

## Hanchen (Howard) Xiao

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SUMMARY	I am an incoming PhD student at Stanford Computational Imaging Lab, advised by Prof. Gordon Wetzstein. Previously, I was an undergraduate researcher at the Toronto Computational Imaging Group (TCIG), working under Prof. Kyros Kutulakos and Prof. David Lindell. My current research focuses on ultrafast single-photon 3D imaging, including the design of next-generation imaging systems using single-photon cameras and the development of novel photon-processing algorithms leveraging machine learning and signal processing techniques.	
EDUCATION	Honours Bachelor of Science (Conferred June 2025) University of Toronto, Toronto, ON, Canada Computer Science Specialist and Mathematics Specialist, GPA: 3.86/4.00  Completed Computer Science courses: Computational Imaging; Neural Networks and Deep Learning; Probabilistic Learning and Reasoning; Algorithms Design, Analysis & Complexity; Introduction to Artificial Intelligence, Data Structures and Analysis.  Completed Mathematics and Statistics courses: Real Analysis; Complex Analysis; Classical Geometries; Differential Topology; Groups, Rings and Fields; Introduction to Number Theory; Introduction to Combinatorics; Probability and Statistics.	
PUBLICATIONS	<ul style="list-style-type: none"><li>[1] Sotiris Nousias*, Mian Wei*, Howard Xiao, Maxx Wu, Shahmeer Athar, Kevin J Wang, Anagh Malik, David A. Barmherzig, David B. Lindell, Kyros Kutulakos <i>Opportunistic Single-Photon Time of Flight</i> IEEE/CVF Conference on Computer Vision and Pattern Recognition, 2025 (<a href="#">oral presentation</a>)</li><li>[2] Howard Xiao, Anton Izosimov, Boris Khesin <i>Broken Virasoro Groupoid</i> In preparation.</li></ul>	
UPCOMING WORKS	Howard Xiao, Sotiris Nousias, Mian Wei, David B. Lindell, Kyros Kutulakos <i>Single-photon Doppler Lidar</i> (In preparation)	
RESEARCH EXPERIENCE	<ul style="list-style-type: none"><li>[1] <i>Ultra-wideband Single-photon Imaging</i> <span style="float:right">September 2023 – Now</span> Supervisor: Prof. Kyros Kutulakos, Prof. David Lindell Focusing on developing mathematical and signal processing techniques inspired by ultra-wideband Fourier probing to enhance tasks like LiDAR, velocity and distance measurement, and passive imaging, pushing the limits of modern single-photon detectors.</li><li>[2] <i>Broken Virasoro Groupoid</i> <span style="float:right">September 2023 – Now</span> Supervisor: Prof. Boris Khesin Conducting research to understand the structure of central extensions of the Virasoro groupoid and algebroid, classify their cocycles and co-adjoint actions, as well as to study the corresponding equations in mathematical physics.</li><li>[3] <i>Rate of Convergence in Steiner Symmetrizations</i> <span style="float:right">August 2023 – April 2024</span> Supervisor: Prof. Almut Burchard During this one-year research course, we explored transformations of convex and non-convex bodies under Steiner symmetrizations, and the rate of convergence of Steiner symmetrizations on different bodies.</li></ul>	

AWARDS	<p>[1] <i>Undergraduate Student Research Awards (USRA) – Natural Sciences and Engineering Research Council of Canada (NSERC)</i>, May 2024 – August 2024  Supervisor: Prof. Kyros Kutulakos, Prof. David Lindell  Project title: <i>Ultra-wideband Single-photon 3D Imaging</i>  Amount: \$7500</p>	
	<p>[2] <i>Undergraduates Student Research Awards (USRA) – Natural Sciences and Engineering Research Council of Canada (NSERC)</i>, May 2024 – August 2024 (Declined offer)  Supervisor: Prof. Boris Khesin  Project title: <i>Groupoids in Mathematical Physics</i>  Amount: \$7500</p>	
	<p>[3] <i>2022 and 2023 Innis College Exceptional Achievement Award – Innis College, University of Toronto</i>  Amount: \$400</p>	
	<p>[4] <i>2021, 2022 and 2023 Dean’s List Scholar – Faculty of Arts &amp; Science, University of Toronto</i></p>	
	<p>[5] <i>University of Toronto In-course Scholarship</i>, September 2021  Amount: \$1500</p>	
	<p>[6] <i>University of Toronto Scholars Program</i>, September 2020  Amount: \$7500</p>	
TALKS	<p>Canadian Undergraduate Mathematics Conference (CUMC)  Talk title: <i>Learning the Math Language: Gaining Intuition Behind Analysis</i>  Video link <a href="#">here</a></p>	June 2023
TEACHING	<p><i>Teaching Assistant, Mathematics Department, University of Toronto, Toronto, ON</i>  For three semesters, I worked as a teaching assistant for first-year advanced linear algebra courses at University of Toronto. My responsibilities included leading weekly two-hour tutorials, creating problems and solutions, designing make-up exams, grading assignments, and invigilating exams.</p>	January 2024 – April 2025
EMPLOYMENT	<p><i>Software Developer Intern, Bell Canada, Mississauga, ON</i>  During the 12-month internship, I utilized Python, Ruby, SQL, as well as Ollama and Langchain framework to fine-tune open-sourced large language model into internal document retrieval and code generator tools. I also initiated various projects related to generative AI in daily work tasks.</p>	May 2023 – May 2024
COMMUNITY ENGAGEMENT	<p><i>Activity Manager, Brighten A Day Toronto, Toronto, ON</i>  As the activity manager, I organized fundraising events, including food sales at the University of Toronto, with raised funds going to support five local nursing homes. Additionally, I coordinated a Christmas card writing event that connected students with seniors in long-term care homes, fostering a sense of community and connection.</p>	September 2021 – April 2023