

Alvin Chan

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Education

MIT & Harvard Medical School

POSTDOCTORAL TRAINING

- Research project: Deep learning for RNA Lipid Nanoparticle Design

Cambridge, USA

Dec 2021 - Feb 2024

Nanyang Technological University

PH.D. (COMPUTER SCIENCE)

- Ph.D. thesis: "Defences and Threats in Safe Deep Learning"

Singapore

Aug 2018 - Nov 2021

Nanyang Technological University

B.ENG (BIOMEDICAL ENGINEERING)

- First Class Honors, cGPA: 4.94/5.00 (Dean's List AY 2009-2013)

Singapore

Aug 2009 - May 2013

Research Experience

Nanyang Technological University

ASSISTANT PROFESSOR, COLLEGE OF COMPUTING AND DATA SCIENCE, LKC SCHOOL OF MEDICINE

Singapore

Mar 2024 - Present

MIT & Harvard Medical School

POSTDOCTORAL FELLOW, ADVISOR: DR. GIOVANNI TRAVERSO

- Developing deep learning models and high-throughput in-vivo assay to design novel lipid nanoparticles
- Leading 3 projects, managing 1 research associate, 1 graduate and 4 undergraduate students

Cambridge, USA

Dec 2021 - Feb 2024

Nanyang Technological University

PH.D. CANDIDATE, ADVISOR: DR. YEW-SOON ONG

- Developed algorithms to manipulate generative AI models, with applications in protein engineering and natural language
- Designed approaches to fortify deep learning models' robustness

Singapore

Aug 2018 - Nov 2021

Salesforce AI Research

DEEP LEARNING RESEARCH INTERN, SUPERVISOR: DR. ALI MADANI

- Developed generative deep learning technologies for protein engineering in Salesforce's moonshot AI research team

Palo Alto, USA (Remote)

Jan 2021 - May 2021

Bioinformatics Institute (A*STAR) & Cloak Apps

MACHINE LEARNING ENGINEER

- Developed privacy-preserving platform for AI-powered automatic annotation of histopathological images

Singapore

Jan 2018 - Aug 2018

Hordespot

FOUNDER & FULL-STACK DEVELOPER

- Conceptualized and developed hordespot.com, an event aggregation platform

Singapore

Dec 2016 - Aug 2018

Medtronic

MEDICAL PRODUCT SPECIALIST

- Supported medical Key-Opinion Leaders on neuro-interventional devices

Singapore

May 2016 - Dec 2018

Servier Laboratories

SPECIALIST MEDICAL REPRESENTATIVE

- Convinced medical Key-Opinion Leaders of anti-diabetic and cardiovascular pharmaceutical products

Singapore

Sep 2014 - Apr 2016

Abbott Manufacturing Singapore

OPERATIONS PROFESSIONAL DEVELOPMENT PROGRAM (QA)

- Conducted investigation in Quality issues & led improvement projects in the plant

Singapore

Jul 2013 - Feb 2014

Exploit Technologies Pte Ltd (A*STAR)

TECHNOLOGY TRANSFER INTERN

Singapore

Jun 2012 - Aug 2012

- Evaluated the commercialization of 4 new A*STAR biomedical technologies through interviews with scientists and market research

Institute of Bioengineering and Nanotechnology (A*STAR)

RESEARCH INTERN, SUPERVISOR: DR. YIHUA LOO

Singapore

Jan 2012 - Jun 2012

- Conducted presentations and experiments on a hydrogel-based biomaterial for wound healing

Publications

RIGOROUSLY REVIEWED CONFERENCE PUBLICATIONS

Alvin Chan, Yew-Soon Ong, Clement Tan. How Does Frequency Bias Affect the Robustness of Neural Image Classifiers against Common Corruption and Adversarial Perturbations? In International Joint Conference on Artificial Intelligence (IJCAI 2022)

Alvin Chan*, Ali Madani*, Ben Krause, Nikhil Naik. Deep Extrapolation for Attribute-Enhanced Generation. In Conference on Neural Information Processing Systems (NeurIPS 2021)

Alvin Chan*, Anna Korsakova*, Yew-Soon Ong, Fernaldo RW, Kah Wai Lim, Anh Tuan Phan. RNA Alternative Splicing Prediction with Discrete Compositional Energy Network. In ACM Conference on Health, Inference, and Learning (ACM CHIL 2021)

Alvin Chan, Yew-Soon Ong, Bill Pung, Aston Zhang, Jie Fu. CoCon: A Self-Supervised Approach for Controlled Text Generation. In International Conference on Learning Representations (ICLR 2021)

Aston Zhang, Yi Tay, Shuai Zhang, **Alvin Chan**, Anh Tuan Luu, Siu Hui, Jie Fu. Beyond Fully-Connected Layers with Quaternions: Parameterization of Hypercomplex Multiplications with $\frac{1}{n}$ Parameters. In International Conference on Learning Representations (ICLR 2021)

Aston Zhang, **Alvin Chan**, Yi Tay, Jie Fu, Shuohang Wang, Shuai Zhang, Huajie Shao, Shuochao Yao, Roy Ka-Wei Lee. On orthogonality constraints for transformers. In Proceedings of the 59th Annual Meeting of the Association for Computational Linguistics (ACL 2021)

Alvin Chan, Yi Tay, Yew Soon Ong, Aston Zhang. Poison Attacks against Text Datasets with Conditional Adversarially Regularized Autoencoder. In Findings of Empirical Methods in Natural Language Processing 2020 (EMNLP-Findings 2020)

Yi Tay, Donovan Ong, Jie Fu, **Alvin Chan**, Nancy Chen, Anh Tuan Luu, Christopher Pal. Would you Rather? A New Benchmark for Learning Machine Alignment with Cultural Values and Social Preferences. In Annual Meeting of the Association for Computational Linguistics (ACL 2020)

Alvin Chan, Yi Tay, Yew Soon Ong. What it Thinks is Important is Important: Robustness Transfers through Input Gradients. In Conference on Computer Vision and Pattern Recognition (CVPR 2020, Oral)

Alvin Chan, Yi Tay, Yew Soon Ong, Jie Fu. Jacobian Adversarially Regularized Networks for Robustness. In International Conference on Learning Representations (ICLR 2020)

JOURNALS

Alvin Chan*, Ameya R. Kirtane*, Qing Rui Qu, Xisha Huang, Jonathan Woo, Deepak A. Subramanian, Rajib Dey, Rika Semalty, Joshua D. Bernstock, Taksim Ahmed, Rowan James Honeywell, Charles Hanhurst, Isaac Diaz Beccach, Leah S. Prizant, Ashley K. Brown, Hao Song, Justin Law Cobb, Louis B. DeRidder, Bruna Santos, Miguel Jimenez, Michelle Sun, Yuebin Huang, Ceara Byrne, Giovanni Traverso. Designing Lipid Nanoparticles using a Transformer-Based Neural Network. Nature Nanotechnology 20 (10), 1491-1501

Ameya R. Kirtane, Jianling Bi, Netra U. Rajesh, Chaoyang Tang, Miguel Jimenez, Emily Witt, Megan McGovern, Arielle Cafi, Samuel Hatfield, Lauren Rosenstock, Sarah L. Becker, Nicole Machado, Veena Venkatachalam, Dylan Freitas, Xisha Huang, **Alvin Chan**, Aaron Lopes, Hyunjoon Kim, Nayoon Kim, Joy E. Collins, Michelle E. Howard, Srija Manchanti, Theodore S. Hong, James D. Byrne, Giovanni Traverso. Radioprotection of healthy tissue via nanoparticle-delivered mRNA encoding for a damage-suppressor protein found in tardigrades. Nature Biomedical Engineering (2025): 1-14.

Zhenghua Chen, Min Wu, **Alvin Chan**, Xiaoli Li, Yew Soon Ong. Survey on AI Sustainability: Emerging Trends on Learning Algorithms and Research Challenges. In IEEE Computational Intelligence Magazine, 2023

Wei Long Ng*, **Alvin Chan***, Yew Soon Ong, Chee Kai Chua. Deep Learning for Fabrication and Maturation of 3D Bioprinted Tissues and Organs. In Virtual and Physical Prototyping, 2020

Loo Yihua, Wong Yong-Chiat, Cai Elijah Z, Ang Chuan-Han, Raju Ashvin, Lakshmanan Anupama, **Alvin Chan**, Zhou Hui J, Lim Thiam-Chye, Moochhala Shabbir. Ultrashort Peptide Nanofibrous Hydrogels for the Acceleration of Healing of Burn Wounds. In Biomaterials, 2014

PATENTS

Machine Learning-Guided Discovery of Nanoparticle Formulations Maximizing mRNA Transfection. US Patent App. 63/700,337

Methods and System for Deep Learning Model Generation of Samples with Enhanced Attributes. US Patent App. 17/353,691

Research Grants

2025-2027	SRIS: T Cell Targeted RNA Delivery for Inflammatory Skin Disease with Deep Learning (Co-PI), total S\$275,000, Singapore	<i>S\$ 172,000</i>
2025-2028	AISG: Towards Inverse Problems for Foundation Models (Team PI), total S\$2,899,906.30, Singapore	<i>S\$ 475,300</i>
2025-2028	NATi N05: Lipid nanoparticle platform technology for targeted mRNA delivery (Team PI), total S\$3,137,763.20, Singapore	<i>S\$ 349,050</i>
2024	MOE Tier 1 Award (PI), Singapore	<i>S\$ 185,000</i>
2024	NTU Startup Grant (PI), Singapore	<i>S\$ 150,000</i>
2023	MIT Marble Center for Cancer Nanomedicine's Global Oncology in Nanomedicine, MIT, USA	<i>US\$ 100,000</i>

Awards & Fellowships

2021	Nanyang Technological University CoE International Postdoctoral Fellowship , Ministry of Education, Singapore	
2019	NISTH AI Ideas Challenge (Commendation Award) , Nanyang Technological University, Singapore	
2018	Nanyang President's Graduate Scholarship , Nanyang Technological University, Singapore	
2012	The Change Agent (Best Team & Individual) , Business Leaders Alumni Club, Singapore	\$ 7,000
2012	SCBE Chair Award (Colors Award) , Nanyang Technological University, Singapore	
2012	Abbott Innovation University Challenge (1st in Singapore, 3rd worldwide) , Abbott Laboratories	\$ 5,000
2010	A*STAR Pre-Graduate Scholarship , A*STAR	

Teaching Experience

2025	Probability & Statistics (SC2000) , Nanyang Technological University, Singapore, Instructor
2024	Neural Networks & Deep Learning (SC4001) , Nanyang Technological University, Singapore, Instructor
2024	Signal Processing (SC3102) , Nanyang Technological University, Singapore, Instructor
2021, 2020, 2019	Computational Thinking (RE1016) , Nanyang Technological University, Singapore, Teaching Assistant

Students Mentored

Matthias Koh Yong An, Ph.D., NTU, Spring 2025 to Present
Zhang Tianle, Ph.D., NTU, Spring 2025 to Present
Fang Wanlong, Ph.D., NTU, Summer 2024 to Present
Bi Weishan, Master's, NTU, Summer 2024 to Present
Jonathan Woo, B.S., University of Toronto, Fall 2023, Spring 2024
Sophia L Yao, B.S., MIT, Spring 2023 to Spring 2024
Pari Latawa, B.S., MIT, Fall 2023, Spring 2024
Shriya Rangaswamy, B.S., MIT, Summer 2022 to Spring 2024
Sainiket (Sami) Panyam, Conestoga High School, Spring 2023 to Spring 2024
Simon Qu, B.S., University of Toronto, Fall 2022 to Summer 2023
Justin Law Cobb, Northeastern University, Spring 2023, Summer 2023
Yuebin Huang, B.S., MIT, Summer 2022, Fall 2022, Spring 2023

Invited Talks

Jan 2025	A Deep Learning Approach to Nucleic Acid Delivery , Singapore-MIT Alliance for Research and Technology (SMART)
May 2024	A Deep Learning Approach to Nucleic Acid Delivery , Lee Kong Chian School of Medicine, NTU
Feb 2021	A Self-Supervised Approach to Controlled Sequence Generation , Microsoft Research Lab - New England & Vector Institute
Aug 2020	Controlled Text Generation , DSO National Laboratories
Jul 2020	AI: Why It Matters and What is It? , Technical University of Munich (TUM Asia)
Mar 2020	Jacobian Adversarially Regularized Networks for Robustness , DSO National Laboratories
May 2019	Get Started on Deep Learning , Python meetup @ Zendesk
Feb 2019	Deep Learning Jumpstart , Nanyang Technological University, Singapore
Jun 2018	TensorFlow.js: Machine Learning in the Browser , talk.js meetup @ Singapore Power

Academic Services

- 2025 ICLR AI4NA Workshop, Area Chair
- 2021 - 2025 ICLR, Program Committee
- 2022 - 2025 ICML, Program Committee
- 2020 - 2025 NeurIPS, Program Committee
- 2020 - 2022 EMNLP, Program Committee
- 2021, 2022 CVPR, Program Committee

Other Work Experience

Bioinformatics Institute (A*STAR) & Cloak Apps

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