Personal History Statement

First of all, my previous experience makes me an open-minded person with high motivation that do not take the current circumstances for granted. I think that kind of up momentum and curiosity is cultivated through my travel and experience. As for the social practices, for the summer of Sophomore, 20 other students and me come to PingTang, the place installed with Five-hundred-meter Aperture Spherical Telescope. We investigated how this externalities affect the locals' tourism from first year's pouring of capital to second year's over-saturated and how it changed with the down turn of Chinese economy. China's investment of Infrastructure is fundamental to every public in the rural area, and the socialism is taking effect with the targeted poverty alleviation in this Xi's time. 800 RMB per year per family is the definition of the poor and until 2020 if he's still under this line, he have diabled member or unwillingness to labour. However, critism is cast on the push of every man to engage to the smallholder economy like strawberries that do not match the local environment. I solo visit HK during the protest, Singapore, Malasia, Thailand, India and Nepal within 12 days. I witnessed the big countries' hegemony and small country esteem. I witnessed the deep inequality of poverty in this world and the importance of establishing the network/highway infrastructure.

Open mind takes me naturally into a diverse environment. My previous employer, Jump Trading is a place that embraces diversity. I first come to realize that in a tiny office, there exists multiple races, LGBTQ+, multiple languages as native language and multiple religion. For communicating more fluently without barrier, all we did is to respect with no discrimination. The colleague coworked with me is a MtF(Male to Female), besides calling 'her', talking off sex mutual stuff and no man's joke. My mentor is born in Malaysia and his mother is from England and father from Hong Kong. So he's quite familiar with Cantonese words. From a technical perspective, the people graduated from French Schools focus more on the mathematical proof as well as intuition while those from American Schools care more of implementation and effectiveness. We are valuing every people from different backgrounds which I'm tuned a while for it since I'm situated a single race country with single religion. Every year, there's 3 top tier competition for super cluster competition and I'm the lead for the team to compete with prestigious universities like UCSD, UIUC and Gatech. Our team GeekPie_HPC has recruited 2 female out of 6 for daily training and eventual competition. We highly recommend female computer science students to join in such a low female density department.

My research taste and delight come from the demand of my curiousity. Many dummy things happen when choosing the courses and take exams, I get accustomed to getting hardest course that gives me challenge of pressure. Once I'm determined to do something, I would focus on the

thinguntil it's figure out or give up it because I knew the stuff does not fit me. The overall process of college for me is a time of testing failures. The projects and exams are similar to a I knew that I have many shortages, but it didn't bother my desiration to solve hardest open questions.

Statement of Purpose

For pure motivation, I need a Ph.D. for investigating a direction that worth my life fighting for and the society values. With the rapid growth of Chinese economy following by huge research investment, at least for the past three years in ShanghaiTech, I witnessed the extraordinary scientific progress in all disciplines. China has also provided huge markets to fast deploy the research results and companies start to be willing to devote higher salary and equipment for new grads to dig on their research fields. However, literally most professor in our school only takes care of short-term profits and put much efforts on applications of established ideas, which things solely get one-direction worse in other institutes. Plus, no profitable company is founded on tech infrastructure as Nvidia, Intel and Xilinx does but exploiting the unsophisticated public's time like Tencent and ByteDance. That accounts for the U.S.A. is still the origin of innovation today. In China, general public's pure pursuit for better technology downturns to self-imposed comfort based on the current circumstance. But, I'm not and from the bottom of heart, want to use technology to change.

I recently, published a paper on adversarial sample in AI security scenario on ISSTA21 as fourth author under supervision of Prof. Fu Song. I helped the first author Ph.D. candidate Zhe Zhao run most experiments at my Freshman summer. It innovatively utilized the fact label change rate through model mutation testing to distinguish adversarial examples and put them on defend the data that use this technique, which we called Attack as Defense. I got to know how software engineering testing works on artificial intelligence and could apply on any other places like language spec on smart contract, operating system’s concurrency and computer architecture's semantics. That's my two other Work-In-Progress work mainly focus on, to use Z3 solver on verifying the possible timestamp attack and arithmetic overflow on diem move language. During my weekly seminar at System and Software Security Lab for two years, I grabbed ideas like Decision Procedures, basically the originality/application of SMT solver as the combination of logic and program, fuzzing techniques and Capture The Flags Surroundings - a security competition.

From Sophomore year on, my main focus turns into industrial needs' practice. GeekPie_HPC is a place I devote time to. I would say I put the obscure system knowledge into production on high-performance heterogenous systems. For example, I got how Linux system call flock work on class, but not until I found it messy once linking on GPFS with un-updated data drag me into this semantic deeper, I resolved it by fsync to manually force synchronize. I knew Cuda only as a library importer using Pytorch auto-gradient that for sure run on GPU, not until I compare different compiler hint with different HPC algorithm and MPI scatter/reduce and alltoallv takes me

to filgure how data transmit on GPU. My school establish long term connection to Jump Trading by us winning the super clustering competition that the recruiter get to know that our students are unique to problem solving with right tools. My experience at Jump Trading in sophomore's summer let me dig into the more cutting-edge technology eBPF and Intel Mesh Micro Architecture. However, the main focus of industrial is quite different. I mostly applied the kernel dynamic inspection work on distributed filesystem in terms of different lease user and apply the core affinity strategy considering core to NUMA, DDR, NIC and GPU latency. From my perception through my ex-colleague, more production level engineer usually have Bachelor Degree only and cultivated by the company like my mentor, but the real secret big thing is usually bring by Ph.D. guy like the author of eBPF or reverse engineering work on intel processors.

Last academic year, I put great efforts to try on Grad Level Computer Architecture, Abstract Math, Convex Optimization and Computational Theory, which kinda drained my overall GPA. Based on my passion and experience, I joined Chundong's Lab, researching a software technique to identify cache line persistence. However, after months of testing latency, I failed to find a good way to do so. I then turned to another buffer exploitation on Optane's Store Buffer with another little progress. Those challenges let me reflect on the possible failure of Ph.D. journey. I would say there's always sable point we couldn't escape, life is always hard. Some pics like skills and pitfall sedimentations would not always be there, So I would say, I couldn't given with better results with little knowledge of it. But I still enjoyed the procedure of seeking the unkown knowledge even spare my life.

For this summer, I remotely joined Darko Marinov's as REU(research experience for undergrads) and worked with a Peking University Guy Ruidong Zhu for testing order dependent tests. I started a brand-new direction as pure software testing on order-dependent junit tests. Flakiness means test may fail or pass for different rounds. This could be triggered by some order dependent values which could be identified on Darko's iDFlaky tool automatically run on Azure. For testing, their previous work explains the cleaner, polluters and victims of specific variables on specific values. Their latest work submitted for ICSE21 is to introduce a Non-idempotent tests that could be identify by running methods one after one in isolated methods/class/entire suite to see whether they may be flaky. We run a dynamic taint analysis tool called PraDet on all the runnable tests on three of their latest test suites and report. We are currently modifying a more advanced tool based on this limitations. During the process. I'm intrigued by the passion of my mentor Wing Lam and Darko's energy in thoughts in contrast to his lazy lying posture.

For choosing UCSC, I noticed that Andrew R. Quinn is recently joined UCSC. He recently published a paper called "Debugging in the Brave New World of Reconfigurable Hardware" with my twitter friend Jiachen Ma. The interaction between FPGA and Operating System for vitualized access to FPGA. Snynergy Proposed a JIT compilation with cache. With addition to ABI call

implemented over I/O of linux or BSD, there's also hypervisor that does the real scheduling compiling for state-safe compilation. I believe there's still a lot to dig through this field. For these work class research opportunity, the CS department of UCSC is especially attractive to me. It would be a privilege to study under the guidance of its remarkable faculty during "A New Golden Age for Computer Architecture".

I have enjoyed being able to apply what I learned in classes such as computer architecture and the principle of compiler to my research. On the other hand, I have also cultivated a broad interest in other areas, such as Reinforce Learning, as a source of inspiration. I seek different kinds of creativity in engineering and in the beauty of itself when it was realized. It is this creative will that I wish to pursue in UIUC's Ph.D. program and afterwards as a researcher in the industry. My learning experience under the guidance of my advisor convinced me not only of the potential of research but also of the value of teaching. I have also enjoyed working as and undergraduate teaching assistant for compiler. Through my course studies, I expect to become, and will work hard to be an productive researcher and teacher.