**Applicant: Yuxuan Cai**

**Personal Statement**

My past experience could be divided in to two parts, technology and art. I became a Linux user and learnt the first line of code at a young age. At that time, BBS always acted as an initial teacher in the programming world. After majoring in Computer Science in the university, I soon realized computer, the most powerful and intelligent tool, is the physical embodiment of human ingenuity and a ubiquitous force of limitless possibility. At the same time, I found the other world of myself, photography. I took 60,000 photos in my undergraduate time and became a Getty Images photographer. I deeply felt the power of technology behind video shooting and post processing, also the limit. There are times when aesthetics reaches its bound, but technology make the imaginations roam free. The enthusiasm and calling of both computers and photos guide me to Graphics, which I could devote all my strength to.

My undergraduate study was extremely fruitful, courses in different areas like *Information Retrieval, Computer Network, Human-Computer Interaction* laid me a comprehensive foundation in computer science. In 2017, I got the opportunity to study as an exchange student in University of New South Wales Australia. The western style not only enriched my knowledge, but equipped me with the terminology and academic writing skills in computer science. Besides making efforts in courses, my friends and I launched a workshop to undertook some projects. During that period, we made the first official App of our university, which is the only mobile platform in campus life. We also took part in the Contemporary Undergraduate Mathematical Contest in Modeling and won the first prize. In the very beginning, cooperating with each other was not easy. Everyone wanted to show their values and was eager to do the hard part, while dull things were just left there. Then we realized a team needed regulations and mechanisms to control the development process. Guided by the software engineering, we used git as version control, built different environment to develop and test, tracked issues in Jira platform, etc. The workshop period gave me the opportunity to apply the knowledge of web-developing and project management in to practice. Running a team always made me feel satisfied, but I also realized I need to be more specialized in science, rather than spending time on software management.

In 2016, I began to attend research programs. The first step I made on computer vision was the project 3D Face Recognition on NAO Robot. It’s about recognizing faces in RGB-D sequence captured by Kinect. I mainly did the work in face alignment and feature points extraction. At first, we applied the naive Active Appearance Models (AAM) and track the faces in the frames to find the most suitable ones for the AAM model. However, the threshold is attributed to that the naive AAM couldn't deal with faces which have large posture changes. We would prefer to modify the model to handle different postures rather than improve the algorithm to extract the only suitable faces for the model. Enlighted by this, we use Random Forest to classify the faces by head orientations. Then, specific model could be initialized based on the orientation and extract feature points. Even if we only have the feature points of a side face, we could calibrate them by the vertical distance (depth). Comparing with another method Viola-jones, our AAM reduced the missing and error rate by 30 percent. What’s more, considering this research was used on robots, which means both the cameras and the faces are on the move, we brought in Median Flow to track head movement. During that time, I learned the process of how researchers think of problem, which was particularly precious for me as a sophomore. Beyond that, I saw the prospects of object or motion tracking, which also could be useful on the video processing.

It was the interest of photography and videography that made me go far in the computer graphics. As the experience grew, I gradually found that the post-processing still had lots of limits. Even in some industry-level documentary films, the timelapse and hyperlapse (the position of the camera is being changed between each exposure) is rough with shaking and flickering. Troubled by this, I read the paper of stabilization and video alignment from CVPR 2014 and implement the algorithms in video synthesis. (If you are interested, feel free to watch the video on this topic at <http://nightsnack.github.io/2018/04/19/video_stablization/>) Regardless of how much I read or practice, I'm only a single programmer, with limited time and knowledge, and the interdisciplinary subject needs professional knowledge of both computer science and art. Therefore, I decided to take a gap year to be more closed to photos and videos. After graduation, I joined a documentary film team and worked as a professional videographer, so that I could better understand what our video processing and 3D CG animation is lacking of. After that, I will return back to university to pursue the advanced studies, reinforcing my academic and research competence to a new stage.

For me, graduate study is a once in a life opportunity to enrich my knowledge in both width and depth. The enthusiasm of doing research is like a fire burning in my mind. The program MS in Computer Science – Multimedia & Creative Technologies in University of Southern California opens courses in graphics and vision, which offers a much more specialized education on these areas. Specifically, I’m extremely interested in many courses and topics of this program including Computer Animation and Simulation, 3-D Graphics and Rendering, Artificial Intelligence and so on. Besides, there are several research groups focused on graphics and the research interest of 3D animation strongly attracts me. In the future, I aspire to devote myself to media processing and 3D animation, working as a researcher or engineer in related areas. And I believe I could become more insightful and competitive after your well-rounded education. Please give me a positive consideration.