Broader Impact Statement

Yang Zhou

Research

Throughout my PhD, I aim to do impactful work. As a result, my research has led to publications in premier systems conferences including OSDI, NSDI×3, SIGCOMM, SIGMOD, and VLDB. Some of my research has created a broad impact on industry practices:

- My Electrode and Dint projects on eBPF-based distributed protocol acceleration spark interest in big technology companies including Meta and Intel. They are more willing to deploy kernel-native solutions via eBPF/XDP, rather than DPDK-based kernel-bypass techniques which are hard to manage in production.
- My Carbink project paves the way for far memory to be practically usable in datacenters with failures being the norm. The Carbink prototype is implemented and evaluated atop Google's production infrastructure (e.g., networking stacks, threading stacks), showing the potential to be deployed in production environments. Carbink also results in a joint patent with Google.
- My PCAT project helps Facebook design their evolvable telemetry system to systematically handle frequent changes in production networks. PCAT introduces the change cube abstraction to track and confine changes, and drives many system upgrades inside Facebook. For example, as described in the PCAT paper, Facebook's new topology derivation service leverages change cubes to speed up the derivation process.

Diversity, Equity, and Inclusion (DEI)

I view DEI as the basic soil for growing humanity and excellence in society, including the academic community; it is about the daily respect for people regardless of their self-identifications, and self-introspection on "whether I want to be treated like what I treat others". Everyone has the duty to foster DEI in her/his surroundings, because that eventually determines how the society will treat them in one day. Here, I would like to sample my and my family's experiences of being underrepresented due to educational background, language, political affiliation, and ethnic origin, to motivate how I grow awareness of the challenges faced by underrepresented populations and the importance of DEI, and possible ways to foster DEI—some I have adopted and some I plan to do.

I am a first-generation college student, so my parents could hardly give me advice on how to succeed in college and in my PhD studies. However, I was lucky to receive tremendous emotional support from them. I was also fortunate to receive academic mentorship from a variety of professors and student peers. Thus, I am proud to be a faculty job applicant today, and I look forward to creating a sharing and inclusive environment in the classroom and in my research group.

As a first-generation immigrant to the US, one of the first challenges that I faced was mastering the English language. At Harvard, I greatly benefited from the university's English Language Program (ELP), which offered weekly lectures by experienced English teachers, and recruited native English speakers from the university to serve as language partners. The ELP experience showed me how community building is a critical aspect of helping students integrate into challenging environments. As a professor, I hope to make students aware of programs like the ELP that target specific barriers to students' success (e.g., language issues, or a lack of adequate high school preparation for college-level classes).

Fifty years ago, my uncle was denied admission to his dream civil aviation university, despite his excellent academic performance and physical fitness. He was rejected because his father (my grandfather) was a combat medic for the Chinese Nationalist Party–the party who had fought with the Communist Party of China that founded the People's Republic of China. Such political discrimination prevented a whole generation of my uncles from participating in activities that were even slightly related to military service. I was told this experience at a very young age; thus, I have always known that the political environment of the past can influence personal outcomes in the present.

My mother and her family are Hui Chinese, one of the ethnic minorities that comprises 0.79% of the total Chinese population. Being an ethnic minority in China often results in discrimination by the majority Han population. For example, a popular stereotype is that Hui Chinese are thieves. Fortunately, my parents always taught me to not treat people by their ethnicity, race, or religion. As a result, I am always conscious of potential biases that may impact my interactions with others, and I hope to support DEI principles as a professor.

My Past Contributions to Advancing DEI

Mentoring: During the summers of 2022 and 2023, I mentored four undergraduate students for research internships at Harvard: three came from non-US schools, with two being in the US for the first time. To help the students get familiar with systems research (and life in the US), I held weekly meetings with each student, talking about not only research but also various cultural acclimation challenges that I had experienced during my own PhD. At the time of this writing, one of them has co-authored a paper with me that was published at a premier system conference. This student was also accepted to the University of Washington as a computer science PhD student. The other three students have also decided to apply to systems PhD programs, including one that was hesitating for a long time before working with me. I also consistently (monthly) shared my research and internship experiences with five junior PhD students over the past two years. All of them are non-native English speakers and are non-white.

Occasionally, I received email inquiries from PhDs who are in other research areas or from underrepresented minorities; I often scheduled one-to-one meetings to learn about their difficulties or puzzles. For example, Jessica Quaye, originally from the Republic of Ghana in West Africa, was interested in system research though she is in an architecture research group. I had long meetings with her both in person and online, and introduced her to my co-advisor Minlan Yu to identify potential opportunities for collaboration and advising.

Besides one-to-one mentoring, I also participate in one-to-many panels to share my research experience with junior system PhDs. For example, I was a panelist for the "Getting started with systems research" panel [1] organized by Students@Systems in 2022. The video recording for the panel is freely accessible online to help systems PhD students regardless of their university or physical location.

Talking: I extensively talk to undergraduates regarding computer science research. For example, in October 2022, I gave a research talk at a Harvard AM/CS/EE PhD recruitment event (accessible to all US universities) which targeted students "that hold membership in an underrepresented and/or historically minoritized group in STEM." In 2022, I also gave talks at the Harvard SEAS Undergraduate Research Open House and the SEAS Research Showcase, targeting Harvard freshman and sophomore undergraduates. These talks were well-received, with several undergraduates in the audience later contacting my research lab to learn more about participation opportunities; I still mentor one of these undergraduates.

Teaching: I make an explicit effort to help students with little prior exposure to computer science, and I try to promote inclusiveness during teaching. When I was the small-group "supervisor" for the Algorithm Design and Analysis course at Peking University, I realized that some students lacked high school experience with programming contests; these students often found it hard to catch up with peers who did have this experience. To help them, I wrote step-by-step, thorough explanations for the algorithms discussed in class, and I handed out these explanations after class. When TA'ing a course at Harvard University, I answered all questions that appeared in the Ed forum, no matter whether the questions were anonymous or not, to keep everyone's learning progress on track.

My Future Plans for Fostering DEI

Going forward, as a faculty member, I plan to take the following actions:

- *Advising:* Actively recruiting underrepresented students, being attentive to any anti-DEI atmosphere in my research group, and explicitly adopting counter-measures to foster DEI with affirmative actions.
- *Connecting:* Reducing the barriers of students finding research opportunities by organizing mutual-connecting programs like UCB DARE [2]—matching students with faculty members for research.
- *Teaching:* Being attentive to any students with weaker prior knowledge in my classes, and helping them build confidence with support on a case-by-case basis.
- *Daily life:* Being kind to people I meet, no matter their age, color, disability, gender, ethnicity, politics, religion, education, language, and more. I believe "kindness is the ultimate nobility" [3].

References

[1] Student@Systems. A panel on "Getting started with systems research". https://students-at-systems.org/pages/events/getting-started-with-systems-research.html.

[2] UC Berkeley. DARE: Diversifying Access to Research in Engineering. https://dare.berkeley.edu/.

[3] Amin Vahdat. SIGCOMM Lifetime Achievement Award 2020 Keynote (48m44s): kindness is the ultimate nobility. https://youtu.be/Am_itCzkaE0?t=2924.