awardees and the IEEE AP-S YPs career development and growth conversations [8]. Throughout this process, I have engaged in discussions and deci-

sions via Zoom video calls and e-mail coordination led by the YP Committee members, C. J. Reddy, Payam Nayeri, Qammer Abbasi, and Christina Yepes. This experience has provided me with the opportunity to connect with numerous professors, experts, and leaders whom I have been looking forward to meeting.

Another significant aspect of my role as a YP ambassador is delivering virtual talks. I have been fortunate to receive invitations from various organizations, including the IEEE AP-MTT SBC IIT-KGP, IEEE AP-MTTS Student Chapter at IIT Kharagpur in India, University of Technology Sydney in Australia, Tokyo Institute of Technology in Japan, IEEE AP-S Hong Kong Chapter, and IEEE AP-S YP ambassador webinar series, as of August 2023. While some talks can be given virtually, several institutions have requested on-site seminars along with a Zoom broadcast to foster additional interactions and discussions for future collaborations. Consequently, I traveled to Tokyo, Japan, in June and visited Hong Kong in July. Being an IEEE YP ambassador offers incredible opportunities like these that contribute to personal and professional growth.

Throughout this journey, I have had the opportunity to promote myself and my research group as well as collaborate with diverse international researchers. Now, my goal is to elevate our group's international reputation through continuous and high-quality research on



FIGURE 3. Members of my group, Antenna Technology Laboratory UNIST, in 2023.



FIGURE 4. A collage of photos from YP activities organized by the AP-S YP Committee at IEEE AP-S/URSI 2023. I moderated the IEEE AP-S YP panel discussion with IEEE and AP-S awardees with Gaurangi Gupta, another YP ambassador.

millimeter-wave antenna arrays and metasurfaces for future wireless communications. Although my dream started at a small university in Korea, it has taken its first step into the wider world. To any young researchers hesitating at this very moment, I hope my story can provide you with courage and determination as you pursue your dreams.

SUMMARY

Throughout this article, I have shared my personal journey of becoming a professor, highlighting valuable lessons that can empower young researchers in their academic pursuits. By embracing our realities, setting optimal goals, and maintaining a positive mindset, we can overcome barriers and achieve success. Consistency and persistence play crucial roles in making progress, even when we are faced with personal and societal obstacles.

From my own experiences, I have emphasized the importance of staying committed to our studies and maintaining a rigorous schedule. Despite initial rejections and setbacks, unwavering determination and perseverance can ultimately lead to success.

As I look toward the future, my aspirations include achieving international recognition and expanding my research activities. By seizing opportunities for collaboration and showcasing high-quality research, we can make meaningful

contributions to our respective fields and pursue our dreams.

In summary, I hope that my story inspires young researchers, encouraging them to fearlessly pursue their aspirations. Success is within reach when we confront reality, set goals, and remain consistent in our efforts. Each aspiring researcher has the potential to make a significant impact and realize their desired dreams.

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WOMEN IN ENGINEERING (continued from page 100)

the support of my family, friends, professional therapy, and the amazing people in the antenna community, I am starting to see the light again, but I will never be the same.

In academia and life, bad people exist, and unfortunate events can happen without warning. Becoming a victim is not something we can always avoid, exactly like in the real world. There is no magic recipe for avoiding such situations. However, having created my "antenna family" has been a lifeline. When things went

wrong, they were there to take care of me, providing the necessary support and understanding.

My hope is that sharing my story will serve as a reminder that bad things can happen, but with the right support system and resilience, we can gradually heal and find the strength to move forward. It is crucial to build a strong network of colleagues, friends, and mentors who can stand by us during difficult times and help us navigate the darkest moments.

As I conclude this article, I would like to express my heartfelt gratitude

to Francesca for encouraging me to write it. I am also taking this moment to extend my deepest thanks to all the people who have stood by me throughout these difficult years. You know who you are, and your support has meant the world to me.

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