## Hanchen (Howard) Xiao

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SUMMARY	I am a fourth-year 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 (Expected 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	[1] Sotiris Nousias*, Mian Wei* (joint first author), Howard Xiao, Maxx Wu, Shahmeer Athar, Kevin J Wang, Anagh Malik, David A. Barmherzig, David B. Lindell, Kyros Kutulakos Opportunistic Single-Photon Time of Flight Under review.		
	<ul> <li>[2] Howard Xiao, Anton Izosimov, Boris Khesin Broken Virasoro Groupoid In preparation.</li> </ul>		
Upcoming works	Howard Xiao, Sotiris Nousias, Mian Wei, David B. Lindell, Kyros Kutulakos Single-Photon Doppler Lidar (In preparation)		
RESEARCH EXPERIENCE	[1] Ultra-wideband Single-photon Imaging Supervisor: Prof. Kyros Kutulakos, Prof. David Lind Focusing on developing mathematical and signal processing techniques inspired by ultra-wideband Fo probing to enhance tasks like LiDAR, velocity and distance measurement, and passive imaging, pushing limits of modern single-photon detectors.	September 2023 – Now lell g the	
	[2] Broken Virasoro Groupoid Supervisor: Prof. Boris Khesin Conducting research to understand the structure of ce extensions of the Virasoro groupoid and algebroid, classify their cocycles and co-adjoint actions, as well study the corresponding equations in mathematical physics.	September 2023 – Now entral l as to	
	[3] <i>Rate of Convergence in Steiner Symmetrizations</i> Supervisor: Prof. Almut Burchard During this one-year research course, we explored transformations of convex and non-convex bodies un Steiner symmetrizations, and the rate of convergence Steiner symmetrizations on different bodies.	August 2023 – April 2024 nder e of	

Awards	<ul> <li>[1] Undergraduate Student Research Awards (USRA) – Natural Sciences and Engineering Research Council of Canada (NSERC), May 2024 – August 2024 Supervisor: Prof. Kyros Kutulakos, Prof. David Lindell Project title: Ultra-wideband Single-photon 3D Imaging Amount: \$7500</li> </ul>		
	<ul> <li>[2] Undergraduates Student Research Awards (USRA) – Natural Sciences and Engineering Research Council of Canada (NSERC), May 2024 – August 2024 (Declined offer) Supervisor: Prof. Boris Khesin Project title: Groupoids in Mathematical Physics Amount: \$7500</li> </ul>		
	<ul> <li>[3] 2022 and 2023 Innis College Exceptional Achievement Award – Innis College, University of Toronto Amount: \$400</li> </ul>		
	[4] 2021, 2022 and 2023 Dean's List Scholar – Faculty of Arts & Science, University of Toronto		
	[5] University of Toronto In-course Scholarship, September 2021 Amount: \$1500		
	[6] University of Toronto Scholars Program, September 2020 Amount: \$7500		
Talks	Canadian Undergraduate Mathematics Conference (CUMC) Talk title: <i>Learning the Math Language: Gaining Intuition</i> <i>Behind Analysis</i> Video link <u>here</u>	June 2023	
TEACHING	<i>Teaching Assistant, Mathematics Department, University of</i> <i>Toronto,</i> <b>Toronto, ON</b> 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.	January 2024 – Now	
Employment	<i>Software Developer Intern, Bell Canada,</i> Mississauga, ON 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.	May 2023 – May 2024	
Community Engagement	Activity Manager, Brighten A Day Toronto, Toronto, ON 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.	September 2021 – April 2023	