Hundreds of individuals worldwide are currently sporting denim jeans crafted from a technology I created.

At unspun, my first job out of undergrad, I designed a novel system for converting a 3D body scan into a sewable denim jeans pattern. This was a difficult task: there is no obvious way to flatten our curved body into flat pieces, and traditional tailoring would require multiple fittings. Through independent study of theliterature and experimentation, I explored several solution spaces, including 3D-to-2D shape flattening and CAD-style constrained shape designing. In the end, a combination of machine learning and AI was the answer. Using statistical human shape spaces—pre-trained neural networks describing human body variability using a few principle components—using regression models I was able to correlate body shape with pattern shape with satisfactory accuracy. Additionally, utilizing SciPy's constrained optimization toolbox in conjunction with my custom-developed Python-based geometry kernels, I optimized the patterns for sewability, including seam alignment and angle compatibility. As a named inventor on this technology's patent, I brought about a paradigm shift for unspun, increasing our fit-rate by 15%—with 90% of customers satisfied with the fit of their pants at their first try-on—and cutting human intervention required by 50%.

This project cemented my interest in **geometry processing**, a field where my love for computer science and mathematical geometry coexist. More specifically, it introduced me to **discrete differential geometry (DDG)**—the study of smooth surfaces approximated by discrete elements, enabling computation—and gave me my first hands-on experience with **3D geometric machine learning**. These emerging fields, with their many unsolved problems, are where I wish to focus my graduate studies.

My research journey began at Santa Clara University. Though I initially published my work on latent Dirichlet allocation-based topic modeling at IEEE IRC 2018, it was the mentorship of Dr. Thomas Banchoff during his year-long visit from Brown University that revealed my true passion for geometry. Under his guidance and specialty in higher-dimensional geometry, I tackled the challenge of making abstract mathematical concepts tangible through computation. By visualizing the projections of the 4-dimensional Cartan 3-manifold's polyhedral form and creating an interactive VR experience in collaboration with the Virtual Reality Lab, I developed crucial skills in translating complex geometric concepts into intuitive visual representations. This foundation in geometric visualization and computational thinking directly influenced my work at unspun and shaped my approach to technical challenges throughout my career.

My subsequent industry experiences further deepened my engagement with advanced geometrical concepts across diverse applications. At Yannix, a Bangkok-based visual effects company serving major Hollywood studios, I led the research initiative on Monte Carlo-based simulation of anamorphic lens aberration effects and developed Bayesian inference-based robust feature extraction, leading to new product offerings. At Tesla's Autopilot division, I engineered GPU-accelerated solutions in PyTorch for transforming complex 3D pointcloud scenes into neural network-compatible representations, directly supporting the team's autonomous driving research. All of these experiences taught me the value of starting with analytical geometric models rather than immediately turning to AI solutions. Geometric principles provide foundational frameworks for AI system design, while AI's capacity to learn from data bridge the gap between models and real-world complexity. Through these experiences, I also developed competencies essential for graduate-level research: ideation and reiterations, managing stakeholder relationships, crafting compelling proposals, producing maintainable, well-documented code, and timeline adherence. As a key example, across all three positions, I consistently balanced research exploration with practical implementation to deliver viable solutions within established timelines, which are crucial for downstream stakeholders and project success. I have no doubt the same challenge will present itself in my graduate study—having to balance between exploring for my curiosity and producing papers/thesis—and I will be well-prepared to face it.

What draws me to research is my ability to make a significant impact on unsolved problems and how I can fully unleash my creativity in the process. I have been doing just this since I graduated college, and after four years of industry experience, I've reached a point where my bachelor's degree no longer suffices for the depth of research I aspire to pursue. This is why I currently aspire to enter a PhD program. While I have successfully led R&D projects across three companies, I recognize that the master's program at UCSD would provide two crucial elements I need before pursuing a PhD: immersion in academic research, and advanced mathematical foundations. The prospect of completing a master's thesis with professors who are actively pushing the boundaries of geometric computing particularly excites me, and I'm eager to learn the methodologies of academic research from established scholars in the field. This master's program would serve as a vital bridge between my industry experience and my ultimate goal of pursuing a PhD, where I hope to make lasting contributions to the field of computational geometry.

The option of completing a supervised thesis at UCSD, particularly under Professor Albert Chern of the Visual Computing Center, strongly motivates my application to this program. His focus on geometry processing and geometric modeling aligns perfectly with my academic interests. While independently studying Discrete Differential Geometry (DDG), I came across his publication "Computing Minimal Surfaces with Differential Forms"—a paper that showed me an elegant application of DDG and inspired my pursuit of research in this direction. The paper exemplifies the research approach I aspire to pursue in my thesis: translating theoretical insights from smooth geometry into robust discrete algorithms. Under Professor Chern's mentorship, I aim to gain not only technical expertise, but also the ability to conduct and communicate truly impactful research.

As a nosey problem solver, I enjoy confronting problems by imagining new ways to dissect them and creating novel solutions. I have been able to build great solutions with my limited formal training—from crafting jeans that people wear to simulating anamorphic lenses used in cinematic visual effects. Further training from UCSD's master's program, and subsequently the PhD, will enable me to go back into the world and ask more complex questions about more sophisticated problems, wrestling with the kind of scientific questions that inspire me to find answers no one else has ever thought of before.

Beyond advancing my professional and research capabilities, my six years in the United States profoundly shaped my personal growth. The Bay Area provided me with resources to embrace my identity as a gay man and begin understanding my neurodivergent traits—opportunities that were limited in Thailand's more traditional environment. While serving as an active member of LGBTQ+ organizations and finding a supportive queer community, I thrived despite undiagnosed challenges that I would later understand as autism spectrum disorder and ADHD. However, upon returning to Thailand, I found myself constrained by a hierarchical research culture that often prioritizes conformity over innovation. Though I never stopped advancing new ideas, this experience has strengthened my resolve to return to the US, where both my personal identity and professional creativity can flourish.