



Professor C.-C. Jay Kuo and His Cohort of 111 Ph.D. Alumni

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[The Mathematics Genealogy Project](#) report, an aggregate of the number of Ph.D. students any given advisor has graduated, lists USC Viterbi's C.-C. Jay Kuo as their top hit. As of this year, the professor of electrical engineering and computer science has produced a total of 111 alumni.

The international database is by no means definitive as it relies on voluntary data, but it's safe to assume that whether or not Kuo has graduated the most Ph.D.s worldwide, he's no doubt encroaching the golden number. On this anomalous achievement, Kuo explains, "I never thought I would have so many students, and maybe I will have even more, but that's really not something I am...striving for. That's definitely not."

One cannot overlook the practical reality: Kuo—one man—leads a laboratory of students working towards a shared goal, and that's graduating. Kuo is renowned for his coveted mentorship, and beyond that, his name is ubiquitous in the field of image and signal processing. Yet, often times, especially in the academic community, there is an argument to be made of quality vs. quantity; the criticism of "fast food" programs is certainly not unfounded. But Kuo is not of that ilk: "It's a process, not about the outcome. So, including the number of Ph.D. graduates, that's the outcome. That's not my focus. People say good words about that. People even say bad words about that."

Martin Gaweski (E.E., Audio Signal Processing, Ph.D. '13) remarks, "For [Kuo], this is building the name of his lab group, improving the quality of students in the entire lab group and also improving the reputation of all the students, whether they've already graduated or whether they're still working on their Ph.D.s."

Certainly, Kuo's proliferation of successful students is not a quantifiable science, but often times, results speak deftly for themselves. Intel, Qualcomm, Samsung and MediaTek have all hired at least ten of Kuo's alumni. Still, Kuo remains modest and rarely touts this fact. Of course, every now and then he likes to playfully acknowledge this in his joke that "they should give me a plaque to appreciate my contribution to their companies!"

It's normal to balk at the thought of advising thirty Ph.D. students at any given time, and one has to wonder how Kuo is even able to summon the time and the wherewithal to steward them all towards success. Nearly twenty years ago, Kuo graduated his second Ph.D. candidate: Seoul National University's Professor Kyoung Mu Lee (E.E., Ph.D. '93). Lee's primary research focus is on computer vision, and prior to academia, he worked briefly for Samsung as a senior researcher. Even Lee, who has long since been a student and is every much a professional peer of Kuo's nowadays, is just as befuddled as any other:

"[Kuo's] so energetic. I try, but I cannot follow him. Sometimes, he has more than thirty Ph.D. students—I cannot handle that! Whenever he visits Korea or attends conferences, he's always reading theses or papers of his students on planes and in hotels." Lee, with absolute certainty, attributes this all to Kuo's diligence and passion: "Without passion, no one can do that. It's amazing. I haven't [met] anybody like him, not even in the industry." As a researcher, Lee explains, "I notice how beautiful it is to research. [Kuo] showed me how to research. His attitude, his ambition and his passion brought me my own motivation to go into research."

Kuo's living legacy manifests itself in many ways. In addition to his prominence in image and signal processing, Kuo directs the distinguished USC Signal and Image Processing Institute (SIPI) and is a fellow of the American Association for the Advancement of Science, the Institute of Electrical and **Electronics** Engineers, and SPIE, the international society for optics and photonics. He has authored and co-authored ten books and is regularly invited to give lectures around the world. His current tally on the latter? Probably at least 500.

No wonder Kuo inspires so many to go into research, but more than that, his energy—his exuberance—amplifies the possibilities for young students looking to make their own waves in the world. He's a larger-than-life figure, especially on paper, and that itself holds its own magnetism. But what really keeps the

students around—and what keeps the lab going strong, in a near comic understatement—is Kuo's sense of paternal responsibility for his students. It's really no wonder so many students consider their humble basement lab a veritable home away from home.

Jing Zhang (E.E., Computational Biology, Ph.D. '13), who plans to pursue academia, describes this legacy as being in "a good family." When envisioning herself as a professor in the future, she references Kuo's model of teaching as "academic DNA"—a formative code writ for a lifetime. Kuo alumni also tend to not only keep in touch with him, but with one another. Whether it is catching up, writing recommendation letters for one another or advising on job openings, it's apparent that this cohort—or Kuohort—is like no other.

This "genetic" lineage resonates with Lee, who attributes his ability to overcome his Ph.D. research slump to Kuo. During a steep drop in what Gawecky aptly describes as "the emotional roller coaster that is graduate studies," Lee recalls that the unconditional confidence Kuo instilled in him made him feel, "I am something and someone. and I can do better than this." Zhana also describes this confidence as essential

in building mutual trust between advisor and advisee. As a Ph.D. student, “[Kuo] knows you are a person with a strong mind and that you are a tough cookie in life.”

The hardship of Ph.D. programs is often considered an obligatory rite of passage, and this is perhaps why not many students are formally equipped to deal with the psychological and emotional agonies inextricably bound to the graduate school experience. The unfortunate reality is that this comes at the expense of students at risk of dropping out of their programs. Zhang recalls her personal strife in deciding to drastically change her research field from electrical engineering to computational biology: “In the first month of computational biology, the only thing I knew was ‘RNA’ and ‘DNA’ and *no other words*, and I didn’t think I could proceed anymore. I was really thinking about quitting my Ph.D.”

Convinced this was her fateful cue, she promptly attended a campus career fair with her resume clutched in hand. However, at first sight of fellow students and alumni queuing—and vying—for positions, Zhang “just walked [back] into [Kuo’s] office and asked for advice.” She affirmatively beams, “Yes, I took his advice!” and regards this moment as fundamental in her ultimate decision to remain in the program. “[Kuo] did not push me to finish my Ph.D. or to quit. He just told me his story about how he lived at MIT—how he survived [there]. He just told me, ‘Give yourself another chance.’”

Though Kuo has inspired no shortage of students in their pursuit of academia, he has no personal bias for it or for the industry. In fact, roughly 75% of his alumni have moved on to obtain careers in the industry. Jiangyang Zhang (E.E., Image Processing, Ph.D. ’13) says, “[Kuo] is one of the professors who really cares about the students. He respects peoples’ opinions. I prefer to go into industry, and he knows what my preference is, so he’s very supportive of me doing some internships in the summer.”

Similarly, Gawecki emphasizes, “I really appreciate the fact that [Kuo] not only... understands what [students] want to do with [their lives] after [they] graduate, but also understands [their] strengths and weaknesses and understands that every student is individual. He’s willing to address those very clearly, and I think that’s what sets him apart from a lot of professors in USC and in general.”

Lee describes Kuo as “very unique in the sense that he cannot treat students as work,” and this has quintessentially informed Lee as a mentor himself. “That’s very important, and that’s what I know. For my own students, I try to do it like that—not to push the students directly, but encourage them, so that they can solve the problem and increase their own abilities by themselves.”

In reflecting upon his own values, as influenced by Kuo, Lee explains, “A professor actually has two fields: research and teaching. Both are important. Teaching not only means transporting knowledge, but also caring for the students. I feel that it is just as important as research. As a professor, [when] I’m [in] my retirement thinking about my career, what could remain? There are two things: one is my own research, and the other are my students.”

Surely, not every academic shares the same priorities. Kuo, a tenured professor whose professional accolades and achievements resonate internationally, sagely muses upon his guiding principles in research and in academia: “Some researchers are very focused on their research, but my philosophy as a Ph.D. advisor is that the important thing is to nurture the next generation of researchers, scholars and so on. So, we should put their training as the first priority.”

However, it could be argued that it is not so much that Kuo prioritizes advising over research, or vice versa, but rather, he is that rare and remarkable hybrid that is able to **excel** in both arenas at once. “The advisor and the student are in the same boat,” he says. “It’s not like, ‘I succeed, you fail’ or, ‘You succeed, I fail.’ It’s not like a zero-sum game... we succeed together, or we fail together.” In assuming complete responsibility as an advisor, Kuo understands his role is not just about lauds and recognizing student achievement. It’s also about teaching students to accept their own failures so that they can learn from them. How else better to teach this than leading by example?

Outside of studies, Kuo regularly meets with alumni, whether locally or in his travels. He also has a tradition of throwing a Thanksgiving luncheon for his students, many of whom are far from home and rarely, if ever, celebrate the quintessential American holiday. “I talk to my wife, ‘It’s a harvest time, right?’ You really spend some time [with the students], and now you see they grow and become the trees and become very important persons in the society. But when we talk we’re just like family members, you know? We don’t talk

important persons in the society. But when we talk, we're just like family members, you know: we don't talk about outside achievements. We talk about good memories and relationships and so on."

Lee, who is based in South Korea, regularly corresponds and meets with Kuo. He candidly and warmly states, "He's a lifetime mentor to me. He teaches me, still, in success, in life and in career development. That's a *real* mentor."