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Diversity and Teaching Statement

1 Diversity and outreach through active contributions to open source software

I am an active user of the *open source software* (OSS) based platforms Linux and OpenBSD since my teenage years. I was exposed to the availability, education, superior documentation and freely available source to high-quality production software that runs the backbone of all large computer networks early on by teaching myself how to use these systems. This experience provides me insight, grounded philosophy and a great passionate love for OSS. I have gone to significant efforts to donate time to developing publicly available OSS. This work on OSS is both as an extension of my formal studies as a graduate student and is utilized to grow my skill set as a professional software engineer. I actively develop and maintain over a dozen public cross-platform OSS projects on *GitHub* written in the C/C++, Java, Python and assembly languages, among others. I strive to contribute high quality open source software, educationally literate publicly available source code advancing STEM areas, and to grow myself as a professional software developer. I will continue to pursue stimulating research problems with cross-disciplinary applications in mathematics, computer science and OSS. I intend to publish the results of my research on these topics in peer-reviewed journals, present the results through talks at professional conferences, and make the research broadly available for education, teaching, and other purposes in venues such as the web.

From 2020–2021, I worked on a larger scale, energizing and experimental security project that was a welcome challenge and software outlet away from my pure math research over the pandemic. The project brings sophisticated new embedded firmware extensions to a class of NFC penetration testing and data sniffer-loggers (the Chameleon Mini) that interfaces with common wireless NFC tags (e.g., most university student ID cards). This project afforded a heightened platform online over which to bring more awareness by users to important issues that have increasingly beleaguered the world this pandemic. In particular, the first beta testing versions became a reality the long weekend of the sad passing of inspirational US supreme court justice Ruth Bader Ginsberg on Rosh Hashanah, to whom I was able to pay tribute by working on this software. I am proud to have "hacked" for freedom with free software, as I like to say, for days on end while cloaked in an over-sized *Black Lives Matter* shirt. The net gain from the project is that the complex and proprietary *DESFire* NFC tag specification is now emulated by the Chameleon Mini hardware appreciated globally by wireless security researchers. The experience working on this project speaks to the power of open source software (OSS) and how I intend to use its reach as a postdoctoral fellow.

In 2018, I collaborated on open source code and documentation that makes typing programming languages on-screen for users with disabilities more accessible within the *Optikey* project on *GitHub*. These fondly titled "big hacker" encoded keyboards are designed to simplify on-screen entry of programming languages, a task which otherwise requires scrolling through multiple cell-phone-type keyboard screens to enter a single line of code or even language statement literals in C++, Perl or Python. I am familiar with disability through my own struggles with it since my teenage years. After talking with a friend and fellow co-author at Georgia Tech with accessibility needs from her motor disability, I decided to "hack", or reverse engineer, the source code of the popular on-screen keyboard software she relies upon to write computer programs and typeset mathematics via an eye-gaze interface to make entry of programming languages more efficient for her use case. We published a note about the project in 2018 in a newsletter for students with disabilities and contributed documentation to extend my self-termed "big hacker" keyboard styles to related applications on the *Optikey* online WIKI site. Eventually, she returned the favor by helping me secure funding to work as a remote RA at Georgia Tech through the *Access Computing* project at the University of Washington.

2 Accomodating diversity in my teaching and mentoring of students

I aim to interact with students by an active learning approach that includes combining new technologies into the classroom. I also seek to promote a flexible, friendly and open learning environment for students coming from diverse backgrounds to engage with me as the instructor from within. While working on computational geometry projects funded by Prof. Jayadev Athreya at the University of Washington from 2016–2017, I was offered an unforgettable opportunity to take part in mentoring advanced undergraduates in mathematics by teaching a self-created junior-level topics course. The course outline focused on getting students hands-on experience with experimental mathematics, gap distributions and spatial statistics by visualizing substitution tilings of the plane in the Python programming language while practicing standardized agile software

development methodologies. My enthusiasm for teaching students has grown as I have developed more techniques to overcome shyness in large groups. I was promoted to be the first head TA of *Integral Calculus* in the Fall of 2018 at GA Tech. I accepted the opportunity to teach a section of integral calculus as the instructor of record over the summer of 2021. This is an exciting learning experience for me to administer a large course and to expand my CV with more expansive requisite professional experience in academia.

I feel that I will be able to more broadly contribute to initiatives in mathematics and other STEM fields as a postdoctoral fellow. As woman working within my areas of study, I will continue to promote new learning and research mentorship opportunities to encourage diversity and help to bridge the gender gap for the under-represented talented women in these fields. I also reflect positively on having benefited over the years from my undergraduate research experiences with Prof. Bruce Reznick and mentoring experiences with Prof. Bruce Berndt who was influential in developing my mathematical writing style. Personally having been considered seriously as an undergraduate pursuing original research was encouraging to me through my mentors that has been mission critical to my academic success and development over the years. I plan to pass on the wisdom I have learned by talking with these experienced career mathematicians to young motivated researchers as my own professional career moves forward. This especially applies to offering advice and influencing talented women in mathematics to develop their own early original research work as undergraduates and onward.