I've always wished to explore new ways to enrich entertainment and interactions with graphic technologies. I first looked into computer graphics, but there was not much research opportunity in my college, so I switched my studies to computer vision. I self-taught the contents with Jeff Heaton's Keras lectures, Stanford CS231 Convolutional Neural Networks and CS330 Meta Learning. I also took math courses that were helpful to my understanding of neural networks, such as probability, advanced linear algebra, differential equations and math of big data.

In order to gain a deeper understanding in the subject, I started my first research 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-wise machine learning club and recruited three students through the organization. I led the research direction, held group discussions and distributed research works. We implemented the distance recognition with Gaussian model clustering. In this experience, I learned to read the papers, set the research goal, do presentations and write academically, and I was determined to keep on doing research after this experience.

My dream of combining computer vision and graphcis soon came true. Earlier this year, I started a project in accelerating the training of NeRF with meta-learning. As I saw MetaSDF, 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, I found 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 Reptile, another optimization-based meta-learning algorithm. 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. Though I failed to publish, I had a much deeper understanding in computer vision and graphics, and improved my academic writing to a higher level.

I then stepped into HCI to see the applications of graphics and vision technologies. In August, I began a project in augmented reality with professor Misha Sra at UCSB. 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. 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. We have all the details set at this point, and we plan to do the user study in spring semester. I had no experience with Android development before this project, but I learned everything in a short time and was able to finish the app for experiment by myself. I am grateful for prof Sra as she guided me in designing the experiments and writing the interview questions.

At this point, my research spans from machine learning to graphical display to human computer interaction. I am proud for having experience in all of these fields. In the future, I wish to continue creating better graphics for entertainment and utilities. I am mostly interested in joining professor Shree K. Nayar. I wish to continue my study on machine learning-aided graphics generation by incorporating lightfield capturing and physics, which are both his expertise. I would also like to work for prof Steven Feiner in VR and AR contents creation, with a specific focus on learning and storytelling. In all, I believe I will thrive in Graphics & User Interfaces Lab of Columbia University.