STATEMENT OF PURPOSE

This statement will be used in conjunction with your application for graduate admission and financial support. Please adhere to the specific requirements for the program to which you are applying. Click here to browse for Departmental Information.

Please state your purpose in applying for graduate study. Describe your scholarly and research area(s) of interest, experiences that contributed to your preparation in the field, and your plans for your future occupation or profession. Briefly describe experiences that have prepared you for advanced study or research, and provide any additional information that may aid the selection committee in evaluating your preparation and aptitude for graduate study at UCLA. If you are applying for a research masters or doctoral program, you are encouraged to indicate specific research interests and potential faculty mentors.

My biggest role models and largest support in pursuing a career in science have been the 3 generations of engineers in my family that came before me. Now, as an engineering student and researcher, I strive to push the boundaries of scientific knowledge like they did and to inspire others just as they inspired me. I have chosen to pursue a **PhD in Mechanical Engineering** because I believe that it will help me advance towards a career as a **university professor** where I can best fulfill that dream.

Within Mechanical Engineering, I intend to focus my graduate studies on **Systems and Control**. My interest in that field was sparked by UC Berkeley professors like Andrew Packard, Francesco Borrelli, and George Anwar who inspired me with their work and taught me a wide range of knowledge regarding classical and optimal control, system analysis, and modeling discrete and continuous systems. I also complemented that education with a broad understanding of mechanical engineering topics like dynamics, design, heat transfer, material science, and fluid mechanics, making me particularly skilled at designing, modeling, and controlling complex dynamic systems.

Additionally, I have always paired my classroom learning with experiential research. In my first projects, I studied the anisotropic heat transfer properties of Carbon nanotubes with Technical Fellow Eric Mindock at the Boeing Company and developed a novel testing method for the MPS type II genetic disease with UCLA's Professor Patricia Dickson at the Los Angeles Biomedical Research Institute (LA BioMed). Through those projects, I gained experience surveying literature, designing experiments, and compiling my results into trade-secret reports and poster presentations. Those early successes emboldened me with confidence, curiosity, and independence that continue to fuel my research efforts.

Once at UC Berkeley, I joined Professor Reza Alam's Theoretical and Applied Fluid Dynamics (TAF) Lab. In my first project, I developed an adjustable mooring system for a Wave Energy Converter. I tested and characterized the dynamic properties of our motor and mooring cables and used those results to design a responsive system to maneuver the device. Next, I focused on the dangerous loads experienced by the device during extreme weather conditions. I designed and performed experiments to analyze the efficacy of various load-shedding techniques. Because of my thoughtful control of experimental variables, I was able to develop useful empirical formulas to describe the load characteristics. I later compiled my results and methodology into a report that surpassed my mentor's expectations and continues to guide the lab's design decisions. In addition to gaining research expertise, I developed teamwork and project planning skills by harmoniously collaborating with undergraduate and graduate students to meet deadlines and augment each other's expertise.

Later, in order to explore my interest in robotic Systems and Control, I joined Professor Alice Agogino's Berkeley Emergent Space Tensegrities (BEST) Lab. There I developed the payload housing and mechanical actuator components for a high-impact spherical tensegrity robot with applications in search-and-rescue and planetary exploration. I redesigned the motor mounting and control methods, optimizing them for high impact scenarios and shifting from a linear to a nonlinear tensile network to increase structural rigidity under extreme loads and compliance under normal conditions. Unfortunately, after testing, I realized that, despite significant improvements, our prototype was still unable to meet the project requirements for impact absorption. That failure, however, did not halt my progress. I persevered and have since been working to improve the robot's rigidity by drastically increasing the spring constants of the tensile connections and by completely redesigning the locomotion method. It now uses reaction wheels to control rolling movement instead of changing the position of its center of mass. This

project has engaged me as a collaborative team member and taught me to set and meet goals and deadlines while overcoming obstacles. Ultimately, we intend to compile our research and submit it for publication in 2019.

Outside of academia, I have also gained invaluable experiences as an intern at the Ford Motor Company and through my extracurricular activities. As an intern, I worked to optimize Ford's cold-start test procedures and autonomous vehicle code. Specifically, I achieved a six-fold increase in runtime speed for a Matlab image processing algorithm by focusing only on relevant data and by creatively reducing repetitive or unnecessary calculations and function calls. At Ford, I engaged my problem-solving creativity and driven work ethic to discover unseen flaws and implement novel solutions. Additionally, outside of engineering, I developed well-refined public speaking skills as a campus tour guide; I worked cohesively within a large organization as a trombone player in the University marching band; and I learned to persevere and pursue long-term goals as a triathlete, all while effectively managing my time and juggling those activities.

Overall, I believe that my knowledge, experience, and research interest make me a great fit for UCLA's Mechanical and Aerospace Engineering graduate program. . In particular, I am interested in studying **multi-agent systems, robots with complex or biomimetic dynamics, and advanced feedback control**. Having reviewed the publications of the department, my interests best align with **Professor Tetsuya Iwasaki**'s multi-agent systems and complex biomimetic locomotion research, Professor **Jason Speyer**'s study of optimal control of flight formations, **Professor Tsu-Chin Tsao**'s complex robotics and fully-actuated air vehicles projects, and **Professor Veronica Santos**'s work regarding artificial haptic feedback for humanoid graspers. I believe that I can make meaningful contributions to any of those projects

and that they would allow me to engage my passion for Systems and Control while also making a large societal impact.

As I conclude my undergraduate career, I am looking eagerly towards the opportunities that lie ahead. I am excited to gain new understandings and to use that knowledge to make profound breakthroughs in research. Because of my thorough academic background, refined research abilities, well-versed communication skills, tenacious work ethic, and extensive experience working on engineering projects, I am especially well prepared to perform research in Systems and Control at UCLA and can be an invaluable asset to any laboratory. I sincerely, thank you for your time and consideration and excitedly await the next steps in my academic career.