

Personal Statement: From Reactions to Reasoning

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In the third year of my chemical engineering degree, I stood alone in the lab, watching droplets of solvent sink through a chitosan solution. I was attempting to form uniform zeolite beads for carbon dioxide capture. The process was unpredictable. No two beads were alike. As I repeated trial after trial, I wondered - what if a system could adapt, learn, and even predict the next best experiment?

That moment sparked a shift. While continuing research in adsorption and catalysis, I became captivated by systems that think. Artificial intelligence was trending, and initially, I explored it out of curiosity. But as I studied CNNs as a kickstart for Deep Learning, watched Andrew Ng's courses, and coded late into the night, I saw its deeper potential - not just for automation, but for reshaping scientific exploration itself. I began to envision a future where chemical intuition and computational intelligence worked hand in hand.

After graduating with First Class Honours (GPA 8.7/10, top 10%) and publishing my research in *Chemosphere*, I stood at a crossroads. In Vietnam, most chemical engineers enter field operations - stable, conventional roles in demanding industrial settings. Friends and family encouraged me to follow this route. "It's stable," they said. "It's what your degree was for." But I knew I wanted more than routine processes. I wanted to build intelligent systems that could drive meaningful changes.

So I chose a less certain route. I spent six months studying machine learning full-time - reading papers, building projects, and developing deep learning models from scratch. I had no formal job - only the savings from the academic scholarships I was honored to receive each year during university, and a strong conviction in my chosen path. It was difficult, but transformative. I wasn't just learning tools - I was laying the foundation for a new direction.

This path led me to Greystone Data Systems, where I built computer vision models for industrial automation. Working on real-world object detection and tracking helped me understand how perception enables machines to interact with complex environments - an essential part of robotics. It reframed AI from abstract code into a practical enabler of autonomous systems.

That curiosity deepened at BOS Semiconductors, where I now work as an AI Compiler Engineer. Here, I've learned to understand AI models at their computational core - as orchestrations of simple operations like additions and multiplications. I optimize deep learning inference for RISC-V NPUs, and tune performance for edge devices - crucial platforms for robotics and automation. This role taught me how model behavior is shaped not just by algorithms, but by memory flow, hardware constraints, and computational efficiency. It grounded my understanding of intelligence in both theory and silicon. Still, the curiosity that started in that lab - about experimentation, adaptation, and robotics - continues to guide me.

This is why the CDT in Digital and Automated Materials Chemistry feels like the perfect continuation of my journey. The project - developing adaptive robotic systems under uncertainty - brings together everything I've pursued: the messy unpredictability of chemical systems and the precision of intelligent computation. I understand both the challenges of experimental chemistry and the tools that make automation intelligent, trustworthy, and responsive.

I'm especially drawn to the CDT's interdisciplinary environment and its emphasis on real-world impact. Science is changing. We no longer just use machines; we learn with them. I want to help build systems that think critically, act reliably, and know when to ask for help - starting with a robot that knows when it's uncertain.