

STATEMENT OF OBJECTIVES

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Introduction

My motivation to pursue graduate studies is shaped by a journey of personal growth, academic exploration, and a deepening sense of purpose. Over the years, I have come to recognize three guiding pillars that compel me forward: a desire to contribute to research, mentor others, and explore interdisciplinary ideas. These pillars have developed from various points in my academic and personal journey, each shaped by specific experiences that left a lasting impression. Together, they form a strong and perennial foundation for my aspirations in graduate studies.

Research Contribution During my sophomore term at the Singapore University of Technology and Design (SUTD), I participated in an Undergraduate Research Opportunity Program (UROP) under the SmartDrive project. This project seeks to propose novel methods to combat fatigue-induced traffic accidents. Although I undertook this UROP on a voluntary basis, the progress I made in SmartDrive felt especially meaningful as my stepfather is a taxi driver. I thought about the problem from my stepfather's perspective, connecting the issues he faced in his night shifts with existing literature to reveal an opportunity: detecting fatigue by using multiple modalities (thermal, depth, and RGB data) under low light conditions. To date, I still recall the excitement and satisfaction of thinking about a complex problem and arriving at a promising solution. It was a pivotal moment that sparked my passion for research. Moreover, this project showed me the potential of multimodal models: their ability to bring tangible benefits to diverse communities across society. As such, I would further this passion in multimodal AI to contribute meaningfully to society—just as the progress I made in SmartDrive translated into a possible solution for real problems faced by my stepfather.

Mentorship Another pillar of motivation in pursuing graduate studies is formed by my personal experiences and circumstances. This desire to mentor first surfaced after completing the aforementioned SmartDrive project. It made me realize the importance of mentorship, and how it could nurture passion and talent—something I had lacked in my earlier years. Raised by a single parent under significant financial constraints, I had limited access to opportunities and often felt uncertain, disinterested, and adrift. This changed under the guidance of Prof. Roy Lee and Prof. Kenny Choo, who helped me recognize my strengths and cultivated my research interests. Their mentorship instilled in me a lasting sense of purpose and a "pay-it-forward" mindset. Additionally, my background has made me acutely aware of a prominent issue in a purportedly meritocratic society like Singapore: underprivileged youths often unable to compete on a level playing field due to limited resources and opportunities. These individuals are underrepresented, frequently falling through the cracks

in society; they may not be in extreme situations and are thus overlooked by charitable organizations. As such, I hope to not only mentor and guide such youths, but also open doors for them—just as I once wished someone had done for me.

Interdisciplinary Exploration The last pillar of motivation for graduate studies is my interest in integrating cross-disciplinary ideas that are unique to humans into existing AI models. This curiosity stemmed from my interdisciplinary education in SUTD, equipping me with ideas and knowledge from the humanities and social sciences. Even seemingly frivolous topics, such as fashion, tell a deeper story of Orientalism and long-standing cultural appropriation practices on minority groups. Yet, these problems are often underexplored in existing multimodal AI research, leaving them to fester. If left unchecked, these same conundrums would propagate into existing models, affecting underrepresented communities and reinforcing stereotypes and biases. Thus, I would bring a holistic perspective to multimodal AI research, driven by my curiosity to quantitatively represent and reason with abstract concepts. In doing so, I aspire to generate novel actionable insights into Large Multimodal Models (LMMs), instead of favoring research that pursues marginal gains on well-established benchmarks.

Research Interests & Goals

I center my research on Collaborative AI: humans and intelligent systems improving and augmenting each other to achieve shared goals; achieving a symbiotic relationship to continuously improve both humans and AI. However, a crucial aspect of this theme that receives less attention is the quality of interactions between humans and AI. To improve such interactions, AI must become more socially intelligent to better understand the social signals of each individual. While there is a growing body of work on such cues and abstract social concepts such as culture, existing models still struggle to comprehend specific differences in different communities. Thus, I aim to make great strides in this direction by rethinking how social signals can be quantitatively represented to enable multimodal agentic reasoning.

Within this theme, my research interests lie in improving multimodal models as humans naturally perceive with multiple types of information. Specifically, I am interested in multimodal interactions—representing and reasoning with redundant, unique, and synergistic information when two or more modalities combine—and how they can improve the quality of human-AI communication. Currently, models struggle the most with synergy, where new information surfaces when multiple modalities combine. Hence, I seek to improve the interpretability and explore better techniques for multimodal fusion using synergy.

To contextualize my research, I wish to investigate Large Multimodal Models (LMMs) and their ability to comprehend social signals. One such signal is humor. As a medium, humor is an important indicator of social intelligence, involving various facets such as culture. Furthering humor comprehension and generation is imperative in raising the quality of human-AI interactions for Collaborative AI. In doing so, one can also better guard against adversaries who misuse humor for malicious intent.

Academic Goals Ultimately, these research interests work towards my dream of becoming an academic professor in the future. I aspire to lead a research group focused on socially intelligent multimodal systems, where students are encouraged to pursue bold and creative interdisciplinary questions with real-world relevance. In this capacity, I hope to cultivate a nurturing environment that mirrors the guidance that I have received. Beyond research, I am also committed to teaching, especially in integrating design thinking and creative applications into AI. Through this path, I aim to contribute meaningfully to both the advancement of knowledge and the shaping of thoughtful and creative innovators.

Education & Technical Experiences

To support the aforementioned depth of research, I have accumulated a myriad of experiences and technical knowledge. As an undergraduate in SUTD, I took modules such as deep learning, computer vision and discrete mathematics, achieving an Honours with Highest Distinction for my BEng (Computer Science). Further, I garnered technical and research experiences through projects and internships.

PixelHumor I worked with Prof. Roy Lee (SUTD) on PixelHumor to improve my research abilities and enable future work on synergy. PixelHumor is a benchmark dataset and framework for LMMs that utilized web comics from sources such as Peanuts and Garfield. In this project, I collected over 28,000 comics and managed 8 participants to annotate 2,800 samples for humor identification, classification and interpretation tasks. As these comics naturally have a sequential narrative building towards a humorous punchline, it enabled us to evaluate LMM's reasoning abilities to comprehend humor. Hence, laying the foundations for future work on synergistic interactions between text and visuals to further social intelligence in existing models.

DSO National Laboratories My internship with DSO armed me with more perspectives in approaching complex research questions. During my attachment, I actively consulted with my mentors, Chieu Hai Leong, Wei Ming and Joshua to better understand how they would tackle open-ended problems. In doing so, I was able to replicate the Graph of Thoughts reasoning framework under their guidance, achieving a 25% reduction in API costs. Further, I integrated a Retrieval Augmented Generation (RAG) system using LangChain to detect deeper code vulnerabilities within a three function call stack. This experience has better prepared me to take on even more challenging and abstract problems, such as reasoning with humor in LMMs.

Check As a founding AI Engineer in Check, I developed multimodal systems to reduce the workload of educators and help students to learn more easily. These systems include a document cleaning workflow and RAG by deploying open source models such as DeepSeek-R1. Developing these systems helped me to better manage tradeoffs, balancing quality, uptime and latency with costs incurred from Google Cloud Run. Additionally, I had the flexibility to explore and implement a plethora of features in the early days of the startup. This not only exposed me to sound industrial practices, but also helped me to internalize my

personal working style. I find great satisfaction in having the freedom to explore and experiment with multiple ideas before arriving at a novel solution. As such, further affirming my belief that a career in research would be a great fit.

Conclusion

My experiences have collectively affirmed my conviction that a career in research is both a natural and fulfilling path for me. Whether designing multimodal systems at Check, generating research value through PixelHumor, or applying reasoning frameworks at DSO, I have consistently found purpose in grappling with abstract ideas and translating them into actionable insights. Graduate studies thus represent not merely the next step, but a deliberate and essential one in deepening my technical capabilities and broadening the scope of my contributions towards true Collaborative AI.

I have built a strong interdisciplinary foundation through my undergraduate training, and I now seek to refine this perspective through a research-oriented graduate program. I am particularly driven to explore the challenges of social intelligence in multimodal AI, with the aim of advancing large multimodal models (LMMs) to facilitate richer, more meaningful human-AI interactions. Ultimately, I aspire not only to push the boundaries of Collaborative AI, but also to give back through mentorship; supporting aspiring researchers and underrepresented communities as part of my long-term academic and societal contributions.