

Alvin Chan

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Education

MIT & Harvard Medical School

POSTDOCTORAL FELLOW

- 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, SCHOOL OF COMPUTER SCIENCE AND ENGINEERING

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

Institute of Bioengineering and Nanotechnology (A*STAR)

RESEARCH INTERN, SUPERVISOR: DR. YIHUA LOO

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

Singapore

Jan 2012 - Jun 2012

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**)

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

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

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

Research Grants

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|------|---|------------|
| 2023 | MIT Marble Center for Cancer Nanomedicine's Global Oncology in Nanomedicine, MIT, USA | \$ 100,000 |
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Awards & Fellowships

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| 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

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| 2021, 2020, | Computational Thinking (RE1016), Nanyang Technological University, Singapore, |
| 2019 | Teaching Assistant |

Students Mentored

Deepak Adarsh Subramanian, Ph.D., MIT, Summer 2023, Fall 2023, Spring 2024
Jonathan Woo, B.S., University of Toronto, Fall 2023, Spring 2024
Sophia L Yao, B.S., MIT, Spring 2023, Summer 2023, Fall 2023, Spring 2024
Pari Latawa, B.S., MIT, Fall 2023, Spring 2024
Shriya Rangaswamy, B.S., MIT, Summer 2022, Fall 2022, Spring 2023, Summer 2023, Fall 2023, Spring 2024
Sainiket (Sami) Panyam, Conestoga High School, Spring 2023, Summer 2023, Fall 2023
Simon Qu, B.S., University of Toronto, Fall 2022, Spring 2023, Summer 2023
Justin Law Cobb, Northeastern University, Spring 2023, Summer 2023
Yuebin Huang, B.S., MIT, Summer 2022, Fall 2022, Spring 2023

Invited Talks

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

2021 - 2023 **ICLR**, Program Committee
2022, 2023 **ICML**, Program Committee
2020 - 2023 **NeurIPS**, Program Committee
2020 - 2022 **EMNLP**, Program Committee
2021, 2022 **CVPR**, Program Committee

Other Work Experience

Bioinformatics Institute (A*STAR) & Cloak Apps

MACHINE LEARNING ENGINEER

Singapore

Jan 2018 – Aug 2018

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

Hordespot

FOUNDER

Singapore

Dec 2016 - Aug 2018

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

Medtronic

MEDICAL PRODUCT SPECIALIST

Singapore

May 2016 - Dec 2016

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

Servier Laboratories

SPECIALIST MEDICAL REPRESENTATIVE

Singapore

Sep 2014 - Apr 2016

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

Abbott Manufacturing

OPERATIONS PROFESSIONAL DEVELOPMENT PROGRAM (QA)

Singapore

Jul 2013 - Feb 2014

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

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