Xudong **Shen**

(+86) 186-5814-3615 | xudong.shen@u.nus.edu | xudongolivershen.github.io | OliverXudongShen

Personal Statement

My research interests are **fairness and other safety / alignment problems of ML applications**. I have worked on fair representation learning, gender discrimination in FinTech, and biases in large language models. I believe in Diversity, Equity & Inclusion. I am committed to uphold these values.

Position

Sea AI Lab, Sea Limited — *Singapore*

Research Intern — *Oct. 2022 - current*

- Mentor: Chao Du, Tianyu Pang.
- Working on fairness and biases of large pre-trained language / vision / multimodality models.

Education

National University of Singapore — *Singapore*

Ph.D. at Integrative Sciences and Engineering Programme, NUS Graduate School — *Aug. 2019 - current*

- Doctoral advisor: Professor Mohan S. Kankanhalli

Zhejiang University — *Hangzhou, China*

B.Eng. with Honor in Naval Architecture and Ocean Engineering — *Sep. 2015 - Jun. 2019*

- Research experience: computational fluid dynamics, satellite imaging

Waseda University — *Tokyo, Japan*

Master Kong Dream Scholarship Programme, a Leadership Programme — *Sep. 2018 - Feb. 2019*

Università di Trento — *Trento, Italy*

ERASMUS+ Student Mobility — *Feb. - Jun. 2017*

Working Papers

[w1] **Xudong Shen**, Tianhui Tan, Jussi Keppo, and Tuan Q. Phan, "Unwarranted Gender Disparity and Its Drivers in Online P2P Lending".

- We show improved identification of the tast-based and the belief-based gender discrimination drivers on one of the largest P2P platforms in China.
- Oral presentation at the International Conference on Smart Finance, 2022.
- Preparing journal submission.

[w2] **Xudong Shen**, Yongkang Wong, and Mohan Kankanhalli, "Theoretical Guarantees of Subgroup-Fair Representation via Task Anticipation".

Preprints

[p1] Kaustubh D Dhole, Varun Gangal, Sebastian Gehrmann, Aadesh Gupta, ..., **Xudong Shen**, ..., "NL-Augmenter: A Framework for Task-Sensitive Natural Language Augmentation". In: *arXiv preprint, arXiv:2112.02721 (2021).*

[p2] Aarohi Srivastava, Abhinav Rastogi, Abhishek Rao, Abu Awal Md Shoeb, ..., **Xudong Shen**, ..., "Beyond the Imitation Game: Quantifying and Extrapolating the Capabilities of Language Models". In: *arXiv preprint, arXiv:2206.04615 (2022).*

[p3] **Xudong Shen**, Tianhui Tan, Tuan Q. Phan, Jussi Keppo, "Unwarranted Gender Disparity in Online P2P Lending: Evidence of Affirmative Action". In: *arXiv preprint, arXiv:2210.07864 (2022).*

Publication

[1] Ziwei Xu, **Xudong Shen**, Yongkang Wong, Mohan Kankanhalli, "Unsupervised Motion Representation Learning with Capsule Autoencoders". In: *NeurIPS (2021).*

[2] **Xudong Shen**, Yongkang Wong, Mohan Kankanhalli, "Fair Representation: Guaranteeing Approximate Multiple Group Fairness for Unknown Tasks". In: *IEEE Trans. PAMI (2022)*.

[3] Yizhong Wang, Swaroop Mishra, Pegah Alipoormolabashi, Yeganeh Kordi, ..., **Xudong Shen**, ..., "Benchmarking Generalization via In-Context Instructions on 1,600+ Language Tasks". In: *EMNLP (2022)*.

Experience

Analysis and Optimization of Hydrodynamically Focused Printing for High-resolution Printed Electronics

Toronto, Canada

SUPERVISED BY PROF. GERD GRAU AT ELECTRONICS ADDITIVE MANUFACTURING LAB, YORK UNIVERSITY, SUPPORTED BY MITACS GLOBALINK

May – Aug. 2018

- I worked with Prof. Gerd Grau in hydrodynamically focused printing for printed electronics. I worked alongside a team of four researchers to develop and optimize a hydrodynamically focused nozzle for a higher resolution in printed electronics.
- My work focused on micron-scale multi-phase flow simulation using COMSOL and FLUENT. As it was predominantly a microfluidic problem, a laminar model was applied. Volume fraction equation was added to track the interfaces between ink, sheath fluid, and air. Continuum surface force method and a physical-based evaporation-condensation model were also implemented. I also included features that were not readily available by self-defined functions, such as contact angle hysteresis and velocity-dependent contact angle. PISO pressure-velocity coupling scheme was employed as the solver, allowing large time steps. Non-Iterative Time Advancement (NITA) further enhanced computational efficiency. Supported by SHARCNET, Canada, the calculation was conducted in a high-performance computing (HPC) environment.

Cloud Detection in Satellite Remote Sensing using Fully Convolutional Neural Network

Hangzhou, China

SUPERVISED BY PROF. GANG ZHENG AT STATE KEY LABORATORY OF SATELLITE OCEAN ENVIRONMENT DYNAMICS, SECOND INSTITUTE OF OCEANOGRAPHY

Jul. - Sep. 2017 & Nov. 2018 - Jul. 2019

- I worked with Prof. Gang Zheng to achieve state-of-the-art cloud detection in satellite remote sensing. We proposed a fully convolutional neural network for cloud and cloud shadow detection in satellite images.
- Dataset was established by manually labeling. Our fully convolutional neural network built on the encoder-decoder structure and incorporated many well-established features, such as skip-layer connection, batch normalization, dropout, and residual module. By using dropout at test time as a way of Monte Carlo sampling, our NN produce pixel-level prediction with a measure of uncertainty. Our method can well recognize broken clouds, thin (cirrus) clouds and their shadow with different underlying surfaces.

A Study of Japan's History, Regulation, and Specific Measures regarding Persistent Organic Pollutants (POPs)

Tokyo, Japan

SUPERVISED BY PROF. SACHIKO HIRAKAWA AT WASEDA UNIVERSITY, UNDER MASTER KONG DREAM SCHOLARSHIP PROGRAMME

Sep. 2018 - Feb. 2019

- I conducted research regarding Japan's policies and actions towards the elimination of Persistent Organic Pollutants (POPS) at Waseda University, Japan. My academic advisor is Prof. Sachiko HIRAKAWA.
- POPs are hazardous chemical pollutants of global concern. Japan is one of the global leaders in resolving this issue. I examined Japan's laws, regulations, and specific actions regarding POPs in the past 50 years. An attempt was made to analyze the reasons behind its success. Specific proposals were put forward to help other countries, China as an example.

Awards & Scholarships

2019	NGS scholarship	*National University of Singapore*
2018	GLOBALINK Research Internship Award	*Mitacs Canada*
2018	Master Kong Dream Scholarship	*Tingyi Holdings Corp. & Waseda University*
2017	ERASMUS+ Student Mobility Grant	*EU & Università di Trento*
2017	Second-class Scholarship for Outstanding Students	*Zhejiang University*
2016,2017	Second-class Scholarship for Outstanding Merits	*Zhejiang University*