Zhaoyi Xu

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EDUCATION

UNIVERSITY OF MICHIGAN
PH.D. CANDIDATE IN MECHANICAL ENGINEERING
2021-2026(expected)
Ann Arbor, US
GPA: 4.0 / 4.0

UNIVERSITY OF TORONTO
MASC IN MECHANICAL ENGINEERING
2021 | Toronto, Canada
GPA: 3.9 / 4.0

THE HONG KONG UNIVERSITY OF SCIENCE AND TECHNOLOGY
BENG IN MECHANICAL ENGINEERING
2019 | Hong Kong
The Dean's List, First Class Honours

NATIONAL UNIVERSITY OF SINGAPORE
EXCHANGE STUDENT
2018 | Singapore

LINKS

LinkedIn:// Zhaoyi Xu
Google Scholar:// Zhaoyi Xu

SKILLS

LABORATORY
Cell biology
Human Pluripoten Stem Cell • Imaging and Microscopy • Immunostaining
qPCR • Single-cell RNA Sequencing

Engineering
Microfluidics • Nanofabrication
3D Printing (Bioprinting)

QUANTITATIVE ANALYSIS
Python • RStudio • Matlab • VS C++

ILLUSTRATION
ImageJ • Adobe Photoshop
Adobe Illustrator • Procreate

LANGUAGES
English • Mandarin • Cantonese

EXPERIENCE

UNIVERSITY OF MICHIGAN |PHD STUDENT RESEARCHER
SUPERVISOR: PROFESSOR JIANPING FU
Project: Synthetic 3D hPSC Models on Peri-Implantation Development
Sep 2021 - Present

- Developed biomimetic implantation-like niches for 3D hPSC organoid culture using microfluidics and microfabrication, replicating maternal tissue properties to study early human embryo development events.
- Independently initiated and executed three sub-projects, leading to publications [5][6][7].

Project: Neural Differentiation of hPSCs via Acoustic Tweezing Cytometry
Sep 2022 - 2024

- Developed the Acoustic Tweezing Cytometry (ATC) technology to study hPSCs' mechanosensitive properties, for large-scale production of functional motor neurons for medical applications.
- Participated as a core member of this NIH R01 grant, main contributor to two annual progress reports. Independently led experiments, mentored two graduate students, resulting in publication [1][5][6].

UNIVERSITY OF TORONTO | MASC STUDENT RESEARCHER
SUPERVISOR: PROFESSOR XINYU LIU
Thesis: An Improved Approach for Optogenetic Locomotion Control of Caenorhabditis Elegans
Aug 2019 – Aug 2021

- Collaborated on developing the living soft microrobot, RoboWorm, using optogenetic control of C. elegans with microfluidic tools; resulted in a notable Science Robotics publication (publication [2]).
- My work improved RoboWorm technology, elevating success rate from 7.1% to 80.77%, by creating a new transgenic C. elegans strain and enhancing the control system's robustness.
- Collaborated closely with the renowned molecular biology team at Mount Sinai Hospital (Zhen lab) on a daily basis.

HKUST ROBOTICS INSTITUTE | UNDERGRADUATE RESEARCHER
Final-Year-Project: Gecko-Inspired Symbiosis Robotics End-Effector
July 2018 – Jun 2019

- Utilizing 3D-printing and Finite Element Method, I designed and microfabricated a gecko-inspired gripper for delicate object handling in industrial production.
- Devoted 300+ hours, led a group of 4 students and awarded the HKUST President's Cup for the most outstanding final-year projects of the year.

NUS CENTRE FOR ADDITIVE MANUFACTURING (AM.NUS) | UNDERGRADUATE STUDENT
Projects: 3D-Printed Devices with Negative Poisson's Ratio
2018 – 2019

- Worked with Dr. Lu Wen Feng, director of AM.NUS and his team, we developed medical protective equipment and soft robots with auxetic structures using 3D-Bioprinting (publication [3][8]).

PUBLICATIONS

JOURNAL ARTICLES

[1] **Zhaoyi Xu**, Weiping Li, Xufeng Xue, *et al.*, "Acoustic cell patterning reveals geometry- and substrate-dependent vasculogenesis and human embryo model development," *Nature Communications*, in revision, 2025.

[2] Tao Hong, **Zhaoyi Xu**, Se Young Chun, Luis Hernandez-Garcia, and Jeffrey A. Fessler, "Convergent complex quasi-newton proximal methods for gradient-driven denoisers in compressed sensing mri reconstruction," *IEEE Trans. on Computational Imaging*, vol. 11, pp. 1534–1547, 2025. doi: 10.1109/TCI.2025.3625052.

[3] Tao Hong, **Zhaoyi Xu**, Jason Hu, and Jeffrey A. Fessler, "Using randomized nyström preconditioners to accelerate variational image reconstruction," *IEEE Trans. on Computational Imaging*, vol. 11, pp. 1630–1643, 2025. doi: 10.1109/TCI.2025.3622903.

[4] **Zhaoyi Xu**, Shiying Liu, Xufeng Xue, Weiping Li, Jianping Fu*, and Cheri X Deng*, "Microbubble behaviors in acoustic tweezing cytometry regulates embryonic stem cell differentiation," *Scientific Reports*, vol. 13, no. 18030, 2023. doi: 10.1038/s41598-023-45397-5.

[5] Xianke Dong, Sina Kheiri, Yangning Lu, **Zhaoyi Xu**, Mei Zhen, and Xinyu Liu*, "Towards a living soft microrobot: Optogenetic locomotion control of caenorhabditis elegans," *Science Robotics*, vol. 6, no. 55, eabe3950, 2021. doi: 10.1126/scirobotics.abe3950.

[6] Mingcan Liu, **Zhaoyi Xu**, Jing Jie Ong, Jian Zhu, and Wen Feng Lu*, "An earthworm-like soft robot with integration of single pneumatic actuator and cellular structures for peristaltic motion," *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, pp. 7840–7845, 2020. doi: 10.1109/IROS45743.2020.9341166.

[7] Sihan Huang, **Zhaoyi Xu**, Guoxin Wang*, Cong Zeng, and Yan Yan, "Reconfigurable machine tools design for multi-part families," *The International Journal of Advanced Manufacturing Technology*, vol. 105, no. 1, pp. 813–829, 2019. doi: 10.1007/s00170-019-04236-6.

CONFERENCE PRESENTATIONS

[8] **Zhaoyi Xu**, Weiping Li, Jianping Fu*, and Cheri X Deng*, "Controlled development of a human epiblast model using acoustic patterning," 8th Bioengineering and Translational Medicine Conference by AIChE, San Diego, US, 2024.

[9] **Zhaoyi Xu**, Weiping Li, Jianping Fu*, and Cheri X Deng*, "Formation and development of a human epiblast model in biomimetic implantation-like niche through acoustic hpscs patterning," The Great Lakes Developmental Biology Meeting, Toronto, Canada, 2023.

[10] **Zhaoyi Xu**, Xufeng Xue, and Jianping Fu*, "Probing mechanobiology of human neural crest cell development using a patterned microfluidic neural tube model," Keystone Symposia on Molecular and Cellular Biology, Keystone, CO, United States, 2022.

[11] Yafeng Han, **Zhaoyi Xu**, and Wen Feng Lu*, "Design of conforming surface for human skin at highly-stretched joint areas with additive manufacturing," 5th International Conference on Additive Manufacturing and Bio-Manufacturing (ICAM-BM), Beijing, China, 2018.

SELECTED AWARDS

2024	8th Bioengineering and Translational Medicine Conference	Young Investigator Award
2021-23	UMich Rackham Travel Grant	US$ 2,150
2021	UMich ME Department Fellowship	US$ 89,775
2019-21	UofT MIE Department Fellowship	Full Scholarship
2021	UofT Barbara and Frank Milligan Fellowships	CA$ 10,000
2020	UofT MIE Endowed Fellowship	CA$ 3,000
2019	HKUST President's Cup	Gold Award
2018	HKSAR Government Talent Development Scholarship	HKD 10,000
2016	HKUST Robot Design Contest	Champion
2013	China National Awarding Program of Future Scientists	Top 100
2009	China Arts Grade Examination - Piano, Grade 10	Top Level

VOLUNTEERING AND SERVICES

SASKATOON OPEN DOOR SOCIETY | Volunteer
June 2023 – Present | Canada | 100+ voluntary hours

HONG KONG EDUCATION EXCHANGE CENTER | Student Communication Ambassador
Nov 2017 – Present | Hong Kong | 300+ voluntary hours

BEIJING-HONG KONG ACADEMIC EXCHANGE CENTRE, DEPARTMENT OF SCIENCE AND TECHNOLOGY | Communication Representative
May 2019 – Aug 2019 | Hong Kong