Chi-Wei Tseng

STATEMENT OF PURPOSE

From the viewpoint of not only appreciation, but creation, digital art — graphics, animation and music — have long fascinated me with their capability and expressibility. Since my childhood, I have gained much sense of achievement by exhibiting my works to friends. I worked on many extracurricular projects in website designing from which I earned practical experiences in digital image editing. As I got older, amazed at the features produced by animation studios like Pixar and Dreamworks, I self-studied generating three-dimensional computer graphics (3DCG) with commercial softwares, and gave introductory lectures about 3DCG at the information club of my high school. I also had fun toying with midi keyboards and audio editing softwares, trying to compose my own pieces of music. Indeed, I have become addicted to expressing myself via forms of digital art. Through broad and vigorous exploration, I realized that the strength of computers as tools for artistic productions lies in its ability to generate complicated effects and styles through simulation, and yet their weakness lies in the difficulty in translating artistic intentions into programs and parameters. Hence, I want to study toward a graduate degree in computer science, focusing on narrowing the gap between technology and people so that digital artists can concentrate more on their works rather than their skills, and thus effectively unleash full power of computation for artistic purposes.

My strong passion for digital art, especially for 3DCG, motivated me to dive head-first into a series of advanced courses in the university curriculum, equipping me with exceptional knowledge in related subjects. The courses included "Digital Image Synthesis", "Digital Visual Effects", "Computational Photography", "Interactive Computer Graphics", "Digital Image Processing" and "GPU Programming." I worked with devotion, particularly in terms of projects, where I often led my teammates to hunt for inspiring research papers and contributed ways to modify, hybridize or combine algorithms in order to achieve our goal. I became confident in my leadership as my teammates commented that I had a good taste in selecting prominent topics (i.e. "Milktea Rendering" and " Chord Arranger on A Field-Programmable Gate Array Board"), planned feasible roadmaps and provided encouraging goals and visions. Besides curricular works, I and friends have tried to write a ray-tracer from scratch in our sophomore year. Although our knowledge in both rendering and coding were limited back then, we spent months surveying and gradually built up the renderer. The excitement for opening up the blackbox of 3DCG for the first time in our life was unforgettable. This, along with other projects and courses, provided me opportunities to find my strength in collaborative software development, and to explore the mechanisms behind functionalities of many production tools I have used. With enthusiasm, I grasped them and prepared myself with a specialization in digital art that differentiated me from other students.

During my senior year, I participated in developing the "Lighting-by-guide System" under instruction of Professor Yung-Yu Chuang. The goal of the research project was a system to

guess automatically the quantity, positions, intensities and colors of lights in a 3D scene from an artistic depiction of the anticipated render, namely the lighting-guide. We faced challenges from a high-dimensional optimization problem for energy functions with considerable discontinuities. In addition to implementing a hierarical search-and-reduction procedure in the space of lighting properties, I fine-tuned the algorithm through proposing an adequate optimizing target under a "most-noticeable-light-first" approach, achieving faster convergence and lower perceptual difference between the lighting-guide and the image rendered under the guessed lighting parameters. The method is readily applicable to the production pipeline of 3D animation, since the output of the system offers a convenient starting point from which lighting artists only need to make minute adjustments. Under the supervision of Professor Chuang, I have been given the freedom to push the project toward any direction I wanted, which implicitly forced me to build up the essential traits for an independent researcher in computer graphics. I learned to discover hidden bottlenecks and defects through benchmarking and analysing intermediate products, to ask crucial questions that may lead to great improvements in the result, and to widely consult resources from manuals to journals. Through working on this project, I have developed strong research fundamentals.

All is not possible if it were not for a turning point in my freshman year. As I originally enrolled in university to study chemistry, a compromise for not doing well enough on the college entrance exam, I strived in my freshman year and got qualified in double-majoring computer science. While creative innovation and careful system analysis are the backbone of engineering, the ability to think critically and accurately is strongly emphasized in the field of natural science like chemistry. I got the best of both worlds. I joined the theoretical chemsitry lab led by Professor Yuan-Chung Cheng, where we verified novel designs of ultrafast nonlinear electronic spectroscopy by simulating quantum dynamics of molecules interacting with light. The work experience at the junction point of computer science and chemistry enables me to mathematically formulate and implement physically accurate models on computers. Additionally, in order to write programs for simulation and to process obtained data, I got myself familiar with various numerical methods and visualization tools, which radically benefitted my capability in carrying out research projects. Most important of all, through seminars and frequent discussion with labmates, I acknowledged that ... is the essence of interdisciplinary research. (...)

Personally, I am aspired to a career as an artist more than an engineer or a scientist. I enjoyed writing stories, through which I conveyed my attitude toward life, nature and love. I collected preliminary ideas on my blog and gradually developed them into complete works. I voluntarily directed the graduate musical in 2012 of the chemistry department, where I led a brilliant team to write the scripts, to compose the scores, to design the stage and to act. Yet, my fond of storytelling forms my ultimate resolution to establish an animation studio in my homeland, Taiwan, producing movies as well as developing novel techniques in the production pipeline. While lack of funding and human resources severely hinder traditional animation industry from blooming in Taiwan, the prosperous status of our information/technology industry

sets a much more concrete foundation for producing digital animation. However, mere passion is not enough to grant the fulfillment of this goal. I need to learn more and to recieve further trainings in doing research for the purpose of mastering the discipline of computer graphics. This is the reason I apply for XXX program at XXX university.

Through a careful survey, I am convinced that your program suits me the best. (...)