**Personal Statement**

A new era of the implementation of Artificial Intelligence (AI) is approaching, as we find ourselves at the intersection of machine learning and engineering practice. In the face of the emerging breakthroughs in AI algorithms, the challenges of autonomous driving, including perception, prediction, planning, and safety assurance, remain significant barriers to transforming algorithms into real-world mobility solutions and achieving the democratization of technology. As a promising researcher, I am committed to this tech revolution, transforming breakthrough AI algorithms into reliable and scalable autonomous driving systems through advanced engineering and infrastructure.

My interest in autonomous vehicles grew from seeing how perception and decision-making algorithms could predict and respond to complex road situations, so I began deliberately building expertise in this area. Started my professional engagement as a research assistant in Professor Lu’s team, I was exposed to machine learning algorithms and training. Nevertheless, a project focused on dataset preparation has revealed that scientific research often relies on tedious yet crucial engineering steps. To support my team's research on person and vessel re-identification, I used 3D models and Blender programming to generate a usable synthetic image dataset. For the first time, I found that this kind of engineering work is precisely the prerequisite for the implementation of algorithms, and it later inspired me to think about its applications in autonomous driving where synthetic data and simulation are essential. Through this experience, I came to appreciate how critical engineering considerations are to successfully translating algorithms into real-world systems.

With this fresh understanding, I began pairing algorithmic research with the engineering required for real-world deployment. In my senior year, an excellent opportunity appeared, enabling me to transform my research into a usable system. In the RTDNet project, I developed a video gaze estimation algorithm that achieved state-of-the-art performance on the EVE and EYEDIAP datasets. I not only designed a temporal difference (TD) module and recurrent network architecture to enhance prediction accuracy, but also deployed it as an online service, allowing users to upload videos and obtain inference results via a webpage. To make the idea become reality, I needed to address the preprocessing of diverse input videos, design a stable interface, and manage the stability of GPU-intensive inference during deployment. Experiencing the entire process inspired me: turning algorithms into real-world autonomous systems requires more than accuracy; their value is unlocked only when they are integrated into end-to-end pipelines that handle sensing, prediction, and control reliably. This pipeline thinking parallels the autonomous vehicle stack, covering temporal perception, trajectory prediction, and service reliability, and it reinforced my focus on engineering algorithms into deployable autonomous systems.

Alongside deepening my algorithmic base through courses such as LH Machine Learning, and LH Neural Computation, I also strengthened the engineering side via LI Software Engineering and Professional Practice and LI Team Project module. Through my TA experience, I found that the rapid advancement of AI has become a double-edged sword, as I've noticed that team members often unconstrainedly use AI to generate code. From a professional angle, instead of improving efficiency when utilizing AI, it resulted in style conflicts, code redundancy, increased communication costs, and ultimately reduced overall output. To tackle this issue and avoid diminishing human subjectivity, I required each team to develop a unified style guideline and establishing a clear definition of task completion. Meanwhile, I reiterated the boundaries of AI's use among the 42 students clearly, making it serve as a "translator," translating natural language requirements into code snippets if necessary, rather than a “worker” that directly generated complete projects. This approach has proven to facilitate smoother student collaboration and minimize rework. The outcome also demonstrated that the essence of integrating team norms with a systems engineering framework is in making AI tools truly improve system development efficiency.

Experiencing “AI-in-the-loop” inspired me to explore how intelligent components fit into larger autonomous systems. The emphasis on the core issue of autonomous driving: how to effectively embed AI into perception, prediction, and planning pipelines while ensuring reliability and maintainability. The contemporary challenge is not merely squeezing out another 1% of accuracy, but co-engineering accuracy, latency, and reliability by integrating sensing, data processing, trajectory forecasting, and control with robust simulation, deployment, and monitoring to keep the system scalable and safe.

My in-depth thinking and my passion for utilizing engineering-oriented methods to make a breakthrough of the current autonomous driving technology stimulated me to pursue the MS in ECE (Machine Learning and Data Science) offered by Viterbi School of Engineering, University of Southern California. The program aligns with my academic goal of building deployable and reliable autonomous systems rather than simply pursuing algorithmic benchmarks.

Diving deep into autonomous driving concentration, I can gain professional knowledge. Courses such as *CSCI 574 Computer Vision*, *CSCI 646 Coordinated Mobile Robotics* and related special topics like *CSCI 599 Autonomous Decision Making* will equip me with the technical foundation needed to design and implement key components of an autonomous driving stack, from perception and prediction to planning and control. Besides，I hope to engage with the USC AutoDRIVE Lab and the Geometry, Vision, and Learning (GVL) Lab as strong research platforms. I am interested in Prof. Rahul Jain’s work on reinforcement and online learning for dynamic autonomous systems, particularly closed-loop, reliability- and latency-constrained policy design for AVs. I am also interested in Prof. Yue Wang’s research on simulation-to-real 3D perception and language-augmented decision making, and hope to contribute to his group. Aside from harnessing my advanced knowledge, the internship, tech talks, and hackathons will give me access to practice, allowing me to conduct algorithm research and engineering implementation and distill these methods into reusable practices.

The enhancement in algorithm and engineering practice at USC Viterbi will cultivate me into an autonomous driving engineer. Upon graduation, I aspire to work at companies leading in autonomy, such as Waymo, Cruise, or Tesla Autopilot, to tackle challenges of perception, prediction, planning, and safety at scale. With three to five years’ preparation, I will move to the next stage, pursuing my long-term goal of developing integrated platforms for autonomous mobility that unify sensing, simulation, and decision-making for multimodal and real-time applications. Collaborated with like-minded peers, I can promote data-model-system co-design and output reusable components and standards in open source and the community continuously. From building models to engineering deployable systems, I have seen that true innovation lies at their intersection. USC Viterbi is where I intend to refine this vision and help shape the future of safe and intelligent mobility.