When I was 14, I fell in love with visual arts. I yearned to consume the great works of cinema, TV series, storytelling, video games and VR shorts. I believed visual art was the best way to express our inner selves and bring us together. Then, I entered Pomona College as a film studies major, and am so grateful for the freedom I had to explore my interests. As I delved deeper into the field, I gradually realized the importance of technology on the development of visual art. As I saw the visual effects in movies like *The Curious Case of Benjamin Button* and *Avengers*, I realized what attracted me the most in movies was the graphical aspect. I then set off to explore visual technologies in academic research.

My journey through the academics was not smooth. I first explored computer graphics, but due to the lack of research opportunities in my college, I switched my studies to computer vision. I self-taught the content using Jeff Heaton's Keras lectures of Stanford CS231 Convolutional Neural Networks and CS330 Meta Learning. I also took math courses to elevate my understanding of neural networks, such as probability, advanced linear algebra, differential equations and big data math.

In order to get a deeper understanding of the subject, I started doing research. My first research project was in facial recognition with Professor Weiqing Gu at Harvey Mudd College. I proposed to use a joint network combining the prediction of face shape recognition and CNN recognition on extracted areas. To accelerate the progress, I registered the project in a college-wide machine learning club and recruited three students to the organization. As the group leader, I led the research direction, held group discussions and distributed research works. Based on our learnings, we implemented the distance recognition with Gaussian model clustering. Although it did not achieve ideal results, I learned how to effectively read papers, set research goals, concisely articulate my findings through presenations and writings. This experience fostered my determination to continue researching computer science after this experience.

Another thing I learned was that researchers must track academic result in their respective field in order to relevantly contributed. Earlier this year, in Vincent Sitzmann's twitter, I read about the exciting work of NeRF: Representing Scenes as Neural Radiance Fields for View Synthesis. I was impressed by the high-quality renderings from the trained model, as well as the elegance of this pipeline. Nonetheless, the training on each scene took 1-2 days on a high-end GPU, which would be too long for interactive 3D graphics or training on a full video. I thought of accelerating the training with meta-learning, so I began to look for relevant articles. As I saw MetaSDF, which applied a Model-Agnostic Meta-Learning (MAML) model to a neural rendering function for computer-generated scenes, I confirmed my idea that first-order meta-learning methods could have great effects on accelerating the training of neural rendering tasks. After I implemented MAML-NeRF, it performed only slightly better than a blank model, and became worse as the iteration increased. Rather than giving up, I continued looking for other meta-learning methods. I soon discovered another optimization-based meta-learning algorithm - Reptile. Since this method could have many more inner steps, I was able to make Reptile-NeRF treat each scene as an inner task, and thus shuffle the rays to decrease the variance of inner training data. I am currently collecting more training data to improve the result. Hopefully, I will submit the work in February. In this project, I experienced the whole process of research. This was also my first time writing the final paper as the first author. Learning from the best, I carefully read through NeRF and MetaSDF quite a few times to learn their writing structures. For

details, I received help from my research partner, a PhD student at Princeton University. I also learned to alleviate my frustrations at each obstacle and come back with fresh energy. Furthermore, this project made me wonder if a wiser choice of the rendering function could also improve the training efficiency. I was thus inspired to start my math thesis project - a survey on rendering functions for neural rendering on view synthesis. I plan to explore further in neural rendering.

My previous experiences gave me a solid understanding on computer vision and computer graphics. In August, I had another great opportunity to work with Professor Misha Sra at UCSB on augmented reality. It was a amazing to work with an active researcher in the field and further develop my research skills. Apart from learning the AR implementations, I also learned about designing experiments that involved human participants, which I believe is very helpful for my future research career. Our goal was to investigate the effect of location-based memory in AR language learning. We let our participants walk around an outdoor area holding a smartphone, through which they would see word tags in the foreign language attached to the real objects. Designing the first user study in my life was quite challenging, so I went through every detail in relevant studies and learned the HCI study principles behind them. In this way, I finished experiment setup and testing metrics. I discussed many details with Professor Sra on how to display the words in the most comfortable way and how to control time spent on the walking procedure. Eventually, I successfully designed a pipeline that could demonstrate the effectiveness of AR learning in fair comparison, and implemented an Android AR app with cloud anchors to give participants a comfortable user interface. The actual experiment was postponed due to COVID-19, but we are ready to launch the experiement. We plan to conduct the user study at a college in late January, and hope to then publish the paper in February. With no experience in Android development before this project, I learned everything in a short time and was able to finish the app by myself. I am grateful for Professor Sra as she guided me through the design of experiments, writing interview questions and analyzing users' reviews. Though I don't plan to concentrate on HCI for my career, this research experience is invaluable in making me think what we can do wiuth technologies.

In my masters education, I wish to explore industrial applications of computer graphics and machine learning, and that requires a strong technical knowledge. I was highly attracted to Stanford university when I learned CS231N and CS330, and so am I now. I like Stanford's academic rigor, depth and width. The rich pool of courses covers machine learning, computer graphics and HCI. Plus the quarter system of Stanford, I can broaden my sight by taking classes in other field than the focus of my degree. Furthermore, I like the technical vibe in the campus. There are many TA's, professors, co-work sessions to help students succeed. Finally, there is abundant job opportunity. Great companies in the Bay Area comes to hire, and there is strong support for startups. I cannot wait to study and thrive at Stanford.